Business Services
Procurement and Contracting
16550 SW Merlo Road
Beaverton, OR 97003
(503) 356-4324

October 25, 2021

SOLICITATION ADDENDUM NO. 1
ITB 21-0005
21-22 HVAC Upgrades

THE FOLLOWING CHANGES/ADDITIONS TO THE ABOVE CITED SOLICITATION ARE ANNOUNCED:

This Addendum modifies the Invitation to Bid (ITB) document(s) only to the extent indicated herein. All other areas not changed or otherwise modified by this Addendum shall remain in full force and effect. This Addendum is hereby made an integral part of the ITB document. Bidder must be responsive to any requirements of this Addendum as if the requirements were set forth in the ITB. Failure to do so may result in Bid rejection. See the ITB regarding requests for clarification or change and protests of this Addendum, and the deadlines for the foregoing.

This addendum is to be acknowledged in the space provided on the Bidder Certification form supplied in the solicitation document. Failure to acknowledge receipt of this addendum may be cause to reject your offer.

The closing date **REMAINS UNCHANGED:**
November 9, 2021 at 2:00 PM Pacific Time

CLARIFICATONS:

Please see the Revised Documents:

Asbestos Survey for Errol Hassell ES and Kinnaman ES
Revised Specifications Division 1 for Errol Hassell ES, Kinnaman ES, and McKinley ES
Attachment J- Revised Drawings Errol Hassell ES
Attachment J- Revised Drawings Kinnaman ES
Attachment J- Revised Drawings McKinley ES
Attachment K- Revised Specifications Errol Hassell ES
Attachment K- Revised Specifications McKinley ES

Pre-Renovation Asbestos Survey Report

Errol Hassell Elementary School
HVAC Control Upgrades Project
18100 SW Bany Road
Beaverton, OR 97007

Prepared for:

Beaverton School District 48J

May 2021
Project No.: 27121.005 Phase No.: 001

4412 S Corbett Avenue, Portland, OR 97239
503.248.1939 Main
866.727.0140 Fax
888.248.1939 Toll-Free

PBSUSA.COM

GENERAL INFORMATION

BUILDING DATA

Errol Hassell Elementary School

18100 SW Bany Road

Beaverton, OR 97007

CLIENT DATA

Beaverton School District 48J

16550 SW Merlo Road

Beaverton, OR 97003

(503) 591-4560

BACKGROUND INFORMATION

SURVEY SCOPE

PBS Engineering and Environmental Inc. (PBS) has performed a limited asbestos survey of accessible building areas in accordance with OSHA in 29 CFR 1910.1001 and compiled a report with the following information:

- The type, location, and approximate quantity of suspect asbestos-containing materials
- Bulk sampling of selected suspect building materials
- Inspection summary
- Laboratory analytical data of bulk material sampled

With regard to asbestos, PBS endeavored to locate all the suspect asbestos-containing materials in the building; however, suspect asbestos-containing materials may be present and concealed within wall, ceiling, or floor spaces. If suspect materials are uncovered during demolition activities that are not identified in this report, testing should be performed prior to impact.

PBS has conducted a physical inspection of the building, compiled this report consistent with the survey scope, and certifies that the information is correct and accurate within the standards of professional quality and contractual obligations.

Rich Dufresne
Project Manager/Prime Inspector
Accreditation #: IMR-21-0264A

Digitally signed by Rich Dufresne
Date: 2021.05.20 12:56:02 -07'00'

Signature Date

INSPECTION SUMMARY

DATES	SURVEYED BY	ACTIVITY
5/12/2021	Rich Dufresne	Inspect and Sample

PBS has investigated accessible areas inside of the building to locate suspect asbestos-containing building materials (ACBM). Suspect materials may be present in concealed areas (e.g., behind walls and under carpet). The findings are listed below.

ASBESTOS MATERIALS

The following materials either tested positive, or, based on the experience of PBS field personnel, were not tested and should be considered asbestos-containing. Materials that had mixed results are considered positive. Materials not sampled may contain asbestos and should be tested to verify asbestos content prior to impact through demolition, renovation, etc.
(+) Tested Positive, (M) Mixed Results, (P) Presumed Positive, (T) Previously Tested Positive.

See sample inventory for specific results.

Results	Material Description	Location	Details
(T)	Sheet Floor Covering	Various locations	NOT QUANTIFIED Non-friable Good Response Action: Do not disturb material during HVAC controls upgrades
(T)	Vinyl Floor Tile	Various locations	NOT QUANTIFIED Non-friable Good Response Action: Do not disturb material during HVAC controls upgrades

MATERIALS THAT TESTED NEGATIVE FOR ASBESTOS

The following materials tested negative based on ASHARA sampling minimums and testing by NVLAP participating laboratories. Although no asbestos was detected, it is possible that further sampling could indicate asbestos content. It may be prudent to test prior to impact through demolition, renovation, etc.

Material (type)	Location
Gypsum Wallboard/Joint Compound	Throughout
Hard Fittings on Fiberglass Pipe Insulation	Throughout
HVAC Duct Seam Tape	Mechanical areas, above ceilings
Lay-in Ceiling Tile	Throughout

INSPECTION SUMMARY

BACKGROUND

On May 12, 2021, PBS performed a pre-renovation asbestos survey at Errol Hassell Elementary School located at 18100 SW Bany Road in Beaverton, Oregon. The purpose of the survey was to locate, identify, and quantify asbestos-containing building materials that may be impacted by the planned heating, ventilation, and air conditioning (HVAC) controls upgrades project.

Only those portions of the school building and materials that are expected to be impacted by the HVAC controls upgrades were included in this survey. Asbestos-containing building materials are known to exist in other portions of the school that are not included in the scope of this investigation.

The survey is intended to satisfy the Oregon Department of Environmental Quality (DEQ) requirements to perform an asbestos inspection prior to renovation or demolition activities under Oregon Administrative Rule (OAR) 340-248-0270 and Occupational Safety and Health Administration (OSHA) hazard communication.

ASBESTOS SUMMARY

PBS performed a thorough review of existing asbestos survey and abatement information. Findings from prior surveys are incorporated into this survey report.

The building was inspected by a PBS Asbestos Hazard Emergency Response Act (AHERA) accredited inspector to determine the presence, location, and approximate quantity of asbestos-containing materials (ACM). Bulk samples of building materials, suspected of containing asbestos, were collected and submitted under chain of custody to Lab/Cor Portland Inc. of Portland, Oregon, for polarized light microscopy (PLM) analysis.

No asbestos-containing building materials were identified that will be impacted by the HVAC controls upgrade project.

Asbestos-containing floor tile and sheet floor covering are known to exist at Errol Hassell Elementary School. It is not anticipated that these materials will be impacted during this project.

Please refer to the asbestos bulk sample inventory and Verdant web-based data for additional details.

Although the work under the project may not impact ACM, it is important to communicate the hazards to all individuals involved in the project to meet Oregon OSHA hazard communication requirements and to avoid accidental damage to ACM during construction.

Asbestos Regulations

Oregon DEQ, Environmental Protection Agency (EPA), and OSHA regulations require proper removal and handling of ACM by licensed and trained asbestos abatement contractors prior to building renovations or demolition.

The EPA, DEQ, and OSHA all define ACM as any material containing more than 1% asbestos. Although materials equal to or less than 1% are not considered by regulatory agencies to be an ACM, they still have some asbestos content, and Oregon OSHA has specific requirements for situations in which workers may encounter, disturb, or remove materials containing any level of asbestos. For the sake of hazard communication, these materials are included in the asbestos-containing materials section of this report.

In 1995, Oregon OSHA adopted 29 Code of Federal Regulations (CFR) Part 1926.1101 governing asbestos under

INSPECTION SUMMARY

OAR 437-003-1926.1101. The regulation has made significant changes in work procedures and how asbestos materials are managed. OSHA believes that the single biggest risk of asbestos exposure is to workers who unknowingly or improperly disturb ACM. Hazard communication, training, personal protection, work practices, exposure monitoring, and recordkeeping are all major components of the regulation.

DEQ's OAR 340, Division 248 also covers asbestos abatement requirements, removal notifications, licensing, and certifications for contractors.

For more information regarding the removal of asbestos-containing materials, please refer to the following:

1. Oregon Occupational Safety and Health Administration, OAR 437-003-1926.1101
2. Department of Environmental Quality, OAR-340, Division 248

Code	Material		Location	Results	Lab
27121.005-0001	Lay-in Ceiling Tile		Library; 2' by 4' ceiling tile		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 01	coating, white	No Asbestos Detected	
		Layer 02	compressed fibrous material, tan	No Asbestos Detected	
27121.005-0002	Hard Fittings/Fiberglass		A104; above ceiling, 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	compact chalky material, off-white	No Asbestos Detected	
27121.005-0003	Lay-in Ceiling Tile		B100; 2' by 4' ceiling tile		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 01	coating, white	No Asbestos Detected	
		Layer 02	compressed fibrous material, tan	No Asbestos Detected	
27121.005-0004	Duct Felt Tape		B100; above ceiling, duct seam tape		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	woven fibers with thin coating, off-white/tan	No Asbestos Detected	
27121.005-0005	Hard Fittings/Fiberglass		B110; above ceiling, 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	compact chalky material, off-white	No Asbestos Detected	
27121.005-0006	Hard Fittings/Fiberglass		Mechanical penthouse; 6" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	compact chalky material, off-white	No Asbestos Detected	
27121.005-0007	Duct Felt Tape		Mechanical penthouse; duct seam tape		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	woven fibers with thin coating, off-white/tan	No Asbestos Detected	

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

Phone: (503) 224-5055
www.labcorpdx.com

PLM - Visual Estimate Extended Final Report

Job Number: 211667
Client: PBS Engineering and Environmental
Address: 4412 S Corbett Avenue
Portland, OR 97239
Project Name:
Project No.: 27121.005 Phase 0001
PO Number:
Sub Project:
Reference No.:

Report Number: 211667R01
Report Date: 5/17/2021

Enclosed please find results for samples submitted to our laboratory. A list of samples and analyses follows:

Lab/Cor Sample #	Client Sample # and Description	Analysis	Analysis Notes	Date Received:
211667 - S1	27121.005-0001 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S2	27121.005-0002 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S3	27121.005-0003 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S4	27121.005-0004 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S5	27121.005-0005 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S6	27121.005-0006 -	PLM - Visual Estimate Extended		5/13/2021
211667 - S7	27121.005-0007 -	PLM - Visual Estimate Extended		5/13/2021

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

Phone: (503) 224-5055
www.labcorpdx.com

PLM - Visual Estimate Extended Final Report

Job Number: 211667
Client: PBS Engineering and Environmental
Project Name:

Report Number: 211667R01
Report Date: 5/17/2021

PLM - Visual Estimate Extended

The submitted sample(s) were analyzed according to the EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA - 40CFR App. E to Subpart E of Part 763. The sample(s) were analyzed with a digital microscope in order to determine homogeneity, the presence of fibers, and make a preliminary estimate of any asbestos fibers present in the sample. The sample(s), and any observed layers, were then homogenized through techniques appropriate to that material and prepared for analysis by polarized light microscopy (PLM).

Three slide mount preparations were made from random subsamples of the homogenized material. This material was then mounted in the suitable refractive index liquid needed to perform a full optical characterization of the observed fibers. When necessary, dilute HCl, instead of RI liquids, were used to remove cementitious binders to facilitate analysis. The entirety of the slide mount preparations were then analyzed by PLM. Any observed fibers were reported and their optical characteristics recorded according to the EPA 600-R-93-116 method.

Disclaimer

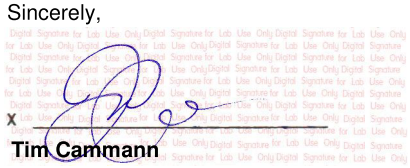
This report, and the data contained therein, cannot be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government. The results found in this report are based only on the submitted sample(s). LabCor has no control over sampling procedures. This report is only valid when signed by an analyst.

NAD is No Asbestos Detected. Asbestos consists of the six following minerals: chrysotile, amosite, crocidolite, anthophyllite, actinolite, and tremolite.

Additional gravimetric, point-count or TEM analysis may be recommended for samples testing at < or = 1% asbestos, or those with material binders that prevent the detection of small diameter fibers.

The following estimate of error for this method by visual estimation of asbestos percent are as follows:
1% asbestos: >0-3% error,
5% asbestos: 1-9% error,
10% asbestos: 5-15% error,
20% asbestos: 10-30% error.

Sincerely,



X _____

Tim Cammann
Senior Analyst

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239
Phone: (503) 224-5055
www.labcorpdx.com

BULK SAMPLE ASBESTOS ANALYSIS

Client: PBS Engineering and Environmental
4412 S Corbett Avenue
Portland, OR 97239

Report Number: 211667R01
Report Date: 05/17/2021
P.O. No: n/a

Job Number: 211667
Project Name:
Project Number: 27121.005 Phase 0001
Project Notes:

Client Sample ID: 27121.005-0001 **Sample ID:** S1 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Layer 01					
coating, white	6 %	-	-	-	**NAD**
Layer 02					
compressed fibrous material, tan	94 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	-	-	-	-	-	100 %
Layer 02	-	45 %	45 %	-	-	-	10 %

Client Sample ID: 27121.005-0002 **Sample ID:** S2 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Homogeneous					
compact chalky material, off-white	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	9 %	3 %	-	-	-	-	88 %

Client Sample ID: 27121.005-0003 **Sample ID:** S3 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Layer 01					
coating, white	8 %	-	-	-	**NAD**
Layer 02					
compressed fibrous material, tan	92 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	-	-	-	-	-	100 %
Layer 02	-	45 %	45 %	-	-	-	10 %

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
www.labcorpdx.com

Client: PBS Engineering and Environmental
4412 S Corbett Avenue
Portland, OR 97239

Report Number: 211667R01
Report Date: 05/17/2021

P.O. No: n/a

Job Number: **211667**
Project Name:
Project Number: 27121.005 Phase 0001
Project Notes:

Client Sample ID: **27121.005-0004** **Sample ID:** S4 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			Percent Asbestos:
Homogeneous							
woven fibers with thin coating, off-white/tan	100 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	90 %	-	-	-	-	10 %

Client Sample ID: **27121.005-0005** **Sample ID:** S5 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			Percent Asbestos:
Homogeneous							
compact chalky material, off-white	100 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	3 %	10 %	-	-	-	87 %

Client Sample ID: **27121.005-0006** **Sample ID:** S6 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			Percent Asbestos:
Homogeneous							
compact chalky material, off-white	100 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	4 %	10 %	-	-	-	86 %

Client Sample ID: **27121.005-0007** **Sample ID:** S7 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite			Percent Asbestos:
Homogeneous							
woven fibers with thin coating, off-white/tan	100 %	-	-	-			**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	90 %	-	-	-	-	10 %

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
www.labcorpdx.com

Client: PBS Engineering and Environmental
4412 S Corbett Avenue
Portland, OR 97239

Report Number: 211667R01
Report Date: 05/17/2021

P.O. No: n/a

Job Number: **211667**
Project Name:
Project Number: 27121.005 Phase 0001
Project Notes:

This laboratory participates in the National Voluntary Laboratory Accreditation Program (NVLAP). Testing method is per EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA - 40CFR App. E to Subpart E of Part 763, PLM. This report and the data contained therein cannot be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

- "NAD" is No Asbestos Detected.
- Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite.
- Material binders, such as those found in vinyl floor tiles, may prevent the detection of small diameter asbestos fibers. A gravimetric preparation and point-count is recommended for such samples.
- Quantitative analysis by PLM point count or TEM may be recommended for samples testing at < or = to 1% asbestos.
- The following estimate of error for this method by visual estimation of asbestos percent are as follows:
1% asbestos: >0-3% error, 5% asbestos: 1-9% error, 10% asbestos: 5-15% error, 20% asbestos: 10-30% error.
- This report pertains only to the samples listed on the report. Report considered valid only when signed by analyst.

Reviewed by:

X

Tim Cammann
Senior Analyst

NVLAP TESTING
NVLAP Lab Code: 200741-0

21167

TRANSMITTAL AND CHAIN OF CUSTODY FOR ASBESTOS BULK SAMPLES

Project No.: 27121.005 Phase 0001

Individuals signing this form warrant that the information provided is correct and complete. The Sender should keep a copy and send the original. The Receiver should complete the form, keep a copy and return the original to the Sender. Receiver shall report damage of package immediately to Sender.

SENDER

Date Sent: May 13, 2021

PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, OR 97239
503.248.1939, Fax: 866.727.0140

Alex Johnson
Name

Digitally signed by Alex Johnson
Date: 2021.05.13 11:16:18 -07'00'

Authorized Signature **Date** **Time**

RECEIVER

Date Received: 5/13/21

Company: Lab Cor
Address: 4321 S Corbett Ave Ste A
Portland, OR 97239
503-224-5055

Mark Dennis
Name

Authorized Signature 5/13/21 **Date** 11:20 **Time**

Sender's ID No.	Brief Description	Receiver's ID No.
27121.005-0001		
27121.005-0002		
27121.005-0003		
27121.005-0004		
27121.005-0005		
27121.005-0006		
27121.005-0007		

Please analyze the enclosed 7 sample(s) for asbestos content using PLM with dispersion staining. PBS requests prior notification if samples will be disposed.

Request verbal results by: _____ AM/PM _____Date.

Please fax and mail the results to the above address.

TURNAROUND DESIRED: **48 Hour**

SPECIAL INSTRUCTIONS: RD

THIS IS TO CERTIFY THAT

RICH A. DUFRESNE

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ASBESTOS INSPECTOR / MANAGEMENT PLANNER REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 03/18/2021

Course Location: Portland, OR

Certificate: IMR-21-0264A

CCB #SRA0615 4-Hr Training for Inspector and 4-Hr Management Planner

AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 03/18/2022

For verification of the authenticity of this certificate contact:
PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, Oregon 97239
503.248.1939

Andy Fridley, Instructor

Pre-Renovation Asbestos Survey Report

Kinnaman Elementary School
HVAC Control Upgrades Project
4205 SW 193rd Avenue
Beaverton, OR 97007

Prepared for:

Beaverton School District 48J

May 2021
Project No.: 27121.005 Phase No.: 002

4412 S Corbett Avenue, Portland, OR 97239
503.248.1939 Main
866.727.0140 Fax
888.248.1939 Toll-Free

PBSUSA.COM

GENERAL INFORMATION

BUILDING DATA

Kinnaman Elementary School

4205 SW 193rd Avenue

Beaverton, OR 97007

CLIENT DATA

Beaverton School District 48J

16550 SW Merlo Road

Beaverton, OR 97003

(503) 591-4560

BACKGROUND INFORMATION

SURVEY SCOPE

PBS Engineering and Environmental Inc. (PBS) has performed a limited asbestos survey of accessible building areas in accordance with OSHA in 29 CFR 1910.1001 and compiled a report with the following information:

- The type, location, and approximate quantity of suspect asbestos-containing materials
- Bulk sampling of selected suspect building materials
- Inspection summary
- Laboratory analytical data of bulk material sampled

With regard to asbestos, PBS endeavored to locate all the suspect asbestos-containing materials in the building; however, suspect asbestos-containing materials may be present and concealed within wall, ceiling, or floor spaces. If suspect materials are uncovered during demolition activities that are not identified in this report, testing should be performed prior to impact.

PBS has conducted a physical inspection of the building, compiled this report consistent with the survey scope, and certifies that the information is correct and accurate within the standards of professional quality and contractual obligations.

Rich Dufresne
Project Manager/Prime Inspector
Accreditation #: IMR-21-0264A

Digitally signed by Rich Dufresne
Date: 2021.05.20 12:56:46 -07'00'

Signature Date

INSPECTION SUMMARY

DATES	SURVEYED BY	ACTIVITY
5/12/2021	Rich Dufresne	Inspect and Sample

PBS has investigated accessible areas inside of the building to locate suspect asbestos-containing building materials (ACBM). Suspect materials may be present in concealed areas (e.g., behind walls and under carpet). The findings are listed below.

ASBESTOS MATERIALS

The following materials either tested positive, or, based on the experience of PBS field personnel, were not tested and should be considered asbestos-containing. Materials that had mixed results are considered positive. Materials not sampled may contain asbestos and should be tested to verify asbestos content prior to impact through demolition, renovation, etc.
(+) Tested Positive, (M) Mixed Results, (P) Presumed Positive, (T) Previously Tested Positive.

See sample inventory for specific results.

Results	Material Description	Location	Details
(T)	Joint Compound on Gypsum Wallboard	Throughout	NOT QUANTIFIED Non-friable Good Response Action: Do not disturb material during HVAC controls upgrades
(T)	Sheet Floor Covering	Various locations	NOT QUANTIFIED Friable Response Action: Do not disturb material during HVAC controls upgrades
(T)	Vinyl Floor Tile	Various locations	NOT QUANTIFIED Friable Response Action: Do not disturb material during HVAC controls upgrades

MATERIALS THAT TESTED NEGATIVE FOR ASBESTOS

The following materials tested negative based on ASHARA sampling minimums and testing by NVLAP participating laboratories. Although no asbestos was detected, it is possible that further sampling could indicate asbestos content. It may be prudent to test prior to impact through demolition, renovation, etc.

Material (type)	Location
Hard Fittings on Fiberglass Pipe Insulation	Throughout
Lay-in Ceiling Tile	Throughout

INSPECTION SUMMARY

BACKGROUND

On May 12, 2021, PBS performed a pre-renovation asbestos survey at Kinnaman Elementary School located at 4205 SW 193rd Avenue in Beaverton, Oregon. The purpose of the survey was to locate, identify, and quantify asbestos-containing building materials that may be impacted by the planned heating, ventilation, and air conditioning (HVAC) controls upgrades project.

Only those portions of the school building and materials that are expected to be impacted by the HVAC controls upgrades were included in this survey. Asbestos-containing building materials are known to exist in other portions of the school that are not included in the scope of this investigation.

The survey is intended to satisfy the Oregon Department of Environmental Quality (DEQ) requirements to perform an asbestos inspection prior to renovation or demolition activities under Oregon Administrative Rule (OAR) 340-248-0270 and Occupational Safety and Health Administration (OSHA) hazard communication.

ASBESTOS SUMMARY

PBS performed a thorough review of existing asbestos survey and abatement information. Findings from prior surveys are incorporated into this survey report.

The building was inspected by a PBS Asbestos Hazard Emergency Response Act (AHERA) accredited inspector to determine the presence, location, and approximate quantity of asbestos-containing materials (ACM). Bulk samples of building materials, suspected of containing asbestos, were collected and submitted under chain of custody to Lab/Cor Portland Inc. of Portland, Oregon, for polarized light microscopy (PLM) analysis.

No asbestos-containing building materials were identified that will be impacted by the HVAC controls upgrade project.

Asbestos-containing joint compound is present on wallboard at Kinnaman Elementary School. Asbestos-containing floor tile and sheet floor covering are also present. It is not anticipated that these materials will be impacted during this project. If they are encountered, contact the district project manager.

Please refer to the asbestos bulk sample inventory and Verdant web-based data for additional details.

Although the work under the project may not impact ACM, it is important to communicate the hazards to all individuals involved in the project to meet Oregon OSHA hazard communication requirements and to avoid accidental damage to ACM during construction.

Asbestos Regulations

Oregon DEQ, Environmental Protection Agency (EPA), and OSHA regulations require proper removal and handling of ACM by licensed and trained asbestos abatement contractors prior to building renovations or demolition.

The EPA, DEQ, and OSHA all define ACM as any material containing more than 1% asbestos. Although materials equal to or less than 1% are not considered by regulatory agencies to be an ACM, they still have some asbestos content, and Oregon OSHA has specific requirements for situations in which workers may encounter, disturb, or remove materials containing any level of asbestos. For the sake of hazard communication, these materials are included in the asbestos-containing materials section of this report.

INSPECTION SUMMARY

In 1995, Oregon OSHA adopted 29 Code of Federal Regulations (CFR) Part 1926.1101 governing asbestos under OAR 437-003-1926.1101. The regulation has made significant changes in work procedures and how asbestos materials are managed. OSHA believes that the single biggest risk of asbestos exposure is to workers who unknowingly or improperly disturb ACM. Hazard communication, training, personal protection, work practices, exposure monitoring, and recordkeeping are all major components of the regulation.

DEQ's OAR 340, Division 248 also covers asbestos abatement requirements, removal notifications, licensing, and certifications for contractors.

For more information regarding the removal of asbestos-containing materials, please refer to the following:

1. Oregon Occupational Safety and Health Administration, OAR 437-003-1926.1101
2. Department of Environmental Quality, OAR-340, Division 248

Code	Material		Location	Results	Lab
27121.005-0001	Lay-in Ceiling Tile		A110; 2' by 4' ceiling tile		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 01	coating, white	No Asbestos Detected	
		Layer 02	compressed fibrous material, tan/gray	No Asbestos Detected	
27121.005-0002	Hard Fittings/Fiberglass		A110; above ceiling, 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	fibrous powdery material, tan	No Asbestos Detected	
27121.005-0003	Hard Fittings/Fiberglass		A wing mechanical penthouse; 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	fibrous powdery material, tan	No Asbestos Detected	
27121.005-0004	Hard Fittings/Fiberglass		Kitchen mechanical room; 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	compact chalky material with woven fibers, off-white	No Asbestos Detected	
27121.005-0005	Lay-in Ceiling Tile		Corridor; 2' by 4' ceiling tile		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 01	coating, white	No Asbestos Detected	
		Layer 02	compressed fibrous material, tan/gray	No Asbestos Detected	
27121.005-0006	Hard Fittings/Fiberglass		Corridor; 4" line pipe fitting insulation		Lab Cor
		Layer:	**Description:**	**Analysis:**	
		Layer 1	compact chalky material, white/orange	No Asbestos Detected	

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

Phone: (503) 224-5055
www.labcorpdx.com

PLM - Visual Estimate Extended Final Report

Job Number: 211668
Client: PBS Engineering and Environmental
Address: 4412 S Corbett Avenue
Portland, OR 97239
Project Name:
Project No.: 27121.005 Phase 0002
PO Number:
Sub Project:
Reference No.:

Report Number: 211668R01
Report Date: 5/17/2021

Enclosed please find results for samples submitted to our laboratory. A list of samples and analyses follows:

Lab/Cor Sample #	Client Sample # and Description	Analysis	Analysis Notes	Date Received:
211668 - S1	27121.005-0001 -	PLM - Visual Estimate Extended		5/13/2021
211668 - S2	27121.005-0002 -	PLM - Visual Estimate Extended		5/13/2021
211668 - S3	27121.005-0003 -	PLM - Visual Estimate Extended		5/13/2021
211668 - S4	27121.005-0004 -	PLM - Visual Estimate Extended		5/13/2021
211668 - S5	27121.005-0005 -	PLM - Visual Estimate Extended		5/13/2021
211668 - S6	27121.005-0006 -	PLM - Visual Estimate Extended		5/13/2021

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

Phone: (503) 224-5055
www.labcorpdx.com

PLM - Visual Estimate Extended Final Report

Job Number: 211668
Client: PBS Engineering and Environmental
Project Name:

Report Number: 211668R01
Report Date: 5/17/2021

PLM - Visual Estimate Extended

The submitted sample(s) were analyzed according to the EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA - 40CFR App. E to Subpart E of Part 763. The sample(s) were analyzed with a digital microscope in order to determine homogeneity, the presence of fibers, and make a preliminary estimate of any asbestos fibers present in the sample. The sample(s), and any observed layers, were then homogenized through techniques appropriate to that material and prepared for analysis by polarized light microscopy (PLM).

Three slide mount preparations were made from random subsamples of the homogenized material. This material was then mounted in the suitable refractive index liquid needed to perform a full optical characterization of the observed fibers. When necessary, dilute HCl, instead of RI liquids, were used to remove cementitious binders to facilitate analysis. The entirety of the slide mount preparations were then analyzed by PLM. Any observed fibers were reported and their optical characteristics recorded according to the EPA 600-R-93-116 method.

Disclaimer

This report, and the data contained therein, cannot be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government. The results found in this report are based only on the submitted sample(s). LabCor has no control over sampling procedures. This report is only valid when signed by an analyst.

NAD is No Asbestos Detected. Asbestos consists of the six following minerals: chrysotile, amosite, crocidolite, anthophyllite, actinolite, and tremolite.

Additional gravimetric, point-count or TEM analysis may be recommended for samples testing at < or = 1% asbestos, or those with material binders that prevent the detection of small diameter fibers.

The following estimate of error for this method by visual estimation of asbestos percent are as follows:
1% asbestos: >0-3% error,
5% asbestos: 1-9% error,
10% asbestos: 5-15% error,
20% asbestos: 10-30% error.

Sincerely,

X

Tim Cammann
Senior Analyst

NVLAP TESTING
NVLAP Lab Code: 200741-0

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

Phone: (503) 224-5055
www.labcorpdx.com

BULK SAMPLE ASBESTOS ANALYSIS

Client: PBS Engineering and Environmental
4412 S Corbett Avenue
Portland, OR 97239

Report Number: 211668R01
Report Date: 05/17/2021
P.O. No: n/a

Job Number: 211668
Project Name:
Project Number: 27121.005 Phase 0002
Project Notes:

Client Sample ID: 27121.005-0001 **Sample ID:** S1 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Layer 01					
coating, white	10 %	-	-	-	**NAD**
Layer 02					
compressed fibrous material, tan/gray	90 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	-	-	-	-	-	100 %
Layer 02	-	45 %	45 %	-	-	-	10 %

Client Sample ID: 27121.005-0002 **Sample ID:** S2 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Homogeneous					
fibrous powdery material, tan	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	20 %	-	-	-	-	80 %

Client Sample ID: 27121.005-0003 **Sample ID:** S3 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Homogeneous					
fibrous powdery material, tan	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	15 %	-	-	-	-	85 %

Client Sample ID: 27121.005-0004 **Sample ID:** S4 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Homogeneous					
compact chalky material with woven fibers, off-white	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	10 %	5 %	-	-	-	85 %

Lab/Cor Portland, Inc.
4321 South Corbett Ave., Ste A
Portland, OR 97239

BULK SAMPLE ASBESTOS ANALYSIS

Asbestos and Environmental Analysis

Phone: (503) 224-5055
www.labcorpdx.com

Client: PBS Engineering and Environmental
4412 S Corbett Avenue
Portland, OR 97239

Report Number: 211668R01
Report Date: 05/17/2021
P.O. No: n/a

Job Number: 211668
Project Name:
Project Number: 27121.005 Phase 0002
Project Notes:

Client Sample ID: 27121.005-0005 **Sample ID:** S5 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Layer 01					
coating, white	6 %	-	-	-	**NAD**
Layer 02					
compressed fibrous material, tan/gray	94 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
Layer 01	-	-	-	-	-	-	100 %
Layer 02	5 %	60 %	-	-	-	-	35 %

Client Sample ID: 27121.005-0006 **Sample ID:** S6 **Date Analyzed:** 05/17/2021
Client Sample Description: **Analyst:** Tim Cammann

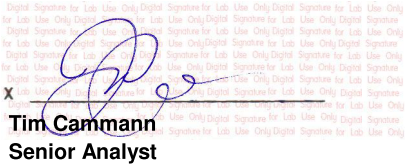
Asbestos Mineral Fibers	Layer Percent:	Chrysotile	Amosite	Crocidolite	Percent Asbestos:
Homogeneous					
compact chalky material, white/orange	100 %	-	-	-	**NAD**

Other Fibers	Fibrous Glass	Cellulose	Mineral Wool	Synthetic	Other		Matrix
	-	4 %	15 %	-	-	-	81 %

This laboratory participates in the National Voluntary Laboratory Accreditation Program (NVLAP). Testing method is per EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials and EPA - 40CFR App. E to Subpart E of Part 763, PLM. This report and the data contained therein cannot be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

- "NAD" is No Asbestos Detected.
- Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite.
- Material binders, such as those found in vinyl floor tiles, may prevent the detection of small diameter asbestos fibers. A gravimetric preparation and point-count is recommended for such samples.
- Quantitative analysis by PLM point count or TEM may be recommended for samples testing at < or = to 1% asbestos.
- The following estimate of error for this method by visual estimation of asbestos percent are as follows:
1% asbestos: >0-3% error, 5% asbestos: 1-9% error, 10% asbestos: 5-15% error, 20% asbestos: 10-30% error.
- This report pertains only to the samples listed on the report. Report considered valid only when signed by analyst.

Reviewed by:



Tim Cammann
Senior Analyst

NVLAP TESTING
NVLAP Lab Code: 200741-0

21168

TRANSMITTAL AND CHAIN OF CUSTODY FOR ASBESTOS BULK SAMPLES

Project No.: 27121.005 Phase 0002

Individuals signing this form warrant that the information provided is correct and complete. The Sender should keep a copy and send the original. The Receiver should complete the form, keep a copy and return the original to the Sender. Receiver shall report damage of package immediately to Sender.

SENDER

Date Sent: May 13, 2021

PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, OR 97239
503.248.1939, Fax: 866.727.0140

Alex Johnson
Name

Digitally signed by Alex Johnson
Date: 2021.05.13 11:17:02 -07'00'

Authorized Signature **Date** **Time**

RECEIVER

Date Received: 5/13/21

Company: Lab Cor
Address: 4321 S Corbett Ave Ste A
Portland, OR 97239
503-224-5055

MARK DOMAHE
Name

5/13/21 1420
Authorized Signature **Date** **Time**

Sender's ID No.	Brief Description	Receiver's ID No.
27121.005-0001		
27121.005-0002		
27121.005-0003		
27121.005-0004		
27121.005-0005		
27121.005-0006		

Please analyze the enclosed 6 sample(s) for asbestos content using PLM with dispersion staining. PBS requests prior notification if samples will be disposed.
Request verbal results by: _____ AM/PM _____Date.
Please fax and mail the results to the above address.
TURNAROUND DESIRED: **48 Hour**

SPECIAL INSTRUCTIONS: RD

THIS IS TO CERTIFY THAT

RICH A. DUFRESNE

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ASBESTOS INSPECTOR / MANAGEMENT PLANNER REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 03/18/2021

Course Location: Portland, OR

Certificate: IMR-21-0264A

CCB #SRA0615 4-Hr Training for Inspector and 4-Hr Management Planner

AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 03/18/2022

For verification of the authenticity of this certificate contact:
PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, Oregon 97239
503.248.1939

Andy Fridley, Instructor

2022 HVAC Upgrade

DIVISION 1 GENERAL REQUIREMENT

TABLE OF CONTENTS

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.1 PROJECT

A. Project Name: 2022 HVAC Upgrade

B. Owner's Name: Beaverton School District.

C. Engineer's Name: MFIA Consulting Engineers

1.2 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings.

B. Scope of alterations work is indicated on drawings.

C. HVAC: Selectively replace existing system with new construction as indicated on drawings.

1.3 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Owner intends to occupy the Project upon Substantial Completion.

D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

E. Schedule the Work to accommodate Owner occupancy.

1.4 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

3. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

B. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the building is unoccupied.

2. Do not disrupt or shut down life safety systems, including but not limited to fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.

3. Prevent accidental disruption of utility services to other facilities.

C. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.

a. Unavailability.

b. Regulatory changes.

2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

PART 2 PRODUCTS - NOT USED PART 3

EXECUTION

3.1 GENERAL REQUIREMENTS

A. Substitution Request Form: Use CSI Substitution Request Form provided at the end of this section.

B. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.

2. Agrees to provide the same warranty for the substitution as for the specified product.

3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.

4. Waives claims for additional costs or time extension that may subsequently become apparent.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.

1. Forms included in the Project Manual are adequate for this purpose, and must be used.

E. Limit each request to a single proposed substitution item.

BEAVERTON SCHOOL DISTRICT

TO:

PROJECT:

SPECIFIED ITEM:

Section	**Page**	**Paragraph**	**Description**

PROPOSED SUBSTITUTION:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of request including identification of applicable data portions. Attached data also includes description of changes to Contract Documents and proposed substitution requires for proper installation.

Undersigned certifies following items, unless modified by attachments, are correct:

1. Proposed substitution does not affect dimensions shown on drawings.
2. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.
3. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
4. Maintenance and service parts available locally or readily obtainable for proposed substitution.

Undersigned further certifies function, appearance, and quality of proposed substitution are equivalent or superior to specified item.

Undersigned agrees, if this page is reproduced, terms and conditions for substitutions found in Bidding Documents apply to this proposed substitution.

Submitted by:

Name (Printed or typed)

General Contractor (if after award of Contract)

Signature

Firm Name

Address

City, State, Zip

Date

Tel: Fax:

For use by A/E	
Approved	Approved as noted
Not Approved	Received too late
By	
Date	
Remarks	

Advancement of Construction Technology

The Construction Specifications Institute
September 1997
Northwest Region

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.2 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule of values.

B. The schedule of values should have separate line items for scopes related to:

1. Energy Trust & SB 1149 Program
2. Elementary & Secondary School Emergency Relief (ESSER) Fund

C. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

D. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

E. Within 10 days after joint review, submit complete schedule.

F. Submit updated schedule with each Application for Payment.

1.3 SCHEDULE OF VALUES

A. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
    a. Project name and location.
    b. Name of Architect.
    c. Architect's Project number.
    d. Contractor's name and address.
    e. Date of submittal.
2. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
    f. Related Specification Section or Division.
    g. Description of the Work.
    h. Name of subcontractor.
    i. Name of manufacturer or fabricator.
    j. Name of supplier.
    k. Change Orders (numbers) that affect value.

l. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   m. Differentiate between items stored on-site and items stored off-site.
5. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
6. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling 5% of the Contract Sum and subcontract amount.
7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

D. Transmittal: Submit signed and notarized original copies of each Application for Payment to Architect through Owner’s web-based program (eBuilder).

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Contractor's construction schedule (preliminary if not final).
   4. Products list (preliminary if not final).
   5. Submittal schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.
   8. Copies of building permits.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial progress report.
   11. Report of preconstruction conference.

F. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   3. Contractor shall provide all requirements of documents AIA 201 Section 9.10.2.

G. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. All listed items in AIA Document A201 Section 9.10.2.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.2 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Construction progress schedule.

G. Progress photographs.

H. Number of copies of submittals.

I. Requests for Interpretation (RFI) procedures.

J. Submittal procedures.

1.3 RELATED REQUIREMENTS

A. Section 01 60 00 - Product Requirements: General product requirements.

1.4 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Engineer:

1. Requests for Interpretation (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Correction Punch List and Final Correction Punch List for Substantial Completion.
9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.2 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via eBuilder, an Internet-based submittal service that receives, logs and stores documents and notifies addressees via email.

1. Contractor and Engineer are required to use this service for the following processes:

a. Submission of shop drawings and other submittals and receiving the processed submittals.

b. Submission of Requests for Information (RFI) and receiving RFI responses from the Owner and Engineer.

c. Submission of invoices and approval or rejection of same.

d. Distribution of meeting minutes.

e. Submission of as-built record drawings.

f. Submission of test results and Operation and Maintenance (O&M) manuals (electronic format).

g. Submission of Change Orders (COs) and contract amendment and approval or rejection of same.

h. Transmission of formal letters and notices between the District and the Contractor.

2. Subcontractors, suppliers, and Engineer's consultants will be permitted to use the service at no extra charge.

3. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.

4. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service will be paid by Owner.

C. Training: Owner will provide one, one-hour, web-based training session for all participants. Further training is the responsibility of the user of the service.

3.3 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

B. Attendance Required:

1. Owner.
2. Engineer.
3. Contractor.

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participantsto Engineer, Owner, participants, and those affected by decisions made.

3.4 SITE MOBILIZATION MEETING

A. Owner will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:

1. Contractor.
2. Owner.
3. Engineer.
4. Contractor's superintendent.
5. Major subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.
2. \Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.

5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, to Engineer, Owner, participants, and those affected by decisions made.

3.5 PROGRESS MEETINGS

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

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:

1. Contractor.
2. Owner.
3. Engineer.
4. Contractor's superintendent.
5. Major subcontractors.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.

10. Maintenance of quality and work standards.

11. Effect of proposed changes on progress schedule and coordination.

12. Other business relating to work.

E. Record minutes and distribute copies within two days after meeting to participants to Engineer, Owner, participants, and those affected by decisions made.

3.6 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.7 PROGRESS PHOTOGRAPHS

A. Submit new photographs at least once a month, within 3 days after being taken.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Engineer.

D. In addition to periodic, recurring views, take photographs of each of the following events:

1. Final completion, minimum of ten (10) photos.

E. Views:

1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.

2. Consult with Engineer for instructions on views required.

3. Provide factual presentation.

4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.

1. Delivery Medium: eBuilder.

2. File Naming: Include project identification, date and time of view, and view identification.

3.8 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.

a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.

b. Do not forward requests which solely require internal coordination between subcontractors.

2. Prepare in eBuilder internet software.

3. Prepare using software provided by the Electronic Document Submittal Service.

4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.

2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::

a. Approval of submittals (use procedures specified elsewhere in this section).

b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)

c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).

d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).

3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.

a. The Owner reserves the right to assess the Contractor for the costs (on time-and- materials basis) incurred by the Engineer, and any of its consultants, due to processing of such RFIs.

D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.

2. Owner's, Engineer's, and Contractor's names.

3. Discrete and consecutive RFI number, and descriptive subject/title.

4. Issue date, and requested reply date.

5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).

6. Annotations: Field dimensions and/or description of conditions which have engendered the request.

7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. RFI Log: RFI log is automatically built in the eBuilder software.

G. Review Time: Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.

H. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.

2. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

3. Notify Engineer within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.9 SUBMITTAL SCHEDULE

A. Submit to Engineer for review a schedule for submittals in tabular format.

1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.

2. Coordinate with Contractor's construction schedule and schedule of values.

3. Format schedule to allow tracking of status of submittals throughout duration of construction.

4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.

5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:

1. Product data.

2. Shop drawings.

3. Samples for selection.

4. Samples for verification.

B. Submit to Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Engineer's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will berejected.

3.14 SUBMITTAL PROCEDURES

A. General Requirements:

1. Use a separate transmittal for each item.
2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.

3. Transmit on eBuilder, including approved form in the electronic submittal uploaded to eBuilder.

    a. Use Form CSI/CSC Form 12.1A.

4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.

5. 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 the requirements of the work and Contract Documents.

    a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.

6. Schedule submittals to expedite the Project, and coordinate submission of related items.

    a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

    b. For sequential reviews involving Engineer's consultants, Owner, or another affected party, allow an additional 7 days.

    c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Engineer's approval, allow an additional 30 days.

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

8. Provide space for Contractor and Engineer review stamps.

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

10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

12. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:

1. Submit only information required by individual specification sections.

2. Collect required information into a single submittal.

C. Do not submit (Material) Safety Data Sheets for materials or products.

D. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.

2. Do not reproduce Contract Documents to create shop drawings.

3. Generic, non-project-specific information submitted as shop drawings do not meetthe requirements for shop drawings.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.

C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Engineer's and consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:

a. "Approved", or language with same legal meaning.

b. "Approved as Noted, Resubmission not required", or language with same legal meaning.

1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

2. Not Authorizing fabrication, delivery, and installation:

a. "Revise and Resubmit".

1) Resubmit revised item, with review notations acknowledged and incorporated.

b. "Rejected".

1) Submit item complying with requirements of Contract Documents.

E. Engineer's and consultants' actions on items submitted for information:

1. Items for which no action was taken:

a. "Received" - to notify the Contractor that the submittal has been received for record only.

2. Items for which action was taken:

a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preliminary schedule.

1.2 REFERENCE STANDARDS

1.3 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit in electronic PDF format to eBuilder.

PART 2 PRODUCTS - NOT USED PART 3

EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.2 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

END OF SECTION

SECTION 01 35 53 - SECURITY PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Security measures including personnel identification.

B. Background Screenings.

C. Covid-19 Procedures.

1.2 SECURITY PROGRAM

A. Protect Work , existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

B. Initiate program in coordination with Owner's existing security system at project mobilization.

C. Maintain program throughout construction period until Owner acceptance precludes the need for Contractor security.

1.3 PERSONNEL IDENTIFICATION

A. All personnel under the employment of the Contractor and its Subcontractors that travel to, or spend time at the project site are to wear photo ID badges while on the work site. individuals not wearing badges will be removed from the project work site.

B. Badge To Include:

1. Individual's full name (no nicknames).

2. Individual's company affiliation.

3. Recent photograph of the individual, taken within the last 4 years.

C. Require return of badges at expiration of their employment on the Work.

1.4 BACKGROUND SCREENING

A. All personnel under the employment of the Contractor and its Subcontractors that spend time at the project site must complete a formal background screening by the Contractor and pass that screening review before being allowed on the work site. Background screening is to be done by a professional screening firm meeting the following qualifications:

1. Must have a minimum of five years of screening experience specifically for construction industry clients.

2. Must have a minimum of fifteen employees.

3. Must be able to provide access to an internet based screening management software system which has a feature to allow access by the District to view the pass-no pass result for each screened Contractor/Subcontractor employee working on a District project.

4. Must be accredited by the National Association of Professional Background Screeners (NAPBS).

B. Each individual will be screened for having committed any crime as listed in ORS 342.143, most recent edition.

1.5 COVID-19 PROCEDURES

A. All personnel under the employment of the Contractor and its Subcontractors that spend time at the project site must adhere to the Covid-19 infection prevention procedures of Beaverton School District, the State of Oregon, and Washington County.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection agencies and services.

E. Contractor's construction-related professional design services.

F. Control of installation.

G. Tolerances.

H. Defect Assessment.

1.2 REFERENCE STANDARDS

A. IAS AC89 - Accreditation Criteria for Testing Laboratories 2018.

1.3 DEFINITIONS

1.4 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary sheeting, shoring, or supports.

2. Temporary scaffolding.

3. Temporary bracing.

4. Temporary foundation underpinning.

5. Temporary stairs or steps required for construction access only.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Designer's Qualification Statement: Submit for Engineer's knowledge as contract administrator, or for Owner's information.

1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.

a. Full name.

b. Professional licensure information.

c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.

1. Include:

a. Date issued.

b. Project title and number.

c. Name of inspector.

d. Date and time of sampling or inspection.

e. Identification of product and specifications section.

f. Location in the Project.

g. Type of test/inspection.

h. Date of test/inspection.

i. Results of test/inspection.

j. Compliance with Contract Documents.

k. When requested by Engineer, provide interpretation of results.

2. Test report submittals are for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.7 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.8 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 3 EXECUTION

2.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.2 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

2.3 TESTING AND INSPECTION

A. Testing Agency Duties:

1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

2. Perform specified sampling and testing of products in accordance with specified standards.

3. Ascertain compliance of materials and mixes with requirements of Contract Documents.

4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.

5. Perform additional tests and inspections required by Engineer.

6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency may not approve or accept any portion of the Work.

3. Agency may not assume any duties of Contractor.

4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.

2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.

3. Provide incidental labor and facilities:

a. To provide access to Work to be tested/inspected.

b. To obtain and handle samples at the site or at source of Products to be tested/inspected.

c. To facilitate tests/inspections.

d. To provide storage and curing of test samples.

4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.

5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

2.4 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary sanitary facilities.

B. Temporary Controls: Barriers, enclosures, and fencing.

C. Vehicular access and parking.

D. Waste removal facilities and services.

1.2 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.3 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of- way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.4 FENCING

A. Construction: Commercial grade chain link fence.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.5 SECURITY - SEE SECTION 01 35 53

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.6 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Designated existing on-site roads may be used for construction traffic.

E. Existing parking areas may be used for construction parking.

1.7 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.8 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

1.2 RELATED REQUIREMENTS

A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:

1. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01 61 16.

2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.

2.3 PRODUCT OPTIONS

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

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications. Submit a request for substitution for any manufacturer not named.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.2 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

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

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

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

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

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.3 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

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

D. Store with seals and labels intact and legible.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

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

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

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

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

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

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

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

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Cutting and patching.

D. Cleaning and protection.

E. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.2 REFERENCE STANDARDS

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.

2. Integrity of weather exposed or moisture resistant element.

3. Efficiency, maintenance, or safety of any operational element.

4. Visual qualities of sight exposed elements.

5. Work of Owner or separate Contractor.

C. Closeout Submittal Log: Submit to owner on eBuilder within 30 days of start of contract.

D. Closeout Submittals: Submit only final, complete, and correct closeout documents by uploading to eBuilder.

1. Red-Lined As-Built Documents: Accurately record actual locations of capped and active utilities, supplemental instructions, change orders, and all as-built conditions that differ from the Construction Documents. Submit two hard copies to the owner in addition to uploading electronic version to eBuilder.

2. Operation and Maintenance Manual: Include all operation and maintenance information required in individual sections.

3. Warranties completed in the owner's name.

4. Permit Drawings

1.4 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

1. Provide dust-proof barriers between construction areas and areas continuing tobe occupied by Owner.

C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.5 COORDINATION

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

B. Notify affected utility companies and comply with their requirements.

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

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated 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.

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

F. Coordinate completion and clean-up of work of separate sections.

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

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine and verify specific conditions described in individual specification sections.

B. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

C. Verify that utility services are available, of the correct characteristics, and in the correct locations.

D. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.4 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.

2. Report discrepancies to Engineer before disturbing existing installation.

3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.

1. Remove items indicated on drawings.

2. Relocate items indicated on drawings.

3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to Plumbing): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.

2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.

3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

a. Disable existing systems only to make switchovers and connections; minimize duration of outages.

b. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.

5. Remove abandoned pipe and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.

3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:

1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.

2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.5 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:

1. Complete the work.

2. Fit products together to integrate with other work.

3. Provide openings for penetration of mechanical, electrical, and other services.

4. Match work that has been cut to adjacent work.

5. Repair areas adjacent to cuts to required condition.

6. Repair new work damaged by subsequent work.

7. Remove samples of installed work for testing when requested.

8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

J. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

2. Match color, texture, and appearance.

3.6 Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.7 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.8 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

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

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

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

F. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.9 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

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

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide hard copies to Owner and upload to eBuilder.

B. Accompany Engineer on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Engineer when work is considered ready for Engineer's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.

H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL PART 1

GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.

2. Burying on the project site.

3. Dumping or burying on other property, public or private.

4. Other illegal dumping or burying.

E. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.3 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

2. Submit Report on a form acceptable to Owner.

3. Landfill Disposal: Include the following information:

a. Identification of material.

b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.

c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Incinerator Disposal: Include the following information:

a. Identification of material.

b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.

c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

5. Recycled and Salvaged Materials: Include the following information for each:

a. Identification of material, including those retrieved by installer for use on other projects.

b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.

c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

6. Material Reused on Project: Include the following information for each:

a. Identification of material and how it was used in the project.

b. Amount, in tons or cubic yards.

c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS (NOT USED) PART 3

EXECUTION

3.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Engineer.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. Provide containers as required.

2. Provide adequate space for pick-up and delivery and convenience to subcontractors.

3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

E. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

F. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

G. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

H. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout Submittal Log.

B. Contractor's Redlined As-Built Documents.

C. Operation and Maintenance Data.

D. Warranties and bonds.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Contractor's Redlined As-Built Documents: Submit documents to eBuilder with claim for final Application for Payment.

B. Closeout Submittal Log

C. Operation and Maintenance Data:

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

2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.

3. Submit two sets of revised final documents in final form within 10 days after final inspection.

D. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

2. Make other submittals within 10 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 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

E. Stamped Authority Having Jurisdiction Permit Drawings: submit electronic documents to Engineer and Owner on eBuilder and two hard copies to owner.

PART 2 PRODUCTS - NOT USED PART 3

EXECUTION

3.1 GENERAL

A. Submit only final, complete, and correct closeout materials by uploading to eBuilder. Do not submit drafts or versions of closeout materials for review.

3.2 CLOSEOUT SUBMITTAL LOG

A. A log listing the closeout deliverables in order of specification number.

B. Include a column in the log for each of the following: specification number, specifcation title, responsible contractor, product data, operation and maintenance data, shop drawings, warranty, and record documents.

3.3 CONTRACTOR'S REDLINED AS-BUILT DOCUMENTS

A. Maintain on site one set of the following red-lined as-built documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Manufacturer's instruction for assembly, installation, and adjusting.

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

C. Store red-lined as-built documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Changes made by Addenda and modifications.

F. Red-Lined As-Built Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.

4. Details not on original Contract drawings.

3.4 OPERATION AND MAINTENANCE DATA

A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.5 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

1. Product data, with catalog number, size, composition, and color and texture designations.

2. Information for re-ordering custom manufactured products.

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

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

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

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Selective demolition of built site elements.

C. Selective demolition of building elements for alteration purposes.

D. Abandonment in place of existing utilities and utility structures.

1.02 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS -- NOT USED PART 3

EXECUTION

3.01 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove fences and gates.

C. Remove other items indicated, for relocation and recycling.

D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 70 00.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.

7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Protect existing structures and other elements that are not to be removed.
1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

H. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

1. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Dismantle existing construction and separate materials.
2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

ERROL HASSELL ES HVAC UPGRADE

INDEX OF DRAWINGS

PROJECT DIRECTORY

OWNER

BEAVERTON SCHOOL DISTRICT
16550 SW MERLO ROAD
BEAVERTON, OR 97003
CONTACT: DOAA ELHAGGAN
PHONE: (503)356–4433

MECHANICAL ENGINEER

MFIA CONSULTING ENGINEERS
2007 SE ASH ST
PORTLAND, OR 97214
CONTACT: MARIANA GALOFTEANU
PHONE: (503)234–0548

STRUCTURAL ENGINEER

JAMES G. PIERSON, INC.
CONSULTING STRUCTURAL ENGINEERS
610 SW ALDER STR, STE 918
PORTLAND, OR 97205
CONTACT: JAMES G. PIERSON
(503)226–1286

PROPERTY INFORMATION

ADDRESS:
18100 SW BANY ROAD
BEAVERTON, OREGON 97007

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

Date: 07/21/2021
Proj No: 10181
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON
COVER SHEET

PERMIT/BID SET
SEPTEMBER 2021

MFIA INC.

Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

SHEET
G001
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MECHANICAL LEGEND

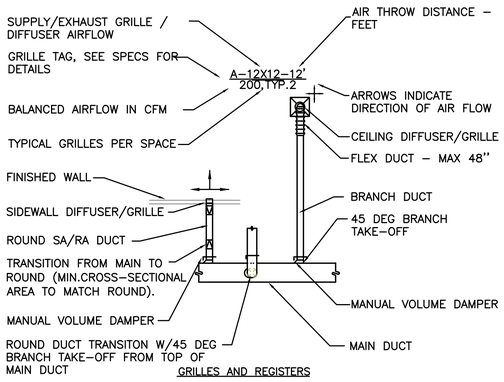
- SUPPLY AIR DIFFUSER
- RETURN AIR DIFFUSER
- EXHAUST AIR DIFFUSER
- DIRECTIONAL AIR FLOW
- MANUAL VOLUME DAMPER
- SUPPLY AIR DUCT UP & DOWN
- RETURN AIR DUCT UP & DOWN
- EXHAUST OR OUTSIDE AIR DUCT UP & DOWN
- SUPPLY AIR DUCT UP & DOWN
- RETURN AIR DUCT UP & DOWN
- EXHAUST OR OUTSIDE AIR DUCT UP & DOWN
- VAV TERMINAL UNIT W/ REHEAT COIL
- (D) DEMOLISH
- (E) EXISTING
- CONNECT TO EXISTING
- THERMOSTAT
- TEMPERATURE SENSOR
- NOTE
- EQUIPMENT DESIGNATOR
- GATE VALVE/SHUT-OFF VALVE SEE SPECS
- CHECK VALVE
- BALANCING VALVE
- FLOW CONTROL/LIMITING VALVE
- THERMOMETER
- DIRECTION OF FLOW
- PUMP
- STRAINER W/DRAIN VALVE
- PRESSURE GUAGE
- PETE'S PLUG
- DOUBLE CHECK ASSEMBLY
- PRESSURE REDUCING VALVE
- UNION
- 2-WAY CONTROL VALVE
- 3-WAY CONTROL VALVE
- TRIPLE DUTY VALVE
- CAP
- MOTORIZED DAMPER
- MOTORIZED DAMPER
- BALL/SHUT-OFF VALVE (SEE SPECS)
- FIRE DAMPER
- FIRE / SMOKE DAMPER
- SMOKE DAMPER
- FAN MOTOR

AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
B.D.	BOTTOM OF DUCT
BHP	BRAKE HORSEPOWER
BOG	BOTTOM OF GRILLE
BTU	BRITISH THERMAL UNITS
CFM	CUBIC FEET PER MINUTE
CONN.	CONNECTION
CONT.	CONTINUATION
CW	DOMESTIC COLD WATER
DB	DRY BULB
DIA.	DIAMETER
DIST.	DISTRIBUTION
EXH	EXHAUST AIR
EDB	ENTERING DRY BULB TEMPERATURE
EWB	ENTERING WET BULB TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
FF	FINISH FLOOR
FIXT.	FIXTURE
F.O.B.	FLAT ON BOTTOM
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT.	FEET / FOOT
GA.	GAUGE
GEXH	GREASE EXHAUST AIR DUCT
GPM	GALLONS PER MINUTE
H	HEIGHT
HP	HORSEPOWER
I.D.	INSIDE DIAMETER
IN.	INCHES
L	LENGTH
LBS.	POUNDS
LDB	LEAVING DRY BULB
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MA	MAKE UP AIR
MAX.	MAXIMUM
MBH	THOUSANDS OF BTUs PER HOUR
MD	MOTORIZED DAMPER
MIN.	MINIMUM
MVD	MANUAL VOLUME DAMPER
NC	NOISE CRITERIA
N.C.	NORMALLY CLOSED
N.I.M.	NOT IN MECHANICAL
NO.	NUMBER
N.O.	NORMALLY OPEN
O.A.	OUTSIDE AIR
P	PERSON
PSI	POUNDS PER SQUARE INCH
P/T	PRESSURE / TEMPERATURE
R.A.	RETURN AIR
RECT.	RECTANGULAR
REQ'D	REQUIRED
S.A.	SUPPLY AIR
S.P.	STATIC PRESSURE
SQ.	SQUARE
TEMP.	TEMPERATURE
TYP.	TYPICAL
VAV	VARIABLE AIR VOLUME
W	WIDTH
WB	WET BULB
WPD	WATER PRESSURE DROP
ø	DIAMETER

- (E) EXISTING
- (D) DEMOLISH
- NEW WORK
- G — (G) NATURAL GAS
- CD — (CD) CONDENSATE DRAIN
- RF — (RF) TWO OR THREE REFRIGERANT LINES
- HWS — (HWS) HEATING WATER SUPPLY
- HWR — (HWR) HEATING WATER RETURN

EQUIPMENT MAINTENANCE CLEARANCE AND ACCESS 1

AIR DISTRIBUTION DETAILS



MECHANICAL GENERAL NOTES

A. THE DRAWINGS ARE DIAGRAMMATIC. PROVIDE ALL MATERIAL (NEW AND UNDAMAGED) AND LABOR FOR A COMPLETE AND OPERABLE SYSTEM. VERIFY ALL BUILDING MEASUREMENTS DIMENSIONS AND EQUIPMENT LOCATIONS BEFORE PROCEEDING WITH ANY OF THE WORK.

B. VERIFY ALL EXISTING CONDITIONS RELATIVE TO THE SCOPE OF WORK. REPORT DISCREPANCIES BACK TO THE ENGINEER.

C. VERIFY INDICATED (E)DUCTWORK/PIPE SIZES PRIOR TO RECONNECTING NEW EQUIPMENT. EQUIPMENT SHALL NOT BE CONNECTED TO EXISTING DUCT/PIPE OF SMALLER DIAMETER THAN NEW DUCT/PIPE. REPORT DISCREPANCIES BACK TO ENGINEER.

D. DO NOT FABRICATE EQUIPMENT SUPPORTS/BASES W/O CONFIRMING SPACE EXISTS AND THE BUILDING ATTACHMENT POINTS.

E. REFER TO THE MECHANICAL SPECIFICATIONS FOR MATERIALS, EQUIPMENT, AND ADDITIONAL CONSTRUCTION INSTRUCTIONS NOT COVERED BY THESE PLANS.

F. ALL INSTALLATIONS SHALL COMPLY WITH APPLICABLE FEDERAL AND STATE CODES INCLUDING, 2019 OREGON STRUCTURAL SPECIALTY CODE (OSSC) INCLUDING APPENDIX N FOR OREGON FIRE CODE REGULATIONS, 2021 OREGON PLUMBING SPECIALTY CODE (OPSC), 2019 OREGON MECHANICAL SPECIALTY CODE (OMSC), 2019 OREGON ENERGY EFFICIENCY SPECIALTY CODE (OEESC), AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA). WHERE TWO CODES DIFFER THE MORE STRICT OF THE TWO SHALL BE FOLLOWED.

G. OBTAIN ALL NECESSARY PERMITS AND INSPECTIONS REQUIRED BY THE GOVERNING AUTHORITIES HAVING JURISDICTION. SUBMIT ALL CERTIFICATES PRIOR TO ACCEPTANCE.

H. COORDINATE ALL MECHANICAL AND CONTROL WORK WITH GENERAL CONTRACTOR, CONTROL CONTRACTOR, ELECTRICAL AND ARCHITECTURAL.

I. COORDINATE OTHER TRADES FOR PATCH/REPAIR OF WALLS WHERE EXISTING SENSORS ARE REMOVED OR MODIFIED.

J. PATCH & REPAIR WALLS / FLOORS / CEILING WHERE OLD DUCTWORK/PIPES HAVE BEEN REMOVED TO MATCH EXISTING FINISHES.

K. COORDINATE WITH OTHER CRAFTS AS REQUIRED TO COMPLETE WORK IN ACCORDANCE WITH CONSTRUCTION SCHEDULE.

L. PROVIDE OWNER INSTRUCTION BY QUALIFIED PERSONNEL ON EQUIPMENT AND SYSTEMS AT OWNER'S REQUEST.

M. ALL DUCTWORK SHALL BE GALVANIZED STEEL, UNLESS OTHERWISE INDICATED, CONFORMING TO LATEST SMACNA, ASHRAE, OMSC, NFPA, AND UL STANDARDS.

N. MANUFACTURERS AND MODEL NUMBERS LISTED IN THE EQUIPMENT SCHEDULES ARE THE BASIS OF DESIGN.

O. CUT WALLS FOR PROPER EQUIPMENT, DUCT OR PIPE INSTALLATION. FILL HOLES WHICH ARE CUT OVERSIZED FOR A TIGHT FIT AROUND OBJECTS PASSING THROUGH.

P. PROVIDE UL LISTED FIRESTOP SYSTEM TO MAINTAIN THE CODE REQUIRED F AND T RATING OF THE CONSTRUCTION ASSEMBLY AT A DUCT/PIPE PENETRATION THROUGH A RATED BUILDING CONSTRUCTION.

Q. INSTALL LABELS ON ALL MECHANICAL EQUIPMENT. SEE SPECIFICATIONS FOR CRITERIA.

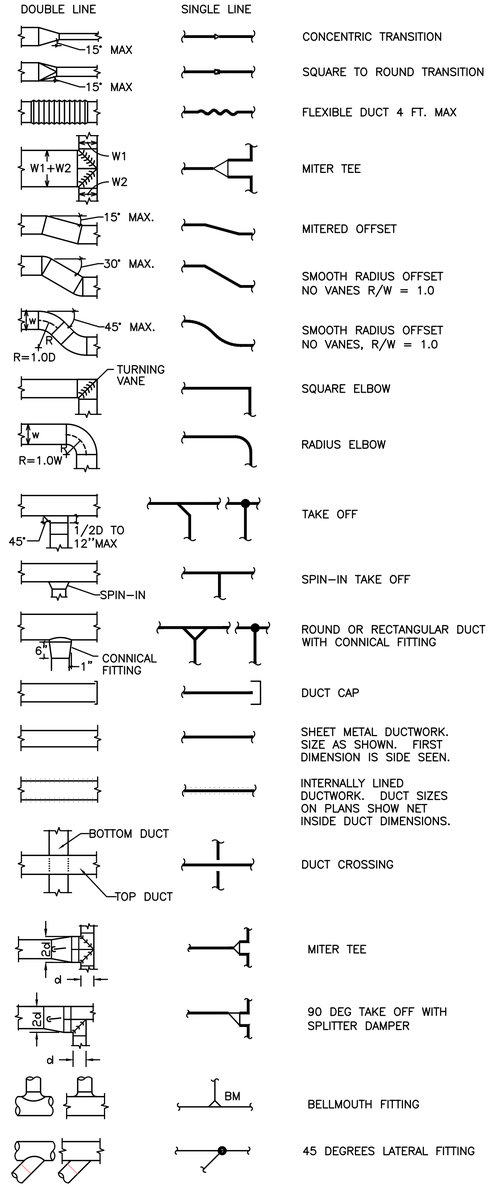
R. CONTROLS AND WIRING SHALL MEET ALL ELECTRICAL REQUIREMENTS OF APPLICABLE ELECTRICAL SPECIFICATIONS AND REQUIREMENTS OF OWNER, BUILDING OFFICIALS AND EQUIPMENT SUPPLIERS OF EQUIPMENT INSTALLED ON PROJECT.

S. ELECTRIC MOTORS SHALL HAVE BUILT-IN THERMAL OVERLOAD PROTECTION OR BE PROTECTED EXTERNALLY WITH SEPARATE THERMAL OVERLOAD DEVICES, WITH LOW-VOLTAGE RELEASE OR LOCK OUT AS REQUIRED.

T. ALL NEW EQUIPMENT, PIPING, CONDUIT, AND DUCTWORK SHALL BE INSTALLED PER CURRENT SEISMIC CODE REQUIREMENTS.

U. PROVIDE LOW LEAK AUTOMATIC DAMPERS ON OUTSIDE AIR, EXHAUST AIR AND RELIEF AIR CONTROL DAMPERS WHERE THESE ARE INDICATED.

AIR DISTRIBUTION DETAILS



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MECHANICAL LEGEND, ABBREVIATIONS & GENERAL NOTES

PERMIT/BID SET
SEPTEMBER 2021

MEA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MEA-ENG.COM

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EXISTING AIR HANDLING UNITS SCHEDULE

DESIGN SYMBOL	ASSOCITED RETURN FAN UNIT	SERVES	OA MIN CFM	OA MAX CFM	SUPPLY FAN SA CFM	SUPPLY FAN TSP IN	SUPPLY FAN BHP	SUPPLY FAN HP	RETURN/EXHAUST FAN RA CFM	RETURN/EXHAUST FAN TSP IN	RETURN/EXHAUST FAN BHP	RETURN/EXHAUST FAN HP	NEW DX COOLING COIL - R410A CAPACITY MBH TOTAL	CAPACITY MBH SENS	EAT F DB	EAT F WB	LAT F DB	LAT F WB	AMBIENT TEMP F	HEATING WATER COILS SA CFM	OSA CFM	CAP MBH	EAT F	LAT F DB	EWT F	LWT F	FLOW GPM	WTR PD FT H2O	AIR PD IN H2O	ZONE TSTAT HTG	COOLING ECONO-MIZER	UNIT SMOKE DETECT	ELECTRICAL POWER V/PH/HZ	VFD DRIVE	FUSE AMPS	MCA	EMERG. POWER	SEE CNTR'S DET'L	NEW DX COIL	REMARKS NOTES	DESIGN BASIS
ACU-1A	RF-1A	BLDG 200	2,290	7,330	7,330	2.80		5	7,330	*0.6*		1.5	260.0	214.9	79.6	63.6	53.0	51.5	88.0/67.0	7,330.0	2288	SEE HEATING COIL SCHEDULE FOR NEW COIL								70	YES	EXISTING	480/3/60	YES			NO	1/M502	CARRIER	1,2,3,4,5,6,7,8,9,16	EXISTING PACE A-20
ACU-1B	RF-1B	BLDG 200	2,275	7,300	7,300	2.80		5	7,300	0.6		2	259.7	213.9	79.2	63.4	53.0	51.5	88.0/67.0	7,300.0	2275	SEE HEATING COIL SCHEDULE FOR NEW COIL								70	YES	EXISTING	480/3/60	YES			NO	1/M502	CARRIER	1,2,3,4,5,6,7,8,9,16	EXISTING PACE A-20
ACU-2	RF–2	CAFETERIA	1,070	2,500	2,500	2.00		1.5	2,500	0.5		0.75	80.0	0.0	80.3	64.4	57.0	55.5	88.0/67.0	2,500.0	1070	SEE HEATING COIL SCHEDULE FOR NEW COIL								70	YES	EXISTING	480/3/60	YES			NO	1/M503	CARRIER	1,2,3,4,5,6,7,8,9,10,15	EXISTING PACE A-12
ACU-3A	RF-3A	BLDG 300	2,870	8,210	8,210	2.80		7.5	8,210	0.6		3	337.0	245.0	79.6	65.3	53.0	51.5	88.0/67.0	8,210.0	2870	SEE HEATING COIL SCHEDULE FOR NEW COIL								70	YES	EXISTING	480/3/60	YES			NO	1/M502	CARRIER	1,2,3,4,5,6,7,8,9,16	EXISTING PACE A-20
HVU-1	-	GYMNASIUM	1,750	6,100	6,100	1.50		5	6,100				NO COOLING COIL							6,100.0	1750	191.0	*56.2*	*85*	140	120	*19*	4.0	0.2	70	YES	EXISTING	480/3/60	YES			NO	2/M503	CARRIER	1,2,4,5,7,9,11	EXISTING PACE A-16
HVU-2	-	LOCKER&TOILET	0	1,725	1,725	1.25		1	1,725											1,740.0	0	38.0	*65*	*85*	140	120	*4*	4.0	0.2	70	*NO*	NO	480/3/60	NO			NO	3/M503	CARRIER	1,2,4,5,7,9,11	EXISTING PACE A-9
HVU-3	-	KITCHEN W/SF-1,SF-2	2,800	5,600	5,600	1.25	(2)	2	5,600											5,600.0	5600	350.0	22	79	140	100	18	4.0	0.7 (1)	70	YES	EXISTING	480/3/60	YES			NO	4/M503	CARRIER	1,2,4,5,7,9,12	EXISTING PACE B-11
MZU-1	RF–4	ADMINISTRATION	MZU IS REPLACED BY 3 FCU; SEE SCHED		1,950	0.5		0.75	COIL IS REPLACED SEE FCUs											COIL IS REPLACED SEE FCUs											YES	EXISTING		YES			NO	5/M503	CARRIER	3,7,13,14	

NOTES:

1 REPLACE EXISTING SUPPLY FAN MOTOR WITH NEW MOTOR (VFD CONTROLLED WHERE INDICATED).
2 SERVICE AND CLEAN AIR-HANDLERS; REPLACE FILTERS.
3 REPLACE EXISTING RETURN/RELIEF FAN MOTOR WITH NEW VFD CONTROLLED MOTOR.
4 BALANCE WATER FLOW, SUPPLY AIR, RETURN AIR AND OUTSIDE AIR VENTILATION AIRFLOW AS SHOWN.
5 CLEAN AND INSPECT EXISTING COILS TO REMAIN, SEE SPECS.
6 REPLACE EXISTING DX COIL WITH NEW DX COIL.
7 VERIFY (E)POWER CONNECTION AND MOTOR HP ON SITE PRIOR TO ORDERING EQUIPMENT.
8 INTERLOCK SUPPLY FAN (SF) MOTOR WITH RETURN/EXHAUST (RF/EF) FAN MOTOR
9 REPLACE DAMPERS AND DAMPER ACTUATORS.
10 REPLACE EXISTING HEATING COIL WITH NEW COIL TO MATCH EXISTING
11 PROVIDE NEW 3WAY CONTROL VALVE AT HEATING COIL; SEE DET'L 2/M6
12 PROVIDE NEW 2WAY CONTROL VALVE AT HEATING COIL. SEE DET'L 1/M6
13 INTERLOCK THE RETURN RF-4 FAN MOTOR W/ THE NEW FAN-COILS FANS.
14 BALANCE RETURN AIR FAN PER PLANS.
15 NEW COIL SIZES SHALL FIT IN CABINET; APPROX 37"WX27"H', VERIFY ON SITE.
16 NEW COIL SIZES SHALL FIT IN CABINET; APPROX 65"WX46"H, VERIFY ON SITE.

UPDATED: 10/20/2021 23:16

NEW LARGE OUTDOOR CONDENSING UNITS SCHEDULE

DESIGN SYMBOL	SERVES	COMPRESSOR TYPE DIGITAL SCROLL	COMPRESSOR AMPS RATED LOAD	COMPRESSOR AMPS LOCKED ROTOR	REFRIG. CHARGE LBS	DX COOLING CAPACITY MBH TOTAL	CAPACITY MBH SENS	EVAPORATOR EAT F DB	EVAPORATOR EAT F WB	EVAPORATOR LAT F DB	EVAPORATOR LAT F WB	AMB. TEMP DB/WB F	MIN SEER	ELECTRICAL POWER VOLT/PHASE/HZ	UNIT MCA	UNIT MAX MOCP	EMERGENCY POWER	UNIT WEIGHT LBS	INTERLOCK	REMARKS NOTES	DESIGN BASIS CARRIER
DXC-1A	ACU-1A	2 STAGE	18.6/18.6	125/125		260.0	214.9	79.6	63.6	53.0	51.5	88.0/67.0	11.0	460/3/60	47.7	60	NO	1131	ACU-1A	*1,2,3,4,5,6*	38APD0256H
DXC-1B	ACU-1B	2 STAGE	18.6/18.6	125/125		259.7	213.9	79.2	63.4	53.0	51.5	88.0/67.0	12.9	460/3/60	47.7	60	NO	1131	ACU-1B	*1,2,3,4,5,6*	38APD0256H
DXC-2	ACU-2	2 STAGE	12.6	100		80.0	0.0	80.3	64.4	57.0	55.5	88.0/67.0	10.8	460/3/60	18	25	NO	391	ACU-2	*1,2,3,4,5,6*	38AUZE08A0
DXC-3A	ACU-3A	2 STAGE	16.9/26.9	179/179		337.0	245.0	79.6	65.3	53.0	51.5	88.0/67.0	11.0	460/3/60	66.3	90	NO	1300	ACU-3A	*1,2,3,4,5,6* (1)	38APD0306H

NOTES:

1 DISCONNECT SWITCH BY OTHERS.
2 PROVIDE REFRIGERANT PIPING AND DEVICES PER MANUFACTURER'S RECOMMENDATIONS.
3 PROVIDE SEISMICALLY RESTRAINT VIBRATION ISOLATION ROOF CURB.
4. CONSULT WITH MANUFACTURER AND PROVIDE LIQUID LINE CHECK VALVES.
5. CONSULT WITH MANUFACTURER AND PROVIDE DUAL SUCTION RISER AS REQUIRED.
6. UNIT IS TWO STAGE WITH TWO SEPARATE CIRCUITS. (1)

UPDATED: 10/20/2021

NEW HEATING WATER COILS SCHEDULE

NEW DESIGN COIL TAG	EXISTING / REPACED COIL NUMBER	SYSTEM SERVED	HOT WATER COILS MAX FLOW (CFM)	MIN FLOW (CFM)	MBH REQ'D	ENT AIR MIXED DB	LAT F DB	EWT F	LWT F	FLOW GPM	FACE VELOCITY FPM	PIPE SIZE IN	MAX WPD FT HD	MAX APD IN H2O	COIL VOLUME GAL	COIL SIZE W x H	CONTROL VALVE NEW OR EXISTING	CONTROL VALVE NEW VALVE TYPE	FOR PIPING CONFIGUR. SEE DET'L	REMARKS NOTES	DESIGN BASIS
HC-1A	NEW COIL	ACU-1A	7330	7330	80.6	55.0	65	140.0	110.1	5	469	1	3.36	0.05	2.06	42.50x67.25	NEW	3-WAY	2/M602	*1,2,5*	*TO FIT EXISTING CABINET*
HC-1B	NEW COIL	ACU-1B	7300	7300	80.0	55.0	65	140.0	110.1	5	469	1	3.36	0.05	2.06	42.50x67.25	NEW	2-WAY	1/M602	*1,2,5*	*TO FIT EXISTING CABINET*
HC-2	NEW COIL	ACU-2	2500	2500	97.7	49.4	85	140	110	7	500	1	4.00	0.06	2.00	37x27	NEW	3-WAY	2/M602	*2,3,4,5*	*TO FIT EXISTING CABINET*
HC-3A	NEW COIL	ACU-3A	8210	8210	106.4	53.2	65	140.0	109.9	7	469	1	5.2	0.05	2.41	47.00x67.25	NEW	3-WAY	2/M602	*1,2,5*	*TO FIT EXISTING CABINET*

NOTES:

1 PROVIDE NEW CASED HEATING COIL INLINE WITH SUPPLY AIR DUCT.
2 REBALANCE COIL FLOW AS SHOWN.
3 VERIFY EXISTING CABINET SIZE FOR FIT.
4 PROVIDE NEW HEATING WATER COIL TO FIT IN PLACE OF THE EXISTING WATER COIL INSIDE A PACE A-12 CABINET, VERIFY SIZE.
5 APPROXIMATE COIL SIZE SHOWN, CONFIRM COIL SIZE PRIOR TO SUBMITTAL. (1)

NEW FAN COIL UNITS SCHEDULE

DESIGN SYMBOL	INSTALLATION	OA MIN CFM	SUPPLY FAN SA CFM	SUPPLY FAN ESP IN WG	SUPPLY FAN HP	DX COOLING COIL CAPACITY MBH TOTAL	CAPACITY MBH SENS	LAT F DB	LAT F WB	EAT F DB	EAT F WB	AMB DEG F	HOT WATER COIL SA CFM	MBH REQ'D MBH	ENT AIR MIXED DB	LAT F DB	EWT F	LWT F	FLOW GPM	COIL VOL GAL	FACE VELOCITY FPM	MAX WPD FT HD	MAX APD IN H2O	SEE PIPING DETAIL	VAVLE TYPE	POWER VOLT/PHASE/HZ -MCA,MROPD	UNIT WEIGHT LBS	REMARKS SEE LISTED NOTES &	DESIGN BASIS DAIKIN
FCU-1	HORIZONTAL	420	760	0.6		21.6	18.4	57.5	55.4	79.5	65	92.8	570	36.0	35	92	140	110	2.4		500	4.0	0.2	1/M602	2W	120/1/60-5.5,15	300	1,2,3,4,5,6,7,8	BCHD0081
FCU-2	HORIZONTAL	90	560	0.7		15.9	13.6	57.5	55.4	79.5	65	92.8	420	14.9	60	92	140	110	1.0		500	4.0	0.2	1/M602	2W	120/1/60-5.5,15	250	1,2,3,4,5,6,7,8	BCHD0061
FCU-3	HORIZONTAL	365	930	0.7		29.5	25.1	57.5	55.4	82	65	92.8	697.5	36.2	45	92	140	110	2.4		500	4.0	0.2	2/M602	3W	120/1/60-8,15	375	1,2,3,4,5,6,7,8	BCHD0101

NOTES:

1 SITE VERIFY ALL DIMENSIONS.
2 PROVIDE (N) UNIT WITH RIGHT OR LEFT-SIDE COIL CONNECTIONS BASED ON SITE CONDITIONS; CONFIRM PRIOR TO SUBMITTAL.
3 DISCONNECT SWITCH BY ELECTRICAL.
4 CONTROL FROM DDC SYSTEM.
5 PROVIDE MERV 13 FILTER
6 PROVIDE ECM MOTOR
7 INTEGRATE FAN CONTROL WITH EXISTING RETURN FAN, RF-4.
8 FOR CONTROLS SEE DETAIL 5/M503.

NEW SMALL OUTDOOR CONDENSING UNITS SCHEDULE

DESIGN SYMBOL	SERVES	COMPRESSOR NUMBER	COMPRESSOR AMPS RATED LOAD	COMPRESSOR AMPS LOCKED ROTOR	REFRIG. CHARGE LBS	DX COOLING CAPACITY MBH TOTAL	CAPACITY MBH SENS	EVAPORATOR EAT F DB	EVAPORATOR EAT F WB	EVAPORATOR LAT F DB	EVAPORATOR LAT F WB	AMB. TEMP DB/WB F	MIN SEER	ELECTRICAL POWER VOLT/PHASE/HZ	UNIT MCA	UNIT MAX OVERCURRENT PROTECTION	EMERGENCY POWER	UNIT WEIGHT LBS	INTERLOCK	REMARKS NOTES	DESIGN BASIS DAIKIN
CU-1	FCU-1	1	13.5	58.3		21.6	18.4	79.5	65	57.5	55.4	92.8/61.9	14.0	208-230/1/60	17.6	30	NO	160	FCU-1	1,2	DX14SA024
CU-2	FCU-2	1	9	47.5		15.9	13.6	79.5	65	57.5	55.4	92.8/61.9	14.0	208-230/1/60	12	20	NO	150	FCU-2	1,2	DX14SA018
CU-3	FCU-3	1	14.1	77		29.5	25.1	82	65	57.5	55.4	92.8/61.9	14.0	208-230/1/60	18.6	30	NO	180	FCU-3	1,2	DX14SA036

NOTES:

1 DISCONNECT SWITCH BY OTHERS.
2 PROVIDE REFRIGERANT PIPING AND DEVICES PER MANUFACTURER'S RECOMMENDATIONS.

UPDATED: 10/20/2021

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EXHAUST FANS SCHEDULE

EXISTING DESIGN SYMBOL	FAN TYPE	SERVES	MIN CFM	MAX CFM	ESP INCHES	MOTOR BHP	MOTOR HP	MOTOR RPM	MOTOR DRIVE TYPE	MOTOR SPEED CONTROLLER	MOTOR VOLTS/PHASE /HZ-AMPS	MOUNTING	DAMPER TYPE	OPER. WEIGHT LBS	FOR CONTROL DIAGRAM SEE	REMARKS NOTES	DESIGN BASIS MODEL#
EF-M	EXISTING	GENERAL EXHAUST	500	500	0.25							(E)ROOF CURB	BACKDRAFT		1/M501	7	EXISTING TO REMAIN
EF-2	EXISTING	GENERAL EXHAUST	330	330	0.50		1/4					(E)ROOF CURB	BACKDRAFT		1/M501	7	EXISTING TO REMAIN
REU-3	NEW	BOILER ROOM	1000	1000	0.25		1/4	1700	DIRECT	DIAL	115/1/60-3.8	(E)ROOF CURB	MOTORIZED	50	1/M501	1,2,3,4	*GREENHECK G-130-VG*
REU-4	EXISTING	LOCKERS	1550	1550	0.75		1				460/3/60 1	(E)ROOF CURB	BACKDRAFT		1/M501	7	EXISTING TO REMAIN
REU-5	(N) GREASE EA	*KITCHEN HOOD LISTED*	2850	5700	0.88		2	1700	DIRECT	DIAL	*460/3/60-3.4*	(E)ROOF CURB	NONE	150	1/M501	1 *1,3,4,6,8,9*	*GREENHECK CUBE 240 VGD*
REU-6	NEW DISHWASH EA	DISHWAHSER HOOD	1100	1100	0.38		1/2	1700	DIRECT	DIAL	115/1/60-6.6	(E)ROOF CURB	MOTORIZED	75	1/M501	1,2,3,4,5	*GREENHECK CUE-140HP-VG*
REU-7	NEW	GENERAL KITCHEN	290	290	0.50		1/6	1700	DIRECT	DIAL	115/1/60-2.8	(E)ROOF CURB	BACKDRAFT	50	1/M501	1,2,3,4	*GREENHECK CUE-095-VG*
REU-8	NEW	GENERAL MAINT	500	500	0.25		1/4	1700	DIRECT	DIAL	115/1/60-3.8	(E)ROOF CURB	MOTORIZED	50	1/M501	1,2,3,4	*GREENHECK G-100-VG*
REU-9	EXISTING	TOILETS BLDG 300	890	890	0.50		1/3					(E)ROOF CURB	BACKDRAFT		1/M501	7	EXISTING TO REMAIN
CEU-10	EXISTING	PRINCIPAL RM	125	125	0.10		1/50					ABOVE CLG	BACKDRAFT		1/M501	7	EXISTING TO REMAIN

NOTES:

1 REPLACE EXISTING FLEX CONNECTORS WITH NEW.
2 PROVIDE NEW ECM MOTOR WITH DIAL ON MOTOR FOR BALANCING.
3 DISCONNECT SWITCH BY ELECTRICAL.
4 VERIFY (E)POWER CONNECTION AND MTR HP ON SITE PRIOR TO ORDERING EQUIPM
5 PROVIDE DRAIN CONNECTION
6 PROVIDE GREASE TRAP W/DRAIN CONN. & ABSORBENT MATERIAL-FACTORY MOUNTED.
7 CLEAN AND SERVICE EXISTING FAN.
8 PROVIDE NEW FAN FOR INSTALLATION TO EXISTING VENTED SHAFT.
1 *9 PROVIDE ECM MOTOR WITH 0-VDC SIGNAL FOR 2 SPEED CONTROL BY DDC.*

UPDATED: 10/20/2021 17:05

EXISTING AIR DEVICE SCHEDULE - TERMINAL UNIT

TAG	SYSTEM	AIRSIDE DATA MAX. FLOW (CFM)	MIN FLOW (CFM)	VENT CFM	UNOCCUPIED MIN FLOW (CFM)	AIR PD STD BOX (IN. WG)	MIN INLET SP.(IN)	MIN INLET SIZE	EXISTING REHEAT COIL DATA EAT (F)	LAT MIN (F)	EWT (F)	LWT (F)	MAX FLOW (GPM)	SCH CAP. (MBH)	ROWS EXIST	MAX WPD FT H2O	PIPING RUNOUT (IN)	SEE DETAILS CONTROL DIAGRAM DETL	PIPING CONFIG DETL	CONTROL VALVE 2-WAY	3-WAY	REMARKS NOTES	BASIS OF DESIGN
TU-1-1A	ACU-1A	330	165	230	66	0.25	0.95	6	65	95	180	165	0.7	5.45	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-2-1A	ACU-1A	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-3-1A	ACU-1A	750	375	390	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-4-1A	ACU-1A	950	475	290	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-5-1A	ACU-1A	750	375	390	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-6-1B	ACU-1B	950	475	290	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-7-1B	ACU-1B	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-8-1B	ACU-1B	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-9-1B	ACU-1B	1,050	525	400	210	0.22	0.92	12	65	95	180	165	2.3	17.33	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-11-1B	ACU-1B	1,050	525	400	210	0.22	0.92	12	65	95	180	165	2.3	17.33	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-12-1B	ACU-1B	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-13-1B	ACU-1B	1,050	525	400	210	0.22	0.92	12	65	95	180	165	2.3	17.33	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-14-1B	ACU-1B	950	475	290	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-15-1A	ACU-1A	1,050	525	390	210	0.22	0.92	12	65	95	180	165	2.3	17.33	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-16-1A	ACU-1A	950	475	300	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-17-1A	ACU-1A	1,050	525	390	210	0.22	0.92	12	65	95	180	165	2.3	17.33	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-18-1A	ACU-1A	750	375	390	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-19-3A	ACU-3A	540	270	270	108	0.21	0.91	8	65	95	180	165	1.2	8.91	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-20-3A	ACU-3A	885	443	130	177	0.23	0.93	10	65	95	180	165	1.9	14.60	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-21-3A	ACU-3A	330	165	220	66	0.25	0.95	6	65	95	180	165	0.7	5.45	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-22-3A	ACU-3A	750	375	370	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-23-3A	ACU-3A	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-24-3A	ACU-3A	750	375	400	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING
TU-25-3A	ACU-3A	900	450	4,250	180	0.23	0.93	10	65	95	180	165	2.0	14.85	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-26-3A	ACU-3A	450	225	80	90	0.27	0.97	7	65	95	180	165	1.0	7.43	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-27-3A	ACU-3A	1,150	575	620	230	0.22	0.92	12	65	95	180	165	2.5	18.98	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-28-3A	ACU-3A	950	475	400	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-29-3A	ACU-3A	950	475	400	190	0.23	0.93	10	65	95	180	165	2.1	15.68	1	4	3/4	2/M502	1/M602	X		1,2,3,4	EXISTING
TU-30-3A	ACU-3A	750	375	370	150	0.16	0.86	9	65	95	180	165	1.7	12.38	1	4	3/4	2/M502	2/M602		X	1,2,3,4	EXISTING

NOTES:

1 EXISTING TERMINAL BOX, REBALANCE AIR AND WATER FLOW AS INDICATED.
2 REPLACE EXISTING CONTROL VALVE WITH NEW CONTROL VALVE. REPLACE ISOLATION VALVE AND STRAINER.
3 CLEAN AND INSPECT COIL.
4 REPLACE EXISTING VAV CONTROLLER WITH NEW CONTROLLER

EXISTING CABINET AND UNIT HEATER SCHEDULE

DESIGN SYMBOL	INSTALLATION	SUPPLY FAN SA CFM	ESP IN WG	HP	HOT WATER COIL MBH REQ'D MBH	ENT AIR MIXED DB	EWT F	LWT F	FLOW GPM	MAX WPD FT HD	VAVLE TYPE	POWER VOLT/PHASE/HZ	REMARKS	EXISTING TO REMAIN SEE NOTED DETAILS FOR (N) PIPING CONNECTION & CONTROLS
CUH-1	RECESSED		0.2	1/20	23.0	60	180		2.0	4.0	2W	120/1/60	1,2,3,4,5	3/M602; 5/M501
CUH-2	RECESSED		0.2	1/20	12.0	60	180		1.0	4.0	2W	120/1/60	1,2,3,4,5	3/M602; 5/M501
CUH-3	RECESSED		0.2	1/20	12.0	60	180		1.0	4.0	2W	120/1/60	1,2,3,4,5	3/M602; 5/M501
CUH-4	RECESSED		0.2	1/20	12.0	60	180		1.0	4.0	2W	120/1/60	1,2,3,4,5	3/M602; 5/M501
UH-1	HANGING		0.0	1/40	20.0	60	180		1.5	4.0	2W	120/1/60	1,2,3,4,	4/M602; 4/M501

NOTES:

1 SERVICE AND CLEAN EQUIPMENT.
2 REPLACE BELTS
3 CONTROL FROM DDC SYSTEM.
4 PROVIDE NEW CONTROL VALVE AS INDICATED.
5 PROVIDE NEW LARGER ACCESS PANEL IN FIRE RATED WALL FOR VALVES AND DEVICES ACCESS.

BOOSTER HEATING COILS SCHEDULE

DESIGN SYMBOL	SYSTEM SERVED	HOT WATER COILS SA CFM	MBH REQ'D	ENT AIR MIXED DB	LAT F DB	EWT F	LWT F	FLOW GPM	MAX WPD FT HD	REMARKS NOTES	EXISTING TO REMAIN SEE DETL'S FOR (N) PIPING CONFIG. & CONTROLS
BHC-1	HVU-1	950	18.8	60	78	180		1.9	4.0	1,2,3	4/M602; 2/M501
BHC-2	HVU-2	330	7.3	65	85	180		0.7	4	1,2,3	4/M602; 2/M501

NOTES:

1 REPLACE EXISTING CONTROL VALVE WITH NEW 2-WAY VALVE TO PERFORM AT THE SCHEDULED FLOW
2 CONTROL FROM DDC SYSTEM.
3 CLEAN AND INSPECT COIL

REGISTERED PROFESSIONAL ENGINEER 17884 OREGON JULY 25, 1995 SCOTT W. MILLER
EXPIRES: 31DEC22

Date: 07/21/2021
Proj No: 10181
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD OREGON
BEAVERTON

MECHANICAL SCHEDULES

PERMIT/BID SET
SEPTEMBER 2021

MFA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFA-ENG.COM

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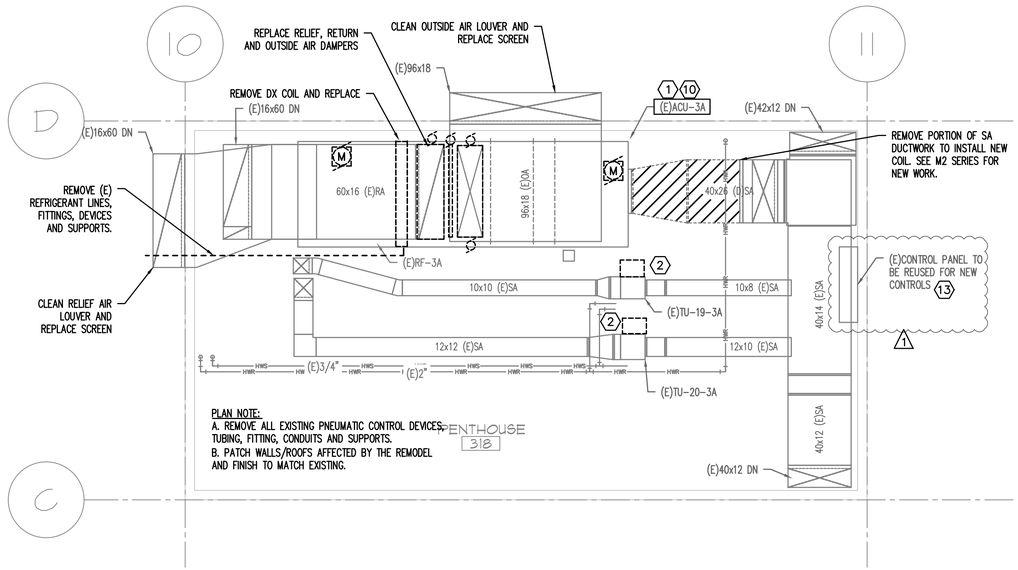
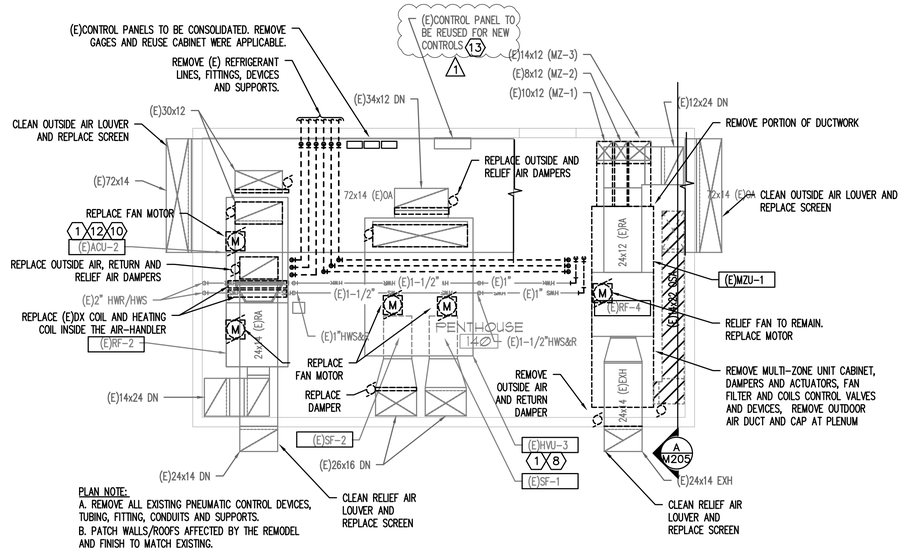


3 M105 ENLARGED MECHANICAL PENTHOUSE 318
SCALE: 1/4" = 1'-0"



1 M105 ENLARGED MECHANICAL PENTHOUSE 140
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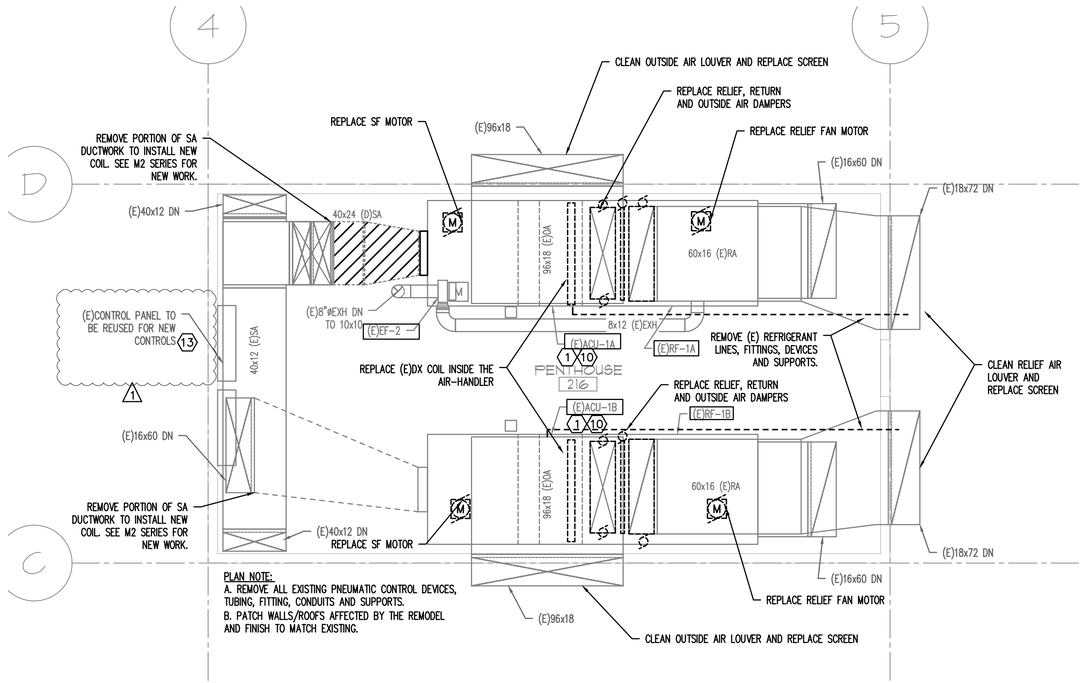
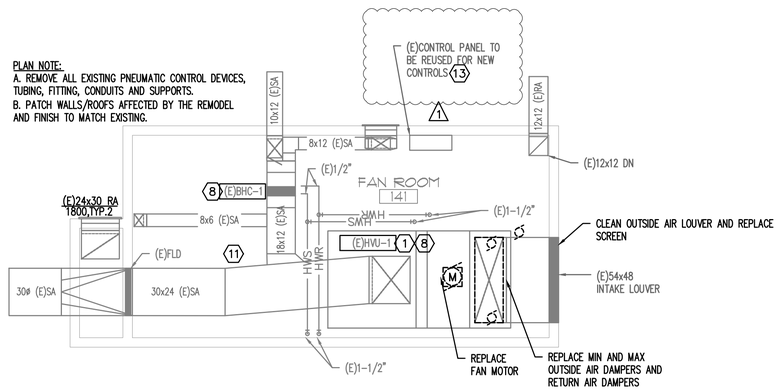


4 M105 ENLARGED MECHANICAL PENTHOUSE 216
SCALE: 1/4" = 1'-0"



2 M105 ENLARGED MECHANICAL FAN ROOM 141
SCALE: 1/4" = 1'-0"

GENERAL DEMO NOTES

A. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

B. DEMOLITION COORDINATION:

(#) KEYED DEMO NOTES

1. EXISTING AIR HANDLING UNIT TO REMAIN. CLEAN AND SERVICE UNIT. REPLACE FLEXIBLE CONNECTORS, BELT, BEARINGS AND SHEAVES AT BELT DRIVE UNITS. INSTALL BELT GUARDS WHERE MISSING. REPLACE ANY LOOSE OR TORN LINER. REPLACE DAMPER ACTUATORS AND CONTROL DEVICES. REPLACE FILTERS. FOR NEW WORK SEE M2 SERIES DRAWINGS.
2. (E) TERMIAL UNIT OR UNIT HEATER TO REMAIN. REMOVE AND REPLACE VAV CONTROLLER. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REMOVE STRAINER SCREEN AND CLEAN. REMOVE (E) CONTROLS AND STAT. SEE NEW WORK FOR REPLACEMENT.
3. (E) CABINET UNIT HEATER TO REMAIN. INSPECT AND CLEAN COIL. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REMOVE STRAINER SCREEN AND CLEAN. REMOVE (E) CONTROLS AND STAT. SEE DETAIL SHEET FOR NEW WORK.
4. EXISTING EXHAUST FAN UNIT TO REMAIN REPLACE MOTOR AND DAMPER ACTUATOR. SEE NEW WORK FOR REFURBISHMENT.
5. EXISTING THERMOSTAT TO BE REPLACED WITH NEW DIGITAL DEVICE. REPAIR WALL AROUND NEW SENSOR. IF LOCATION HAS SECONDARY STAT (NLL), REMOVE STAT AND PATCH WALL AS REQUIRED. SEE NEW WORK FOR REPLACEMENT SENSOR. IF EXISTING EQUIPMENT (ASSOCIATED STAT) IS NOT BEING REPLACED, SENSOR TO BE REMOVED AND COVER PLATE SHALL BE INSTALLED. SEE NEW WORK FOR DETAIL.
6. REMOVE UNIT CONTROLS FOR REPLACEMENT. UNIT TO BE REFURBISHED. SEE NEW WORK FOR DETAIL.
7. REMOVE DUCTWORK AS SHOWN, SEE M2 SERIES FOR INSTALLATION OF NEW WORK.
8. EXISTING HEATING COILS TO BE REUSED. CLEAN COIL AND INSPECT FOR LEAKS. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REMOVE STRAINER SCREEN AND CLEAN. REMOVE (E) CONTROLS AND STAT. SEE DETAIL SHEET FOR NEW WORK. .
9. EXISTING DIGITAL CONTROL THERMOSTAT TO REMAIN.
10. EXISTING DX COOLING COIL TO BE REPLACED WITH NEW. REPLACE PIPING AND DEVICES. REMOVE (E) CONTROLS AND STAT. FOR NEW WORK SEE M2 SERIES PLANS.
11. EXISTING FUSIBLE LINK FIRE DAMPER TO REMAIN.
12. EXISTING HEATING COIL AND COIL CONNECTION PIPING AND DEVICES TO BE REPLACED.
13. PANEL MAY BE REUSED FOR NEW CONTROLS. SEE SPECIFICATION FOR PANEL CONSTRUCTION AND ORGANIZATION. REMOVE OLD GAUGES AND PROVIDE HOLE COVER.

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

Date:	07/21/2021
Proj No:	10181
Drawn By:	MG
Chkd By:	SWM
DSGN By:	MG
Acad File:	

REV#	10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

ENLARGED MECHANICAL PLANS

PERMIT/BID SET
SEPTEMBER 2021

MFIA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

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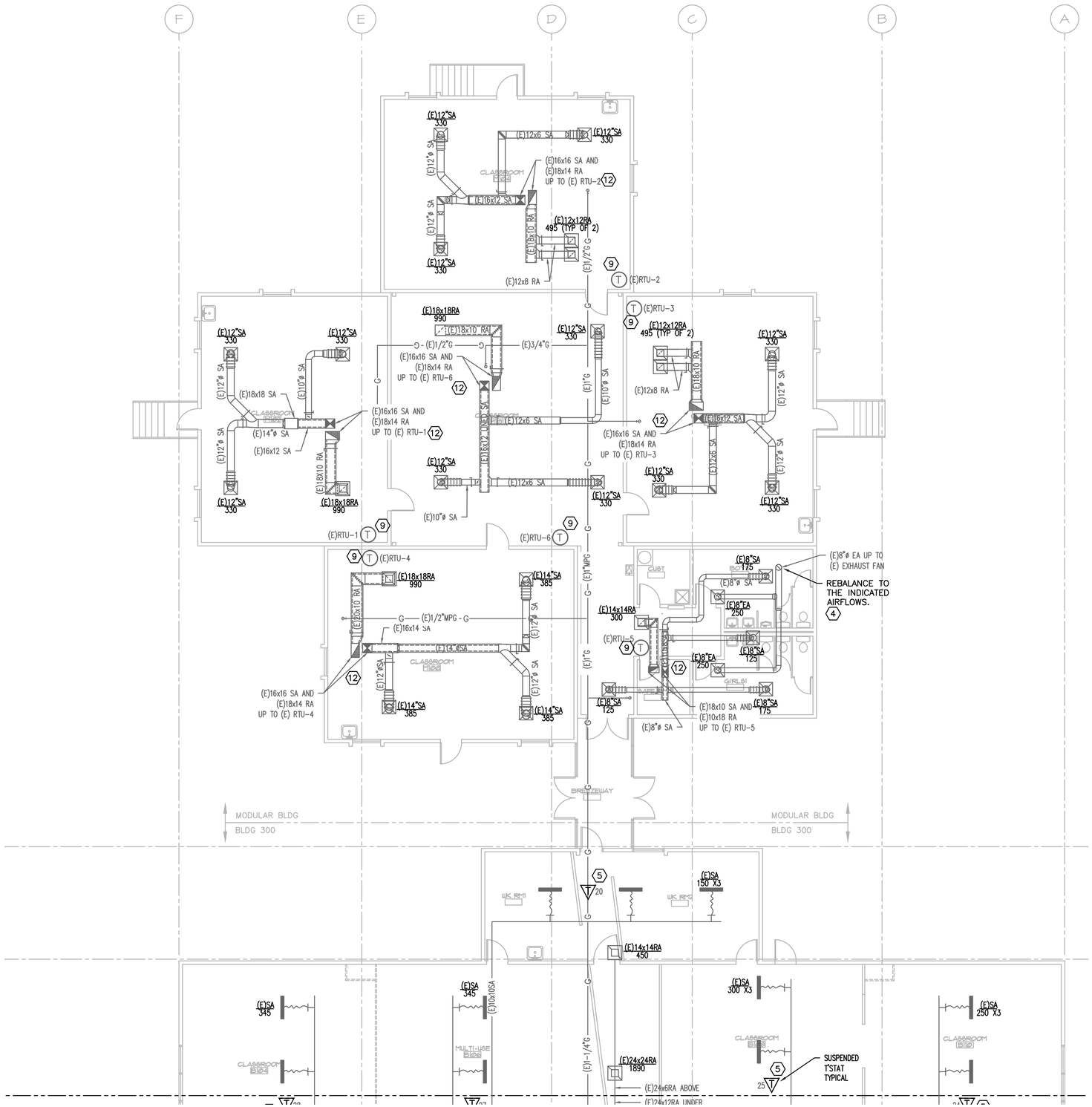


1 M201 PARTIAL MECHANICAL FLOOR PLAN A– NEW

SCALE: 1/8" = 1'–0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO COORDINATE ALL UNIT RE–TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS. 1

C. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORTS.

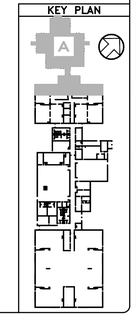
D. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

E. FOR SINGLE ZONE SYSTEMS RE–BALANCE SUPPLY, RETURN AND EXHAUST GRILLES AIRFLOW PER PLANS. FOR VAV TERMINAL UNITS TOTAL AIRFLOW IN HEATING, DEAD BAND AND COOLING MODE IS NECESSARY BUT BALANCING OF INDIVIDUAL DIFFUSERS IS NOT. 1

KEYED NOTES

1. EXISTING AIR HANDLING UNIT. CLEAN AND SERVICE UNITS PER SPECS. REPLACE SUPPLY AND RETURN/EXHAUST FAN MOTOR, REPLACE DAMPERS AND DAMPER ACTUATORS AND CONTROL DEVICES. RE–BALANCE AIRFLOWS AND WATER FLOW. COORDINATE WITH ELECTRICAL AND CONTROLS. CONFIRM VOLTAGE, PHASE, ROTATION AND HORSEPOWER PRIOR TO SUBMITTAL. SEE SCHEDULE AND DETAIL SHEETS FOR REQUIREMENTS. SET INLET VANE DAMPERS OR DISCHARGE DAMPERS PERMANENTLY FULL OPEN. FIX INLET VANE DAMPERS OR DISCHARGE DAMPER PERMANENTLY OPEN OR REMOVE COMPLETELY. INSTALL NEW FLEXIBLE DUCT CONNECTORS AT SA, RA, OA AND RELIEF DUCT CONNECTIONS.
2. EXISTING TERMINAL UNIT. REMOVE AND REPLACE VAV CONTROLLER WITH NEW. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REPLACE STRAINER AND CLEAN HEATING COIL. REBALANCE AIRFLOW AND WATERFLOW. SEE SCHEDULES AND DETAIL 1 OR 2/M602 FOR 2W OR 3W VALVE REQUIREMENTS.
3. EXISTING CABINET UNIT HEATER. CLEAN UNIT AND COIL. REPLACE CONTROL VALVE, ISOLATION VALVES AND STRAINER WITH NEW. REBALANCE AIRFLOW AND WATERFLOW. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. SEE SCHEDULES AND DETAIL 3/M602 FOR REQUIREMENT.
4. EXISTING EXHAUST FAN UNIT TO REMAIN. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. REBALANCE AIRFLOW. SEE SCHEDULES FOR REQUIREMENT. 1
5. NEW DIGITAL DEVICE ZONE/SPACE THERMOSTAT TO REPLACE EXISTING IN SAME LOCATION. LABEL WITH ASSOCIATED EQUIPMENT INFORMATION. WHERE OLD SENSOR IS NO LONGER USED PROVIDE A STAINLESS STEEL COVER PLATE OVER HOLE & SECURE & PATCH WALL. REPAIR WALL AROUND NEW SENSOR.
6. NEW FAN COIL UNIT. ROUTE (N) REFRIGERANT PIPING TO OUTDOOR CONDENSING UNIT. PROVIDE (N) 3/4" HEATING WATER CONNECTIONS TO COIL. SEE DETAIL 4/M601.
7. PROVIDE NEW HEATING COIL INSIDE EXISTING AIR–HANDLING UNIT. SEE DETAIL 1/M602.
8. EXISTING HEATING COILS TO REMAIN. INSPECT AND CLEAN COIL. REMOVE AND REPLACE CONTROL VALVE, STRAINER AND ISOLATION VALVE WITH NEW. PROVIDE NEW CONTROLS SEE M5 SERIES FOR BLDG DDC INTEGRATION. REBALANCE AIRFLOW AND WATERFLOW. SEE DETAIL 4/M602 FOR 2W CONTROL VALVE PIPING. 1
9. EXISTING DIGITAL CONTROL THERMOSTAT TO REMAIN.
10. NEW DX COOLING COIL TO REPLACE EXISTING DX COIL INSIDE EXISTING CABINET. ROUTE NEW REFRIGERANT PIPING TO NEW OUTDOOR CONDENSING UNIT. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. SEE SCHEDULES FOR ADDITIONAL REQUIREMENT. 1
11. EXISTING FUSIBLE LINK FIRE DAMPER TO REMAIN.
12. UP TO EXISTING ROOF–TOP UNIT ON ROOF.

KEY PLAN



REGISTERED PROFESSIONAL ENGINEER 17884 OREGON JULY 25, 1986 SCOTT W. MILLER EXPIRES: 31DEC22

Date:	07/21/2021
Proj No:	10181
Drawn By:	MG
Chkd By:	SWM
DSGN By:	MG
Acad File:	

REV#	DATE	DESCRIPTION
1	10/20/21	ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

PARTIAL MECHANICAL FLOOR PLAN – NEW

PERMIT/BID SET
SEPTEMBER 2021

MFA INC.

Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234–0548
FAX: (503) 234–0577
WWW.MFA–ENG.COM

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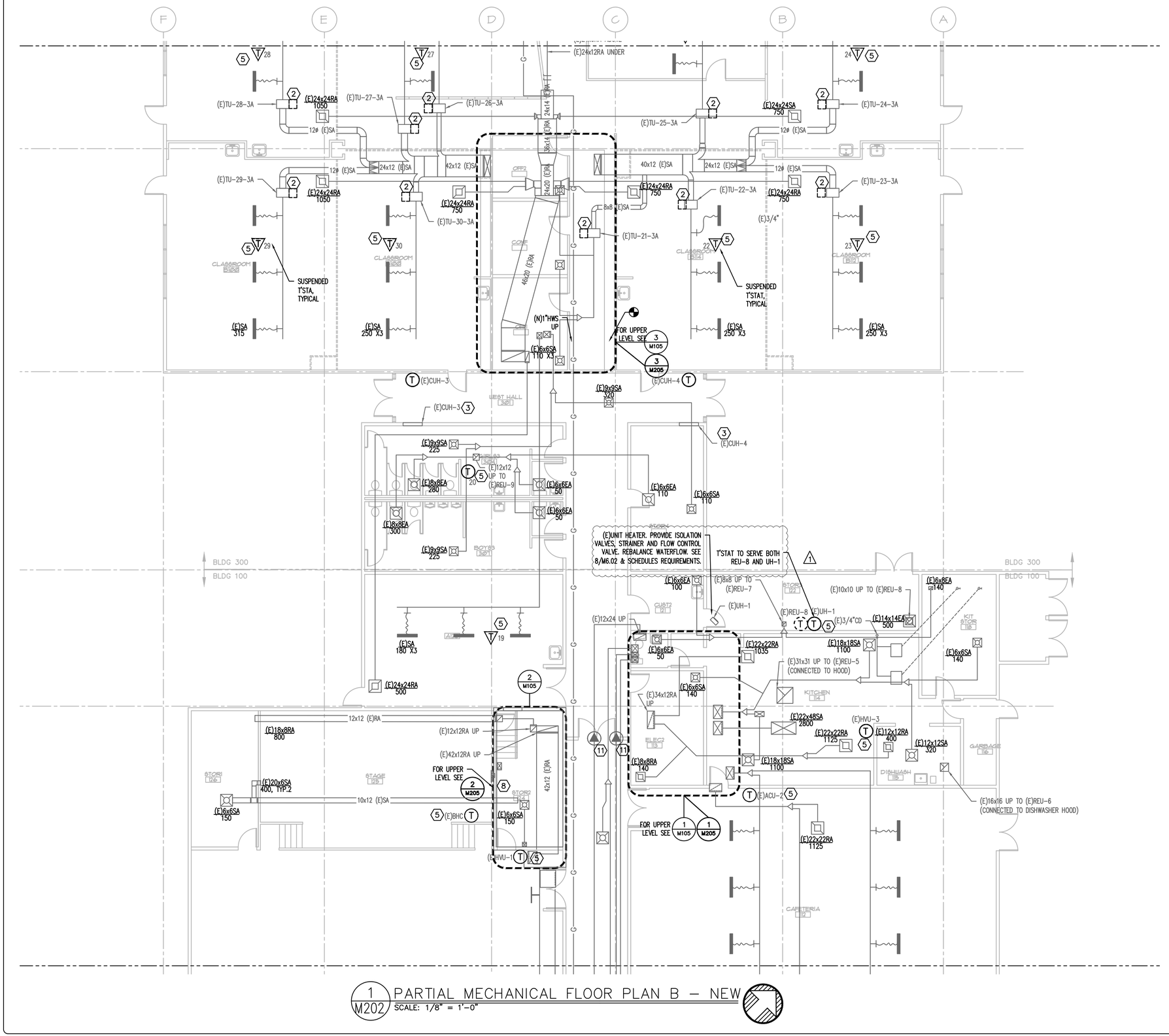

1 M202 PARTIAL MECHANICAL FLOOR PLAN B – NEW
SCALE: 1/8" = 1'-0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO COORDINATE ALL UNIT RE–TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS. 1

C. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORTS.

D. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

E. FOR SINGLE ZONE SYSTEMS RE–BALANCE SUPPLY, RETURN AND EXHAUST GRILLES AIRFLOW PER PLANS. FOR VAV TERMINAL UNITS TOTAL AIRFLOW IN HEATING, DEAD BAND AND COOLING MODE IS NECESSARY BUT BALANCING OF INDIVIDUAL DIFFUSERS IS NOT. 1

(#) KEYED NOTES

1. EXISTING AIR HANDLING UNIT. CLEAN AND SERVICE UNITS PER SPECS. REPLACE SUPPLY AND RETURN/EXHAUST FAN MOTOR, REPLACE DAMPERS AND DAMPER ACTUATORS AND CONTROL DEVICES. RE–BALANCE AIRFLOWS AND WATER FLOW. COORDINATE WITH ELECTRICAL AND CONTROLS. CONFIRM VOLTAGE, PHASE, ROTATION AND HORSEPOWER PRIOR TO SUBMITTAL. SEE SCHEDULE AND DETAIL SHEETS FOR REQUIREMENTS. SET INLET VANE DAMPERS OR DISCHARGE DAMPERS PERMANENTLY FULL OPEN. FIX INLET VANE DAMPERS OR DISCHARGE DAMPER PERMANENTLY OPEN OR REMOVE COMPLETELY. INSTALL NEW FLEXIBLE DUCT CONNECTORS AT SA, RA, OA AND RELIEF DUCT CONNECTIONS.
2. EXISTING TERMINAL UNIT. REMOVE AND REPLACE VAV CONTROLLER WITH NEW. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REPLACE STRAINER AND CLEAN HEATING COIL. REBALANCE AIRFLOW AND WATERFLOW. SEE SCHEDULES AND DETAIL 1 OR 2/M602 FOR 2W OR 3W VALVE REQUIREMENTS.
3. EXISTING CABINET UNIT HEATER. CLEAN UNIT AND COIL. REPLACE CONTROL VALVE, ISOLATION VALVES AND STRAINER WITH NEW. REBALANCE AIRFLOW AND WATERFLOW. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. SEE SCHEDULES AND DETAIL 3/M602 FOR REQUIREMENT.
4. EXISTING EXHAUST FAN UNIT TO REMAIN. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. REBALANCE AIRFLOW. SEE SCHEDULES FOR REQUIREMENT. 1
5. NEW DIGITAL DEVICE ZONE/SPACE THERMOSTAT TO REPLACE EXISTING IN SAME LOCATION. LABEL WITH ASSOCIATED EQUIPMENT INFORMATION. WHERE OLD SENSOR IS NO LONGER USED PROVIDE A STAINLESS STEEL COVER PLATE OVER HOLE & SECURE & PATCH WALL. REPAIR WALL AROUND NEW SENSOR.
6. NEW FAN COIL UNIT. ROUTE (N) REFRIGERANT PIPING TO OUTDOOR CONDENSING UNIT. PROVIDE (N) 3/4" HEATING WATER CONNECTIONS TO COIL. SEE DETAIL 4/M601.
7. PROVIDE NEW HEATING COIL INSIDE EXISTING AIR–HANDLING UNIT. SEE DETAIL 1/M602.
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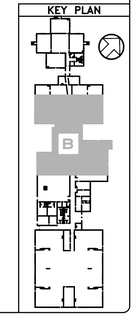
11. EXISTING FUSIBLE LINK FIRE DAMPER TO REMAIN.
12. UP TO EXISTING ROOF–TOP UNIT ON ROOF.

KEY PLAN



REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

REV#	1	10/20/21	ADDENDUM#1
Date:	07/21/2021		
Proj No:	10181		
Drawn By:	MG		
Chkd By:	SWM		
DSGN By:	MG		
Acad File:			

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

PARTIAL MECHANICAL FLOOR PLAN – NEW

PERMIT/BID SET
SEPTEMBER 2021

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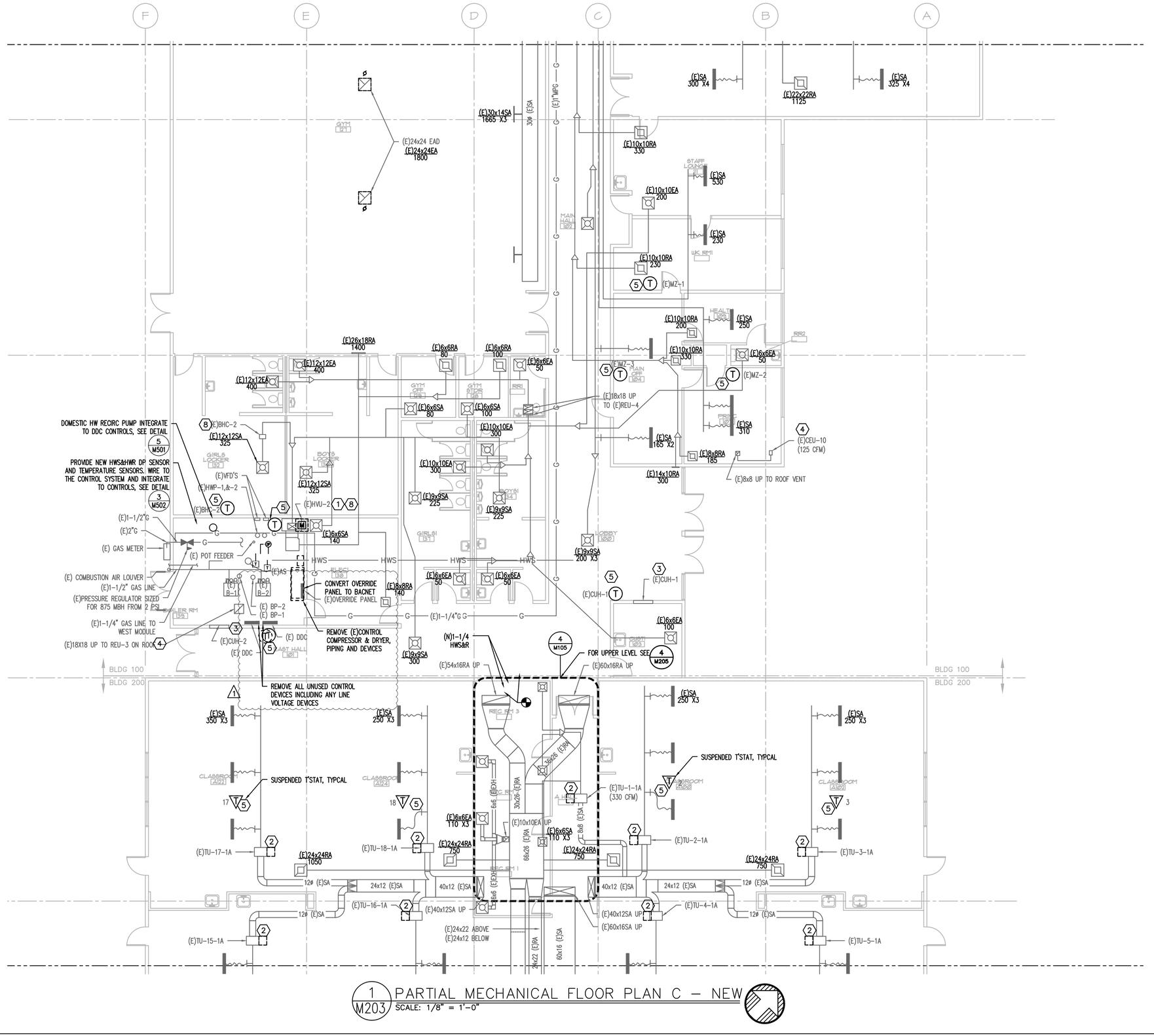

1 M203 PARTIAL MECHANICAL FLOOR PLAN C – NEW
SCALE: 1/8" = 1'-0"

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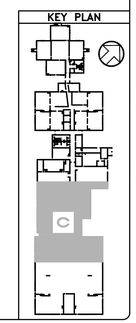
KEY PLAN



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REV#	1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

PARTIAL MECHANICAL FLOOR PLAN – NEW

PERMIT/BID SET
SEPTEMBER 2021

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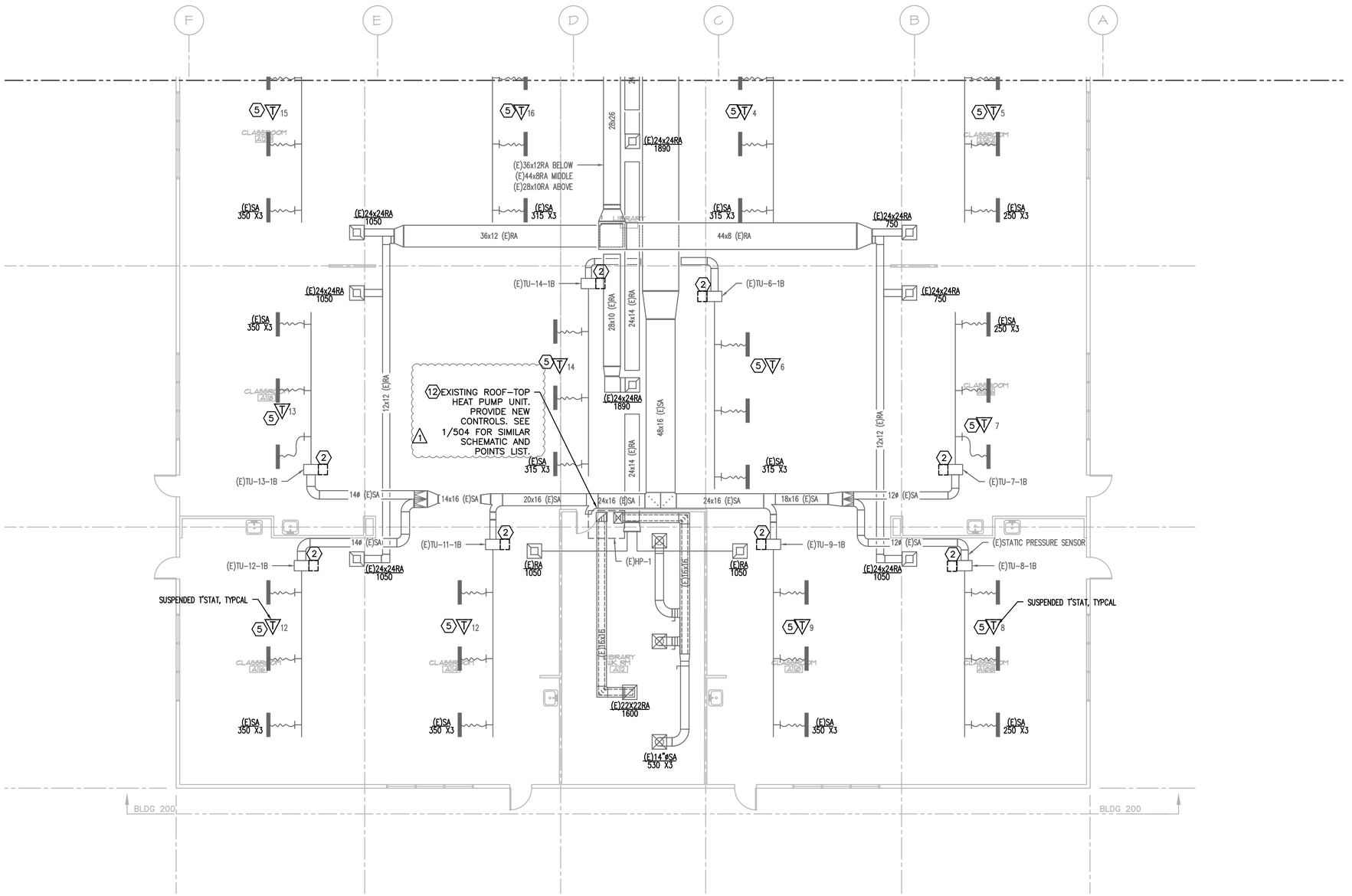

1 M204 PARTIAL MECHANICAL FLOOR PLAN D – NEW
SCALE: 1/8" = 1'-0"

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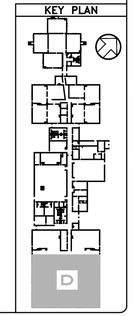
KEY PLAN



REGISTERED PROFESSIONAL ENGINEER 17884 OREGON JULY 25, 1986 SCOTT W. MILLER EXPIRES: 31DEC22

REV#	1	10/20/21	ADDENDUM#1
Date:	07/21/2021		
Proj No:	10181		
Drawn By:	MG		
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18100 SW BANY ROAD OREGON
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PARTIAL MECHANICAL FLOOR PLAN – NEW

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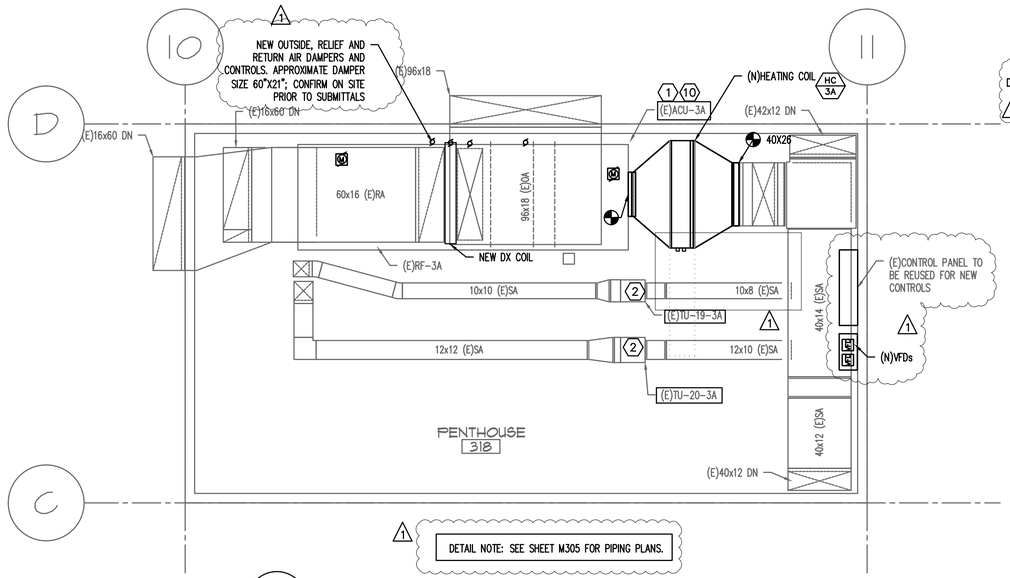
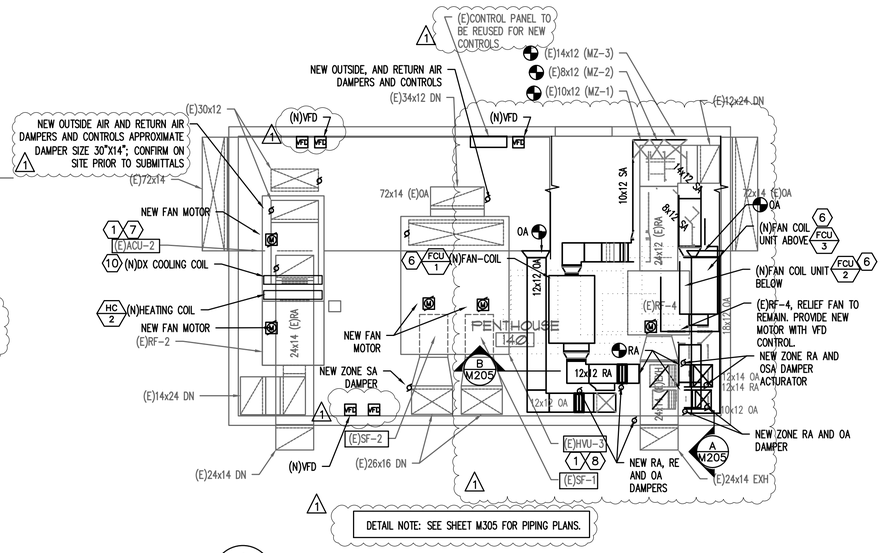
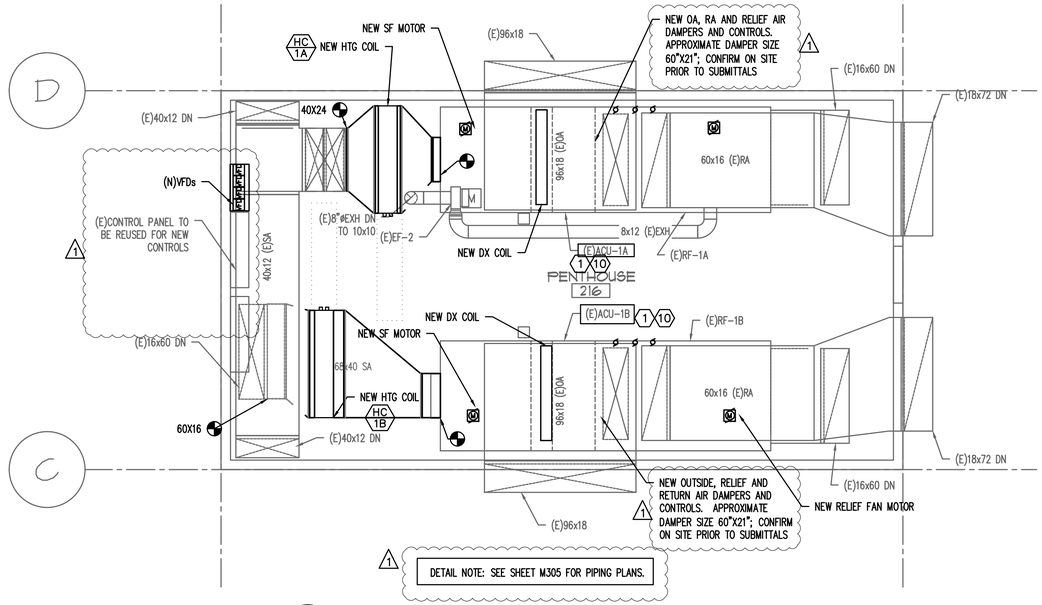


3 M205 ENLARGED MECHANICAL PENTHOUSE 318
SCALE: 1/4" = 1'-0"

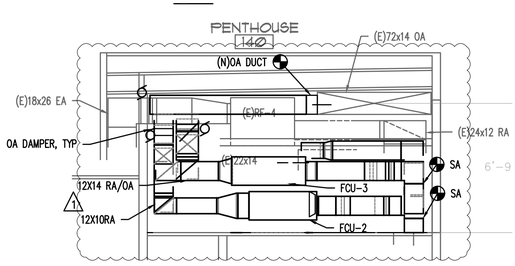


1 M205 ENLARGED MECHANICAL PENTHOUSE 140
SCALE: 1/4" = 1'-0"

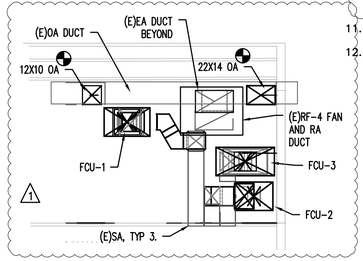


4 M205 ENLARGED MECHANICAL PENTHOUSE 216
SCALE: 1/4" = 1'-0"

2 M205 ENLARGED MECHANICAL FAN ROOM 141
SCALE: 1/4" = 1'-0"



A M205 SECTION A MECH PENTHOUSE 140
SCALE: 1/4" = 1'-0"



B M205 SECTION B MECH. PENTHOUSE 140
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REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
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ENLARGED MECHANICAL HVAC PLANS

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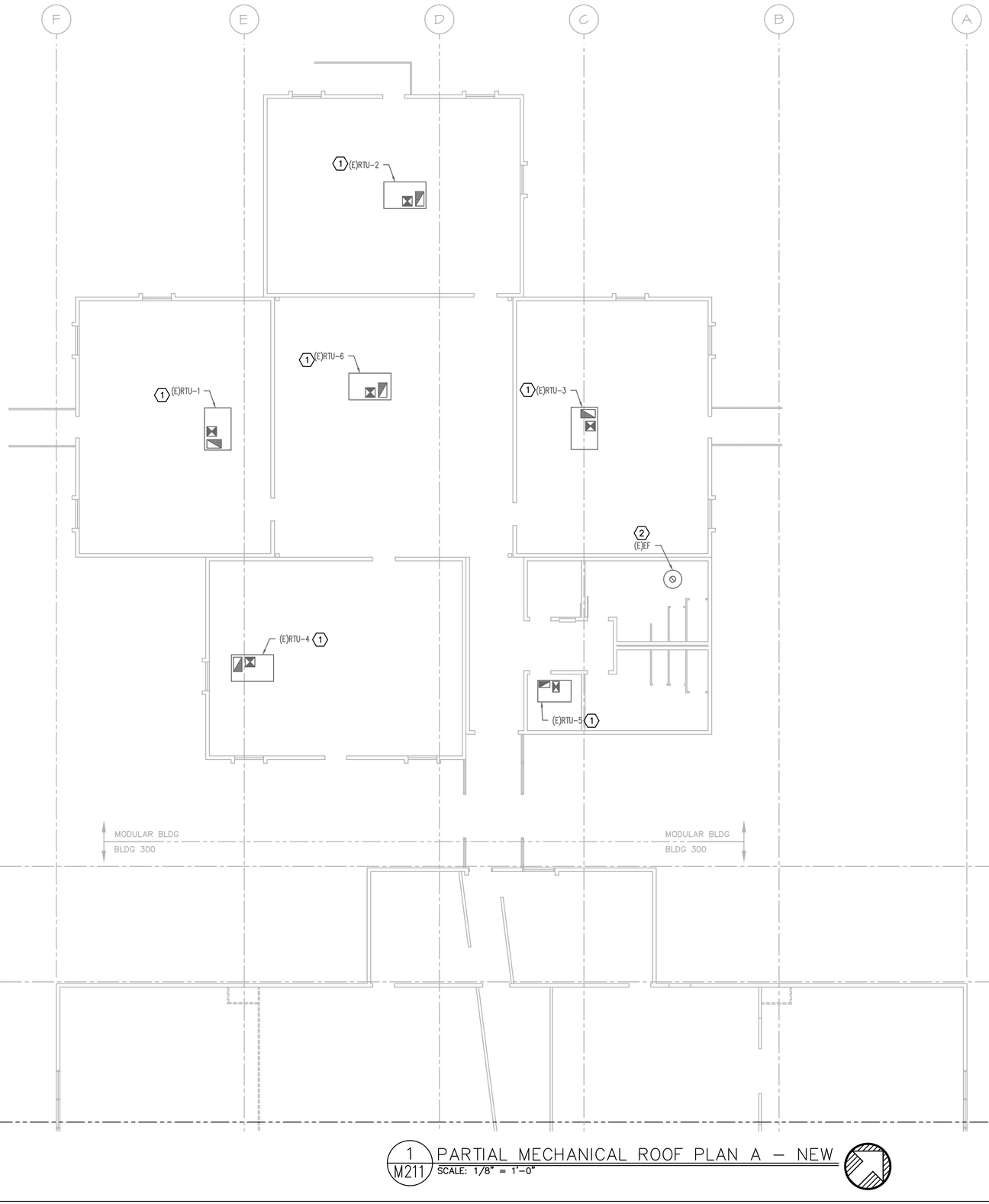

1 M211 PARTIAL MECHANICAL ROOF PLAN A – NEW
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(#) KEYED NOTES

1. EXISTING ROOF-TOP UNIT TO REMAIN. REPLACE (E)JCI CONTROLLER UNT WITH CURRENT JCI CONTROLLER. CONIVERT COMMUNICATION CABLE TO BACNET. PROVIDE NEW EQUIPMENT TAG. PROVIDE NEW GRAPHICS PER SPECIFICATIONS FOR THESE UNITS. SEE CONTROL DETAIL 1/M504. (1)

2. EXISTING EXHAUST FAN. CLEAN AND SERVICE UNIT PER SPECIFICATIONS. REPLACE CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. PROVIDE NEW EQUIPMENT TAG. REBALANCE TO THE INDICATED AIRFLOWS.

3. EXISTING DX CONDENSER UNIT REPLACE CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. CLEAN AND SERVICE UNIT AND COILS, EVACUATE AND RECHARGE REFRIGERANT.

4. EXISTING RELIEF AIR ROOF HOOD. CLEAN AND SERVICE UNIT PER SPECIFICATION. REPLACE DAMPER AND DAMPER ACTUATOR WITH NEW CONTROL DAMPER AND INTEGRATE TO BLDG DDC CONTROLS. PROVIDE NEW EQUIPMENT TAG.

5. EXISTING ROOF-TOP HEAT PUMP UNIT. SEE SPECS FOR SERVICING. PROVIDE NEW CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. RE-BALANCE TO THE LISTED AIRFLOW. PROVIDE NEW EQUIPMENT TAG.

6. NEW CONDENSING UNIT ON NEW VIBRATION ISOLATED AND SEISMIC RESTRAINT ROOF CURB. ROUTE NEW REFRIGERANT PIPING TO NEW DX COOLING COIL INSIDE. INTEGRATE TO BLDG. DDC CONTROLS. PROVIDE EQUIPMENT TAG.
   6.1. EXISTING DX CONDENSER UNIT TO BE REPLACED. REMOVE PIPING, VALVES AND DEVICES; REMOVE CONTROLS, CONTROL WIRING AND PERTAINING DEVICES. REMOVE ROOF CURB, PATCH AND FINISH ROOF AS REQUIRED TO MATCH EXISTING AND BY THE NEW UNIT LOCATION AND SIZE.

7. NEW EXHAUST FAN TO REPLACE EXISTING. REPLACE ON EXISTING ROOF CURB. REPLACE DAMPER AND ACTUATOR WITH NEW. INTEGRATE TO BLDG. DDC CONTROLS. PROVIDE EQUIPMENT TAG.

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

Date: 07/21/2021
Proj No: 10181
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

PARTIAL MECHANICAL ROOF PLAN – NEW

PERMIT/BID SET
SEPTEMBER 2021

KEY PLAN

MFIA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

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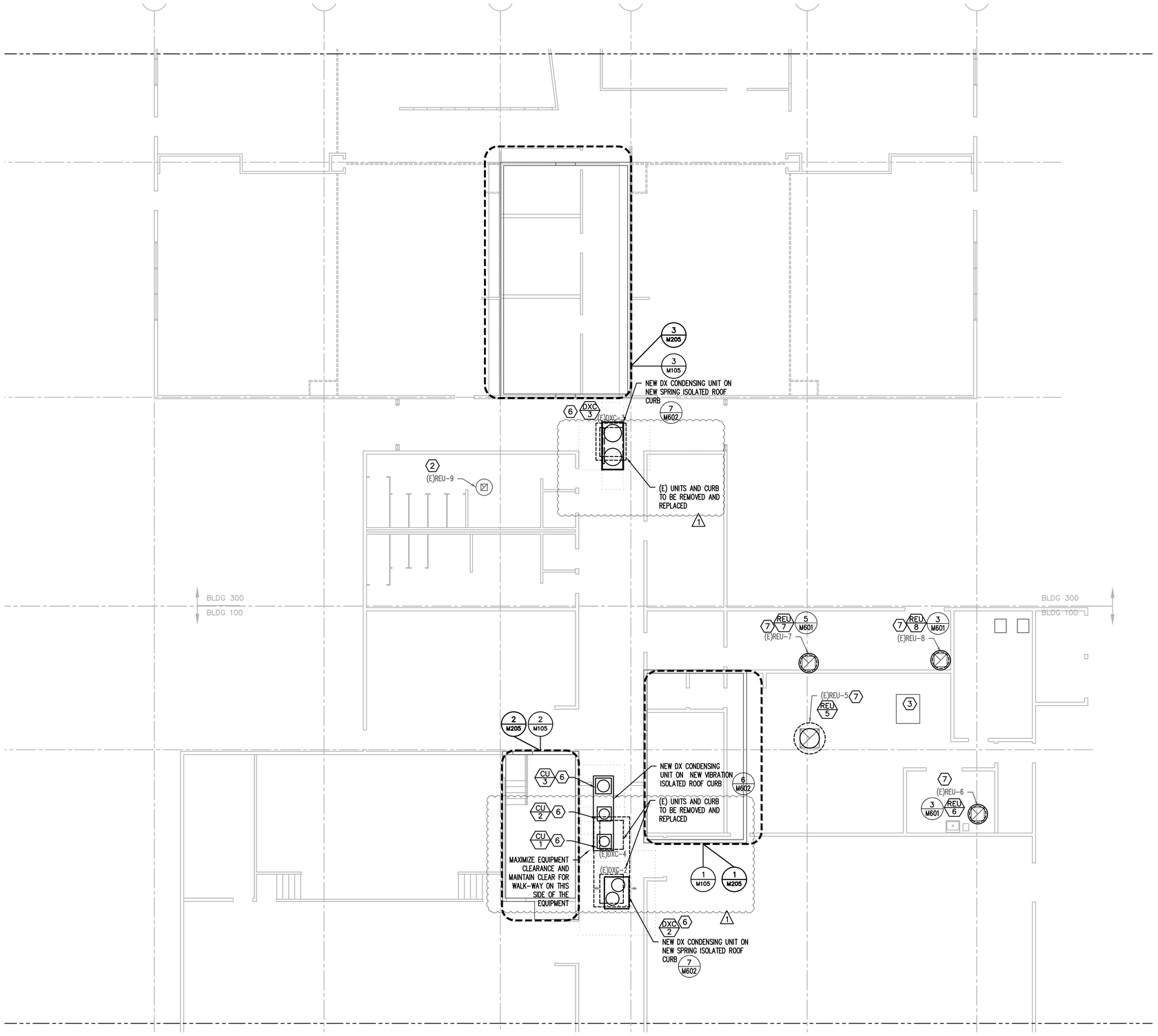

1 M212 PARTIAL MECHANICAL ROOF PLAN B
SCALE: 1/8" = 1'-0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS. (1)

C. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORTS.

D. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

E. FOR SINGLE ZONE SYSTEMS RE-BALANCE SUPPLY, RETURN AND EXHAUST GRILLES AIRFLOW PER PLANS. FOR VAV TERMINAL UNITS TOTAL AIRFLOW IN HEATING, DEAD BAND AND COOLING MODE IS NECESSARY BUT BALANCING OF INDIVIDUAL DIFFUSERS IS NOT. (1)

(#) KEYED NOTES

1. EXISTING ROOF-TOP UNIT TO REMAIN. REPLACE (E)JCI CONTROLLER UNT WITH CURRENT JCI CONTROLLER. CONVERT COMMUNICATION CABLE TO BACNET. PROVIDE NEW EQUIPMENT TAG. PROVIDE NEW GRAPHICS PER SPECIFICATIONS FOR THESE UNITS. SEE CONTROL DETAIL 1/M504. (1)
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3. EXISTING DX CONDENSER UNIT REPLACE CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. CLEAN AND SERVICE UNIT AND COILS, EVACUATE AND RECHARGE REFRIGERANT.
4. EXISTING RELIEF AIR ROOF HOOD. CLEAN AND SERVICE UNIT PER SPECIFICATION. REPLACE DAMPER AND DAMPER ACTUATOR WITH NEW CONTROL DAMPER AND INTEGRATE TO BLDG DDC CONTROLS. PROVIDE NEW EQUIPMENT TAG.
5. EXISTING ROOF-TOP HEAT PUMP UNIT. SEE SPECS FOR SERVICING. PROVIDE NEW CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. RE-BALANCE TO THE LISTED AIRFLOW. PROVIDE NEW EQUIPMENT TAG.
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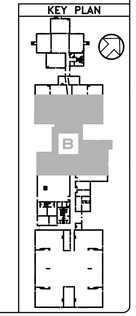
   - 6.1. EXISTING DX CONDENSER UNIT TO BE REPLACED. REMOVE PIPING, VALVES AND DEVICES; REMOVE CONTROLS, CONTROL WIRING AND PERTAINING DEVICES. REMOVE ROOF CURB, PATCH AND FINISH ROOF AS REQUIRED TO MATCH EXISTING AND BY THE NEW UNIT LOCATION AND SIZE.
7. NEW EXHAUST FAN TO REPLACE EXISTING. REPLACE ON EXISTING ROOF CURB. REPLACE DAMPER AND ACTUATOR WITH NEW. INTEGRATE TO BLDG. DDC CONTROLS. PROVIDE EQUIPMENT TAG.

KEY PLAN



REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

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BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

PARTIAL MECHANICAL ROOF PLAN - NEW

PERMIT/BID SET
SEPTEMBER 2021

MFIA INC.
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WWW.MFIA-ENG.COM

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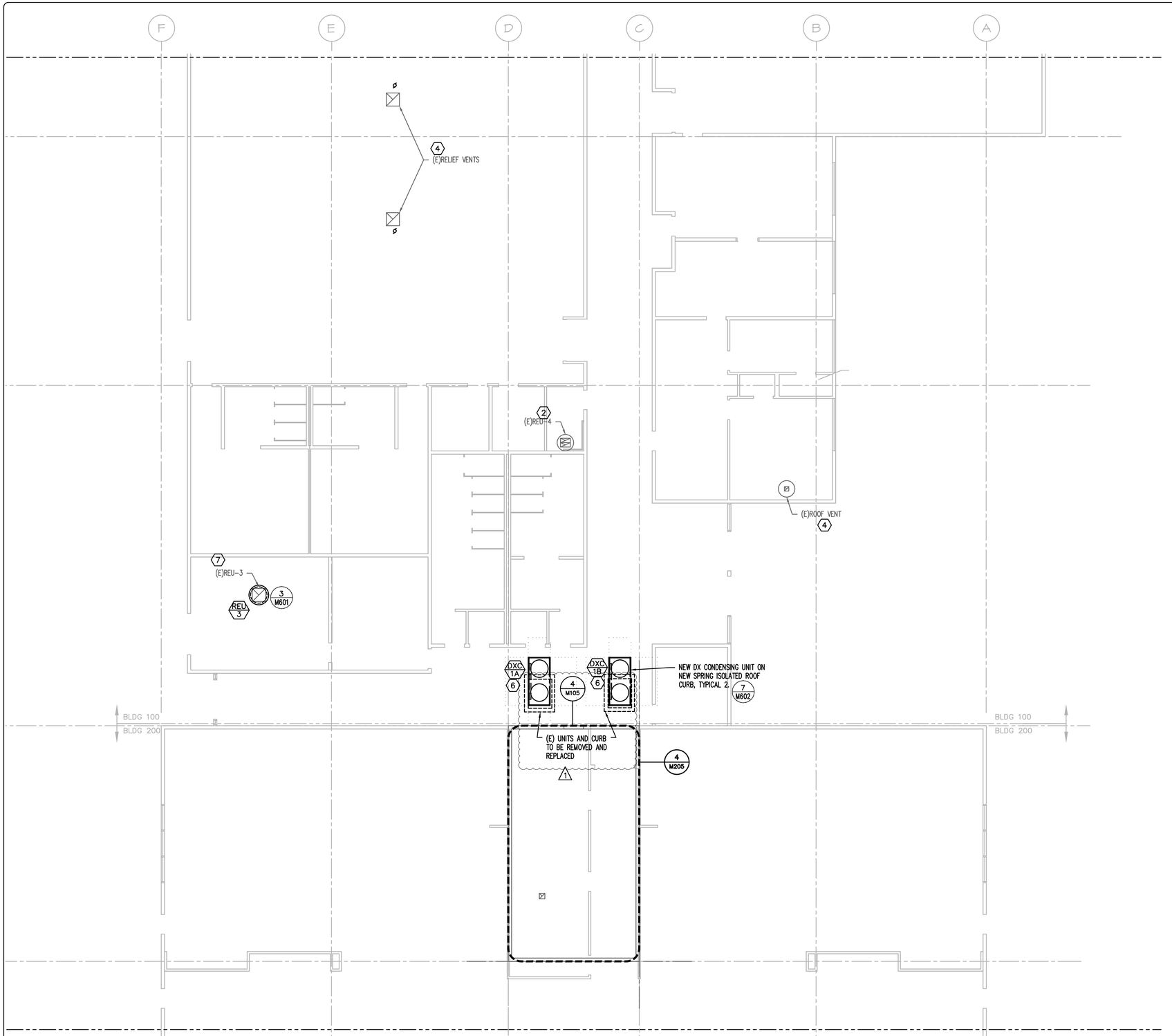

1 M213 PARTIAL MECHANICAL ROOF PLAN C

SCALE: 1/8" = 1'-0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS. (1)

C. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORTS.

D. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

E. FOR SINGLE ZONE SYSTEMS RE-BALANCE SUPPLY, RETURN AND EXHAUST GRILLES AIRFLOW PER PLANS. FOR VAV TERMINAL UNITS TOTAL AIRFLOW IN HEATING, DEAD BAND AND COOLING MODE IS NECESSARY BUT BALANCING OF INDIVIDUAL DIFFUSERS IS NOT. (1)

(#) KEYED NOTES

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5. EXISTING ROOF-TOP HEAT PUMP UNIT. SEE SPECS FOR SERVICING. PROVIDE NEW CONTROLS FOR BUILDING DDC SYSTEM INTEGRATION. RE-BALANCE TO THE LISTED AIRFLOW. PROVIDE NEW EQUIPMENT TAG.
6. NEW CONDENSING UNIT ON NEW VIBRATION ISOLATED AND SEISMIC RESTRAINT ROOF CURB. ROUTE NEW REFRIGERANT PIPING TO NEW DX COOLING COIL INSIDE. INTEGRATE TO BLDG. DDC CONTROLS. PROVIDE EQUIPMENT TAG.
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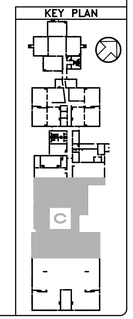
KEY PLAN



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BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD OREGON
BEAVERTON

PARTIAL MECHANICAL ROOF PLAN - NEW

PERMIT/BID SET
SEPTEMBER 2021

MFA INC.

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PHN: (503) 234-0548
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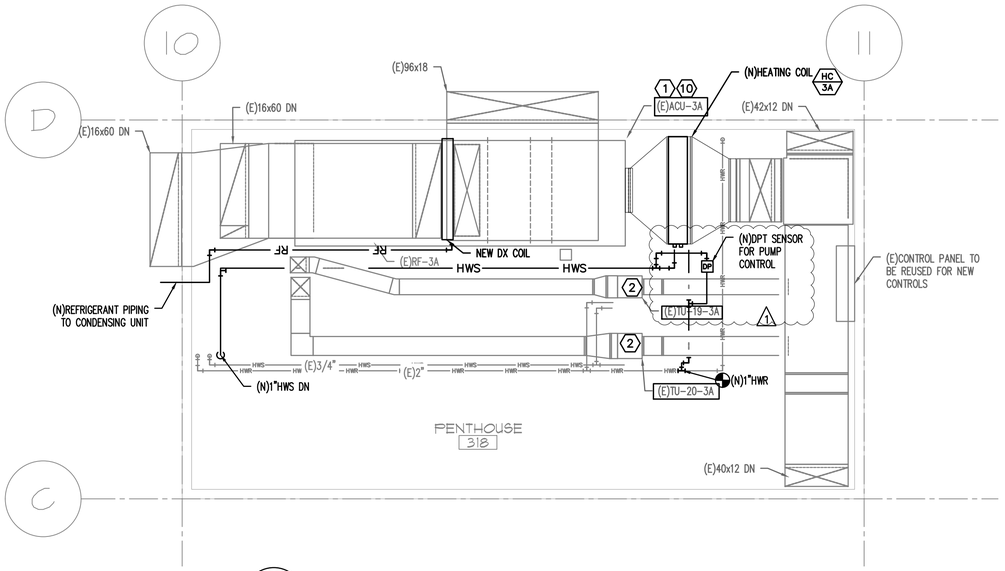
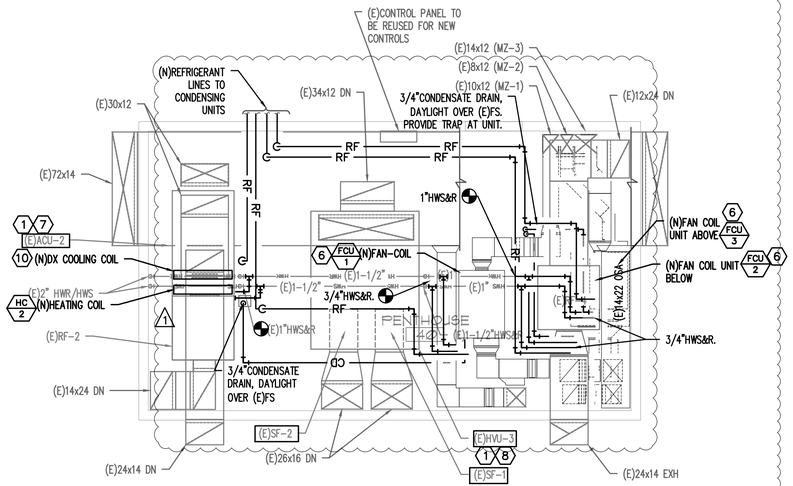
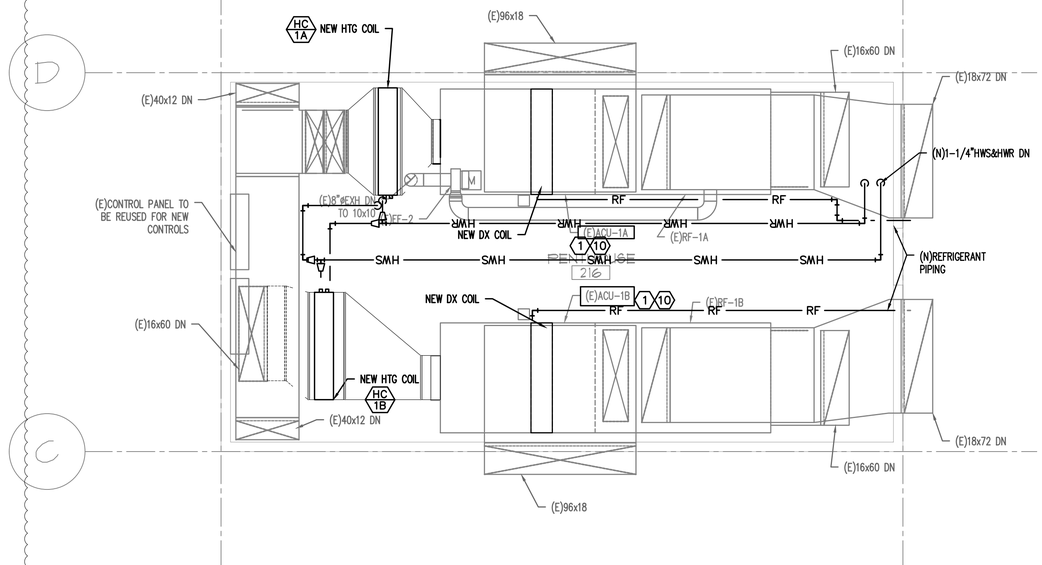


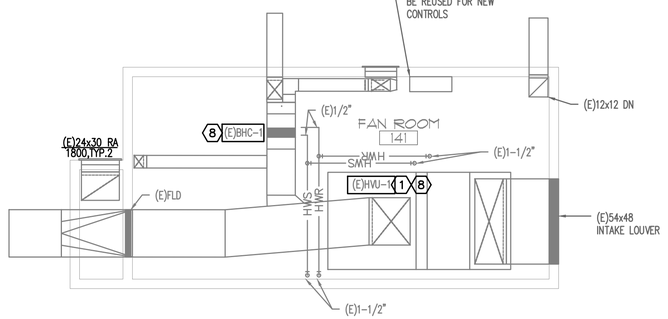
3 M305 ENLARGED MECHANICAL PENTHOUSE 318
SCALE: 1/4" = 1'-0"



1 M305 ENLARGED MECHANICAL PENTHOUSE 140
SCALE: 1/4" = 1'-0"



4 M305 ENLARGED MECHANICAL PENTHOUSE 216
SCALE: 1/4" = 1'-0"



2 M305 ENLARGED MECHANICAL FAN ROOM 141
SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO PERFORM PRESSURE TESTING OF (E)HEATING& WATER SYSTEM LINES PRIOR TO PLACING INTO SERVICE SYSTEM PER SPECIFICATIONS.

C. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS.

D. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORTS.

E. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

F. RE-BALANCE SUPPLY, RETURN AND EXHAUST GRILLES AIRFLOW PER PLANS.

KEYED NOTES

1. EXISTING AIR HANDLING UNIT. CLEAN AND SERVICE UNITS PER SPECS. REPLACE SUPPLY AND RETURN/EXHAUST FAN MOTOR, REPLACE DAMPERS AND DAMPER ACTUATORS AND CONTROL DEVICES. RE-BALANCE AIRFLOWS AND WATER FLOW. COORDINATE WITH ELECTRICAL AND CONTROLS. CONFIRM VOLTAGE, PHASE, ROTATION AND HORSEPOWER PRIOR TO SUBMITTAL. SEE SCHEDULE AND DETAIL SHEETS FOR REQUIREMENTS.
2. EXISTING TERMINAL UNIT. REMOVE AND REPLACE VAV CONTROLLER WITH NEW. REMOVE AND REPLACE CONTROL VALVE AND ISOLATION VALVE. REPLACE STRAINER AND ISOLATION VALVES. INSPECT AND CLEAN HEATING COIL. REBALANCE AIRFLOW AND WATERFLOW. SEE SCHEDULES AND DETAIL 1 OR 2/M602 FOR 2W OR 3W VALVE REQUIREMENTS.
3. EXISTING CABINET UNIT HEATER. CLEAN UNIT AND SERVICE PER SPECS. REPLACE CONTROL VALVE, ISOLATION VALVES AND STRAINER WITH NEW. REBALANCE AIRFLOW AND WATERFLOW. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. SEE SCHEDULES AND DETAIL 3/M602 FOR REQUIREMENT.
4. EXISTING EXHAUST FAN UNIT TO REMAIN, CLEAN AND SERVICE PER SPECS. REPLACE BDD DAMPER. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. REBALANCE AIRFLOW. SEE SCHEDULES FOR REQUIREMENT.
5. NEW DIGITAL DEVICE ZONE/SPACE THERMOSTAT TO REPLACE EXISTING IN SAME LOCATION. LABEL WITH ASSOCIATED EQUIPMENT INFORMATION. WHERE OLD SENSOR IS NO LONGER USED PROVIDE A STAINLESS STEEL COVER PLATE OVER HOLE & SECURE & PATCH WALL. PROVIDE FOR BLDG DDC INTEGRATION. REPAIR WALL AROUND NEW SENSOR.
6. NEW FAN COIL UNIT, ROUTE (N) REFRIGERANT PIPING TO OUTDOOR CONDENSING UNIT. PROVIDE (N) 3/4" HEATING WATER CONNECTIONS TO COIL. SEE DETAIL 4/M601.
7. PROVIDE NEW HEATING COIL INSIDE EXISTING AIR-HANDLING UNIT. SEE DETAIL 1/M602.
8. EXISTING HEATING COILS TO REMAIN. INSPECT AND CLEAN COIL. REMOVE AND REPLACE CONTROL VALVE, STRAINER AND ISOLATION VALVE WITH NEW. PROVIDE NEW CONTROLS SEE M5 SERIES FOR BLDG DDC INTEGRATION. REBALANCE AIRFLOW AND WATERFLOW. SEE SCHEDULES AND DETAIL 4/M602 FOR 2W VALVE REQUIREMENTS.
9. EXISTING DIGITAL CONTROL THERMOSTAT TO REMAIN.
10. NEW DX COOLING COIL TO REPLACE EXISTING DX COIL INSIDE EXISTING CABINET. ROUTE NEW REFRIGERANT PIPING TO NEW OUTDOOR CONDENSING UNIT. PROVIDE NEW CONDENSATE DRAIN AND CONNECT TO EXISTING. PROVIDE NEW CONTROLS FOR BLDG DDC INTEGRATION. SEE SCHEDULES FOR ADDITIONAL REQUIREMENT.
11. EXISTING FUSIBLE LINK FIRE DAMPER TO REMAIN.
12. UP TO EXISTING ROOF-TOP UNIT ON ROOF.

1

REGISTERED PROFESSIONAL ENGINEER 17884 OREGON JULY 25, 1995 SCOTT W. MILLER EXPIRES: 31DEC22

Date:	07/21/2021
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REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD OREGON
BEAVERTON

ENLARGED MECHANICAL PIPING PLANS

PERMIT/BID SET
SEPTEMBER 2021

MFIA INC.

Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
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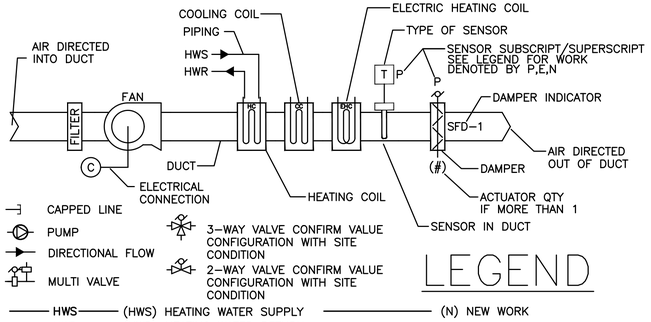


LEGEND

- CAPPED LINE
- PUMP
- DIRECTIONAL FLOW
- MULTI VALVE
- 3-WAY VALVE CONFIRM VALUE CONFIGURATION WITH SITE CONDITION
- 2-WAY VALVE CONFIRM VALUE CONFIGURATION WITH SITE CONDITION
- HWS (HWS) HEATING WATER SUPPLY
- HWR (HWR) HEATING WATER RETURN
- (N) NEW WORK
- (E) EXISTING
- (D) DEMOLISH
- (E) EXISTING
- (T) SPACE TEMPERATURE SENSOR
- (P) SPACE PRESSURE SENSOR
- (H) SPACE HUMIDITY SENSOR
- (DP) DIFFERENTIAL PRESSURE SENSOR
- (OS) OCCUPANCY SENSOR (SEE DIV 16)
- (OSA) OUTSIDE AIR
- H HUMIDITY SENSOR
- T TEMPERATURE SENSOR
- LL TEMPERATURE LOW LIMIT SENSOR
- FL FLUID LEVEL SENSOR
- CO CARBON DIOXIDE SENSOR
- T THERMOSTAT OR TEMP. SENSOR
- CONNECT TO EXISTING
- $ TIMER SWITCH
- $ SWITCH
- FSD FIRE/SMOKE DAMPER ACTUATOR
- CT CURRENT TRANSFORMER
- (M) MANOMETER
- VFD VARIABLE FREQUENCY DRIVE
- (C) CONTACTOR/STARTER
- MCC MOTOR CONTROL CENTER
- SD SMOKE DETECTOR
- F FLOW SENSOR
- P DUCT PRESSURE SENSOR
- (2)= 2 ACTUATORS PER DAMPER
- BAS – BUILDING AUTOMATION SYSTEM
- DDC – DIRECT DIGITAL CONTROL

CONTROL SUBSCRIPTS AND SUPERSCRIPTS:

(R) – REMOVE (E) DEVICE TO BE REPLACED WITH DIGITAL CONTROL DEVICE.
(E) – ELECTRONIC CONTROL DEVICE MAYBE RE-USED AT CONTRACTOR'S OPTION. OR REPLACE WITH DIGIT CONTROL SYSTEM COMPATIBLE DEVICE, UNLESS NOTED OTHERWISE.
(N) – NEW, IF DEVICE HAS NO SUPER SCRIPT DEVICE IS NEW

PIPING ABBREVIATIONS:

HWS – HEATING WATER SUPPLY
HWR – HEATING WATER RETURN
HW – DOMESTIC HOT WATER
CW – DOMESTIC COLD WATER
GPM – GALLONS PER MINUTE
DB – DOUBLE VALVE OPERATOR

EQUIPMENT ABBREVIATIONS :

P – PUMP
SP – SUMP PUMP
BP – BOOSTER PUMP
HWP – HEATING WATER PUMP
CHP – CHILLED WATER PUMP
CWP – CONDENSING WATER PUMP
CSP – COOLING TOWER SUMP PUMP
HWRP – DOMESTIC HOT WATER RECIRCULATION
VFD – VARIABLE FREQUENCY DRIVE
CT – CONTACTOR
CC – CONTROL COMPRESSOR
CH – CHILLER
B – BOILER
EF – EXHAUST FAN
RF – RETURN/RELIEF FAN
AH – AIR HANDLER
VAV – VARIABLE AIR VOLUME DAMPER BOX
AD – AREA DAMPER
SD – SMOKE DAMPER
SFD – FIRE SMOKE COMBO DAMPER
H – HUMIDIFIER
V – VALVE
WH – WATER HEATER
BAS – BUILDING AUTOMATION SYSTEM
CW – COLD WATER
MZU – MULTI ZONE UNIT
CEU – CABINET EXH. UNIT
HVU – HEATING VENTILATION UNIT
CFU – CEILING FAN UNIT
REU – ROOF EXH. UNIT
HC – HEATING COIL
ST – STEAM
CD – CONDENSATE RETURN
HWS – HEATING WATER SUPPLY
HWR – HEATING WATER RETURN

AIR FLOW ABBREVIATIONS

OSA – OUTSIDE AIR
RA – RETURN AIR
SA – SUPPLY AIR
EA – EXHAUSTED AIR

KEYED NOTES: (#)

1. NOT USED.
2. REMOVE DEVICE & PATCH CABINET / DUCTWORK.
3. MODIFY (E) STARTER/CONTACTOR TO OPERATE FROM DIGITAL SIGNAL.
4. NOT USED.

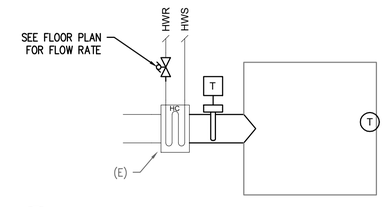
CONTROL INPUT/OUTPUT SCHEDULE

POINT NAME	HARDWARE POINTS: INPUT TO CONTROL DIGITAL	INPUT TO CONTROL ANALOG	OUTPUT TO SYSTEM DIGITAL	OUTPUT TO SYSTEM ANALOG	ALARM	TREND	SHOW ON GRAPHIC
GENERAL CONDITIONS-EXISTING POINTS							
OUTSIDE AIR TEMP		X				15 MIN	X
FIRE ALARM PANEL	X				X	COV	X
EXHAUST FAN: GENERAL EXHAUST 1/M501							
FAN MOTOR START/STOP			X			COV	X
FAN MOTOR STATUS PROOF	X				X	COV	
ZONE TEMPERATURE (REU-3, REU-8 ONLY)		X				15 MIN	X
SWITCH ENABLED (REU-5, REU-6 ONLY)	X					COV	X
CONTROL DAMPER (REU-3, REU-6 ONLY)			X				
DAMPER POSITION O/C (REU-3, REU-6 ONLY)	X					15 MIN	X
FAN SPEED (REU-5)				X		DCV	X
DUCT HEATING COIL 2/M501							
ZONE TEMPERATURE		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
HEATING VALVE				X		15 MIN	X
CABINET UNIT HEATER 3/M501							
FAN MOTOR START/STOP			X			COV	X
ZONE TEMPERATURE		X				15 MIN	X
FAN MOTOR STATUS PROOF	X				X	COV	
HEATING VALVE				X		15 MIN	X
UNIT HEATER 4/M501							
ZONE TEMPERATURE		X				15 MIN	X
FAN MOTOR STATUS PROOF	X				X	COV	
FAN MOTOR STATUS PROOF	X				X	COV	
DOMESTIC HOT WATER RECIRC 5/M501							
RETURN WATER TEMPERATURE		X				15 MIN	X
RECIRC PUMP START/STOP			X			15 MIN	X
OVERRIDE PANEL SWITCH (TYP. OF 6)	X				X	COV	X
OVERRIDE PANEL LIGHT (TYP. OF 6)			X		X	COV	X

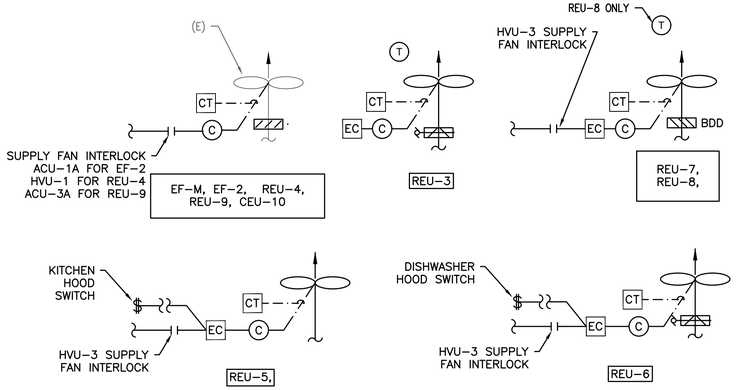
DEFINITIONS

AI ANALOG INPUT TO CONTROL
DI DIGITAL INPUT TO CONTROL
AO ANALOG OUTPUT TO SYSTEM
DO DIGITAL OUTPUT TO SYSTEM
AV ANALOG VALUE.
DVC DIGITAL VALUE.
COV CHANGE OF VALUE FOR DIGITAL POINTS.
DCV DIFFERENTIAL VALUE CHANGE FOR ANALOG POINTS.

0 M501 HVAC SYSTEM – ENVIRONMENTAL CONDITIONS
SCHEMATIC

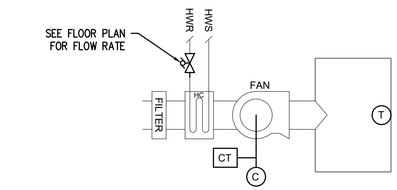


2 M501 DUCT BOOSTER HEATING COIL
SCHEMATIC

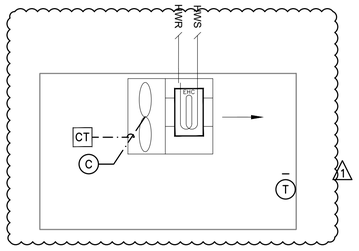


NOTES:
- SEE SCHEDULE FOR ASSOCIATED AIR HANDLER AND MEANS OF CONTROL.
- –.

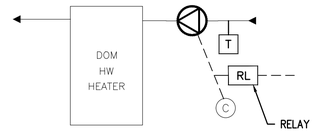
1 M501 EXHAUST FAN CONTROL DIAGRAM
SCHEMATIC



3 M501 CABINET UNIT HEATER
SCHEMATIC



4 M501 UNIT HEATER
SCHEMATIC



ADD RELAY AND MODIFY (E) STARTER/CONTACTOR TO OPERATE FROM DIGITAL SIGNAL.

5 M501 DOMESTIC HOT WATER
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

Date: 07/21/2021
Proj No: 10181
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

REV#1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

MECHANICAL CONTROLS

PERMIT/BID SET
SEPTEMBER 2021

MFA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFA-ENG.COM

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M501
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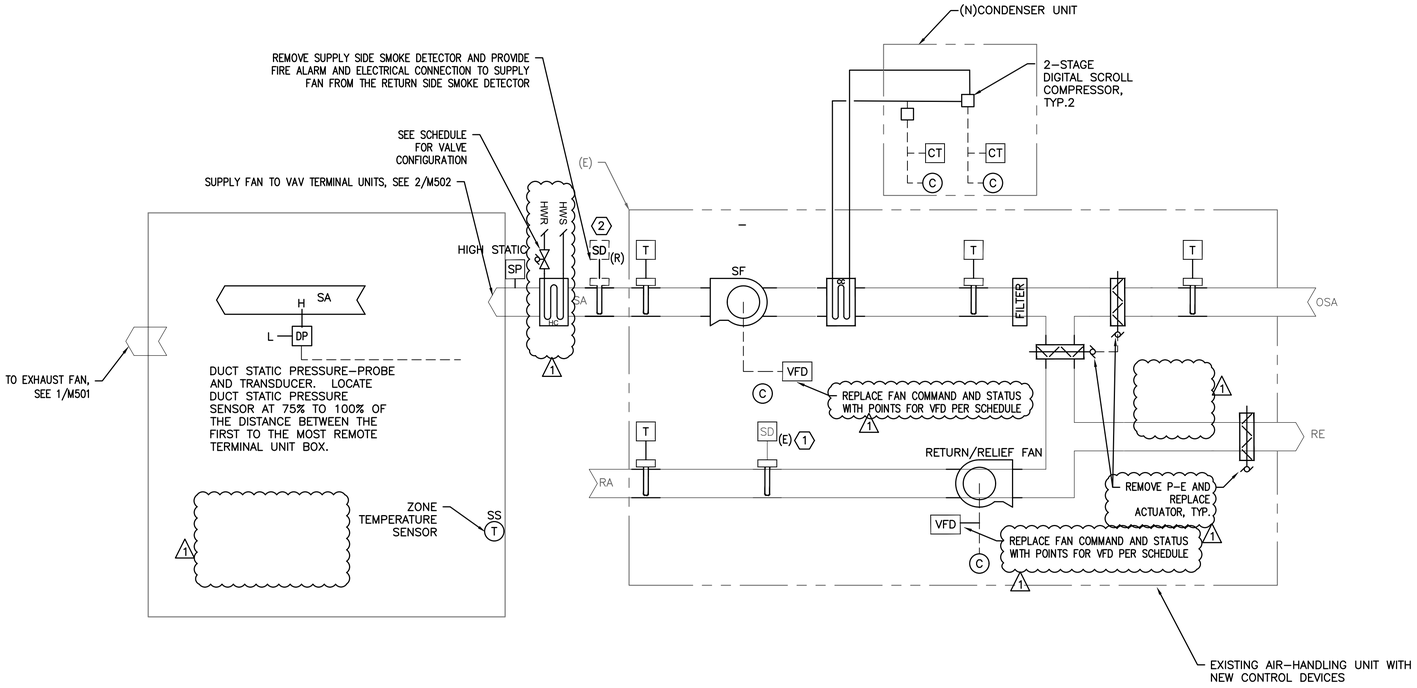
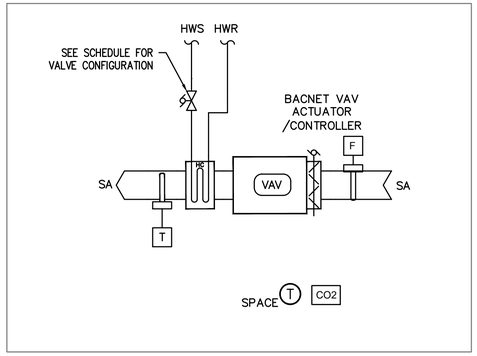
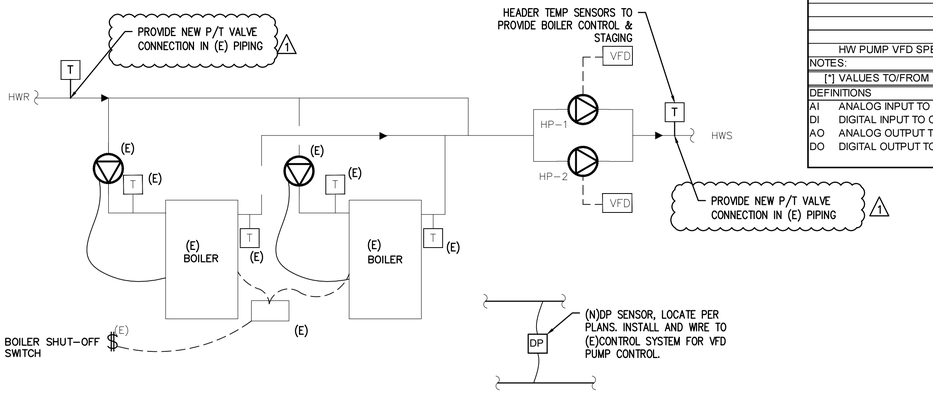


1 M502 EXISTING AIR HANDLING UNITS ACUs
SCHEMATIC
VAV MULTPLE ZONE AIR-HANDLING UNIT: ACU-1A, -1B, -3A



2 M502 TYPICAL VAV TERMINAL UNIT WITH REHEAT COIL
SCHEMATIC



3 M502 BOILER CONTROL DIAGRAM
SCALE: SCHEMATIC

CONTROL INPUT/OUTPUT SCHEDULE

POINT NAME	HARDWARE POINTS: INPUT TO CONTROL DIGITAL	INPUT TO CONTROL ANALOG	OUTPUT TO SYSTEM DIGITAL	OUTPUT TO SYSTEM ANALOG	ALARM	TREND	SHOW ON GRAPHIC
1							
AIR HANDLING UNITS: TYP; ACU-1A,-1B,&-3A; SEE 1/M502							
1							
RETURN AIR TEMP		X				15 MIN	X
MIXED AIR TEMP		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
OUTSIDE AIR DAMPER				X		15 MIN	X
RETURN AIR DAMPER				X		15 MIN	X
RELIEF DAMPER				X		15 MIN	X
SUPPLY FAN STATUS	X					COV	X
SUPPLY FAN START/STOP			X			COV	X
SUPPLY FAN SPEED				X		DCV	X
RETURN FAN STATUS	X					COV	X
RETURN FAN START/STOP			X			COV	X
RETURN FAN SPEED				X		DCV	X
1 *HIGH DUCT STATIC, TYP.1*	X				X	COV	X
SUPPLY DUCT DIFFERENTIAL PRESSURE		X			X	DCV	X
[E]SMOKE DETECTOR	X				X	COV	X
1 ***CONDENSING UNIT***							
CONDENSING UNIT ENABLE			X			COV	X
VAV TERMINAL UNITS: TYPICAL, SEE 2/M502							
ZONE TEMPERATURE		X				15 MIN	X
TERMINAL UNIT AIRFLOW		X				DCV	X
DAMPER POSITION				X		15 MIN	
HEATING VALVE				X		15 MIN	X
SPACE CO2 LEVEL		X			X	15 MIN	
DISCHARGE AIR TEMP		X				15 MIN	X
CONTROLS FOR BOILER SYSTEM, SEE 3/M502							
1							
HEATING SYSTEM ENABLE [*]			X			COV	X
HWS RESET [*]				X		15 MIN	X
HEATING SYSTEM ALARM/FAULT [*]	X				X		X
BOILER SUPPLY WATER TEMPERATURE (TYP.2) [*]		X				15 MIN	X
SYSTEM SUPPLY WATER TEMPERATURE [*]		X				15 MIN	X
SYSTEM RETURN WATER TEMPERATURE		X				15 MIN	X
SYSTEM DIFFERENTIAL PRESSURE		X				15 MIN	X
BOILER SHUT-OFF SWITCH (TYP.2)	X				X		X
1							
HW PUMP VFD START/STOP (TYP.2)			X			COV	
HW PUMP VFD STATUS (TYP.2)		X			X	COV	X
HW PUMP VFD SPEED CONTROL (TYP.2)				X		DCV	X

NOTES:
[*] VALUES TO/FROM BOILER CONTROLLER

DEFINITIONS

AI	ANALOG INPUT TO CONTROL	AV	ANALOG VALUE.
DI	DIGITAL INPUT TO CONTROL	DVC	DIGITAL VALUE.
AO	ANALOG OUTPUT TO SYSTEM	COV	CHANGE OF VALUE FOR DIGITAL POINTS.
DO	DIGITAL OUTPUT TO SYSTEM	DCV	DIFFERENTIAL VALUE CHANGE FOR ANALOG POINTS.

REGISTERED PROFESSIONAL ENGINEER
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OREGON
JULY 25, 1986
SCOTT W. MILLER
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PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

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M502
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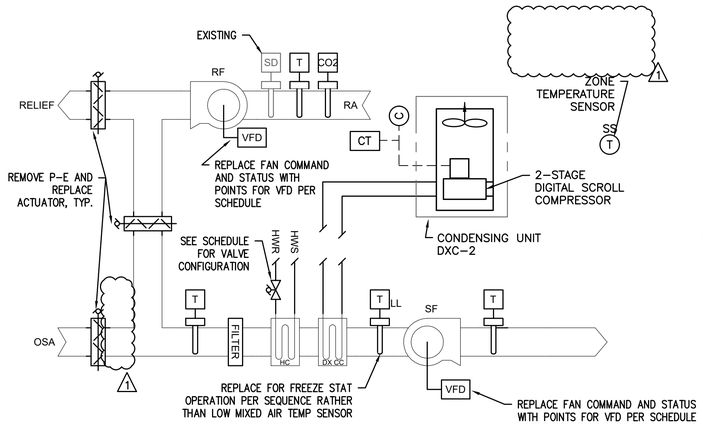
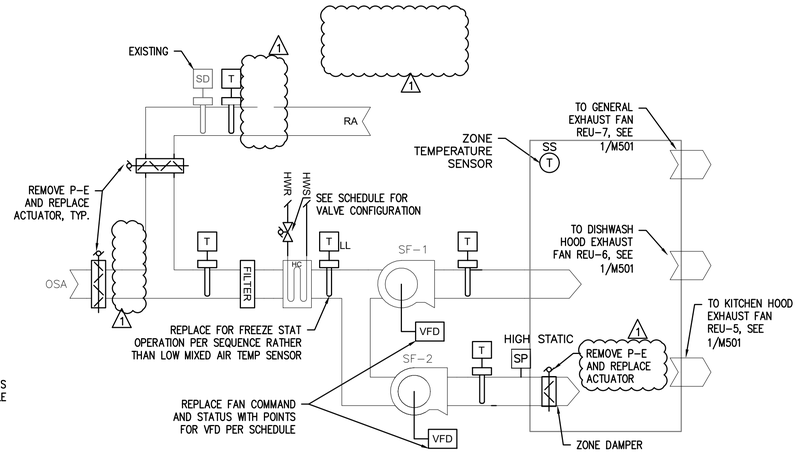
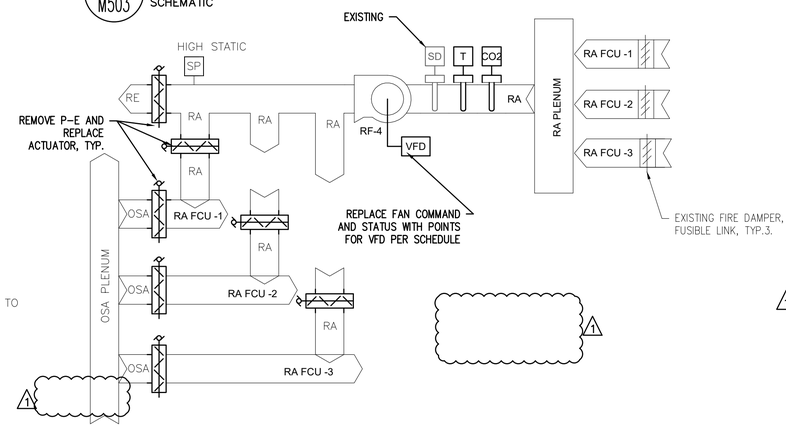
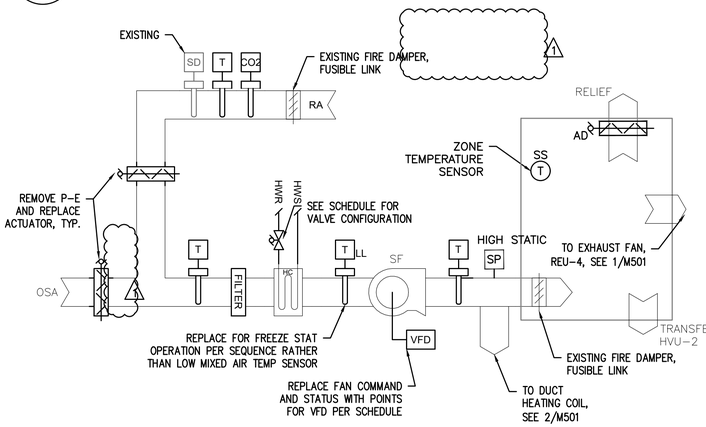


1 M503 (E)AIR HANDLING UNITS W/HTG AND DX CLG COIL
SCHEMATIC
VAV SINGLE ZONE AIR-HANDLING UNIT: ACU-2

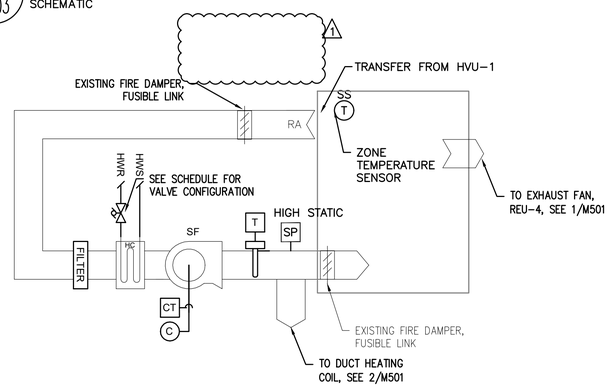


4 M503 (E)HEATING & VENTILATING UNIT, HVU-3
SCHEMATIC

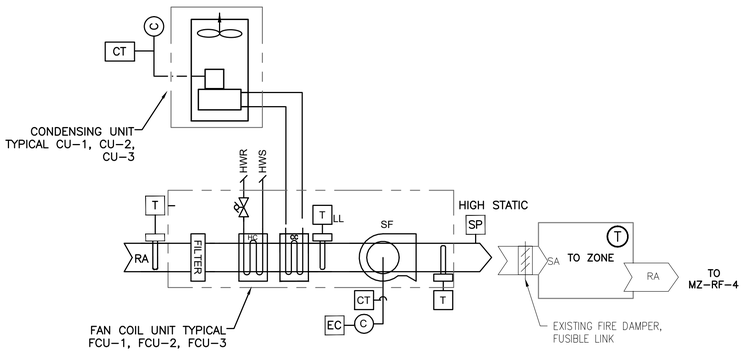




2 M503 (E)HEATING AND VENTILATING UNIT, HVU-1
SCHEMATIC



3 M503 (E)HEATING AND VENTILATING UNIT, HVU-2
SCHEMATIC



5 M503 (N)DX FAN COIL UNITS AND MZU-RF-4
SCHEMATIC
FAN COIL UNIT WITH DX COOLING AND HYDRONIC HEATING COIL

CONTROL INPUT/OUTPUT SCHEDULE

POINT NAME	HARDWARE POINTS: INPUT TO CONTROL DIGITAL	INPUT TO CONTROL ANALOG	OUTPUT TO SYSTEM DIGITAL	OUTPUT TO SYSTEM ANALOG	ALARM	TREND	SHOW ON GRAPHIC
AIR HANDLER UNITS: TYP: ACU-2, SEE 1/M503							
SUPPLY FAN VFD STATUS	X					COV	X
SUPPLY FAN VFD START/STOP			X			COV	X
SUPPLY FAN VFD SPEED				X		DCV	X
MIXED AIR TEMP		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
RETURN AIR TEMP		X				15 MIN	X
LOW TEMPERATURE LIMIT	X				X	COV	X
[E]SMOKE DETECTOR	X				X	COV	X
OUTSIDE AIR DAMPER POSITION				X		15 MIN	X
EXHAUST AIR DAMPER POSITION				X		15 MIN	X
RETURN AIR DAMPER POSITION				X		15 MIN	X
ZONE DAMPER POSITION			X			COV	X
HEATING WATER VALVE				X		15 MIN	X
SPACE TEMPERATURE		X				15 MIN	X
CONDENSING UNIT COMPRESSOR STATUS	X				X	COV	X
CONDENSING UNIT COMPRESSOR START/STOP			X			COV	X
CONDENSING UNIT COMPRESSOR SPEED				X		DCV	X
HEATING AND VENTILATING UNITS: TYP: HVU-1, SEE 2/M503							
SUPPLY FAN VFD STATUS	X					COV	X
SUPPLY FAN VFD START/STOP			X			COV	X
SUPPLY FAN VFD SPEED				X		DCV	X
MIXED AIR TEMP		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
RETURN AIR TEMP		X				15 MIN	X
RETURN AIR CO2 LEVEL		X			X	15 MIN	
LOW TEMPERATURE LIMIT	X				X	COV	X
[E]SMOKE DETECTOR	X				X	COV	X
OUTSIDE AIR DAMPER POSITION				X		15 MIN	X
RELIEF AIR DAMPER POSITION, TYP. 2.			X	X		15 MIN	X
RETURN AIR DAMPER POSITION				X		15 MIN	X
HEATING WATER VALVE				X		15 MIN	X
HIGH DUCT STATIC	X				X	COV	X
SPACE TEMPERATURE		X				15 MIN	X
HEATING AND VENTILATING UNITS: TYP: HVU-2, SEE 3/M503							
SUPPLY FAN STATUS	X					COV	X
SUPPLY FAN START/STOP			X			COV	X
DISCHARGE AIR TEMP		X				15 MIN	X
HEATING WATER VALVE				X		15 MIN	X
HIGH DUCT STATIC	X				X	COV	X
SPACE TEMPERATURE		X				15 MIN	X
HEATING AND VENTILATING UNITS: TYP: HVU-3, SEE 4/M503							
SUPPLY FAN VFD STATUS, TYP. 2	X					COV	X
SUPPLY FAN VFD START/STOP, TYP.2			X			COV	X
SUPPLY FAN VFD SPEED, TYP.2				X		DCV	X
MIXED AIR TEMP		X				15 MIN	X
DISCHARGE AIR TEMP, TYP. 2		X				15 MIN	X
RETURN AIR TEMP		X				15 MIN	X
RETURN AIR CO2 LEVEL		X			X	15 MIN	
LOW TEMPERATURE LIMIT	X				X	COV	X
[E]SMOKE DETECTOR	X				X	COV	X
OUTSIDE AIR DAMPER POSITION				X		15 MIN	X
RETURN AIR DAMPER POSITION				X		15 MIN	X
HEATING WATER VALVE				X		15 MIN	X
HIGH DUCT STATIC	X				X	COV	X
SPACE TEMPERATURE		X				15 MIN	X
DX FAN COIL UNITS & MZU-RF-4, SEE 5/M503							
RETURN/RELIEF FAN VFD STATUS	X					COV	X
RETURN/RELIEF FAN VFD START/STOP			X			COV	X
RETURN/RELIEF FAN VFD SPEED				X		DCV	X
HIGH DUCT STATIC	X				X	COV	X
[E]SMOKE DETECTOR	X				X	COV	X
RETURN AIR TEMP		X				15 MIN	X
RETURN AIR CO2 LEVEL		X			X	15 MIN	
EXHAUST AIR DAMPER POSITION				X		15 MIN	X
FAN-COIL UNIT, TYPICAL 3							
SPACE TEMP		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
SUPPLY FAN STATUS	X					COV	X
SUPPLY FAN START/STOP			X			COV	X
LOW LIMIT AIR TEMP	X					15 MIN	X
HEATING WATER VALVE				X		15 MIN	X
MIXED AIR TEMP		X				15 MIN	X
OSA DAMPER				X		15 MIN	X
RA DAMPER				X		15 MIN	X
HIGH DUCT STATIC	X				X	COV	X
CONDENSING UNIT TYPICAL 3							
CONDENSING UNIT STATUS	X				X	COV	X
CONDENSING UNIT START/STOP			X			COV	X

DEFINITIONS

AI	ANALOG INPUT TO CONTROL	AV	ANALOG VALUE.
DI	DIGITAL INPUT TO CONTROL	DVC	DIGITAL VALUE.
AO	ANALOG OUTPUT TO SYSTEM	COV	CHANGE OF VALUE FOR DIGITAL POINTS.
DO	DIGITAL OUTPUT TO SYSTEM	DCV	DIFFERENTIAL VALUE CHANGE FOR ANALOG POINTS.

REGISTERED PROFESSIONAL ENGINEER 17884 OREGON JULY 25, 1986 SCOTT W. MILLER EXPIRES: 31DEC22

REV#1	10/20/21 ADDENDUM#1
Date:	07/21/2021
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Drawn By:	MG
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DSGN By:	MG
Acad File:	

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

MECHANICAL CONTROLS

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SEPTEMBER 2021

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PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

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M503
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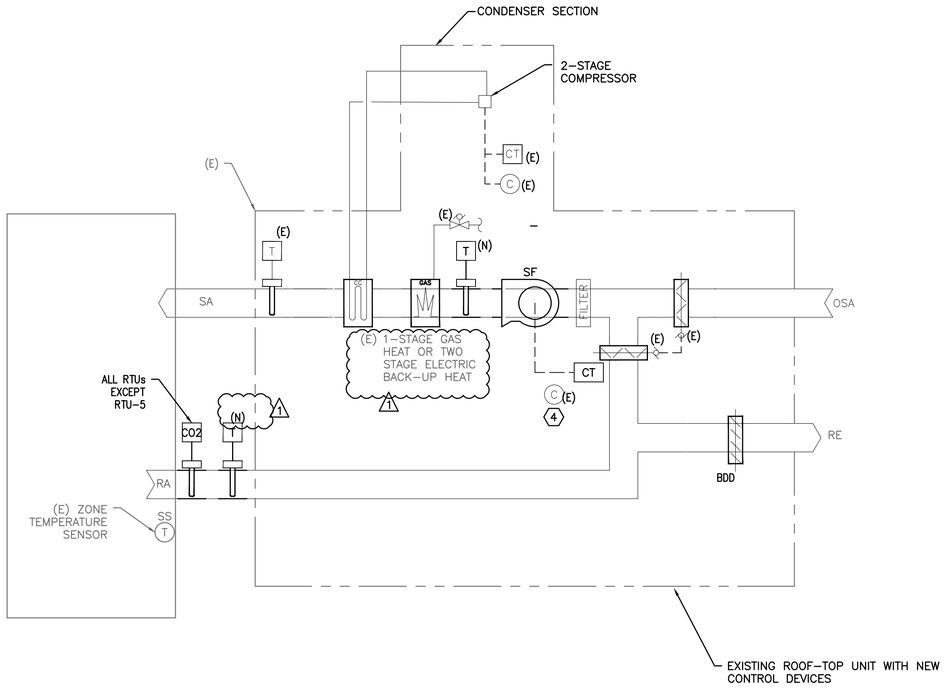

1 M504 EXISTING ROOF-TOP UNITS (RTU & HP) 1

SCHEMATIC

SINGLE ZONE ROOF-TOP UNITS

CONTROL INPUT/OUTPUT SCHEDULE

POINT NAME	HARDWARE POINTS: INPUT TO CONTROL DIGITAL	INPUT TO CONTROL ANALOG	OUTPUT TO SYSTEM DIGITAL	OUTPUT TO SYSTEM ANALOG	ALARM	TREND	SHOW ON GRAPHIC
ROOF-TOP UNITS: TYP: RTU-1 THROUGH RTU-6; SEE 1/M504 AND HP-1							
SPACE TEMP		X				15 MIN	X
RETURN AIR TEMP		X				15 MIN	X
MIXED AIR TEMP		X				15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
HEATING ENABLE/DISABLE			X			COV	X
COOLING ENABLE/DISABLE STAGE 1			X			COV	X
COOLING ENABLE/DISABLE STAGE 2			X			COV	X
RTUs ONLY: RETURN AIR CO2 LEVEL		X			X	15 MIN	
HP-1 ONLY: ELECTRIC HEAT (TYP. 2)			X			COV	X

1

NOTES:

DEFINITIONS

AI	ANALOG INPUT TO CONTROL	AV	ANALOG VALUE.
DI	DIGITAL INPUT TO CONTROL	DVC	DIGITAL VALUE.
AO	ANALOG OUTPUT TO SYSTEM	COV	CHANGE OF VALUE FOR DIGITAL POINTS.
DO	DIGITAL OUTPUT TO SYSTEM	DCV	DIFFERENTIAL VALUE CHANGE FOR ANALOG POINTS.

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M504
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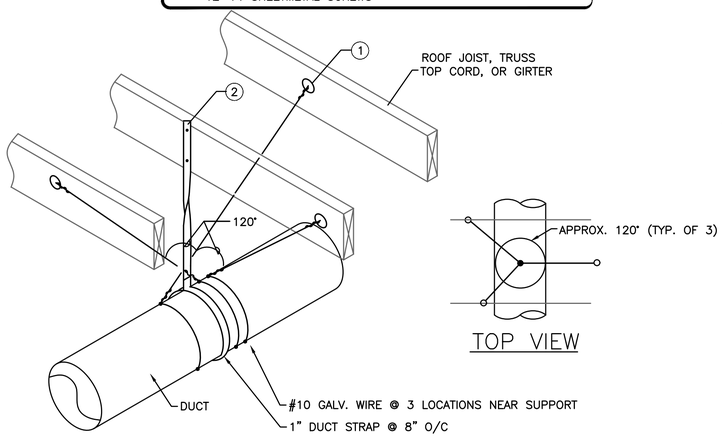
DETAIL NOTES

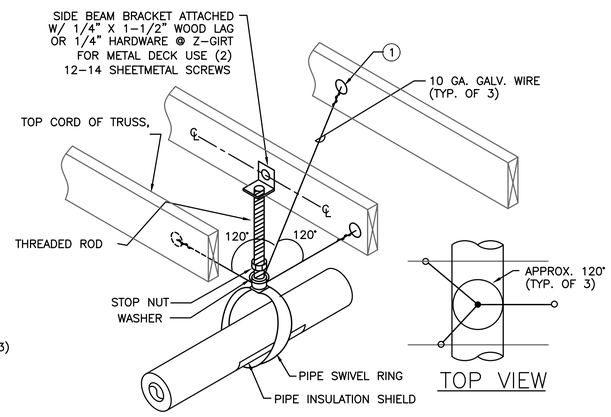
(1) – 1/4" GALV. THREADED EYE BOLT @ CENTER OF WOOD MEMBER (TYP. OF 3). FOR Z-GIRT USE MACHINE THREAD EYE BOLT W/ JAMB NUT & 1/4" WASHER @ EACH SIDE OF GIRT. FOR METAL DECK USE 12 SHEETMETAL SCREWS & 16 GA. MIN STRUT ANGLE CLIP

(2) – ATTACH TO TOP CORD. OF TRUSS ONLY OR WOOD JOIST W/ #12 X 1-5/8 DECK SCREW @ MIN. 1" FROM WOOD MATERIAL EDGE. ATTACH TO Z-GIRT W/ (2) #12 TEK SCREWS. FOR METAL DECK USE (2) 12-14 SHEETMETAL SCREWS



- FOR SHEETMETAL DUCTS 11" TO 27" IN DIAMETER & ALL SQUARE OR RECTANGULAR DUCTS (STRAP ALONE IS SUFFICIENT FOR DUCTS SMALLER THAN 11" IN DIAMETER)
- STRAP INTERVAL MAY BE DECREASED (LESS THAN 96" O/C TO REDUCE THE NEED FOR WIRE TIES AS DETAILED. CONSULT ENGINEER OR SMACNA STANDARDS

1 M601 DUCT SUPPORT
SCALE: DETAIL

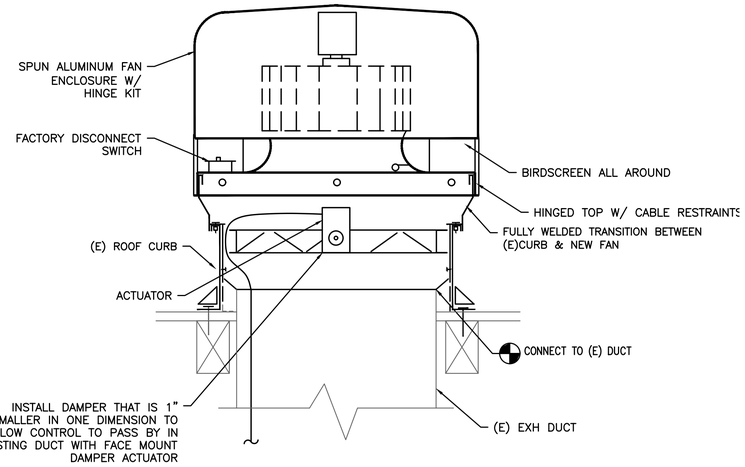


DETAIL NOTES

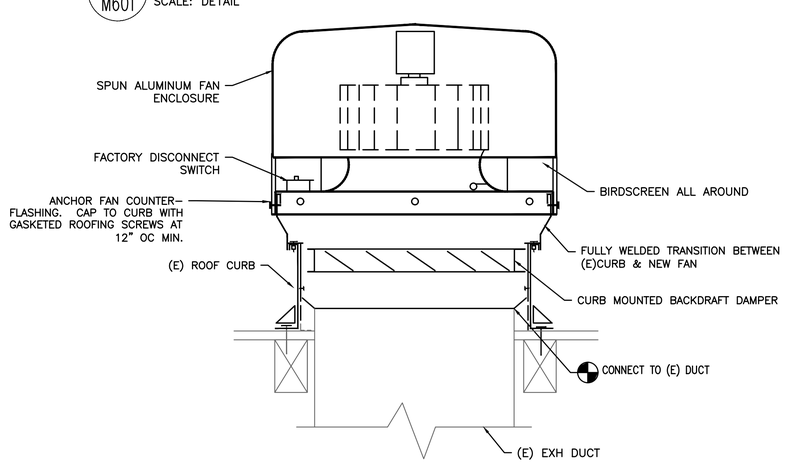
(1) – 1/4" GALV. THREADED EYE BOLT @ CENTER OF WOOD MEMBER (TYP. OF 3). FOR 2 GIRT USE MACHINE THREAD EYE BOLT W/ JAMB NUT & 1/4" WASHER @ EACH SIDE OF GIRT USE 12 SHEETMETAL SCREWS & 16 GA MIN. 16 GA. MIN STRUT ANGLE CLIP

- FOR SINGLE 1-1/2" TO 3" STEEL LINES
- FOR SINGLE 2" COPPER LINES

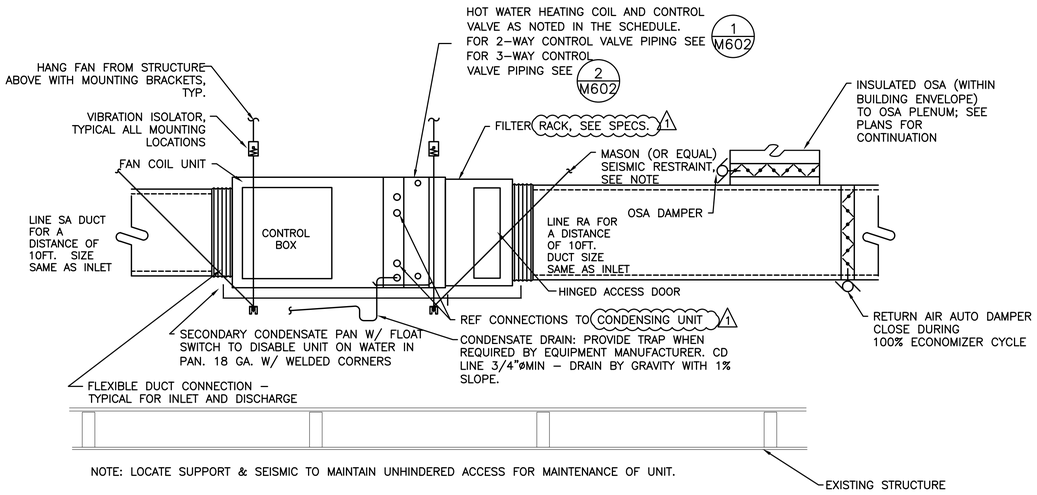
2 M601 PIPE SUPPORT
SCALE: DETAIL



3 M601 NEW EXHAUST FAN W/AUTO DAMPER ON (E) CURB
SCALE: DETAIL



5 M601 NEW EXHAUST FANS ON (E) CURB
SCALE: DETAIL



NOTE: LOCATE SUPPORT & SEISMIC TO MAINTAIN UNHINDERED ACCESS FOR MAINTENANCE OF UNIT.

4 M601 FAN COIL UNIT
SCALE: DETAIL

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

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18100 SW BANY ROAD OREGON
BEAVERTON

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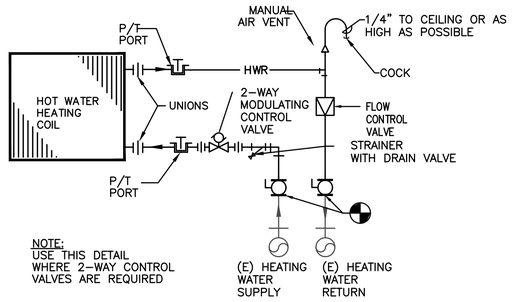
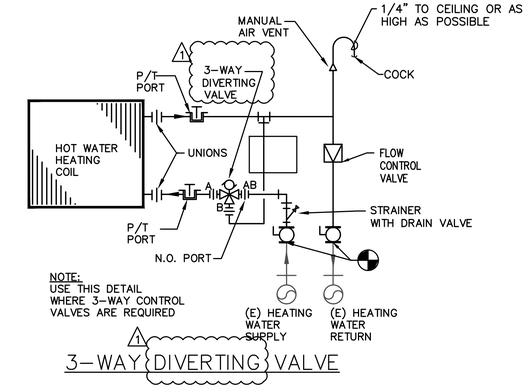


1 M602 COIL PIPING DIAGRAM
SCALE: DETAIL



2 M602 COIL PIPING DETAIL
SCALE: DETAIL

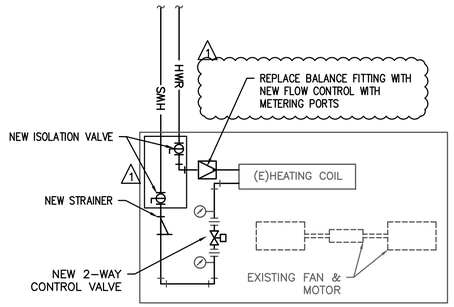


DIAGRAM NOTES:

1. REMOVE EXISTING STRAINER SCREEN, CLEAN AND REINSTALL.

3 M602 (E)PIPING DIAGRAM TYP CUH
SCALE: DETAIL

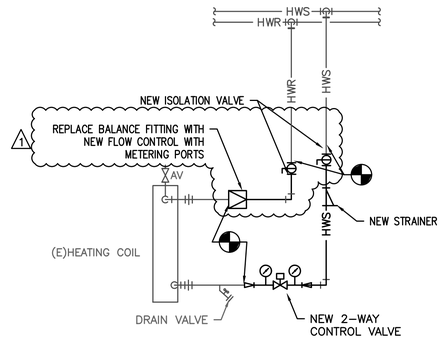
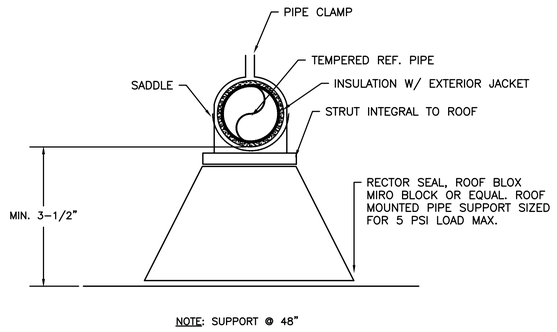


DIAGRAM NOTES:

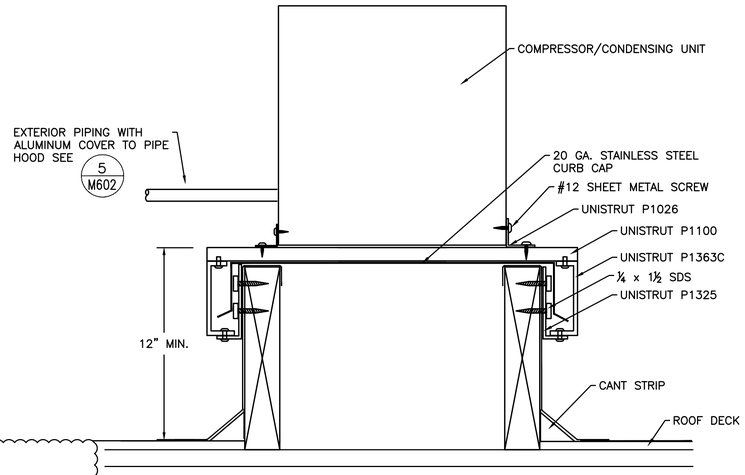
1. HEATING COIL AND DUCT HEATING COILS DIAGRAM
2. REPLACE STRAINERS.

4 M602 (E)HEATING COIL WITH 2-WAY VALVE
SCALE: DETAIL



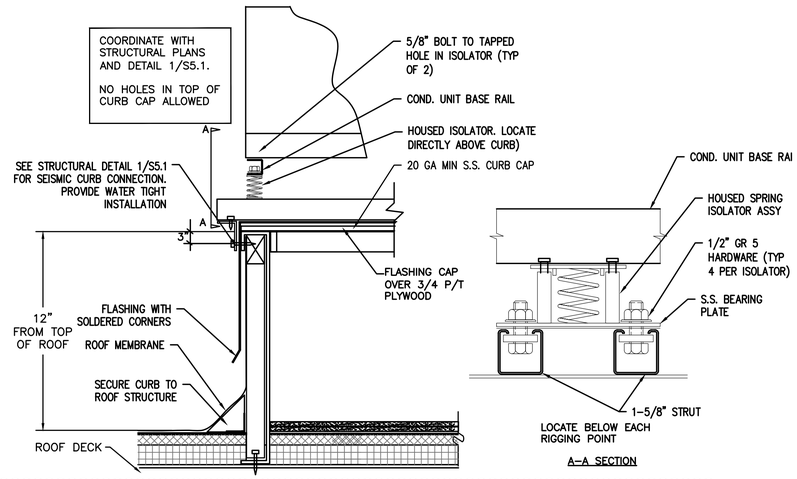
NOTE: SUPPORT @ 48"

5 M602 ROOF MOUNTED REFRIGERANT PIPE
SCALE: DETAIL



NOTES:
1. DO NOT ATTACHED UNIT DIRECTLY TO CURB CAP.
2. PROCURE THE SERVICES OF A ROOFING CONTRACTOR THAT IS APPROVED BY THE ROOF MANUFACTURE. THE ROOF IS UNDER WARRANTY AND ANY WORK MUST BE COMPLETED BY AN APPROVED CONTRACTOR TO MAINTAIN WARRANTY.

6 M602 SMALL CONDENSING UNIT DETAIL
NOT TO SCALE



NOTES:
1. DO NOT ATTACHED UNIT DIRECTLY TO CURB CAP.
2. PROCURE THE SERVICES OF A ROOFING CONTRACTOR THAT IS APPROVED BY THE ROOF MANUFACTURE. THE ROOF IS UNDER WARRANTY AND ANY WORK MUST BE COMPLETED BY AN APPROVED CONTRACTOR TO MAINTAIN WARRANTY.

7 M602 CURB DETAIL FOR CONDENSING UNITS LARGER THAN 5-TON
SCALE: DETAIL

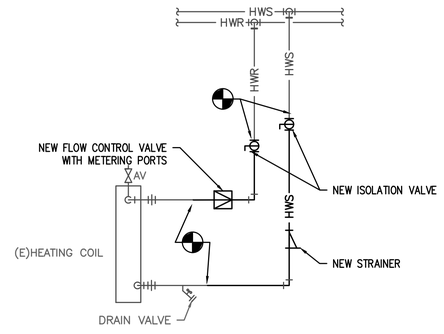


DIAGRAM NOTES:

1. UNIT HEATER COIL WITHOUT CONTROL VALVE.

8 M602 (E)UNIT HEATER COIL
SCALE: DETAIL

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
[EXPIRES: 31DEC22]

Date:	07/21/2021
Proj No:	10181
Drawn By:	MG
Chkd By:	SWM
DSGN By:	MG
Acad File:	

REV#	1 10/20/21 ADDENDUM#1

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD OREGON
BEAVERTON

MECHANICAL DETAILS

PERMIT/BID SET
SEPTEMBER 2021

MFIA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

SHEET
M602
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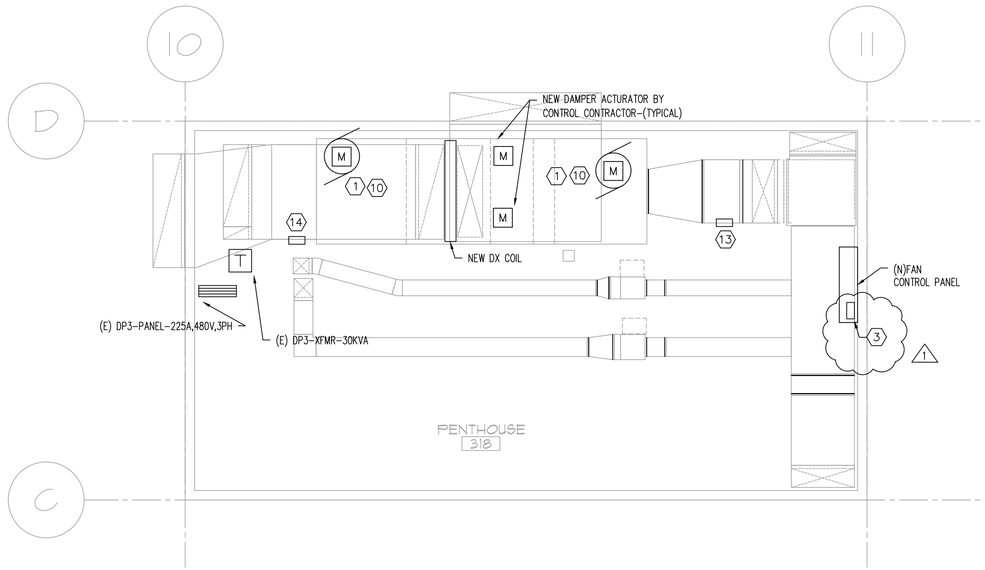
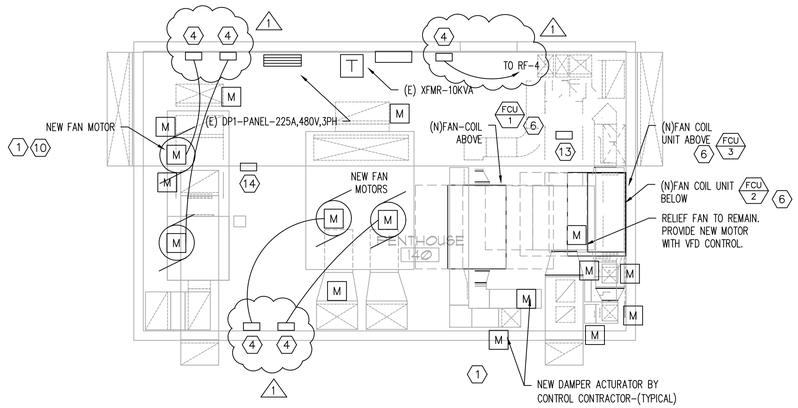
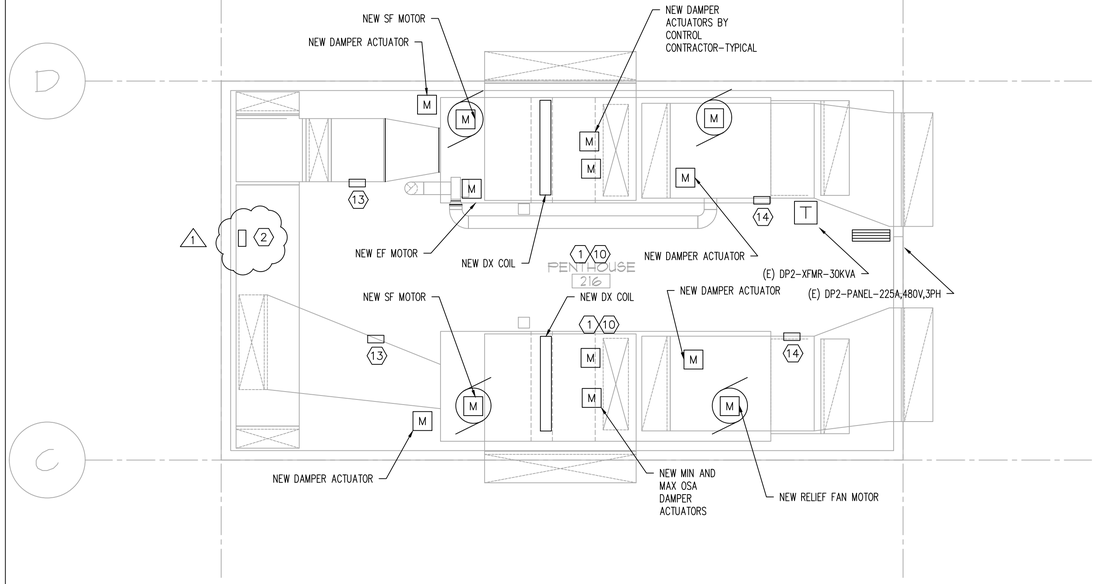


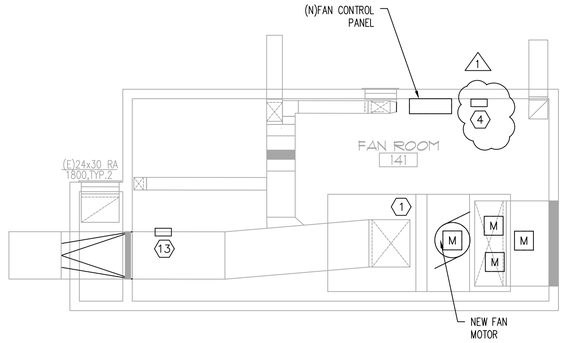
3 E205 ENLARGED ELECTRICAL PENTHOUSE 318
SCALE: 1/4" = 1'-0"



1 E205 ENLARGED ELECTRICAL PENTHOUSE 140
SCALE: 1/4" = 1'-0"



4 E205 ENLARGED ELECTRICAL PENTHOUSE 216
SCALE: 1/4" = 1'-0"



2 E205 ENLARGED ELECTRICAL FAN ROOM 141
SCALE: 1/4" = 1'-0"

GENERAL NOTES

A. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.

B. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH MECHANICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS.

C. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

D. SEE HVAC CONDUIT & WIRE SCHEDULE SHEET E215 FOR CONDUIT AND WIRE SIZE AND PROVIDE LOCAL DISCONNECT SWITCH FOR ALL HVAC UNITS AND MAKE FINAL CONNECTION FROM HVAC UNIT TO THE DESIGNATED PANEL. (NEMA 3R IF UNIT IS OUTSIDE)

KEYED NOTES

1. EXISTING AIR HANDLING UNIT. MAKE POWER CONNECTION TO REPLACED SUPPLY AND RETURN/EXHAUST FAN MOTOR.
2. REMOVE (4) EXISTING MOTOR STARTERS AND CONNECT NEW VFD's AS SHOWN ON E-215 SCHEDULES. (FUSIBLE VFD's FURNISHED BY MECHANICAL).
3. REMOVE (2) EXISTING MOTOR STARTERS AND CONNECT NEW VFD's AS SHOWN ON E-215 SCHEDULES. (FUSIBLE VFD's FURNISHED BY MECHANICAL).
4. REMOVE EXISTING MOTOR STARTERS AND CONNECT NEW VFD's AS SHOWN ON E-215 SCHEDULES. (FUSIBLE VFD's FURNISHED BY MECHANICAL).
5. NOT USED.
6. NEW FAN COIL UNIT. MAKE POWER CONNECTION TO UNIT.
7. NOT USED
8. NOT USED.
9. NOT USED.
10. NEW DX COOLING COIL. MAKE POWER CONNECTION TO UNIT.
11. NOT USED.
12. EXISTING ROOF-TOP UNIT.
13. DISCONNECT AND REMOVE EXISTING DUCT DETECTOR IN "SA" DUCT.
14. EXISTING DUCT DETECTOR IN "RA" TO REMAIN AS IS.

REGISTERED PROFESSIONAL ENGINEER
18,583
OREGON
JULY 14, 1998
TANNER A. NAJAFI
EXPIRES 12-31-22

Date:	07/21/2021
Proj No:	10181
Drawn By:	TN
Chkd By:	TN
DSGN By:	TN
Acad File:	

REVISED ELECTRICAL FOR HVAC RCV-1 10-20-2021

BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

ENLARGED ELECTRICAL PLANS

100% CD SET
JULY 2021

MFIA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

SHEET
E205
06 OF 11

NEW SMALL OUTDOOR CONDENSING UNITS SCHEDULE

DESIGN SYMBOL	SERVES	COMPRESSOR NUMBER	COMPRESSOR AMPS RATED LOAD	COMPRESSOR AMPS LOCKED ROTOR	ELECTRICAL POWER VOLT/PHASE/HZ	ELECTRICAL UNIT MCA	ELECTRICAL UNIT MAX OVERCURRENT PROTECTION	ELECTRICAL EMERGENCY POWER	INTERLOCK	PANEL CIRCUITS	CONDUIT & CONDUCTORS	NOTES
CU-1	FCU-1	1	13.5	58.3	208-230/1/60	17.6	30	NO	FCU-1	CPA-32,34	3/4"C, 2 #10 & 1 #10 GND	1
CU-2	FCU-2	1	9	47.5	208-230/1/60	12	20	NO	FCU-2	CPA-36,38	3/4"C, 2 #10 & 1 #10 GND	1
CU-3	FCU-3	1	14.1	77	208-230/1/60	18.6	30	NO	FCU-3	CPA-40,42	3/4"C, 2 #10 & 1 #10 GND	1

NOTES:

1 PROVIDE DISCONNECT SWITCH

UPDATED: UPDATED: 7/15/2021

NEW FAN COIL UNITS SCHEDULE

DESIGN SYMBOL	PANEL CIRCUITS	CONDUIT & CONDUCTORS	POWER VOLT/PHASE/HZ	MCA/MOCP	NOTES
FCU-1	CPB-20	1/2"C, 2 #12 & 1 #12 GND.	120/1/60	5.5 / 15	1
FCU-2	CPB-22	1/2"C, 2 #12 & 1 #12 GND.	120/1/60	5.5 / 15	1
FCU-3	CPB-24	1/2"C, 2 #12 & 1 #12 GND.	120/1/60	8 / 15	1

NOTES:

1 PROVIDE DISCONNECT SWITCH

NEW LARGE OUTDOOR CONDENSING UNITS SCHEDULE

DESIGN SYMBOL	SERVES	COMPRESSOR TYPE DIGITAL SCROLL	COMPRESSOR AMPS RATED LOAD	COMPRESSOR AMPS LOCKED ROTOR	ELECTRICAL POWER VOLT/PHASE/HZ	ELECTRICAL UNIT MCA	ELECTRICAL UNIT MAX MOCP	ELECTRICAL EMERGENCY POWER	INTERLOCK	PANEL CIRCUITS	CONDUIT & CONDUCTORS	NOTES
DXC-1A	ACU-1A	2 STAGE	18.6/18.6	125/125	460/3/60	47.7	60	NO	ACU-1A	DP2-14,16,18	1"C, 3 #6 & 1 #10 GND.	1,2
DXC-1B	ACU-1B	2 STAGE	18.6/18.6	125/125	460/3/60	47.7	60	NO	ACU-1B	DP2-20,22,24	1"C, 3 #6 & 1 #10 GND.	1,2
DXC-2	ACU-2	2 STAGE	12.6	100	460/3/60	18	25	NO	ACU-2	DP1-19,21,23	3/4"C, 3 #10 & 1 #10 GND.	1,2
DXC-3A	ACU-3A	2 STAGE	16.9/26.9	179/179	460/3/60	66.3	90	NO	ACU-3A	DP3-8,10,12	1 1/4"C, 3 #4 & 1 #8 GND.	1,2

NOTES:

1 PROVIDE FUSIBLE DISCONNECT SWITCH

2 NEW HVAC UNIT IN EXISTING PANEL-SEE REVISED PANEL SCHEDULES

UPDATED: UPDATED: 10/20/2021

EXISTING AIR HANDLING UNITS SCHEDULE WITH NEW VFDS

DESIGN SYMBOL	ASSOCITED RETURN FAN UNIT	SERVES	SUPPLY FAN HP	RETURN/EXHAUST FAN HP	UNIT SMOKE DETECT	ELECTRICAL POWER V/PH/HZ	ELECTRICAL VFD DRIVE	ELECTRICAL EMERG. POWER	REMARKS NOTES	PANEL CIRCUIT	CONDUIT & CONDUCTORS
ACU-1A	RF-1A	BLDG 200	5	1.5	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
ACU-1B	RF-1B	BLDG 200	5	2	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
ACU-2	RF--2	CAFETERIA	1.5	0.75	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
ACU-3A	RF-3A	BLDG 300	7.5	3	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #10 & 1 #10 GND.
HVU-1	-	GYMNASIUM	5	FIELD VERIFY	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
HVU-2	-	LOCKER&TOILET	1	FIELD VERIFY	NO	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
HVU-3	-	KITCHEN	(2) 2	FIELD VERIFY	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.
MZU-1	RF--4	ADMINISTRATION	FIELD VERIFY	0.75	EXISTING	480/3/60	YES	NO	1,2,3,4,5,6	EXISTING CIRCUIT	3/4"C, 3 #12 & 1 #12 GND.

NOTES:

1 PROVIDE NEW CONDUIT & CONDUCTORS FOR SUPPLY FAN MOTOR WITH NEW VFD CONTROLLED MOTOR.

2 PROVIDE NEW CONDUIT & CONDUCTORS FOR RETURN/RELIEF FAN MOTOR WITH NEW VFD CONTROLLED MOTOR.

3 CONTRACTOR HAS THE OPTION OF RE-USING EXISTING CONDUITS AND CONDUCTORS IF THER ARE IN GOOD WORKING CONDITION.

4 PROVIDE FUSIBLE DISCONNECT SWITCH.

5 VERIFY (E)POWER CONNECTION AND MOTOR HP ON SITE PRIOR TO ORDERING EQUIPMENT.

6 INTERLOCK SUPPLY FAN (SF) MOTOR WITH RETURN/EXHAUST (RF/EF) FAN MOTOR

UPDATED: 10/20/2021 11:39

NEW EXHAUST FANS SCHEDULE

EXISTING DESIGN SYMBOL	FAN TYPE	SERVES	HP	VOLTS/PHASE /HZ-AMPS	INTER-LOCK / CONTROL WITH	REMARKS NOTES	PANEL CIRCUITS	CONDUIT & CONDUCTORS
REU-3	NEW	BOILER ROOM	1/4	115/1/60-3.8	T'STAT	1,2,3,4	EXISTING CIRCUIT	1/2"C, 2 #12 & 1 #12 GND
REU-5	NEW GREASE EA	KITCHEN HOOD	2	460/3/60-7.2	HOOD	1,3,4,5	DP1-20,22,24	3/4"C, 3 #12 & 1 #12 GND
REU-6	NEW DISHWASH EA	DISHWAHSER HOOD	1/2	115/1/60-6.6	DISHWASH	1,2,3,4	EXISTING CIRCUIT	1/2"C, 2 #12 & 1 #12 GND
REU-7	NEW	GENERAL KITCHEN	1/6	115/1/60-2.8	AHU	1,2,3,4	EXISTING CIRCUIT	1/2"C, 2 #12 & 1 #12 GND
REU-8	NEW	GENERAL MAINT	1/4	115/1/60-3.8	AHU	1,2,3,4	EXISTING CIRCUIT	1/2"C, 2 #12 & 1 #12 GND
NOTES:								

1 PROVIDE NEW CONDUIT & CONDUCTORS

2 CONTRACTOR HAS THE OPTION OF RE-USING EXISTING CONDUITS AND CONDUCTORS IF THER ARE IN GOOD WORKING CONDITION.

3 PROVIDE DISCONNECT SWITCH

4 VERIFY (E)POWER CONNECTION AND MOTOR HP ON SITE PRIOR TO MAKING FINAL CONNECTION AND ORDERING DEVICES

5 DISCONNECT AND REMOVE 30A/3P CB FOR DCX-4 AND PROVIDE NEW 20A/3P CB FOR KITCHEN HOOD

UPDATED: 7/15/2021 14:37

REGISTERED PROFESSIONAL ENGINEER
18,583
OREGON
JULY 16, 1998
TANNER A. NAJAFI
EXPIRES 12-31-22

REVISED ELECTRICAL FOR HVAC	10-20-2021
RECT-1	
Date:	07/21/2021
Proj No:	10181
Drawn By:	TN
Chkd By:	TN
DSGN By:	TN
Acad File:	

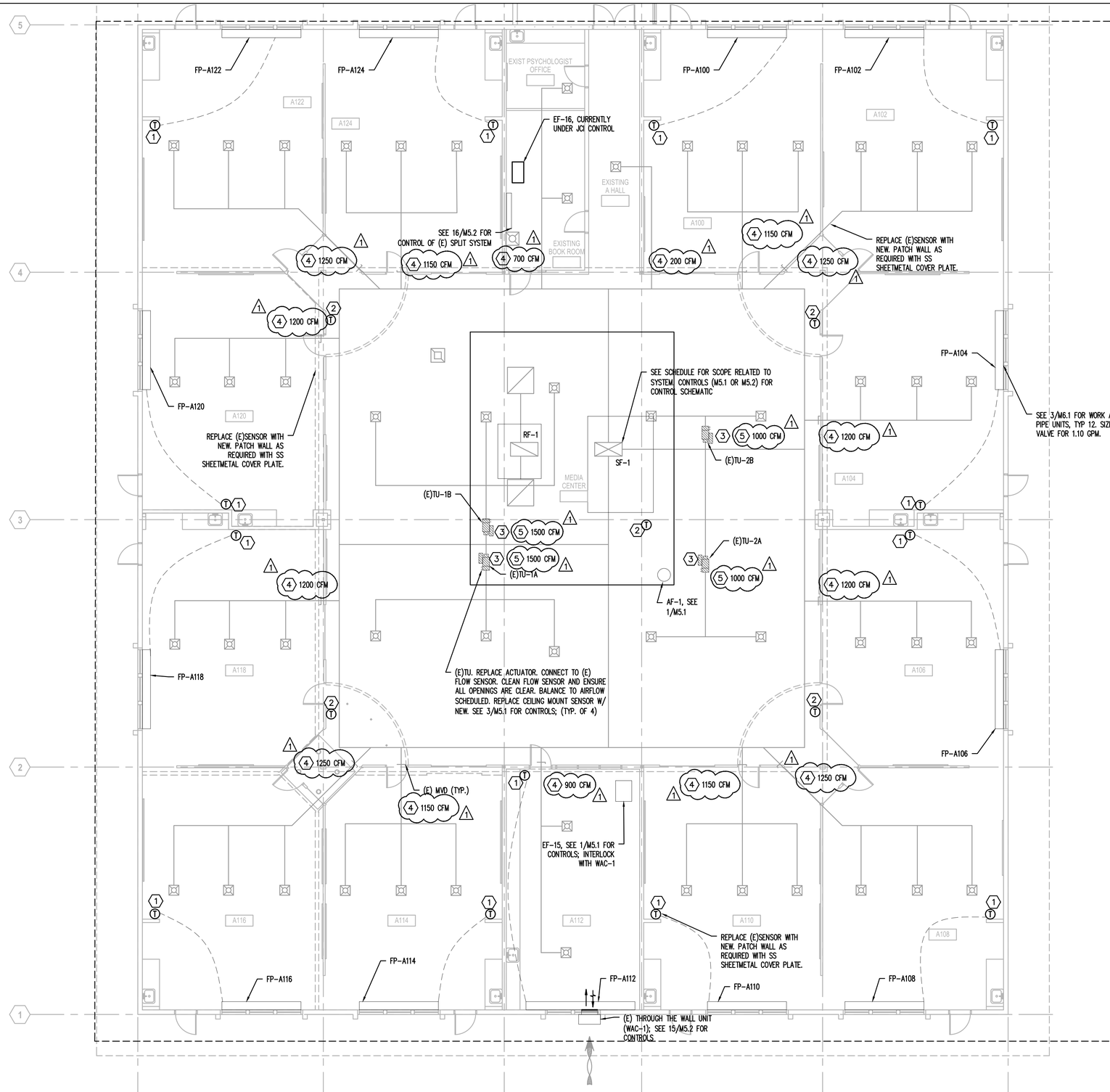
BEAVERTON SCHOOL DISTRICT
ERROL HASSELL ES HVAC UPGRADE
18100 SW BANY ROAD
BEAVERTON OREGON

ELECTRICAL SCHEDULES

100% CD SET
JULY 2021

MFIA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

SHEET
E215
10 OF 11



1 M1.3 PARTIAL MECHANICAL FLOOR PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. ENSURE ALL CHILLED WATER AND HEATING WATER VALVES AND PIPING WERE MODIFIED PER SPECS.
2. REMOVE ALL PNEUMATIC CONTROL DEVICES AND TUBING NO LONGER USED FROM MECHANICAL ROOMS AND ABOVE ACCESSIBLE CEILINGS. ABANDON TUBING ABOVE HARD LID CEILINGS AND IN WALLS.

KEYED NOTES:

1 – REPLACE (E)SENSOR WITH NEW. PATCH WALL AS REQUIRED WITH SS SHEETMETAL COVER PLATE. ROUTE SENSOR WIRES DOWN IN WALL CAVITY.

2 – REPLACE (E)SENSOR WITH NEW. PATCH WALL AS REQUIRED WITH SS SHEETMETAL COVER PLATE. SENSOR IS USED FOR SF-1 DAT CONTROL SEQUENCE.

3 – APPLY TAG TO CEILING TILE NEAR UNIT.

4 – BALANCE DUCT TO AIRFLOW LISTED VIA (E) MVD.

5 – BALANCE TO AIRFLOW LISTED.

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1986
SCOTT W. MILLER
EXPIRES: 31DEC22

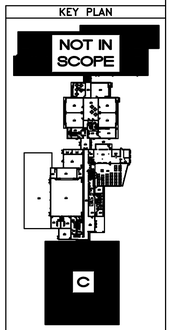
BID SET
1 ADDENDUM 1 10/20/21

Date: 08/09/21
Proj No.: 10180
Drawn By: TF/LKF
Chkd By: SWM
DSGN By: SWM
Acad File: –

BEAVERTON SCHOOL DISTRICT
KINNAMAN HVAC UPGRADE PROJECT
4205 SW 193RD STREET
BEAVERTON OREGON

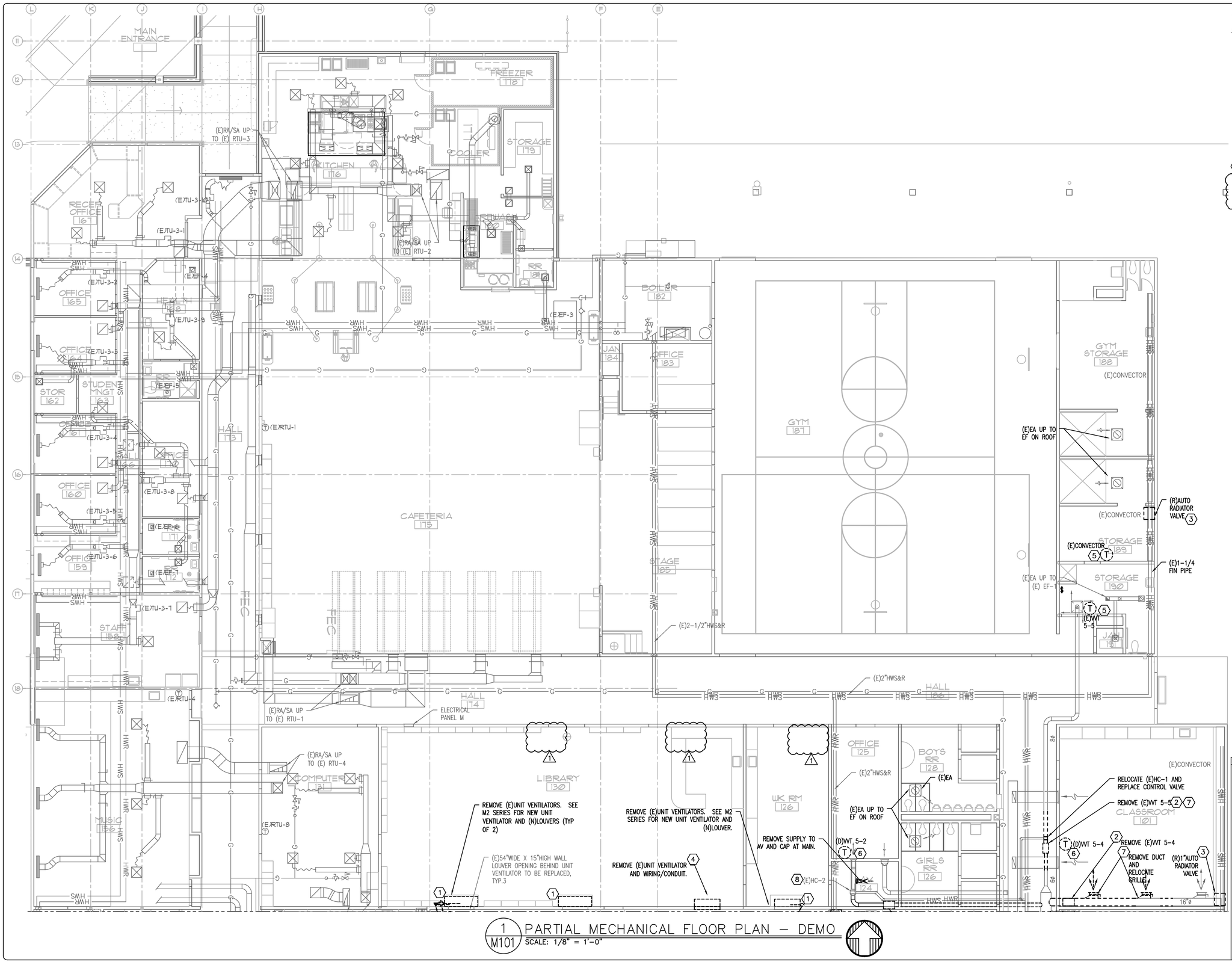
BUILDING AREA 100

KEY PLAN



MFA INC.
Consulting Engineers
2007 S.E. 6th St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0977
WWW.MFA-ENG.COM

SHEET
M1.3
5 OF 10



1 M101 PARTIAL MECHANICAL FLOOR PLAN – DEMO
SCALE: 1/8" = 1'-0"

GENERAL DEMO NOTES

A. OWNER SHALL TAG ANY DEVICES PRIOR TO CONSTRUCTION OR PROVIDE A LIST OF (E) DEVICES THEY WISH THE CONTRACTOR TO SALVAGE & RETURN IN WORKING ORDER TO THEM.

KEYED NOTES

1. REMOVE EXISTING UNIT VENTILATOR, PIPING AND CONTROL DEVICES. FOR INSTALLATION OF NEW UNIT SEE M2 SERIES DRAWINGS.
2. (E) VVT UNIT TO BE REPLACED. REMOVE PORTION OF DUCTWORK AS SHOWN. SEE M2 SERIES DRAWINGS FOR REPLACEMENT WORK AND DUCT ROUTING.
3. (E) CONVECTOR TO REMAIN. SERVICE AND CLEAN UNIT. REMOVE CONTROL VALVE, ISOLATION VALVE AND BALANCE VALVE. REMOVE (E) CONTROLS. SEE M2 SERIES DRAWINGS FOR REPLACEMENT.
4. REMOVE EXISTING UNIT VENTILATOR, PIPING WIRING AND CONTROL DEVICES. REMOVE LOUVERS. PROVIDE WALL FRAME AND PATCH AND FINISH WALL TO MATCH EXISTING.
5. EXISTING THERMOSTAT TO BE REPLACED WITH NEW DIGITAL DEVICE. REPAIR WALL AROUND NEW SENSOR. SEE NEW WORK FOR REPLACEMENT AND DETAILS.
6. EXISTING THERMOSTAT (NLL) TO BE REMOVED. PATCH WALL WITH COVER PLATE AS REQUIRED. SEE NEW WORK PLANS FOR REPLACEMENT AND/OR DETAILS.
7. REMOVE DUCTWORK AS SHOWN, SEE M2 SERIES FOR INSTALLATION OF NEW DUCTWORK.
8. EXISTING HEATING COILS TO BE REUSED. CLEAN COIL AND REMOVE (E) CONTROL VALVE AND CONTROL DEVICES. SEE NEW WORK PLANS FOR NEW WORK.

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1995
SCOTT W. MILLER
EXPIRES: 31DEC22

REV	DATE	ADDENDUM #
1	10/18/21	1

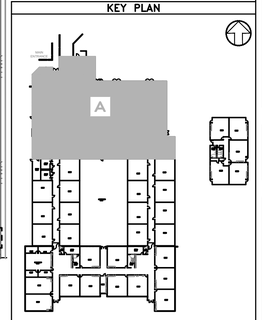
Date: 07/26/2021
Proj No: 1018
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

BEAVERTON SCHOOL DISTRICT
McKINLEY ES HVAC UPGRADE
1500 NW 185TH AVENUE
BEAVERTON OREGON

PARTIAL MECHANICAL FLOOR PLAN – DEMO

PERMIT/BID SET
OCTOBER 2021

KEY PLAN



MEI INC.

Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MEIA-ENG.COM

SHEET
M101

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.
2. FOR ALL MECHANICAL UNITS AND SYSTEMS SERVING THE REMODEL AREA, CLEAN AND REFURBISH PER SPECIFICATIONS.
3. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS.
4. AIR BALANCE SUPPLY, RETURN AND EXHAUST AIR GRILLES TO THE INDICATED AIRFLOW.
5. THE CONTRACTOR SHALL CONFIRM THE ORIGINAL CONTROL VALVES CV/FLOW RATE PRIOR TO SUBMITTALS.

(#) KEYED NOTES

1. NEW UNIT VENTILATOR WITH DX COOLING COIL AND AUX. ELECTRIC HEATING COIL. FOR INSTALLATION SEE DETAIL 3/M601. PROVIDE CONDENSATE DRAIN. PROVIDE REFRIGERANT PIPING TO OUTDOOR HEAT PUMP. SEE DETAIL 3/M501 FOR CONTROL WORK.
2. NEW DIGITAL DEVICE ZONE SENSOR FOR CONTROLS INTEGRATION OF CONVECTOR/FINNED PIPE UNIT. LABEL WITH ASSOCIATED EQUIPMENT INFORMATION.
3. NEW DIGITAL DEVICE ZONE SENSOR TO REPLACE EXISTING SENSOR. LABEL WITH ASSOCIATED EQUIPMENT INFORMATION. PROVIDE A STAINLESS STEEL COVER PLATE OVER HOLE & SECURE WHERE NLL SENSOR IS NO LONGER USED OR WHERE OLD SENSOR IS LARGER THAN NEW SENSOR
4. (E)CONVECTOR, SEE DETAIL 5/M601 FOR INSTALLATION OF NEW CONTROL VALVE, ISOLATION VALVES AND STRAINER SCREEN CLEANING. THE CONTRACTOR SHALL CONFIRM THE ORIGINAL CONTROL VALVE CV/FLOW RATE PRIOR TO SUBMITTALS. SEE DETAIL 4/M501 FOR CONTROL WORK.
5. NEW TERMINAL UNIT WITHOUT HEATING COIL. MAINTAIN NEC CLEARANCE ON THE UNIT'S POWER CONNECTION. SEE DETAIL 4/M601 FOR INSTALLATION REQUIREMENTS. SEE DETAIL 2/M502 FOR CONTROL WORK.
6. PROVIDE NEW EQUIPMENT TAG AS SHOWN. INTEGRATE EQUIPMENT TO BUILDING CONTROLS. SEE M501 AND M502 SERIES FOR ASSOCIATED CONTROL WORK.
7. NEW HEAT PUMP UNIT ON HOUSEKEEPING PAD. SEE DETAIL 7/M601 FOR INSTALLATION.
8. (E)DUCT HEATING COIL, SEE DETAIL 2/M601 FOR INSTALLATION OF NEW CONTROL VALVE, BALANCE VALVE, ISOLATION VALVES, AND STRAINER. SEE DETAIL 2/M501 FOR CONTROL WORK.
9. (E)FINNED PIPE RADIATOR, THE CONTRACTOR SHALL CONFIRM THE INSTALLED CONTROL VALVE PRIOR TO SUBMITTALS.

1 M201 PARTIAL MECHANICAL FLOOR PLAN – NEW
SCALE: 1/8" = 1'-0"

KEY PLAN

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1995
SCOTT W. MILLER
EXPIRES: 31DEC22

	Date:	Proj No:	Drawn By:	Chkd By:	DSGN By:	Acad File:
ADDENDUM #1	07/26/2021	10181	MG	SWM	MG	
REV1 10/18/21						

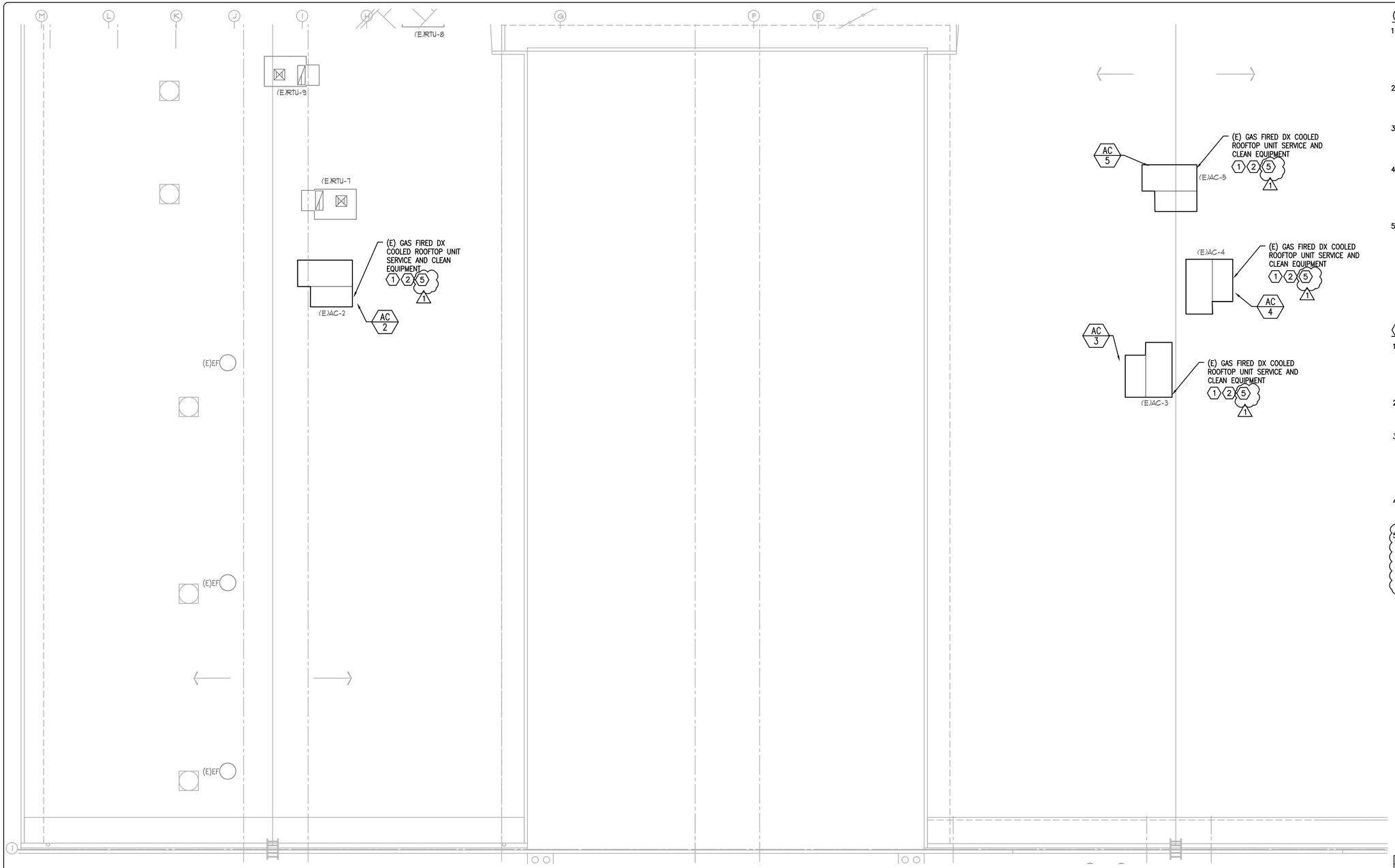
BEAVERTON SCHOOL DISTRICT
McKINLEY ES HVAC UPGRADE
1500 NW 185TH AVENUE
BEAVERTON OREGON

PARTIAL MECHANICAL FLOOR PLAN – NEW

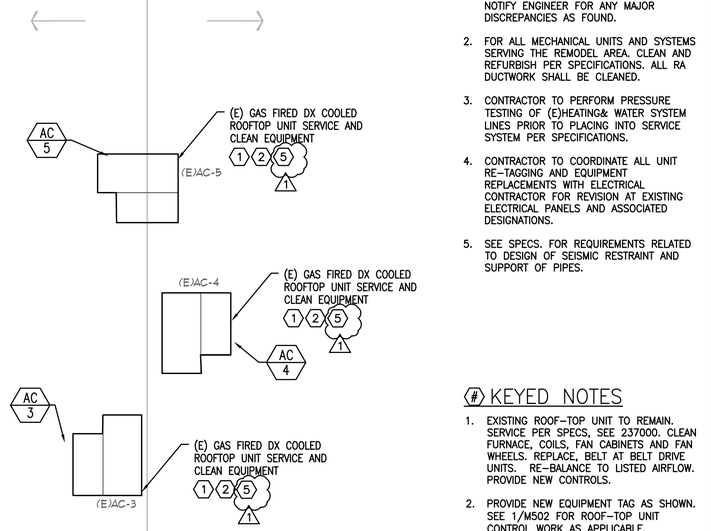
PERMIT/BID SET
OCTOBER 2021

MFEA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFEA-ENG.COM

SHEET
M201



1 M212 PARTIAL MECHANICAL ROOF PLAN – NEW
SCALE: 1/8" = 1'-0"



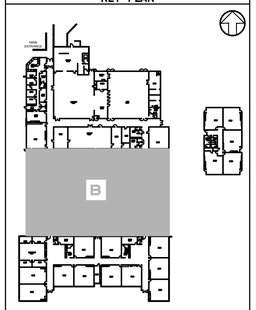
GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ON SITE ALL CONDITIONS RELATED TO EQUIPMENT REPLACEMENT, NEW INSTALLATION LOCATIONS AND REFURBISH/REMODEL. NOTIFY ENGINEER FOR ANY MAJOR DISCREPANCIES AS FOUND.
2. FOR ALL MECHANICAL UNITS AND SYSTEMS SERVING THE REMODEL AREA. CLEAN AND REFURBISH PER SPECIFICATIONS. ALL RA DUCTWORK SHALL BE CLEANED.
3. CONTRACTOR TO PERFORM PRESSURE TESTING OF (E)HEATING& WATER SYSTEM LINES PRIOR TO PLACING INTO SERVICE SYSTEM PER SPECIFICATIONS.
4. CONTRACTOR TO COORDINATE ALL UNIT RE-TAGGING AND EQUIPMENT REPLACEMENTS WITH ELECTRICAL CONTRACTOR FOR REVISION AT EXISTING ELECTRICAL PANELS AND ASSOCIATED DESIGNATIONS.
5. SEE SPECS. FOR REQUIREMENTS RELATED TO DESIGN OF SEISMIC RESTRAINT AND SUPPORT OF PIPES.

(#) KEYED NOTES

1. EXISTING ROOF-TOP UNIT TO REMAIN. SERVICE PER SPECS, SEE 237000. CLEAN FURNACE, COILS, FAN CABINETS AND FAN WHEELS. REPLACE, BELT AT BELT DRIVE UNITS. RE-BALANCE TO LISTED AIRFLOW. PROVIDE NEW CONTROLS.
2. PROVIDE NEW EQUIPMENT TAG AS SHOWN. SEE 1/M502 FOR ROOF-TOP UNIT CONTROL WORK AS APPLICABLE.
3. SERVICE AND CLEAN (E)FAN PER SPECIFICATIONS. REPLACE MOTOR, SHEAVE AND BELT ON BELT DRIVE UNITS. REPLACE BACKDRAFT DAMPER. REBALANCE TO THE INDICATED AIRFLOWS. FIELD VERIFY MOTOR SIZE AND POWER CONNECTION PRIOR TO SUBMITTAL.
4. PROVIDE NEW TAG AND ADD CONTROLS TO (E)EXHAUST FANS. SEE 1/M501 FOR CONTROL WORK.
5. REMOVE (E) VFD INSIDE UNIT ELECTRICAL CONTROL ENCLOSURE. PROVIDE NEW VFD SIZED FOR (E) FAN MOTOR HP. REMOVE ANY CONTROL DEVICES ASSOCIATED WITH THE (E) VFD NO LONGER USED. PROGRAM DRIVE TO OPERATE FAN BASED ON (E) DUCT PRESSURE INPUT SIGNAL. 1

KEY PLAN



REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1995
SCOTT W. MILLER
EXPIRES: 31DEC22

ADDENDUM #1	REV1	10/18/21

Date: 07/26/2021
Proj No: 1018I
Drawn By: MG
Chkd By: SWM
DSGN By: MG
Acad File:

BEAVERTON SCHOOL DISTRICT
McKINLEY ES HVAC UPGRADE
1500 NW 185TH AVENUE
BEAVERTON OREGON

PARTIAL MECHANICAL ROOF PLAN – NEW

PERMIT/BID SET
OCTOBER 2021

MFIA INC.

Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFIA-ENG.COM

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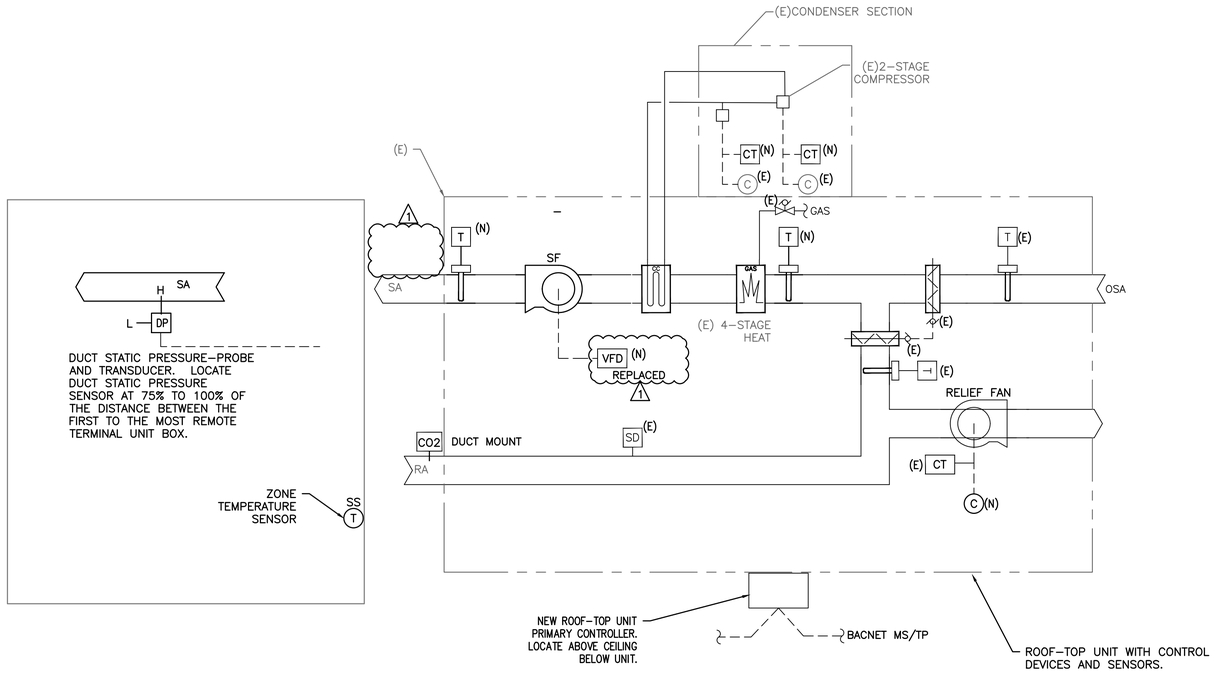
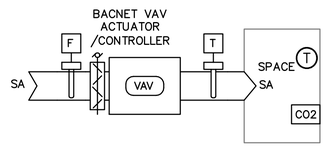


1 M502 EXISTING ROOF TOP UNITS ACUs
SCHEMATIC

CONTROL INPUT/OUTPUT SCHEDULE

POINT NAME	HARDWARE POINTS: INPUT TO CONTROL DIGITAL	INPUT TO CONTROL ANALOG	OUTPUT TO SYSTEM DIGITAL	OUTPUT TO SYSTEM ANALOG	ALARM	TREND	SHOW ON GRAPHIC
GENERAL POINT							
FIRE ALARM SMOKE RELAY	X				X	COV	
ROOF TOP UNITS: TYP: ACU-2,-3,-4,&-5; SEE 1/M502							
OUTSIDE AIR TEMP		X				15 MIN	X
RETURN AIR TEMP		X				15 MIN	X
MIXED AIR TEMP						15 MIN	X
DISCHARGE AIR TEMP		X				15 MIN	X
HEAT - 4 STAGES			X			15 MIN	X
OA&RA DAMPER				X		15 MIN	X
SUPPLY FAN STATUS	X					COV	X
SUPPLY FAN START/STOP			X			COV	X
SUPPLY FAN SPEED				X		DCV	X
RELIEF FAN STATUS	X					COV	X
RELIEF FAN START/STOP			X			COV	X
CONDENSING UNIT COMPRESSOR STATUS; TYP.2	X				X	COV	X
CONDENSING UNIT COMPRESSOR START/STOP; TYP.2			X			COV	X
1							
SUPPLY DUCT DIFFERENTIAL PRESSURE		X			X	DCV	X
SPACE TEMPERATURE		X				15 MIN	X
VAV TERMINAL UNITS: TYP. 14, SEE 2/M502							
ZONE TEMPERATURE		X				15 MIN	X
TERMINAL UNIT AIRFLOW		X				DCV	X
DAMPER POSITION				X		15 MIN	
SPACE CO2 LEVEL		X			X	15 MIN	
DISCHARGE AIR TEMP		X				15 MIN	X

DEFINITIONS
AI ANALOG INPUT TO CONTROL
DI DIGITAL INPUT TO CONTROL
AO ANALOG OUTPUT TO SYSTEM
DO DIGITAL OUTPUT TO SYSTEM
AV ANALOG VALUE.
DVC DIGITAL VALUE.
COV CHANGE OF VALUE FOR DIGITAL POINTS.
DCV DIFFERENTIAL VALUE CHANGE FOR ANALOG POINTS.



2 M502 VAV BOX
SCHEMATIC

REGISTERED PROFESSIONAL ENGINEER
17884
OREGON
JULY 25, 1995
SCOTT W. MILLER
EXPIRES: 31DEC22

Date:	07/26/2021
Proj No:	1018I
Drawn By:	MG
Chkd By:	SWM
DSGN By:	MG
Acad File:	

RCVI 10/18/21 ADDENDUM #1

BEAVERTON SCHOOL DISTRICT
McKINLEY ES HVAC UPGRADE
1500 NW 185TH AVENUE
BEAVERTON OREGON

MECHANICAL CONTROLS

PERMIT/BID SET
OCTOBER 2021

MFA INC.
Consulting Engineers
2007 S.E. Ash St.
Portland, OR 97214
PHN: (503) 234-0548
FAX: (503) 234-0677
WWW.MFA-ENG.COM

SHEET
M502

SPECIFICATIONS

Note: Revised Additions are in bold, deletions have a strikethrough.

SECTION 23 05 00 - HVAC MATERIALS AND METHODS

1) Article 2.6: Add entire Article 2.6 and paragraphs A-M as follows.

2. 6 SOLID-STATE, VARIABLE-SPEED MOTOR CONTROLLERS (ARTICLE 2.6 ADDED IN ADDENDA #1)

A. General: Controllers listed and labeled as a complete unit and arranged to provide variable speed of a standard NEMA Design B 3-phase induction motor by adjusting output voltage and frequency of controller. Designed and rated by the manufacturer for the type of load (e.g., fans, blowers, and pumps) used and also approved by the manufacturer for the type of connection used between the motor and load (direct connection or power transmission connection).

B. Input Line Reactors: 5% for reduction of harmonics.

C. Output Line Reactors: Specially designed and constructed for IGBT controllers and designed to protect motor from voltage spikes over 150% of the bus voltage. Required where controller to motor cable length exceeds 50 feet. Provide dV/dT filters for 460 volt motors with cable lengths in excess of 300'.

D. In lieu of providing line reactors, the drive manufacturers may submit a power system analysis demonstrating compliance with IEEE 519.

E. Ratings:
- **1. Output Ratings: 3-phase, 6 to 60 Hz, with voltage proportional to frequency throughout the voltage range.**
- **2. Starting Torque: 100 percent of rated torque, or as indicated.**
- **3. Speed Regulation: Plus or minus 1 percent.**
- **4. Ambient Temperature: 0° C to 40° C.**
- **5. Efficiency: 98 percent at normal power levels.**

F. Isolated Control Interface: Allow the controller to follow one of the following over an 11:1 speed range:
- **1. Electrical Signal: 4 to 20 milliamperes at 24 V.**

G. Internal Adjustability: Provide the following internal adjustment capabilities:
- **1. Minimum Speed: 5 to 25 percent of maximum RPM.**
- **2. Maximum Speed: 80 to 100 percent of maximum RPM.**
- **3. Acceleration: 2 to 22 seconds.**
- **4. Deceleration: 2 to 22 seconds.**
- **5. Current Limit: 50 to 110 percent of maximum rating.**

H. Self-Protection and Reliability Features:
- **1. Input transient protection by means of surge suppressors.**
- **2. Snubber networks to protect against malfunction due to system voltage transients.**
- **3. Motor Overload Relay: Adjustable and capable of NEMA class 10 performance.**
- **4. Notch filter to prevent operation of the controller-motor-load combination at a**

natural frequency of the combination.

5. **Instantaneous Overcurrent Trip.**
6. **Loss of Phase Protection.**
7. **Reverse Phase Protection.**
8. **Under- and Over-Voltage Trips.**
9. **Overtemperature Trip.**
10. **Short Circuit Protection.**
11. **See motor specification for shaft grounding.**

I. Automatic Reset/Restart: Attempt three restarts after controller fault or on return of power to the system following an interruption and before shutting down for manual reset or fault correction. Provide for restarting during deceleration without damage to the controller, motor, or load.

J. Serial Communications: The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus and BACnet MS/TP. The use of third party gateways and multiplexers is not acceptable. All protocols shall be certified by the governing authority (i.e. BTL Listing for BACnet).

K. EMI / RFI filters: All VFDs shall include onboard EMI/RFI filters. The onboard filters shall allow the entire VFD assembly to be CE Marked and the VFD shall meet product standard EN61800-3 for the First Environment restricted. No Exceptions.

L. Operation and Maintenance Features Include:

1. **Status Lights: Door-mounted LED indicators to indicate power on, run, overvoltage, line fault, overcurrent, and external fault.**
2. **Elapsed Time Meter.**
3. **Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer.**
4. **Current-Voltage-Frequency Indicating Devices: Mount meters or digital readout device and selector switch flush in controller door and connect to indicate controller output.**
5. **Integral Main Disconnect: Fused disconnect connected to shut down all power to the controller. Interlock breaker with cabinet door.**

M. Acceptable Manufacturers: Subject to compliance with requirements:

1. **ABB Power Distribution, Inc.**

(Article 2.6 added in Addenda 1)

SECTION 23 09 23 - DDC CONTROLS

1) Article 1.3, A, 19, 20, 21: Add new line items 19, 20, and 21.

19. **Remove all control devices, compressor, tubing, wiring (including line voltage wiring) and control panels no longer used. (Added in Addenda #1)**
20. **Return building level NCE 25 to BSD. (Added in Addenda #1)**
21. **Convert existing 5 switch override panel to BACnet. (Added in Addenda #1)**

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

1) Article 4.7, B, 8: Revise item 8 as follows.

8. ~~Provide separate sequences to be enable if directed by Engineer to control fan based on a set difference in fan speed between supply air and return air, using this method rather than space pressure control.~~ The above sequence does not use a space pressure sensor. **(Revised in Addenda #1)**

2) Article 4-7, K, 5, 6: Revise items 5 and 6 as follows.

5. The outside air economizer is enabled when the outside air ~~enthalpy~~ **temperature** is less than the return air ~~enthalpy~~ **temperature**. **(Revised in Addenda #1)**
6. The outside air economizer is disabled when the outside air ~~enthalpy~~ **temperature** is greater than the return ~~enthalpy~~ **temperature** for greater than 2 minutes. When the economizer is disabled, the outside air damper modulates to the minimum position setpoint based on the air quality sensor. **(Revised in Addenda #1)**

3) Article 4.7, K, 8-11: Revise item 8, remove item 9 and re-number items to 9, 10 to 11 as follows.

8. Economizer Minimum Position (Air Quality Control): Economizer minimum-minimum (min-min) position value is based on 25% of the minimum ventilation requirement unless otherwise noted. The economizer minimum-maximum (min-max) position is based on the full minimum ventilation requirement. During DVC sequences, outside air damper position (outside airflow) is limited to the min-max setting. Balancer to determine actual damper positions at the min-min and min-max airflow setpoints. Control system shall use damper position setpoints for control purposes~~. Based on 900 PPM with dead-band of 100 the OSA damper will modulate up to min-max position on CO2 levels above 1000 PPM and will modulate to min-min once CO2 level is below 800 PPM.~~ **On signal from any terminal unit that CO2 level at the zone device is at action level modulate OSA damper from min.-min. position towards min.-max. position. Step at 3 stages between min.-min. damper position and min.-max. damper position each at 10 minutes (adj.) per step. If zone CO2 level drops below action level plus 200 ppm offset (1000 ppm action level minus 200 ppm offset = 800 ppm) return to DCV min.-min. damper position. (Revised in Addenda #1)**
9. ~~CO2 sensor fail:~~ **(Removed in Addenda #1)**
   ~~a.~~**9.** lf the CO2 goes below 200 PPM or above 1600 PPM and remains at that level for 30 min (adj), the sensor is assumed to have failed and the CO2 control will be disabled and an alarm generated.
      ~~1)~~ **a.** A faulted sensor will revert to a fixed min OAD setpoint adjustable from the graphics. **(Revised in Addenda #1)**
   ~~b.~~**10.** There will be a manual reset on graphics after CO2 controls are repaired. **(Revised in Addenda #1)**

~~10.~~**11.** The airside economizer control shall include fault detection and diagnostics as required by ASHRAE 90.1-2016. See ASHRAE requirements for full description of sensor, monitoring and alarm requirements which are available normally due to the DDC system. Specific requirements not normally provided are listed below and required.

4) Article 4.9, J: Add new Paragraph J and items 1-8 as follows.

J. Return Fan Control (ACU-2): (Paragraph J added in Addenda #1)

1. **This section applies to return fans with variable frequency drives (VFDs).**
2. **Fan will start/stop when supply fan starts.**
3. **Space pressure Control, Return Fan Speed Endpoints: The return fan shall modulate based on supply fan speed and outside air damper position. The air balancing Contractor will attain the return fan speed based on the following values for the given operating mode.**

Return Fan Speed Endpoint Values				
Mode	**Supply Fan Speed Hi/Lo Reset Limits**	**Desired Space Pressure (InH2O)**	**Economizer Position**	**Return Fan Speed**
Full Heating (All terminal units are operating at heating flow setpoints)	**TBD – Noted during the full heating condition**	**Ideal - 0.02 Acceptable Test Range: 0.01 – 0.03**	**Min-Min (25% of the minimum ventilation requirement)**	**Minimum Return Fan Speed-TBD**
Full Cooling (All terminal units are operating at cooling flow setpoints)	**TBD – Noted during the full cooling condition**	**Ideal - 0.02 Acceptable Test Range: 0.01 – 0.03**	**Min-Max (100% of the minimum ventilation requirement)**	**Maximum Return Fan Speed-TBD**

4. **Space Pressure Return Fan Speed Reset: During Occupied mode the return fan speed shall reset based on the following schedule.**

Return Fan Speed Reset Schedule	
Supply Fan Speed	**Return Fan Speed**
Supply Fan Speed Lo Reset Limit-TBD	**Minimum Return Fan Speed-TBD**
Supply Fan Speed Hi Reset Limit-TBD	**Maximum Return Fan Speed-TBD**

5. **During warm-up and night low limit, operate the unit in 100% recirculation mode.**
6. **Fan speed is reset to zero (0) Hz when the AHU is off.**
7. **Variable speed drive acceleration settings, deceleration settings, minimum speeds, etc. shall be adjusted at start up in coordination with the drive supplier and installer to achieve stable control system performance.**
8. **The above sequence does not use a space pressure sensor.**

(Paragraph J Added in Addenda #1)

5) Article 4.10, A, 2: Add new item 2 as follows.

2. **HVU-3 has two supply fan motors and two fans. On signal that space is occupied enable and operate SF-1. On signal that kitchen hood fan is on open SF-2 discharge damper. Once damper position is confirmed open enable SF-2 fan operation. (Added in Addenda #1)**

6) Article 4.10, I, 5-11: Revise then re-number as follows.

5. The outside air economizer is enabled when the outside air ~~enthalpy~~ **temperature** is less than the return air ~~enthalpy~~ **temperature**. **(Revised in Addenda #1)**

6. The outside air economizer is disabled when the outside air ~~enthalpy~~ **temperature** is greater than the return ~~enthalpy~~ **temperature** for greater than 2 minutes. When the economizer is disabled, the outside air damper modulates to the minimum position setpoint based on the air quality sensor. **(Revised in Addenda #1)**

~~7. Demand Ventilation Control (DVC): During occupied mode the outside air dampers shall modulate to maintain return air CO2 levels at or below 900 PPM (adj.). DVC shall occur when levels begin to exceed the CO2 set point plus a dead-band of 100 PPM (adj.).~~

~~8. Economizer Minimum Position (Air Quality Control): Economizer minimum-minimum (min-min) position value is based on 25% of the minimum ventilation requirement unless otherwise noted. The economizer minimum-maximum (min-max) position is based on the full minimum ventilation requirement. During DVC sequences, outside air damper position (outside airflow) is limited to the min-max setting. Balancer to determine actual damper positions at the min-min and min-max airflow setpoints. Control system shall use damper position setpoints for control purposes. Based on 900 PPM with dead-band of 100 the OSA damper will modulate up to min-max position on CO2 levels above 1000 PPM and will modulate to min-min once CO2 level is below 800 PPM.~~

~~9. CO2 sensor fail: If the CO2 goes below 200 PPM or above 1600 PPM and remains at that level for 30 min (adj), the sensor is assumed to have failed and the CO2 control will be disabled and an alarm generated.~~

~~a. A faulted sensor will revert to a fixed min OAD setpoint adjustable from the graphics.~~

~~b. There will be a manual reset on graphics after CO2 controls are repaired.~~

(Removed in Addenda #1)

~~10.~~**7.** The airside economizer control shall include fault detection and diagnostics as required by ASHRAE 90.1-2016. See ASHRAE requirements for full description of sensor, monitoring and alarm requirements which are available normally due to the DDC system. Specific requirements not normally provided are listed below and required.

a. The system shall display the status of:
   1) Free cooling available
   2) Economizer enabled
   3) Cooling enabled
   4) Heating Enabled
   5) Mixed air low limit cycle active

b. The system shall be capable of detecting and reporting the following faults
   1) Air temperature sensor failure or fault
   2) Economizing when unit should not be economizing
   3) Not economizing when the unit should be economizing
   4) Damper not modulating
   5) Excess outside air

~~11.~~**8.** ~~(HVU-3)~~ **The above sequence is for operation with SF-1 only. Under this sequence SF-2 is off and SF-2 discharge damper is closed. The OSA damper is to modulate over a range of closed to a position that results in 2800 CFM based on initial air balance.** On status that the kitchen hood fan is on modulate the RA damper more closed and the OSA damper more open to a condition where OSA flow rate is **5600**~~XXXX~~ CFM to provide make-up to the kitchen for hood operation. **Flow rate confirmed based on system air balance, there is no air flow measurement sensor.**

(Revised in Addenda #1)

7) Article 4.11, B, C, D, E: Revise Paragraphs B and C, then add new Paragraphs D and E as follows.

B. Cabinet unit heaters or unit heaters: Modulate heating valve to maintain space temperature setpoint. Operate fan only when heating valve is open more than 5% and there is a call for heating. **Space set-point to be based on scheduled occupancy of the school or area / zone**

served. (Revised in Addenda #1)

C. Booster Coils: Modulate heating valve to maintain space temperature setpoint. **Space set-point to be based on scheduled occupancy of the school or area / zone served. (Revised in Addenda #1)**

D. High Static Pressure: Set at 1.5 times the normal operating pressure or maximum reset pressure of the system. Disable fan and reset for normal operation. Provide device with automatic reset. Provide alarm on signal that is to be acknowledges at the system front-end. Three trips with-in 15 minutes results in a permanent system shut-down that must be reset on site. (Added in Addenda #1)

E. Domestic Hot Water Recirculation Pump: Operate when school is scheduled to be occupied and when HWR temp sensor is more than 5 deg. F. below the disable temperature. Disable when school is not occupied or HWR is at water heater set-point minus 5 deg. F. or greater. Alarm on status failure. (Added in Addenda #1)

8) Article 4.12, J, 5, 6: Revise items 5 and 6 as follows.

5. The outside air economizer is enabled when the outside air ~~enthalpy~~ **temperature** is less than the return air ~~enthalpy~~ **temperature**. **(Revised in Addenda #1)**
6. The outside air economizer is disabled when the outside air ~~enthalpy~~ **temperature** is greater than the return ~~enthalpy~~ **temperature** for greater than 2 minutes. When the economizer is disabled, the outside air damper modulates to the minimum position setpoint based on the air quality sensor. **(Revised in Addenda #1)**

9) Article 4.13, B, C: Add new Paragraphs B and C as follows.

B. Dishwasher fan: Enable from status of dishwasher. Disable when dishwasher has been off for 20 minutes (adj.). (Added in Addenda #1)

C. Hood Fan: Fan has multi-speed operation. When space is occupied, economizer signal is enabled, and hood switch is off modulate fan between speeds of minimum speed and the speed that results in 2800 CFM based on air flow balancing. This function provides the space relief for the kitchen zone. When space is occupied and hood switch is on operate at a speed to provide 5600 CFM regardless of economizer signal. This mode provides the hood make up air. (Added in Addenda #1)

10) Article 4.14, F: Revise format for Paragraph F to add items 1 and 2 as follows.

F. ~~Gas Heat~~ Heating Section:

1. Stage single gas heating section to maintain space temperature set-point.

2. For heat pump units operate DX system as first stage of heat. If DAT drops below RAT plus 5 deg. F. (indicating the unit is in defrost mode) stage electric resistance heating coils to maintain DAT at 85 deg. F. plus or minus 5 deg. F. Heating coils may be different sizes resulting in different DAT conditions. Staging shall initiate the smaller of the two coils first when OSA temperature is above 47 deg. F. (adj). Staging shall initiate the larger of the two coils first when OSA temperature is below 47 deg. F. When OSA temperature is below 32 deg. F. disable the heating function at the heat pump and operate electric heaters.

(Revised in Addenda #1)

11) Article 4.14, I, 8: Add new item 8 as follows.

8. The airside economizer control shall include fault detection and diagnostics as required by ASHRAE 90.1-2016. See ASHRAE requirements for full description of sensor, monitoring and alarm requirements which are available normally due to the DDC system. Specific requirements not normally provided are listed below and required.

a. The system shall display the status of:

1) Free cooling available
2) Economizer enabled
3) Cooling enabled
4) Heating Enabled
5) Mixed air low limit cycle active

b. The system shall be capable of detecting and reporting the following faults

1) Air temperature sensor failure or fault
2) Economizing when unit should not be economizing
3) Not economizing when the unit should be economizing
4) Damper not modulating
5) Excess outside air

(Added in Addenda #1)

12) Article 4.15, A-J: Add new Article 4-15 and Paragraphs A-J as follows.

4.15 BOILER OPERATION

A. System Enable/Disable: Enable boiler system and lead pump when any two (2) (adjustable) valves are open more than 20% (adjustable). Disable boiler system when all valves are closed more than 5% (adjustable) or the outside air temperature is above 60°F (adjustable).

B. Building Heating Demand Calculation: Building heating demand will be calculated by taking the sum of all the heating control valve positions, weighted by the scheduled valve flow rate and averaged by the total combined flow rate for all of the valves.

$$Heating\ \ Demand_{Building} = \frac{\sum_{i=1}^{total\ \#\ of\ valves}\left(Heating\ Valve\ Postion_i \times \frac{1}{100} \times Scheduled\ \ Flow\ Rate_i\right)}{Total\ Flow\ Rate}$$

C. Boiler Supply Water Setpoint Reset: Supply water temperature setpoint shall linearly reset based on the building heating demand as described in the following schedule:

Boiler Supply Water Reset Schedule	
Building Heating Demand (%)	**Supply Water Set Point (F)**
0	**110**
>75	**140**

*** Allow hot water supply set-point = 150ºF if outside air is less than 30º F (Adj.)**
**** All reset values shall be adjustable through the operator's workstation.**

D. Pump Disable: Main loop pumps and boiler loop pumps shall operate for five (5) minutes after boiler operation has been disabled to avoid boiler damage.

E. Pump Control: When pump is enabled, VFD shall modulate from minimum speed (25% adjustable) to maintain the system differential pressure setpoint (10 psi, initial (adjustable)). When pump is disabled, VFD speed is set to 0%.

F. Minimum System Cycle Time: Once boilers/pumps have been disabled the system shall remain disabled for a minimum of fifteen (15) minutes to prevent shot-cycling by allowing demand to build when transitioning between heating and cooling modes.

G. Pump Lead/Lag: Operate pumps based on lead/lag. On failure of lead pump, operate lag pump and send alarm. Switch lead operation every week. Lead selection shall also be selectable from the operator's workstation, resetting the current run-time when used. When switching from lead pump to lag pump allow both pumps to operate a minimum of fifteen (15) seconds before disabling the lead pump.

H. System Lockout: If each pump fails three (3) times during an operational period the system shall lockout and an alarm sent to the workstation. Lockout is resettable from the operator's workstation.

I. Emergency Boiler Shutdown: Disable boiler from emergency boiler shutdown switch. Boiler shutdown switch is monitored by the control system and physically interlocked to disable the boilers.

J. Low Outside Air Temperature Loop Pre-Heat: When the outside air temperature is less than 32°F (adjustable, dead band: 3°F) and the system is not in operation (0% building heating demand) the system shall be enabled, and operate the lead boiler and lead pump to maintain 110°F. Operate in this mode until the system is enabled based on the building heating demand schedule or outside air temperatures rise above the setpoint plus the dead band.

(ARTICLE ADDED IN ADDENDA #1)

SECTION 23 30 00 - AIR DISTRIBUTIOIN

1) Article 2.2, E: Add new Paragraph E as follows.

E. Control Dampers: Construct of aluminum frame and blades with continuous full length axle shafts and/or operating "jackshafts" as required to provide coordinate tracking of all blades. Interlocking multi-blade type, except where either dimension is less than 10", a single blade may be used. Opposed blade type on all modulating dampers and parallel blades on all two position dampers. Provide with metal jamb seal and neoprene blade seals. Damper assembly rated for maximum air leakage of 4 CFM per square foot at 1" wg pressure or less and with interconnecting blade linkages in the side channels of the frame. (Added by Addenda #1)

SECTION 23 70 00 - HVAC DEVICES

1) Article 2.3, A-E: Add entire Article 2.3 and paragraphs A-E as follows.

2.3 SPLIT CONDENSING UNIT (LARGER THAN 5 TONS)

A. Air Cooled Condenser

1. The condensing section shall be open on the sides and bottom to provide access and to allow airflow through the coils. Condenser coils shall be constructed with 3/8" copper tubing mechanically bonded to aluminum fins for maximum heat transfer. Each condenser coil shall be factory leak tested with high-pressure air under water.

2. Condenser fans shall be direct drive, propeller type designed for low tip speed, vertical air discharge, and include service guards. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motor shall be direct drive, single phase, permanently lubricated "PSC" motors with inherent thermal overload.

3. Unit shall have standard pressure controls that cycle the condenser fan motors to maintain condensing pressures for operation down to 0°F ambient.

4. Condenser fan motor shall be direct drive, single phase permanently lubricated "PSC" motors with inherent thermal overload.

5. Unit shall be complete with liquid and suction line isolation valves.

6. Provide dual circuit unit.

B. Scroll Compressors

1. Unit shall have heavy-duty Copeland scroll compressor(s).

2. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.

3. Provide VFD or digital scroll compressor as lead on each circuit.

C. Capped connections shall be external to the unit providing for field connection of refrigerant piping.

D. Unit shall have a liquid and suction line service valve.

E. Approved manufactures: Carrier, Daikin, Trane, Aaon, or Johnson Controls Coordinate with DX Coil manufacturer.

(ARTICLE ADDED IN ADDENDA #1)

DRAWINGS

General

1. Sheet G001: COVER SHEET
    a. Added one sheet
    b. Revised sheet names

Mechanical

1. Sheet M001: MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES
    a. Revised legend
2. Sheet M002: MECHANICAL SCHEDULES

   a. Revised heating coil capacities.
   b. Updated schedules notes.
3. Sheet M003: MECHANICAL SCHEDULES
   a. Updated schedules notes.
4. Sheet M105: MECHANICAL DEMOLITION PLANS - MEZZANINE MECH. ROOMS
   a. Revised and added control panels.
5. Sheet M201: MECHANICAL PARTIAL FLOOR PLAN A
   a. Revised General and Keyed notes.
6. Sheet M202: MECHANICAL PARTIAL FLOOR PLAN B
   a. Removed one zone sensor.
   b. Revised General and Keyed notes.
7. Sheet M203: MECHANICAL PARTIAL FLOOR PLAN C
   a. Revised General and Keyed notes.
   b. Modified boiler room demo work and added control panel work.
8. Sheet M204: MECHANICAL PARTIAL FLOOR PLAN D
   a. Revised General and Keyed notes.
   b. Revised HP-1control work.
9. Sheet M205: MECHANICAL NEW WORK HVAC PLANS - MEZZANINE MECH. ROOMS
   a. Revised General and Keyed notes.
   b. Removed piping work from this sheet and moved to the new sheet M305 for clarity.
   c. Added VFD panels and revised existing panel work.
   d. Clarified control damper modifications.
   e. Added section B and revised section A.
   f. Revised detail 1 to clarify ductwork and new equipment location
10. Sheet M211: MECHANICAL PARTIAL ROOF PLAN A
   a. Revised General and Keyed notes.
11. Sheet M212: MECHANICAL PARTIAL ROOF PLAN B
   a. Revised General and Keyed notes.
   b. Added demolition line-work for the removed mech. units.
12. Sheet M213: MECHANICAL PARTIAL ROOF PLAN C
   a. Revised General and Keyed notes.
   b. Added demolition line-work for the removed mech. units.
13. Sheet M305: MECHANICAL NEW WORK PIPING PLANS - MEZZANINE MECH. ROOMS
   a. New piping plan for the Mezzanine mech. rooms.
   b. Added condensate drains.
   c. Revised piping routing.
14. Sheet M501: MECHANICAL CONTROLS
   a. Revised control work.
15. Sheet M502: MECHANICAL CONTROLS
   a. Revised control work.
16. Sheet M503: MECHANICAL CONTROLS
   a. Revised control work.
17. Sheet M504: MECHANICAL CONTROLS
   a. Revised control work and added HP-1 control’s points list.
18. Sheet M601: MECHANICAL DETAILS
   a. Revised details.
19. Sheet M602: MECHANICAL DETAILS
   a. Revised details.
   b. Added detail 8.

Electrical

1. Sheet E205: ELECTRICAL NEW WORK PLANS - MEZZANINE MECH. ROOMS
   a. Revised sheet notes.
   b. Revised panels.

2. Sheet E215: ELECTRICAL SCHEDULES
    a. Updated schedule notes.

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SPECIFICATIONS

Note: Revised Additions are in bold, deletions have a strikethrough.

SECTION 23 05 00 - HVAC MATERIALS AND METHODS

1) Article 2.6: Add entire Article 2.6 and paragraphs as follows.

2. 6 SOLID-STATE, VARIABLE-SPEED MOTOR CONTROLLERS (NEW ARTICLE ADDED IN ADDENDA #1)

A. General: Controllers listed and labeled as a complete unit and arranged to provide variable speed of a standard NEMA Design B 3-phase induction motor by adjusting output voltage and frequency of controller. Designed and rated by the manufacturer for the type of load (e.g., fans, blowers, and pumps) used and also approved by the manufacturer for the type of connection used between the motor and load (direct connection or power transmission connection).

B. Input Line Reactors: 5% for reduction of harmonics.

C. Output Line Reactors: Specially designed and constructed for IGBT controllers and designed to protect motor from voltage spikes over 150% of the bus voltage. Required where controller to motor cable length exceeds 50 feet. Provide dV/dT filters for 460 volt motors with cable lengths in excess of 300'.

D. In lieu of providing line reactors, the drive manufacturers may submit a power system analysis demonstrating compliance with IEEE 519.

E. Ratings:
- **1. Output Ratings: 3-phase, 6 to 60 Hz, with voltage proportional to frequency throughout the voltage range.**
- **2. Starting Torque: 100 percent of rated torque, or as indicated.**
- **3. Speed Regulation: Plus or minus 1 percent.**
- **4. Ambient Temperature: 0° C to 40° C.**
- **5. Efficiency: 98 percent at normal power levels.**

F. Isolated Control Interface: Allow the controller to follow one of the following over an 11:1 speed range:
- **1. Electrical Signal: 4 to 20 milliamperes at 24 V.**

G. Internal Adjustability: Provide the following internal adjustment capabilities:
- **1. Minimum Speed: 5 to 25 percent of maximum RPM.**
- **2. Maximum Speed: 80 to 100 percent of maximum RPM.**
- **3. Acceleration: 2 to 22 seconds.**
- **4. Deceleration: 2 to 22 seconds.**
- **5. Current Limit: 50 to 110 percent of maximum rating.**

H. Self-Protection and Reliability Features:
- **1. Input transient protection by means of surge suppressors.**
- **2. Snubber networks to protect against malfunction due to system voltage transients.**
- **3. Motor Overload Relay: Adjustable and capable of NEMA class 10 performance.**
- **4. Notch filter to prevent operation of the controller-motor-load combination at a**

natural frequency of the combination.

5. **Instantaneous Overcurrent Trip.**
6. **Loss of Phase Protection.**
7. **Reverse Phase Protection.**
8. **Under- and Over-Voltage Trips.**
9. **Overtemperature Trip.**
10. **Short Circuit Protection.**
11. **See motor specification for shaft grounding.**

I. Automatic Reset/Restart: Attempt three restarts after controller fault or on return of power to the system following an interruption and before shutting down for manual reset or fault correction. Provide for restarting during deceleration without damage to the controller, motor, or load.

J. Serial Communications: The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus and BACnet MS/TP. The use of third party gateways and multiplexers is not acceptable. All protocols shall be certified by the governing authority (i.e. BTL Listing for BACnet).

K. EMI / RFI filters: All VFDs shall include onboard EMI/RFI filters. The onboard filters shall allow the entire VFD assembly to be CE Marked and the VFD shall meet product standard EN61800-3 for the First Environment restricted. No Exceptions.

L. Operation and Maintenance Features Include:

1. **Status Lights: Door-mounted LED indicators to indicate power on, run, overvoltage, line fault, overcurrent, and external fault.**
2. **Elapsed Time Meter.**
3. **Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer.**
4. **Current-Voltage-Frequency Indicating Devices: Mount meters or digital readout device and selector switch flush in controller door and connect to indicate controller output.**
5. **Integral Main Disconnect: Circuit breaker connected to shut down all power to the controller. Interlock breaker with cabinet door.**

M. Acceptable Manufacturers: Subject to compliance with requirements:

1. **ABB Power Distribution, Inc.**

(Entire Article 2.6 added in Addenda 1)

SECTION 23 09 23 - DDC CONTROLS

1) Article 1.2, F: Add new paragraph F as follows.

F. Install new BACnet only SNE for systems being installed under this set of documents. Replace the existing NAE in the boiler room with a SNE device that includes BACnet communication capability. Transfer and update all other sequences provided by the current NAE to the new SNE. (Added in Addenda #1)

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

1) Article 4.7, K, 8 and 9: Revise 8, remove item 9, then re-number item 10 as item 9 as follows.

8. Economizer Minimum Position (Air Quality Control): Economizer minimum-minimum (min-min) position value is based on 25% of the minimum ventilation requirement unless otherwise noted. The economizer minimum-maximum (min-max) position is based on the full minimum ventilation requirement. During DVC sequences, outside air damper position (outside airflow) is limited to the min-max setting. Balancer to determine actual damper positions at the min-min and min-max airflow setpoints. Control system shall use damper position setpoints for control purposes. ~~Based on 900 PPM with dead-band of 100 the OSA damper will modulate up to min-max position on CO2 levels above 1000 PPM and will modulate to min-min once CO2 level is below 800 PPM.~~ **On signal from any terminal unit that CO2 level at the zone device is at action level modulate OSA damper from min.-min. position towards min.-max. position. Step at 3 stages between min.-min. damper position and min.-max. damper position each at 10 minutes (adj.) per step. If zone CO2 level drops below action level plus 200 ppm offset (1000 ppm action level minus 200 ppm offset = 800 ppm) return to DCV min.-min. damper position. (Revised in Addenda #1)**

~~9. CO2 sensor fail:~~

~~a. If the CO2 goes below 200 PPM or above 1600 PPM and remains at that level for 30 min (adj), the sensor is assumed to have failed and the CO2 control will be disabled and an alarm generated.~~

~~1) A faulted sensor will revert to a fixed min OAD setpoint adjustable from the graphics.~~

~~b. There will be a manual reset on graphics after CO2 controls are repaired.~~ **(Removed in Addenda #1)**

2) Article 4.8, A, 1, e, f: Remove items e and f as follows.

A. Space Temperature Setpoints:

1. Default Setpoints:

a. Occupied Heating Setpoint: 70 °F (adjustable)
b. Occupied Cooling Setpoint: 76 °F (adjustable)
c. Unoccupied Heating Setpoint: 55 °F (adjustable)
d. Unoccupied Cooling Setpoint: 85 °F (adjustable)
~~e. Standby Occupied Heating Setpoint: (Occupied Heating Setpoint - 3°F (adjustable)~~ **(Removed in Addenda #1)**
~~f. Standby Occupied Cooling Setpoint: (Occupied Cooling Setpoint + 3°F (adjustable)~~ **(Removed in Addenda #1)**

3) Article 4.9, B and C: Revise Paragraph B and add new Paragraph C as follows.

4.9 MISCELLANEOUS

A. Freeze Stat: Set at 38ºF. When freeze stat is tripped turn off fan, ensure coil valve is 100% open, outside air damper is 100% closed, and boiler system is operational. Turn fan back on in 5 minutes (Adj.) once status confirmed. If freeze stat trips again, signal alarm and return to fan off, coil valve 100% open and outside air damper 100% closed.

B. Fin pipe units: Modulate heating valve to maintain space temperature setpoint. **If associated RTU is in cooling mode disable operation. (Revised in Addenda #1)**

C. Booster Coils: Modulate heating valve to maintain space temperature setpoint. (Added in Addenda #1)

4) Article 4.11, B: Add new Paragraph B as follows.

4.11 SEQUENCE OF OPERATION – EXHAUST FAN

A. General exhaust fans: Operate based on associated air handler.

B. EF-5-06: Operate from space mounted temperature sensor. Operate when space temperature exceeds 80 deg. F. (adj.). Alarm on temperatures above 85 deg. F. (adj.). (Added in Addenda #1)

DRAWINGS

Mechanical

1. Sheet M101: Partial Mechanical Floor Plan - Demo
   a. Removed wall temperature sensors.

2. Sheet M201: Partial Mechanical Floor Plan - New
   a. Removed keynote at new temperature sensors.

3. Sheet M212: Partial Mechanical Roof Plan - New
   a. Added keynote to replace VFD.

4. Sheet M502: Mechanical Controls
   a. Added new VFD.
   b. Removed high duct pressure sensor and point list.

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