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February 20, 2018

ADDENDUM #2

Renovations to Myrtle Grove Middle School
901 Piner Road
Wilmington NC 28409

Project ID: 900-9010

This addendum forms a part of the contract documents and modifies the original drawings and project manual dated January 2018. The enclosed additions, deletions, corrections, and changes shall be as binding as if incorporated in the original documents. All General Conditions, Special Conditions, etc. as originally specified shall apply to these items. Acknowledgement of receipt of this addendum will be required as part of the contract agreement.

Item 1 The construction managers, bid date, time and place remain unchanged from the published public notice as follows:

Sealed proposals will be received at the New Hanover County School Board Office, 6410 Carolina Beach Road, Wilmington, NC 28412 by **Monteith Construction Corp.** for the **Renovations to the Myrtle Grove Middle School** project on the following date and time for the following packages: **February 27, 2018 @ 3:00 PM:**

BP-740 Roofing; BP-840 – Glass & Glazing; BP-925 Drywall; BP-930 Ceramic Tile; BP-950 Acoustic Panel Ceiling; BP-960 Flooring; BP-990 Painting; BP-2100 Sprinklers; BP-2200 Plumbing; BP-2300 HVAC; BP-2600 Electrical; BP-3100 Turnkey Sitework

Item 2 **Addendum #1 Revised Drawings A602 and A601 (Attachment #1)**
See attached sheets with Revision #1 changes clouded and dated 02/15/18 and Revision #2 clouded and dated 02/20/18. The unrevised sheets were inadvertently included in the Addendum #1 link.

Item 3 **Interior Design Sheets (Attachment #1)**
Interior Design sheets have been reissued in color (unsigned) to add clarity in differentiating floor finish selections. The content of these sheets remains mostly unchanged except for items clouded as Revision #2, dated 02/20/18 (sealed black and white copy).

Item 4 **Specifications Section 073113**
Paragraph 1.4 A Warranty
Replace with the following:
A. Warranty: The asphalt shingle installation shall carry a 20-year full warranty protecting against manufacturing defects with a 40-year prorated coverage against manufacturing defects and rated for a 130 mph wind exposure.
Paragraph 2.1 A
Replace with the following:
A. Laminated strip asphalt shingles: Fiberglass reinforced 250-270 lb architectural profile self-sealing Class A shingle with mineral granule surface. Subject to compliance with requirements, provide one of the following:

Paragraph 2.1 A 1
Replace with the following:
1. CertainTeed (Landmark Pro Surestart Plus 3 – Basis of Design)

Paragraph 3.1 A
Replace with the following:
A. Synthetic Roof Underlayment: Install per manufacturer's instructions and roof shingle warranty requirements.

Item 5 **Roofing Scope Clarifications**

Exising flat (low scope) modified bitumen surfaced roofs do not comprise a portion of the roof scope. The underside of these decks will receive closed cell spray foam insulation with intumescent overspray as specified in Section 072100 Paragraph 2.3. All gutters and downspouts and miscellaneous metal flashings shall be as specified in Section 076200 Paragraph 2.2. Contractors shall include new metal roof edges at flat roof areas to match new metal fascia and gutters at sloped roofs. Metal coping and rake wall panels at sloped firewall extensions shall remain and be painted as called out on the elevations. Rake wall bases shall be modified to receive new shingle step flashing with raised expansion joint one side of the two building expansion joints called out on Drawing CS-0.9.

Item 6 **Drawing Sheet CS-10 (Attachment #1)**

The demolition and renovation room numbering sheet has been added for purposes of cross referencing including both existing room numbers and new room numbers.

Item 7 **Drawing Sheet A-100 (Attachment #1)**

See Revision #2 clouding for clarifications on floor finishes in the gym area: Rooms 303, 305, 305A, 306, 306A, and 308. See Interior Design Sheet ID-100 Revision #2 of this same area for additional clarifications.

Item 8 **Drawing ID-100**

Painting Scope Clarification in Gym Wing:

- Gymnasium 301 shall receive new wall paint on walls only to top of wall at roof structure and down to base or top of bleachers on north wall. The owner will remove banners and miscellaneous loose items. The painting contractor shall paint around permanently fixed items and remove and rehang items temporary mounted and paint behind them. The logo on the west wall shall be painted around. Mechanical ducts shall be cleaned on the exterior. The ceiling and roof beams shall not be painted.
- Weight room 303 and training room 308 shall have walls painted.
- Girls' locker 304 and boys' locker 307 shall only have the ceilings repainted.
- Private offices 305 and 306 and private toilets 305A and 306A shall not be painted.

Item 9 **Drawing Sheets A-106 and A-601 (Attachment #1)**

See Revision #2 for clarification of window tags at exterior glazing.

Item 10 **Drawing Sheet CS-08 (Attachment #1)**

Sprinkler Pipe Bracing Note
Sprinkler designers shall furnish in-service pipe loads to the Architect for pipes over two inches in size. The design team will evaluate and may suggest relocation to minimize any structural bracing. The cost of bracing shall post to the above ceiling allowance. Sprinkler designers shall endeavor to place these lines below primary structural frame elements. When running perpendicular to the primary frame pipe should be placed within the 1/3 span closest to the primary frame located below bar joist panel points.

Item 11 **Clarification Scope of Window Blinds – Administrative Suite**

The contractor shall include all new window blinds full height of windows for both new and existing windows when only a portion of the existing windows are replaced in any given room for continuity.

Item 12 **Addendum #1 Attachment #2**
Substitute revised CLH Design face page included as **Attachment #2**.

Item 13 **Duke Progress Energy Rebates**
All subcontractors whose work falls under the scope of the Duke Progress Energy Rebate Program shall furnish required invoices for materials.

Item 14 **Engineering Documents**
See attached engineering documents included at **Attachment #3.**

Bowman Murray Hemingway Architects, PC



Bruce Bowman, AIA

Attachments: 1. Revised Sheet List and Drawing Sheets
2. Revised CLH Design Face Page

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Myrtle Grove Middle School
Addendum #2 – 02/20/2018
Revised Sheet List

CS-10 Demolition and Renovation Room Numbers (New Sheet)
A-100 Complete Renovated Floor Plan
A-106 Floor Plan, Admin & Media Center
A-601 Window and Door Elevations
A-602 Door Elevations and Schedule

ID-100 Finish Legend and Details
ID-100 Finish Legend and Details (Color drawing for reference)
ID-103 Floor Pattern Plan, Elective Wing (Color drawing for reference)
ID-104 Floor Pattern Plan, 8th Grade Wing (Color drawing for reference)
ID-106 Floor Pattern Plan, Admin/Media (Color drawing for reference)
ID-107 Floor Pattern Plan, 7th Grade Wing (Color drawing for reference)
ID-108 Floor Pattern Plan, Cafeteria (Color drawing for reference)
ID-109 Floor Pattern Plan, 6th Grade Wing (Color drawing for reference)

H001 Standards, Symbols and Abbreviations
H110 Piping Plan, Elective Wing
H111 Piping Plan, 6th Grade Wing
H112 Piping Plan, Gymnasium
H113 Piping Plan, Admin & Media Center
H114 Piping Plan, 7th Grade Wing
H115 Piping Plan, Cafeteria
H116 Piping Plan, 8th Grade Wing
H201 Alternates
H300 Details
H302 Details
H303 Details (Reprinted for Clarity)
H304 Details (Reprinted for Clarity)
H305 Details (Reprinted for Clarity)
H400 Controls
H402 Controls
H500 Schedules

E001 Standards, Symbols and Abbreviations (corrected Grade assignment)
E002 Electrical Site Plan
E101 Power Plan, 6th Grade Wing (corrected Grade assignment)
E102 Power Plan, Gymnasium
E106 Power Plan, 8th Grade Wing (corrected Grade assignment)
E201 Lighting and Fire Alarm, 6th Grade Wing (corrected Grade assignment)
E202 Lighting Plan, Gymnasium
E203 Lighting and Fire Alarm, Admin / Media Center
E206 Lighting and Fire Alarm, 8th Grade Wing (corrected Grade assignment)
E401 Electrical Distribution
E402 Electrical Distribution and Panel Schedule
E501 Lighting and Fire Alarm Details

SEPARATE PERMIT SCOPE
MOBILE CLASSROOM LOCATION. CM TO INSTALL BUILDINGS, UTILITIES, RAMPS, SIDEWALKS IN CONTRACT. SEE SITE PLAN CS-04. SEE ALLOWANCES FOR FOUNDATION WORK.

REMOVE CARPET THOUGHOUT BAND ROOMS. SCARIFY SLAB & REMOVE GLUE. INSTALL NEW VCT FLOORING ON SLAB AND RUBBER FLOOR FINISH ON ALL ELEVATED FLOORS/RISERS.

EXISTING PAVED PLAY AREA

ALUMINUM STEPS

NEW CONCRETE WALK

NEW ALUMINUM STOREFRONT DOORS.

LOCATION OF NEW ACCESS CONTROL LOCK

ALUM. LANDING

ALUMINUM RAMP

NEW CONCRETE WALK

REMOVE EXISTING LOCKERS AND REPLACE WITH INSTRUMENT LOCKERS FOR ORCHESTRA, ROOM 402.

EXTEND PERIMETER WALLS OF ORCHESTRA ROOM TO ROOF DECK FOR SOUND CONTROL, GYP BRD CONSTRUCTION.

ADD NEW ANTENNA TO PIM ELECTRONIC LOCK MONITORING SYSTEM FOR MODULARS

MOVE FENCE TO ACCOMODATE SIDEWALK

NEW CONCRETE WALK

DASHED LINE INDICATES ROOF OVERHANG, TYP.

PIM 1 TO BE RELOCATED TO IDF IN ROOM T401A

PROJECTOR MOUNT TO BE REMOVED IN ROOM 401

1" BLDG. EXPANSION JOINT

PROJECTOR MOUNT TO BE REMOVED IN ROOM 303

NEW SPRINKLER RISER ROOM, 8' X 6'. SEE FIRE PROTECTION DWGS

DASHED LINE INDICATES ROOF OVERHANG

CAFETERIA OUTSIDE AIR INTAKE UNIT SHALL BE LOCATED OUTSIDE THE BUILDING, WITH CHAIN LINK FENCE WITH PRIVACY SLATS , TYP. **ADD ALTERNATE #6** SEE SHEET A-501 FOR FENCE DETAIL.

REMOTE FDC CONNECTION, TO BE LOCATED WITHIN 150 FEET OF HYDRANT

REMOVE EXISTING WOOD RISERS IN DRAMA CLASSROOM PRIOR TO INSTALLATION OF BLACK VCT FLOORING

APPROXIMATE LOCATION OF EXISTING PIM MONITORING DEVICE

REMOVE FIXED WINDOWS AND REPLACE WITH 3'-0" DOOR AND STOREFRONT SURROUND. **ADD ALTERNATE #2**

REMOVE DOOR & GLAZING ASSEMBLY AND INFILL EXTERIOR WALL ASSEMBLY TO ENCLOSE OPENING. **ADD ALTERNATE #2.**

REMOVE EXISTING WHITE BOARD & ENTIRE BOOKCASE. INSTALL NEW 70" RECORDEX MONITOR. MONITOR BY OWNER, INSTALLED BY CONTRACTOR.

SEE DEMOLITION & RENOVATION IN WORKROOM ON SHEET A-507.

NEW CASEWORK, FINISHES AND FILE ROOM ADDED IN RECEPTION. SEE SHEET A-505 & A-506. **ADD ALT #3.**

PA TOWER FROM RECEPTION TO BE RELOCATED TO NEW MDF ROOM (T715), PHASE 1.

DASHED LINE INDICATES ROOF OVERHANG, TYP.

OUTSIDE AIR INTAKE UNITS (PRECONDITIONED AIR) SHALL BE LOCATED OUTSIDE THE BUILDING, WITH CHAIN LINK FENCE WITH PRIVACY SLATS , TYP. SEE SHEET A-501 FOR FENCE DETAIL.

NEW ALUMINUM STOREFRONT DOOR W/ACCESS HARDWARE

NOTE:
IN FINAL RENOVATED ROOM NUMBERING, THE 6TH & 8TH GRADE WINGS WILL SWITCH.

NOTE:
IN FINAL RENOVATED ROOM NUMBERING, THE 6TH & 8TH GRADE WINGS WILL SWITCH.

NOTE:

THIS RENOVATED FLOOR PLAN SHOWS THE **NEW** ROOM NUMBERS, AND GRADE ASSIGNMENT BY WING, IN THE SCHOOL.

SEE SHEET CS-07 FOR EXISTING ROOM NUMBERS.

NO FLOORING WORK - FLOORING INSTALLED DECEMBER 2017

ELECTIVE WING

6TH GRADE WING (previously 8th Grade Wing)

7TH GRADE WING

8TH GRADE WING (previously 6th Grade Wing)

BUILDING 1

BUILDING 2

MAIN ENTRY

FLOOR REPLACEMENT

- ALL CORRIDOR FLOORS - VCT * 12,920 SF TOTAL.
- CLASSROOM & GRADE LEVEL OFFICE FLOORS - VCT * 42,650 SF TOTAL.
- BAND: REMOVE CARPET, INSTALL VCT FLOORING* 2,000 SF TOTAL.

** INSTALL WAKOL PU 280 MOISTURE BARRIER WITH SCARIFYING SURFACE AND GLUE REMOVAL.*

- CARPET FLOORING REPLACED - CARPET TILE. 4,500 SF TOTAL.
- LOCKER ROOM PORCELAIN TILE - STRIP, CLEAN AND SEAL. 1,060 SF TOTAL.

PROTECT AND CLEAN EXISTING FLOORING THAT IS TO REMAIN - UNSHADED AREAS - TYP.

1 A-100 **Complete Renovated Floor Plan**
Scale 1" = 20'-0"

0' 20' 40' 80'

TRUE PLAN NORTH

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BRUCE F. BOWMAN REGISTERED ARCHITECT 5951 NORTH CAROLINA
2-20-18

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

COMPLETE RENOVATED FLOOR PLAN

JOB NUMBER

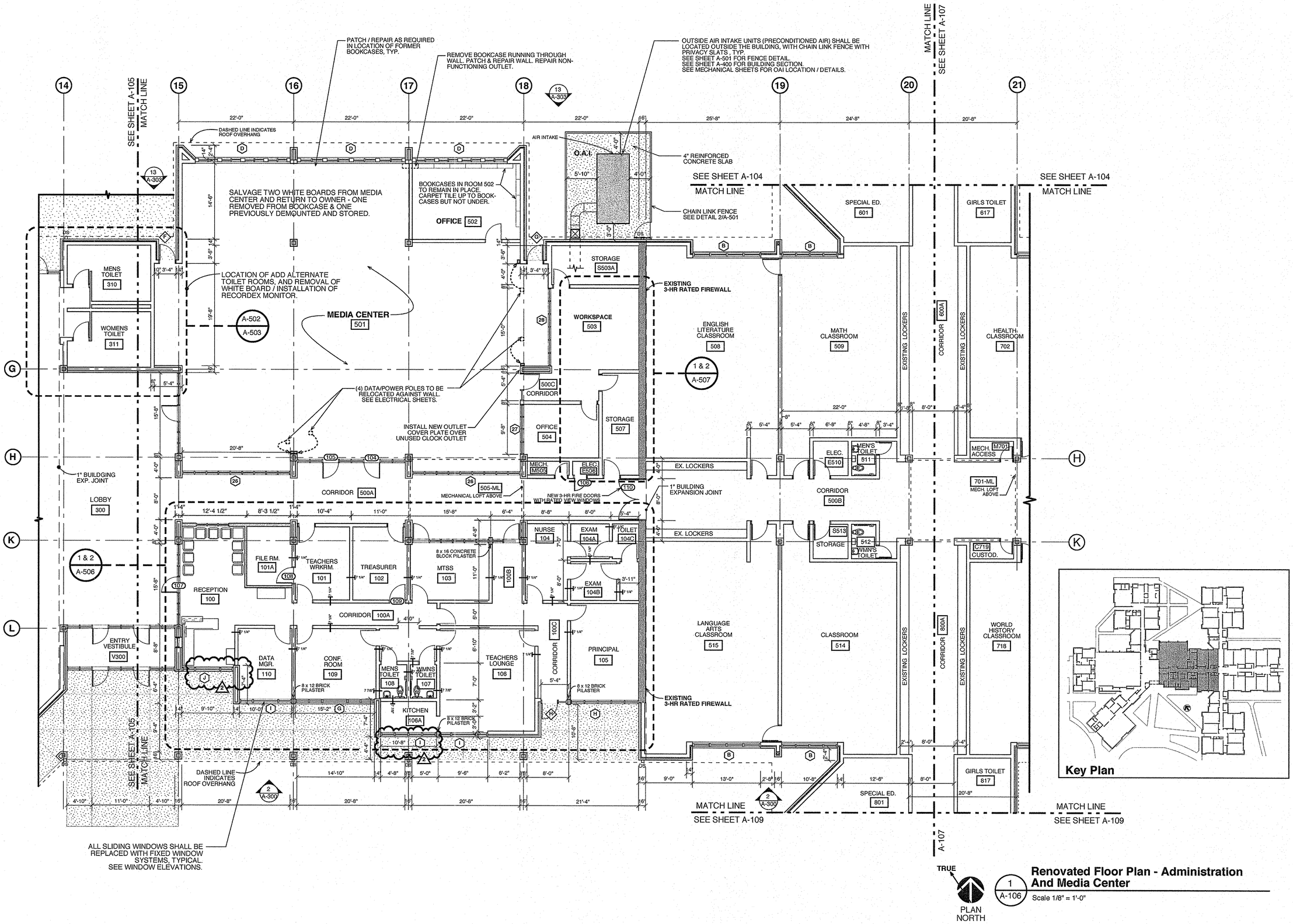
DRAWN BY
Hawk

CHECKED BY
Bowman

DATE
01/24/2018

REVISIONS
1 - 02/15/18 - FLOORING/DOOR CHANGES, MOVE PIM,
2 - 02/20/18 - ADD FLOORING: RMS 303, 305, 306, AND 308,

SHEET NUMBER
A-100



1 / A-106 **Renovated Floor Plan - Administration And Media Center**

Scale 1/8" = 1'-0"

bmh
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REGISTERED ARCHITECT
5951
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WILMINGTON, N.C.
2.20.18

Renovations to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

RENOVATED FLOOR PLAN - ADMINISTRATION AND MEDIA CENTER

JOB NUMBER

DRAWN BY Hawk

CHECKED BY Bowman

DATE 01/24/2018

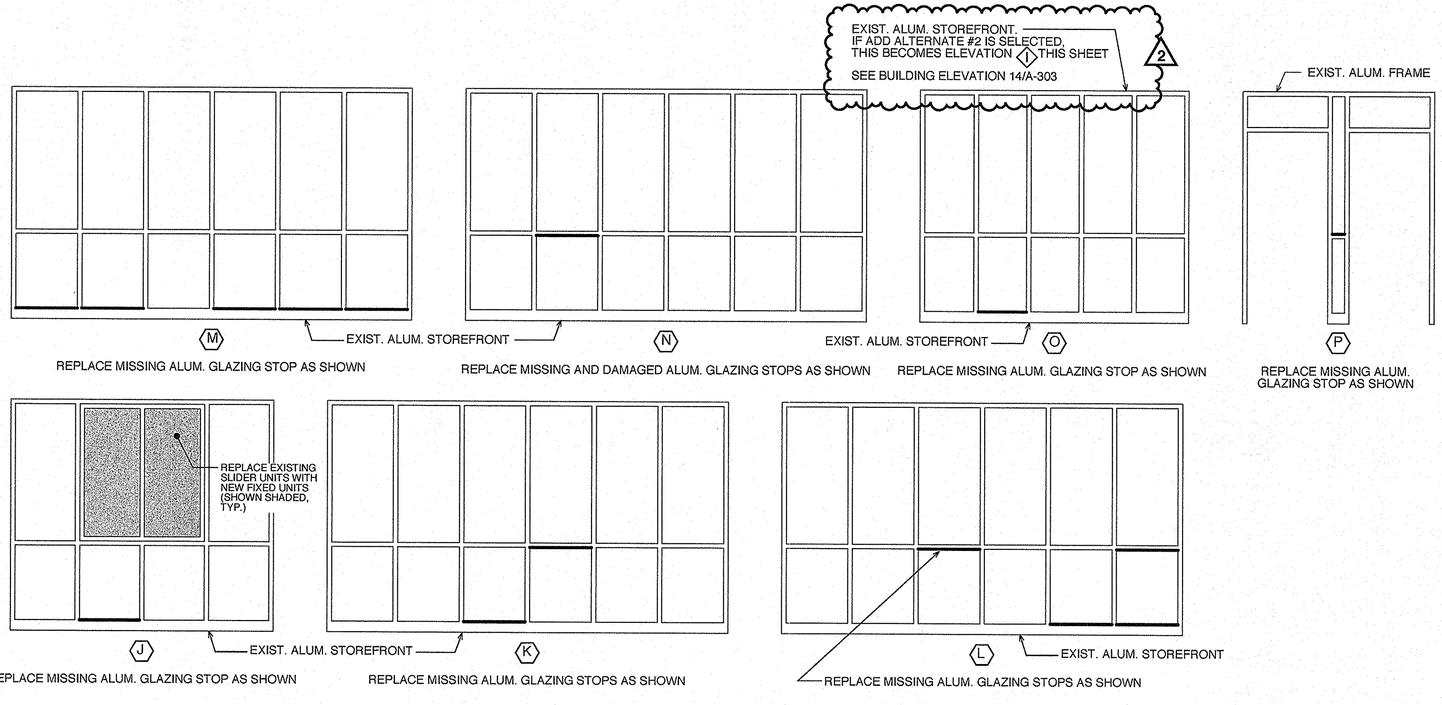
REVISIONS

1 - 02/14/18 - MEDIA CTR: POWER POLES MOVED, SALVAGE WHITE BRDS, WALL REPAIR

2 - 02/20/18 - STOREFRONT ELEV. TAGS AT ADMIN.

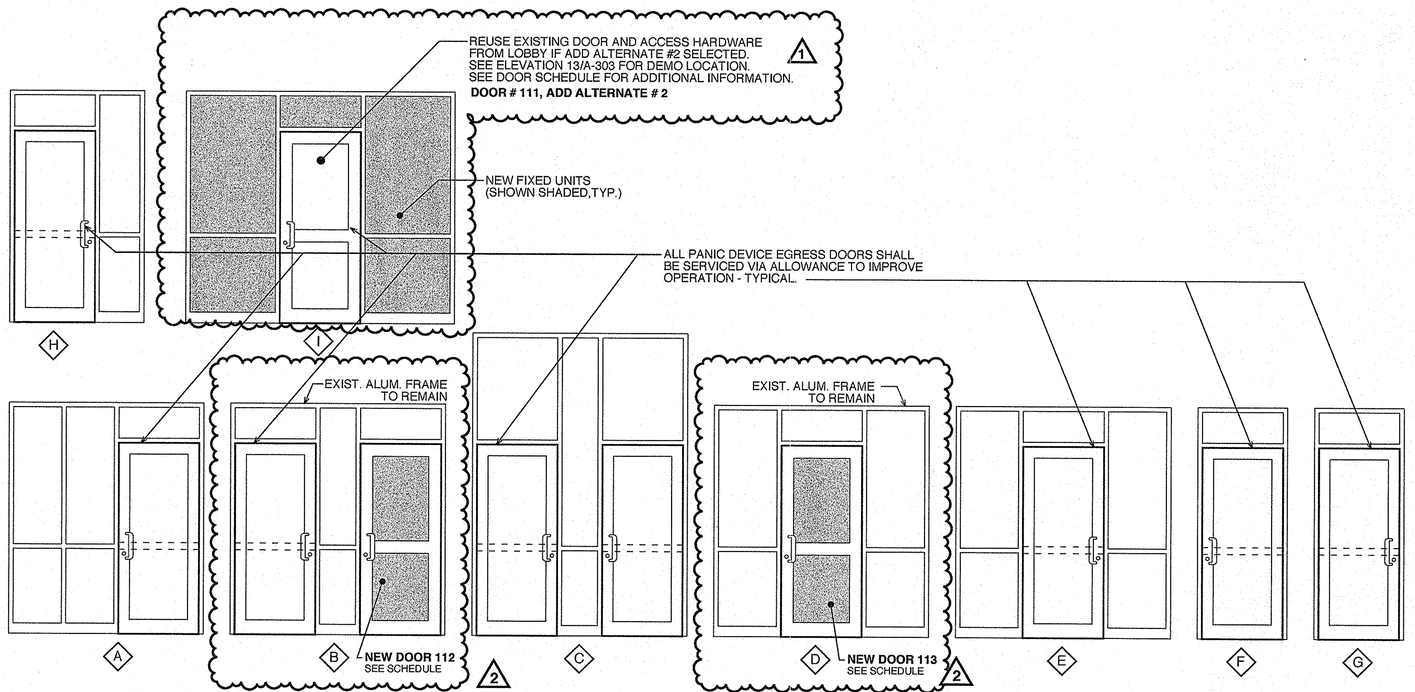
SHEET NUMBER

A-106



2 A-601 Existing Aluminum Storefront Elevations With New Aluminum Glazing Stop Replacements For Missing Stops

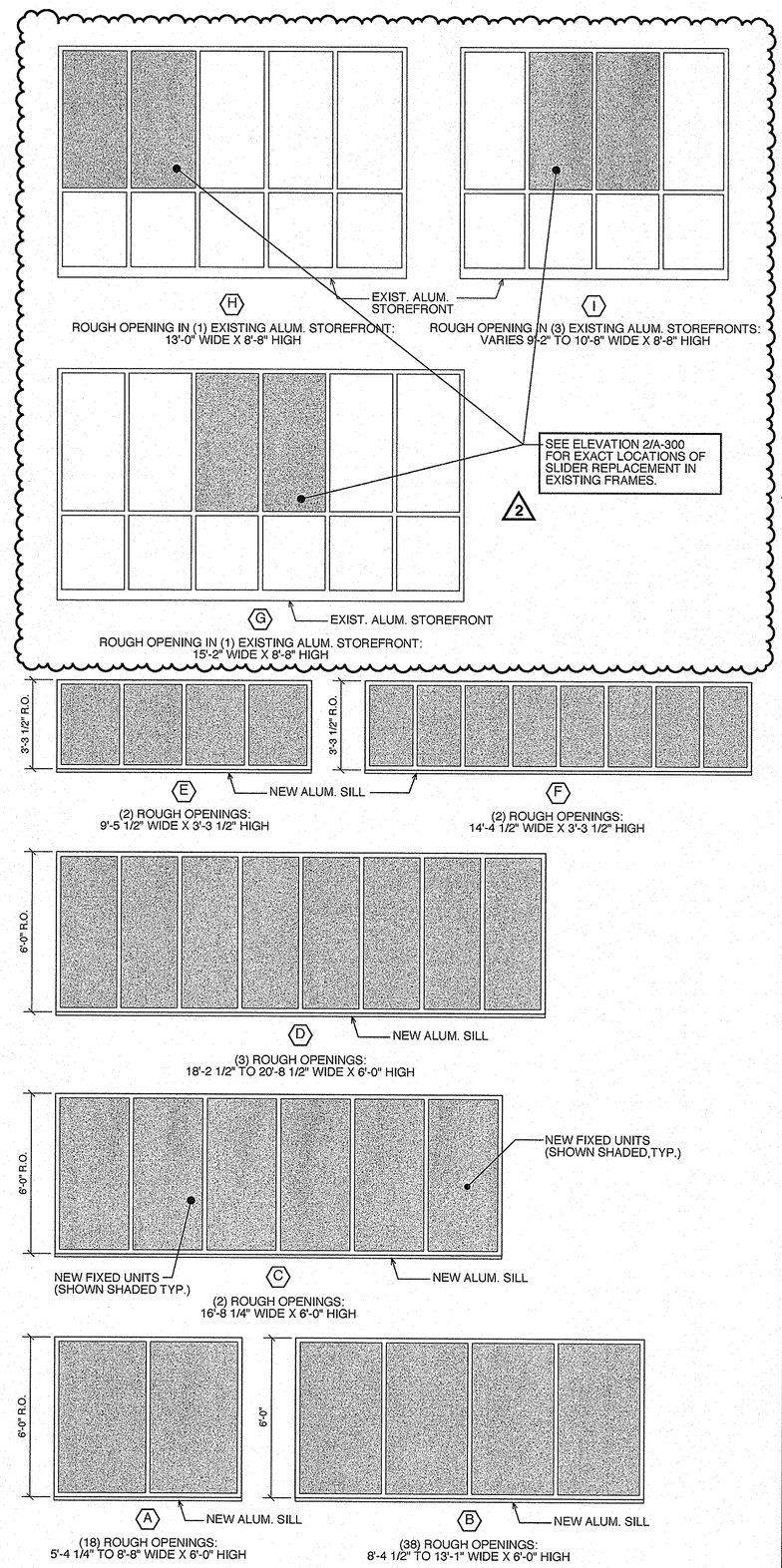
Scale 3/8" = 1'-0"



3 A-601 New & Existing Aluminum Door Elevations With Existing Aluminum Frames

Scale 3/8" = 1'-0"

TYPICAL DOOR: 3'-0" X 7'-2" X 1 3/4"



1 A-601 New Aluminum Window Elevations (Existing Slider Replacements)

Scale 3/8" = 1'-0"

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BRUCE F. BOWMAN — REGISTERED ARCHITECT — 5951 — NORTH CAROLINA — 2.20.18

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

WINDOW & DOOR ELEVATIONS

JOB NUMBER

DRAWN BY: Watson / Hawk

CHECKED BY: Bowman

DATE: 01/24/2018

REVISIONS
1 - 02/15/18 - REUSE DOOR
2 - 02/20/18 - CLARIFY DOOR & WINOW REPL, ADD ALT 2, DIMS ON STOREFRONT FRAMES

SHEET NUMBER
A-601

HARDWARE SCHEDULE

HW 1 Exterior HM Door, Sprinkler Riser Door 101
1 1/2 Pair hinges
1 Closer
1 Mortise lockset-storeroom function
1 Threshold and weatherstrip set
1 Doorstop

HW 2 Interior Single, Toilet Doors 102, 103
1 1/2 Pair hinges
1 Mortise lockset - privacy function
1 Wall stop
1 Mop plate
1 Closer

HW 3 Pair, 3-Hour Fire Doors 110
4 Pair hinges
2 Vertical rod panic devices - passage function
2 Closers
Remove & remount existing magnetic hold open pads

HW 4 Electrical Room 106
1 Continuous hinge
1 Mortise lockset - storeroom function
1 Wall stop
1 Set hinge and strike filler plates

HW 5 New File Room, Door 108
1 1/2 Pair hinges
1 Mortise lockset - storeroom function
1 Wall stop

HW6 Treasurer's Office, Door 109
1 1/2 Pair hinges
1 Mortise lockset - entrance function
1 Wall stop

HW7 Reception/Media, Doors 104, 105, 107
1 1/2 Pair hinges
1 Mortise Lockset - Classroom function
1 Closer with hold open feature

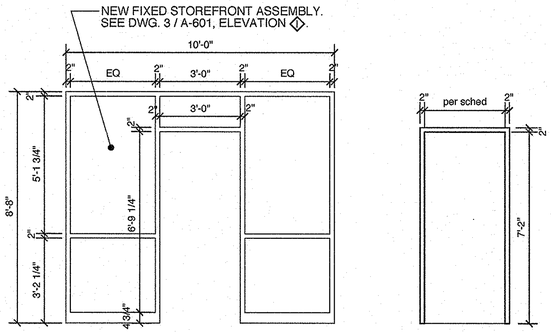
HW8 Aluminum Lobby Door 111
Hardware and door to be relocated

HW9 Aluminum Access Control Doors 112, 113
1 Continuous Hinge
1 Closer
1 Rim Panic Device with Latch Retraction
1 Access Control Device (Battery Operated)

HW10 New Corridor Administrative Access Door 114
1 1/2 Pair Hinges
1 Rim Panic Device with Latch Retraction
1 Access Control Device (Battery Operated)
1 Wall Stop
1 Closer
1 Strike Filler Plate

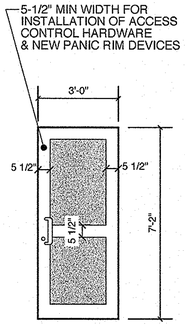
DOOR SCHEDULE

	NO.	SIZE WxHxT	DOOR TYPE	DOOR ELEV.	FRAME ELEV.	FRAME TYPE / FIN.	HEAD/JAMB/SILL	HDW	DOOR FINISH	RATING	GLAZING	REMARKS
Sprinkler Riser Room	101	3'-0" x 7'-2" x 1 3/4"	HM/PT	D-4	F-1	HM/PT		1	PAINT	——	————	
New Lobby Toilet	102	3'-0" x 7'-2" x 1 3/4"	SCW	D-2	F-1	HM/PT		2	STAIN/SEAL	——	————	**Add Alternate # 2**
New Lobby Toilet	103	3'-0" x 7'-2" x 1 3/4"	SCW	D-2	F-1	HM/PT		2	STAIN/SEAL	——	————	**Add Alternate # 2**
Media Center Entry	104	3'-0" x 7'-2" x 1 3/4"	SCW	D-1	Existing	HM/PT		7	STAIN/SEAL	——	1/4" TEMP. GLASS	Verify existing opening dimensions & hardware
Media Center Exit	105	3'-0" x 7'-2" x 1 3/4"	SCW	D-1	Existing	HM/PT		7	STAIN/SEAL	——	1/4" TEMP. GLASS	Verify Existing Opening dimensions
Electrical Room (rev. swing)	106	2'-4" x 7'-2" x 1 3/4"	SCW	D-2	Existing	HM/PT		4	STAIN/SEAL	——	————	Cont' hinge, Cut in strike, verify existing dimensions
Reception Entry	107	3'-0" x 7'-2" x 1 3/4"	SCW	D-1	Existing	HM/PT		7	STAIN/SEAL	——	1/4" TEMP. GLASS	Verify existing opening dimensions & hardware
New File Room	108	3'-0" x 7'-2" x 1 3/4"	SCW	D-2	F-1	HM/PT		5	STAIN/SEAL	——	————	**Add Alternate # 3**
New Treasurer's Office	109	3'-0" x 7'-2" x 1 3/4"	SCW	D-2	Existing	HM/PT		6	STAIN/SEAL	——	————	**Add Alternate # 3**
(2) New 3-hr Fire Doors	110	7'-8" x 7'-2" x 1 3/4"	HM/PT	D-3	Existing	HM/PT		3	PAINT	3 HR.	1/4" FIRE GLASS	Verify existing opening dimensions & hardware
Alum. Lobby Door - Elective Corridor	111	3'-0" x 7'-2" x 1 3/4"	ALUM	D-5	F-2	ALUM.		8	ALUM.	——	1/4" TEMP. GLASS	**Add Alternate # 2** - Hardware & door to be relocated.
Alum. Door - Elective Corridor	112	3'-0" x 7'-2" x 1 3/4"	ALUM	D-5	Existing	ALUM.		9	ALUM.	——	1/4" TEMP. GLASS	New door in existing frame, New card access hardware.
Alum. Door - 8th Grade Corridor	113	3'-0" x 7'-2" x 1 3/4"	ALUM	D-5	Existing	ALUM.		9	ALUM.	——	1/4" TEMP. GLASS	New door in existing frame, New card access hardware.
Corridor Admin Access Door - Add Alt	114	3'-0" x 7'-2" x 1 3/4"	SCW	D-1	Existing	HM/PT		10	STAIN	——	1/4" TEMP. GLASS	New door in existing frame, New card access hardware.

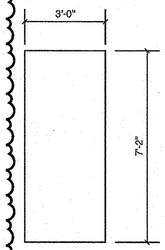


F-2
ALUMINUM STOREFRONT

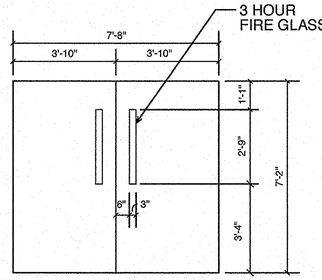
F-1
HOLLOW METAL



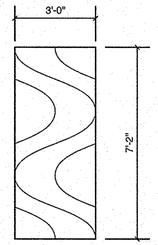
D-5
ALUMINUM



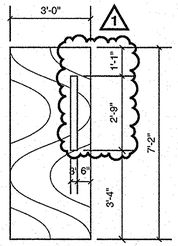
D-4
HOLLOW METAL



D-3
HOLLOW METAL
3 HOUR A LABEL



D-2
SOLID CORE WOOD

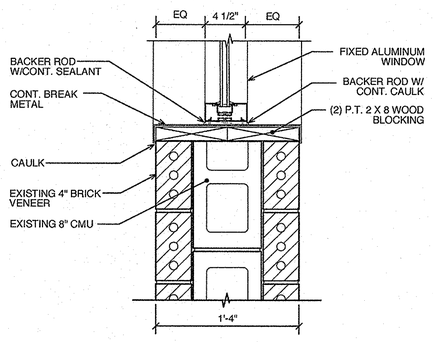


D-1
SOLID CORE WOOD

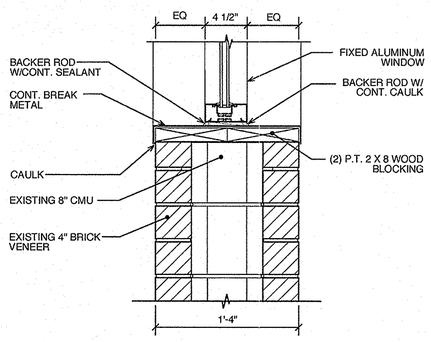
5 A-602 **Doors Frame**
Scale 3/8" = 1'-0"

4 A-602 **New Exterior Doors**
Scale 3/8" = 1'-0"

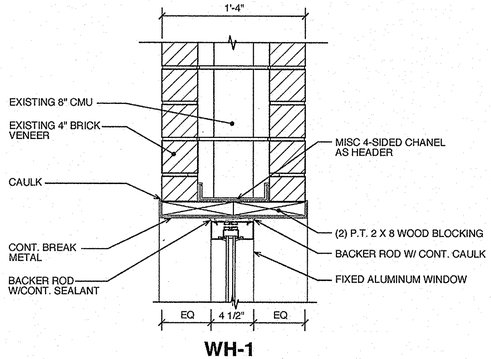
3 A-602 **New Interior Doors**
Scale 3/8" = 1'-0"



WJ-1



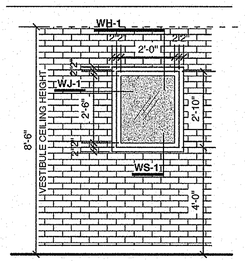
WS-1



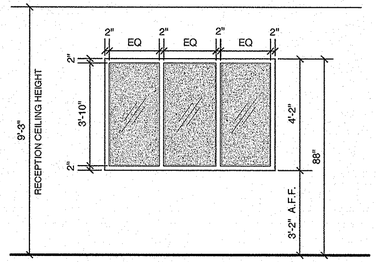
WH-1

2 A-602 **Window Details** - 4 1/2" x 2" Aluminum Storefront with 1" insulated glass in Reception / Entry vestibule
Scale 1 1/2" = 1'-0"

ADD ALTERNATE #3



R
ALUMINUM FIXED
STOREFRONT WINDOW



Q
INTERIOR ALUMINUM FIXED
STOREFRONT WINDOW

1 A-602 **New Aluminum Window Elevations** - Reception
Scale 3/8" = 1'-0"

ADD ALTERNATE #3

BOWMAN, MURRAY, HEMINGWAY ARCHITECTS, P.C.
ARCHITECT
514 Market Street
Wilmington, NC 28401
Tel - (910) 762-2021
Fax - (910) 762-8506

BOWMAN, MURRAY, HEMINGWAY ARCHITECTS, P.C. REGISTERED ARCHITECTURAL CORPORATION CERT. NO. 50424 NORTH CAROLINA WILMINGTON, N.C.

BRUCE F. BOWMAN REGISTERED ARCHITECT 5951 NORTH CAROLINA 2.15.18

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

WINDOW AND DOOR ELEVATIONS AND DETAILS

JOB NUMBER

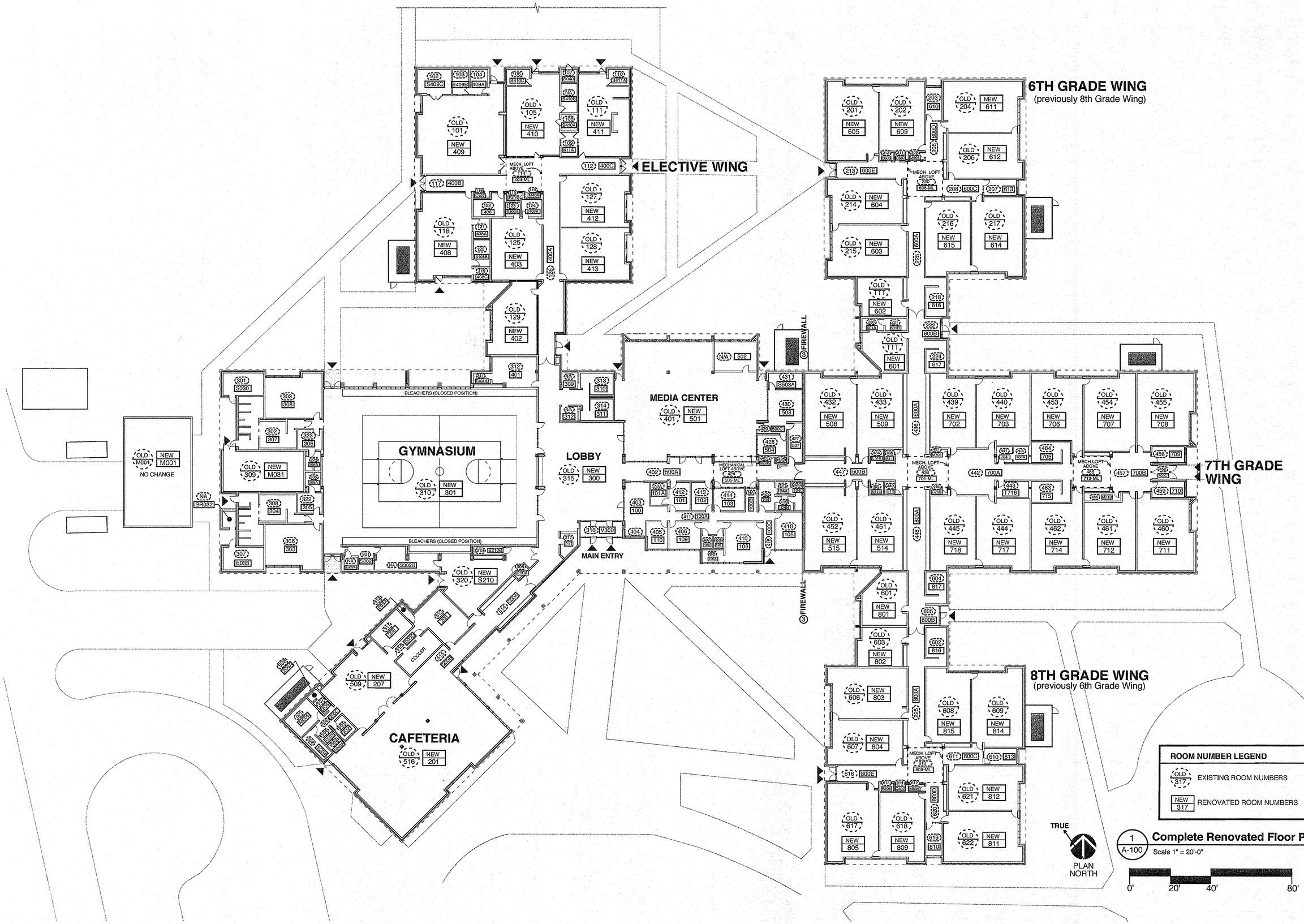
DRAWN BY
Hawk

CHECKED BY
Bowman

DATE
01/24/2018

REVISIONS
1 - 02/15/18 - NEW DOORS

SHEET NUMBER
A-602



ROOM NUMBER LEGEND

- OLD 317 — EXISTING ROOM NUMBERS
- NEW 317 — RENOVATED ROOM NUMBERS

1 / A-100 **Complete Renovated Floor Plan**

Scale 1" = 20'-0"

0' 20' 40' 80'

BOWMAN MURRAY HEMINGWAY
ARCHITECT
514 Market Street
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Tel - (910) 762-2621
Fax - (910) 762-8506

BOWMAN, MURRAY, HEMINGWAY ARCHITECTS, PA
REGISTERED ARCHITECTURAL CORPORATION
CERT. NO. 50424
NORTH CAROLINA
WILMINGTON, N.C.

BRUCE F. BOWMAN
REGISTERED ARCHITECT
5951
NORTH CAROLINA
WILMINGTON, N.C.
2.20.19

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

DEMOLITION AND RENOVATION ROOM NUMBERS

JOB NUMBER

DRAWN BY: Hawk

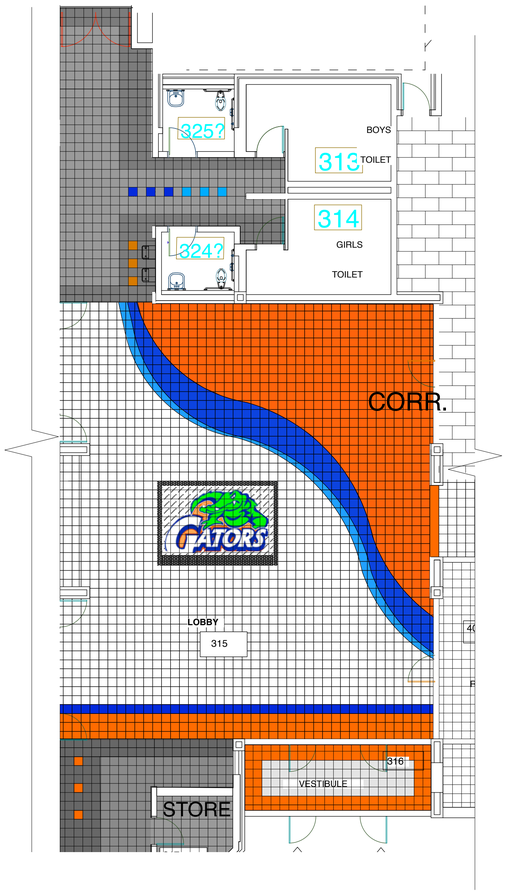
CHECKED BY: Bowman

DATE: 02/16/2018

REVISIONS

SHEET NUMBER

CS-10



1 ID-100

Lobby Detail

Scale 1/8" = 1'-0"

MGMS - FINISH LEGEND		
ID	DESCRIPTION	NOTES
PT-1	SHERWIN WILLIAMS RESERVED WHITE SW7056	
PT-2	SHERWIN WILLIAMS FRONT PORCH SW7651	
PT-3	SHERWIN WILLIAMS ELLIE GRAY SW7650	
PT-4	SHERWIN WILLIAMS FLYWAY SW6794	
PT-5	SHERWIN WILLIAMS SNOWBOUND SW7004	
PT-6	SHERWIN WILLIAMS BLUE PLATE SW6796	
PT-7	SHERWIN WILLIAMS CARNIVAL SW6892	
PT-8	SHERWIN WILLIAMS JAY BLUE SW6797	
RB-1	JOHNSONITE , 4" TRADITIONAL WALL BASE, 70 BLUEST	
RB-2	JOHNSONITE , 4" TRADITIONAL WALL BASE, 38 PEWTER	
VCT-1	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" BLUE CLOUD 51933	
VCT-2	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" CARIBBEAN BLUE 51821	
VCT-3	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" SCREAMIN' PUMPKIN 57516	
VCT-4	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" BIKINI BLUE 57512	
VCT-5	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" SEA GREEN 51824	
VCT-6	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" SOFT WARM GRAY 51861	
VCT-7	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" STERLING 51904	
VCT-8	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" CHARCOAL 51915	
VCT-9	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" CLASSIC BLACK 51910	
CPT-1	SHAW, DUOTONE TILE, COLOR AT WORK 18"X36", 5T108 CHARCOAL CYAN 07436	
CPT-2	SHAW, COLOR FORM TILE, 9"X36", 5T112 BLAZE 81668	
CPT-3	SHAW, VALUE TILE, 9"X36", COLOR AT WORK 5T110 CHARCOAL CYAN 07436	
CPT-4	SHAW, SATURATE TILE, 9"X36", 5T109 SILVER 07518	
CPT-5	SHAW, SATURATE TILE, 9"X36", 5T109 CHARCOAL 07555	
CPT-6	SHAW, SEA EDGE TILE, 24"X24", 5T173 SKYLINE CYAN 72501	
RBF-1	RUBBER FLOORING TBD	
TL-1	AMERICAN OLEAN, MERIT, 12"X24" LIGHT GRAY ME08 GLAZED PORCELAIN	
TL-2	AMERICAN OLEAN, MERIT, 2"X2" LIGHT GRAY ME08 GLAZED PORCELAIN	
WLTL-1	AMERICAN OLEAN, THEORETICAL BLEND, 12"X24" AUTHENTIC ORANGE TH88 COLORBODY PORCELAIN	
WLTL-2	AMERICAN OLEAN, THEORETICAL BLEND, 12"X24" FORMULA BLUE TH86 COLORBODY PORCELAIN	
WLTL-3	AMERICAN OLEAN, THEORETICAL BLEND, 3"X12" AUTHENTIC ORANGE TH88 P-43C9 BULLNOSE	
WLTL-4	AMERICAN OLEAN, THEORETICAL BLEND, 3"X12" FORMULA BLUE TH86 P-43C9 BULLNOSE	
QTZ-1	QUARTZ TBD	
QTZ-2	QUARTZ TBD	

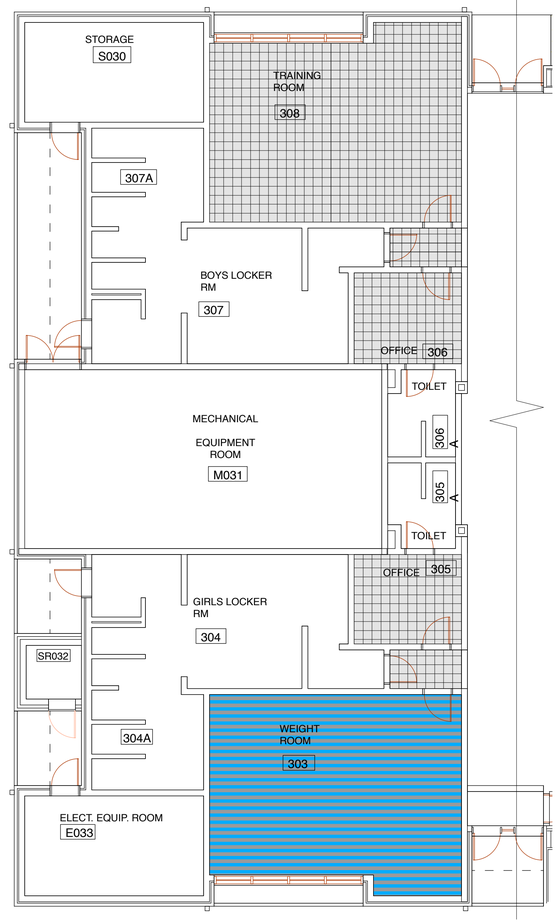
NOTES:

1. FOR ANY QUESTIONS OR CLARIFICATIONS OF THESE DRAWINGS, PLEASE CONTACT BIG SKY DESIGN DIRECTLY. DESIGNER NOT RESPONSIBLE FOR OTHER'S MISINPTERPRETATIONS OF DRAWINGS. (910)793-3992
2. FLOOR PATTERNS ARE DRAWN FOR INSTALLATION REFERENCE. DESIGN INTENT IS TO NOT HAVE ANY SMALL PIECES OF VCT TILE. NO LESS THAN 4". ADJUST LAYOUT ACCORDINGLY.
3. IF ANY ADDITIONAL INSTRUCTIONS NEEDED FOR FLOORING INSTALLATION PLEASE CONTACT DESIGNER.
4. USE TL-1 & TL-2 FOR RENOVATED TOILET ROOMS. USE 12"X24" ALL OVER UNLESS A SLOPE TO DRAIN CONDITION EXISTS. IF SO COORDINATE WITH DESIGNER TO DETERMINE AN AREA OF 2"X2" TILES WITHIN OVERALL PATTERN.
5. THE GATOR EMBLEM SHOWN IN THE FLOOR IS TO BE A LASER CUT FABRICATION. IF THERE ARE QUESTIONS CONTACT DESIGNER.
6. FOR BATHROOMS WHERE WALL TILE IS APPLICABLE, USE WLTL-1, 3 AND WLTL-2,4 WITH BULLNOSE AT TOP EDGE OF WALLTILE. BELOW THE BULNOSE PIECE, WE WILL USE BAND OF WALL TILE IN ALTERNATE COLOR AS AN ACCENT. IF THERE ARE QUESTIONS CONTACT DESIGNER.
7. PAINT COLORS ABOVE LISTED AS PLACEHOLDERS FOR NOW. PAINTERS SHOULD BE PREPARED TO PAINT 60 PERCENT OF THE WALLS IN ACCENT COLORS WITH DIAGONAL OR HORIZONTAL TAPED BANDING. PLEASE ALLOW FOR THIS ADDITIONAL WORK AND COLOR APPLICATION DUE TO THE NATURE OF THIS PROJECT. ELEVATIONS TO FOLLOW.
8. QTZ SELECTIONS SHOWN ABOVE AS PLACEHOLDERS FOR NEW VANITY COUNTERS AT BATHROOMS BEING RENOVATED.

2 ID-100

Finish Legend

Not to Scale



3 ID-100

Gymnasium Detail

Not to Scale

FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

BOWMAN MURRAY HEMINGWAY
ARCHITECTS
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BIG SKY DESIGN
4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28409 - 910-793-3992
www.bigskydesignonline.com

BRUCE F. BOWMAN REGISTERED ARCHITECT 595 1 NORTH CAROLINA WILMINGTON, N.C.

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FINISH LEGEND AND DETAILS

JOB NUMBER

DRAWN BY NL&JK

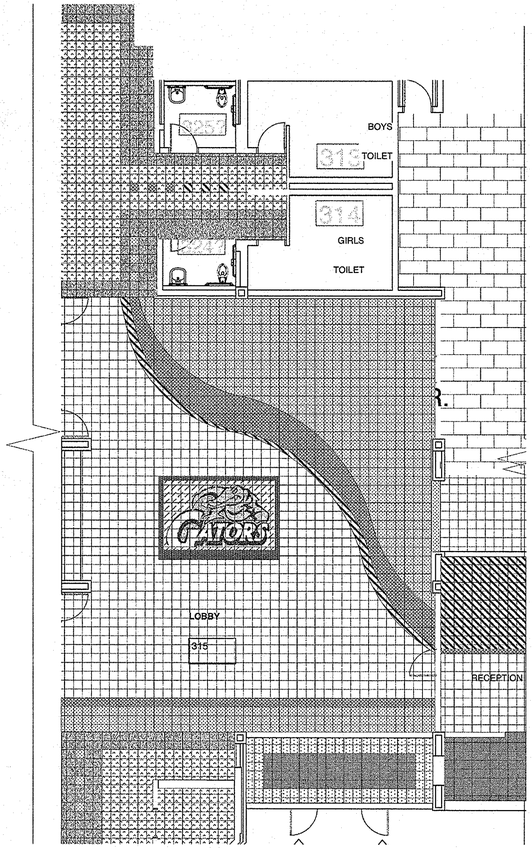
CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1. 2/15/18 - VCT
2. 2/20/18 - IN COLOR

SHEET NUMBER

ID-100



1 ID-100 **Lobby Detail**

Scale 1/8" = 1'-0"

MGMS - FINISH LEGEND

ID	DESCRIPTION	NOTES
PT-1	SHERWIN WILLIAMS RESERVED WHITE SW7056	
PT-2	SHERWIN WILLIAMS FRONT PORCH SW7661	
PT-3	SHERWIN WILLIAMS ELLIE GRAY SW7650	
PT-4	SHERWIN WILLIAMS FLYWAY SW5794	
PT-5	SHERWIN WILLIAMS SNOWBOUND SW7004	
PT-6	SHERWIN WILLIAMS BLUE PLATE SW6796	
PT-7	SHERWIN WILLIAMS CARNIVAL SW6892	
PT-8	SHERWIN WILLIAMS JAY BLUE SW6797	
RB-1	JOHNSONITE, 4" TRADITIONAL WALL BASE, 70 BLUEST	
RB-2	JOHNSONITE, 4" TRADITIONAL WALL BASE, 38 PEWTER	
VCT-1	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" BLUE CLOUD 51933	
VCT-2	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" CARIBBEAN BLUE 51821	
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VCT-4	ARMSTRONG, STANDARD EXCELON IMPERIAL TEXTURE, 12"X12" BIKINI BLUE 57512	
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CPT-2	SHAW, COLOR FORM TILE, 9"X36', 5T112 BLAZE 81668	
CPT-3	SHAW, VALUE TILE, 9"X36", COLOR AT WORK 5T110 CHARCOAL CYAN 07436	
CPT-4	SHAW, SATURATE TILE, 9"X36", 5T109 SILVER 07518	
CPT-5	SHAW, SATURATE TILE, 9"X36", 5T109 CHARCOAL 07555	
CPT-6	SHAW, SEA EDGE TILE, 24"X24", 5T173 SKYLINE CYAN 72501	
RBF-1	RUBBER FLOORING TBD	
TL-1	AMERICAN OLEAN, MERIT, 12"X24" LIGHT GRAY ME08 GLAZED PORCELAIN	
TL-2	AMERICAN OLEAN, MERIT, 2"X2" LIGHT GRAY ME08 GLAZED PORCELAIN	
WLTL-1	AMERICAN OLEAN, THEORETICAL BLEND, 12"X24" AUTHENTIC ORANGE TH88 COLORBODY PORCELAIN	
WLTL-2	AMERICAN OLEAN, THEORETICAL BLEND, 12"X24" FORMULA BLUE TH86 COLORBODY PORCELAIN	
WLTL-3	AMERICAN OLEAN, THEORETICAL BLEND, 3"X12" AUTHENTIC ORANGE TH88 P-43C9 BULLNOSE	
WLTL-4	AMERICAN OLEAN, THEORETICAL BLEND, 3"X12" FORMULA BLUE TH86 P-43C9 BULLNOSE	
QTZ-1	QUARTZ TBD	
QTZ-2	QUARTZ TBD	

NOTES:

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3. IF ANY ADDITIONAL INSTRUCTIONS NEEDED FOR FLOORING INSTALLATION PLEASE CONTACT DESIGNER.
4. USE TL-1 & TL-2 FOR RENOVATED TOILET ROOMS. USE 12"X24" ALL OVER UNLESS A SLOPE TO DRAIN CONDITION EXISTS. IF SO COORDINATE WITH DESIGNER TO DETERMINE AN AREA OF 2"X2" TILES WITHIN OVERALL PATTERN.
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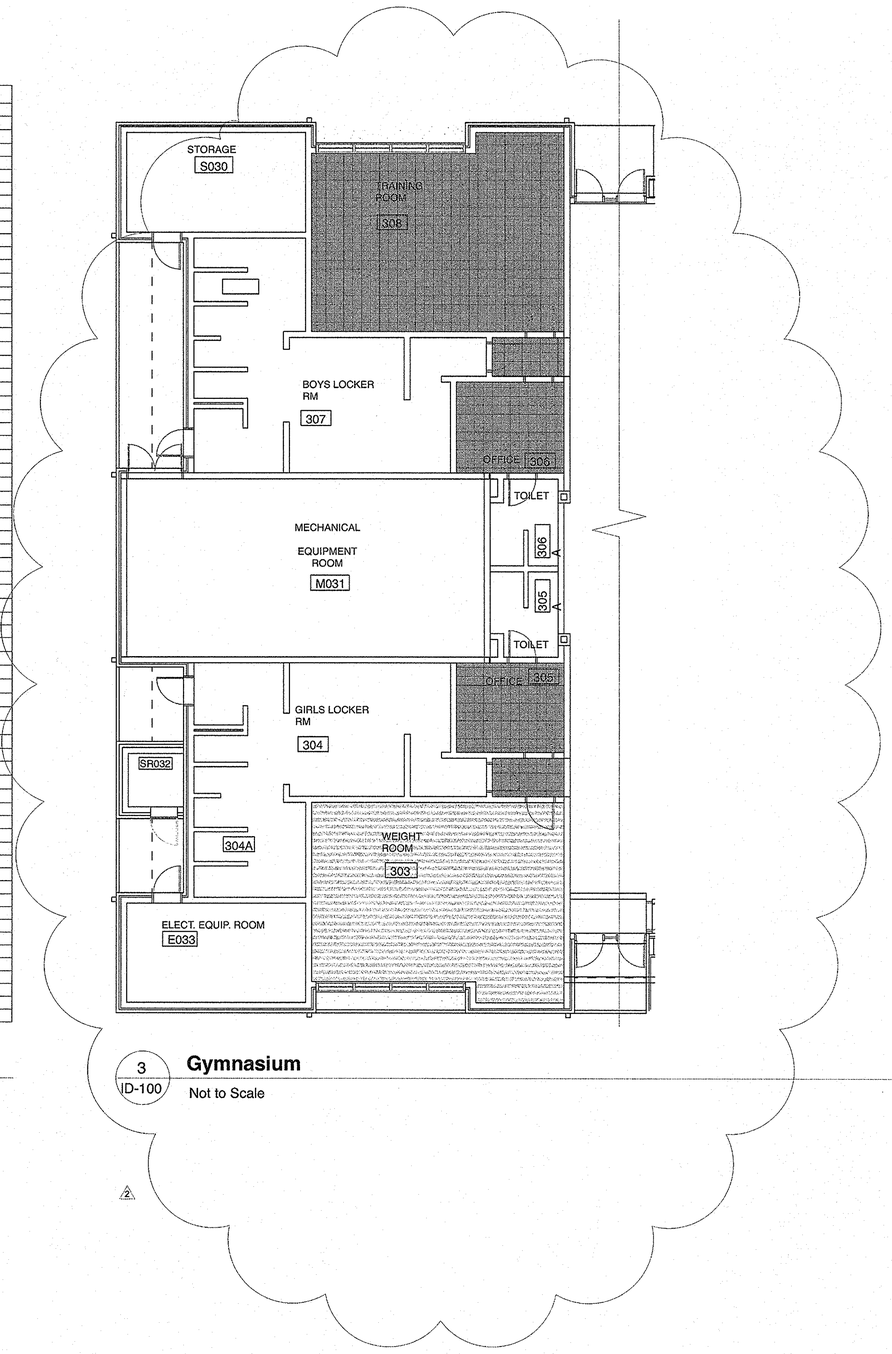
8. QTZ SELECTIONS SHOWN ABOVE AS PLACEHOLDERS FOR NEW VANITY COUNTERS AT BATHROOMS BEING RENOVATED.

2 ID-100 **Finish Legend**

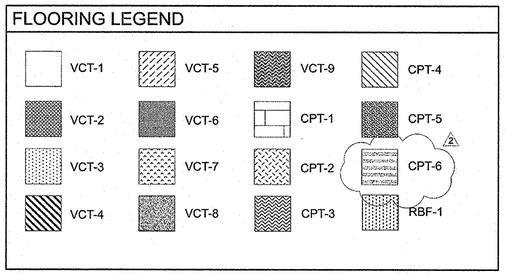
Not to Scale



3 ID-100 **Gymnasium**

Not to Scale

FLOORING LEGEND



BOWMAN MURRAY HEMINGWAY ARCHITECTS
514 Market Street
Wilmington, NC 28401
Tel - (910) 762-2621
Fax - (910) 762-8506

BIG SKY DESIGN
4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28409 - 910-793-3992
www.bigskydesignonline.com

BRUCE F. BOWMAN REGISTERED ARCHITECT 595 NORTH CAROLINA 2.20.13

BOWMAN MURRAY HEMINGWAY ARCHITECTS PC REGISTERED ARCHITECTURAL CORPORATION CERT. NO. 50424 NORTH CAROLINA WILMINGTON, N.C.

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North
Carolina 28409

FINISH LEGEND AND DETAILS

JOB NUMBER

DRAWN BY NL&JK

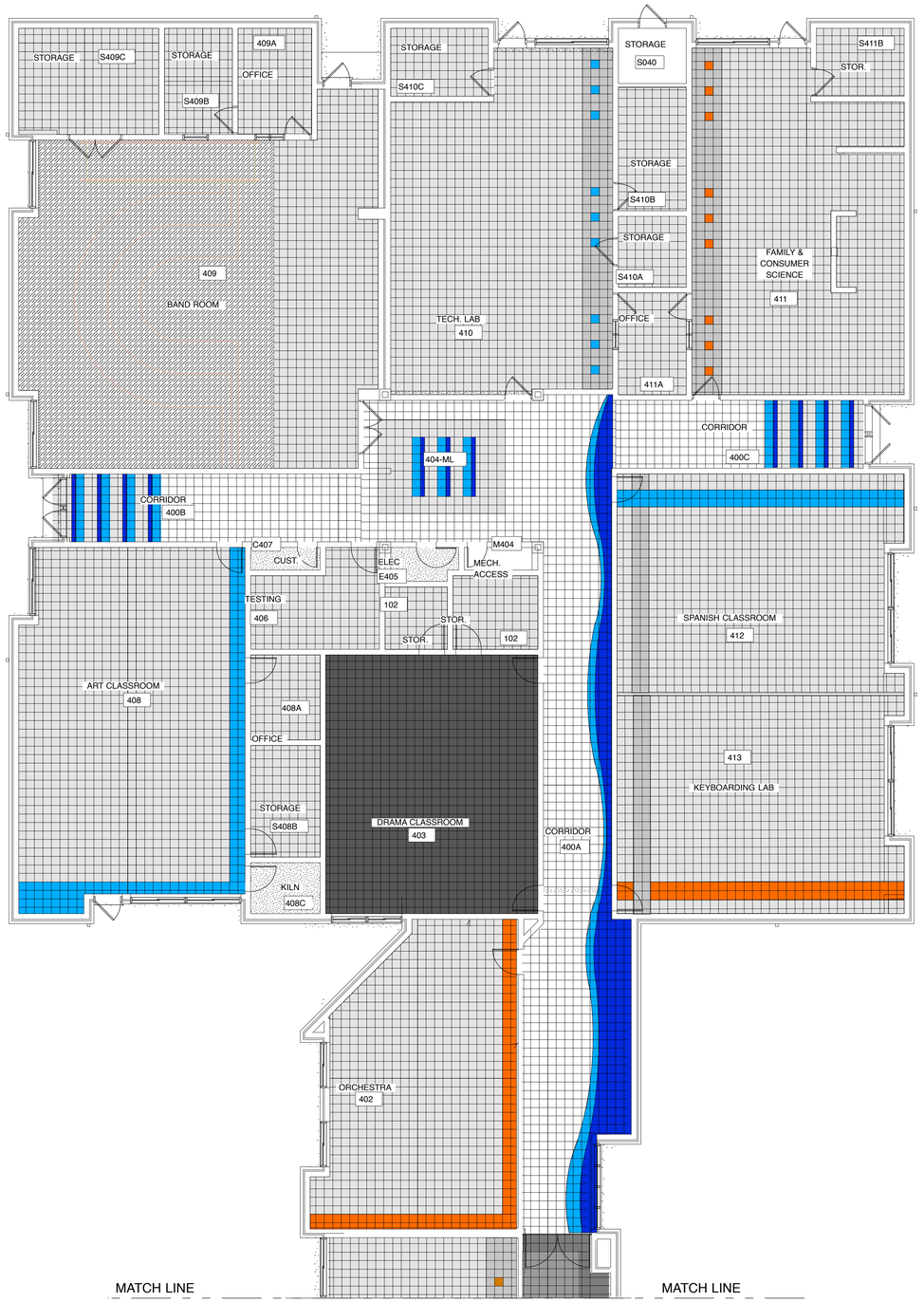
CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1 2/15/18 - VCT
2 2/20/18 - VCT/CARPET

SHEET NUMBER

ID-100



1 ID-103

Floor Pattern Plan Elective Wing

Scale 1/8" = 1'-0"

FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

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Fax - (910) 762-8506

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Wilmington, NC 28409 • 910-793-3992
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BRUCE F. BOWMAN
REGISTERED ARCHITECT
595
1
NORTH CAROLINA
WILMINGTON, N.C.

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTERN PLAN ELECTIVE WING

JOB NUMBER

DRAWN BY NL&JK

CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1 2/15/18
2 2/20/18 - IN COLOR

SHEET NUMBER
ID-103



FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

1 / ID-104 **Floor Pattern Plan 8th Grade Wing**

Scale 1/8" = 1'-0"

BOWMAN MURRAY HEMINGWAY ARCHITECTS
514 Market Street
Wilmington, NC 28401
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Fax - (910) 762-8506

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Wilmington, NC 28409 / 910-793-3992
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BRUCE F. BOWMAN
REGISTERED ARCHITECT
595
1
NORTH CAROLINA
WILMINGTON, NC

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTERN PLAN 8TH GRADE WING

JOB NUMBER

DRAWN BY NL&JK

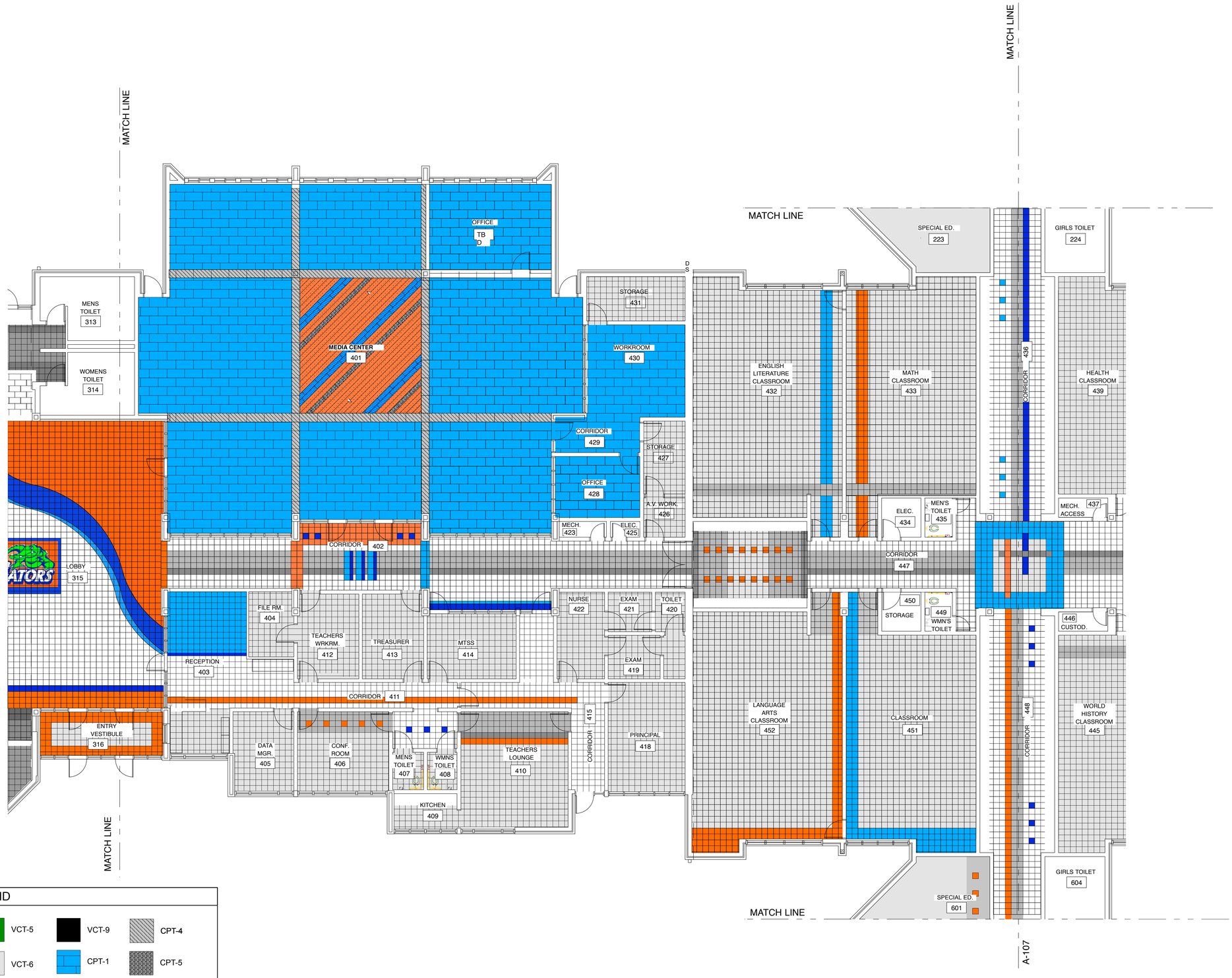
CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1. 2/15/18 - VCT
2. 2/20/18 - IN COLOR

SHEET NUMBER

ID-104



FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

1 / ID-106 **Floor Pattern Plan Administration & Media Center**

Scale 1/8" = 1'-0"

BOWMAN MURRAY HEMINGWAY ARCHITECTS
514 Market Street
Wilmington, NC 28401
Tel - (910) 762-2621
Fax - (910) 762-8506

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4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28405 • 910-793-3992
www.bigskydesignonline.com

BRUCE F. BOWMAN REGISTERED ARCHITECT 595 1 NORTH CAROLINA WILMINGTON, NC

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTER PLAN ADMINISTRATION & MEDIA CENTER

JOB NUMBER

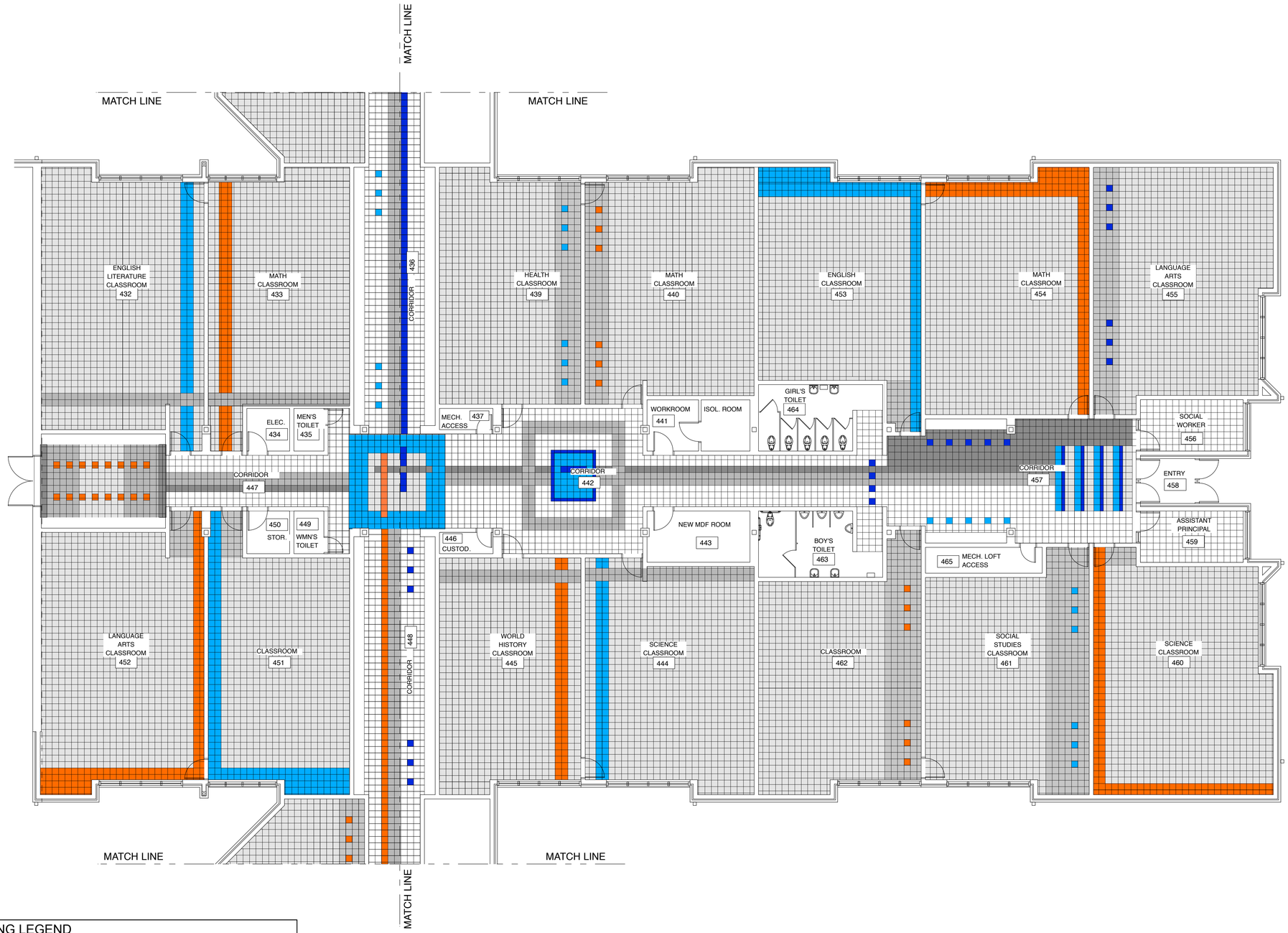
DRAWN BY NL&JK

CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1 2/15/18 - VCT
2 2/20/18 - IN COLOR

SHEET NUMBER
ID-106



FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

1 / ID-107 **Floor Pattern Plan 7th Grade Wing**

Scale 1/8" = 1'-0"

BOWMAN MURRAY HEMINGWAY ARCHITECTS
514 Market Street
Wilmington, NC 28401
Tel - (910) 762-2621
Fax - (910) 762-8506

BIGSKYDESIGN
4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28409 / 910-793-3992
www.bigskydesignonline.com

BRUCE F. BOWMAN REGISTERED ARCHITECT 595 1 NORTH CAROLINA WILMINGTON, N.C.

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTERN PLAN 7TH GRADE WING

JOB NUMBER

DRAWN BY NL&JK

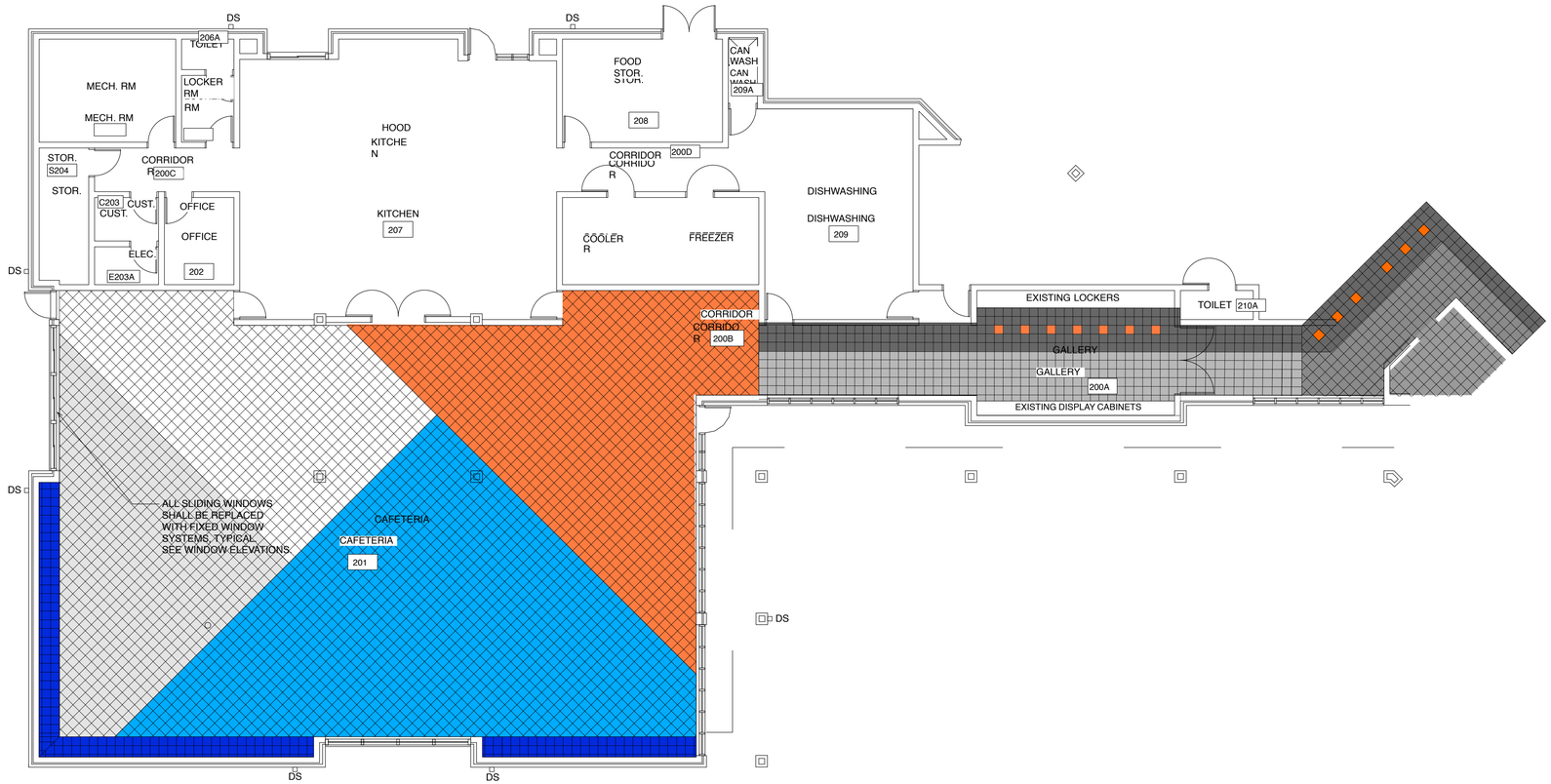
CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1 2/15/18 - VCT color
2 2/20/18 - IN COLOR

SHEET NUMBER

ID-107



FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

1 / ID-108 **Floor Pattern Plan Cafeteria**

Scale 1/8" = 1'-0"

BOWMAN MURRAY HEMINGWAY ARCHITECTS
514 Market Street
Wilmington, NC 28401
Tel - (910) 762-2621
Fax - (910) 762-8506

BIG SKY DESIGN
4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28409 • 910-793-3992
www.bigskydesignonline.com

BRUCE F. BOWMAN REGISTERED ARCHITECT 595 1 NORTH CAROLINA WILMINGTON, N.C.

Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTERN PLAN CAFETERIA

JOB NUMBER

DRAWN BY NL&JK

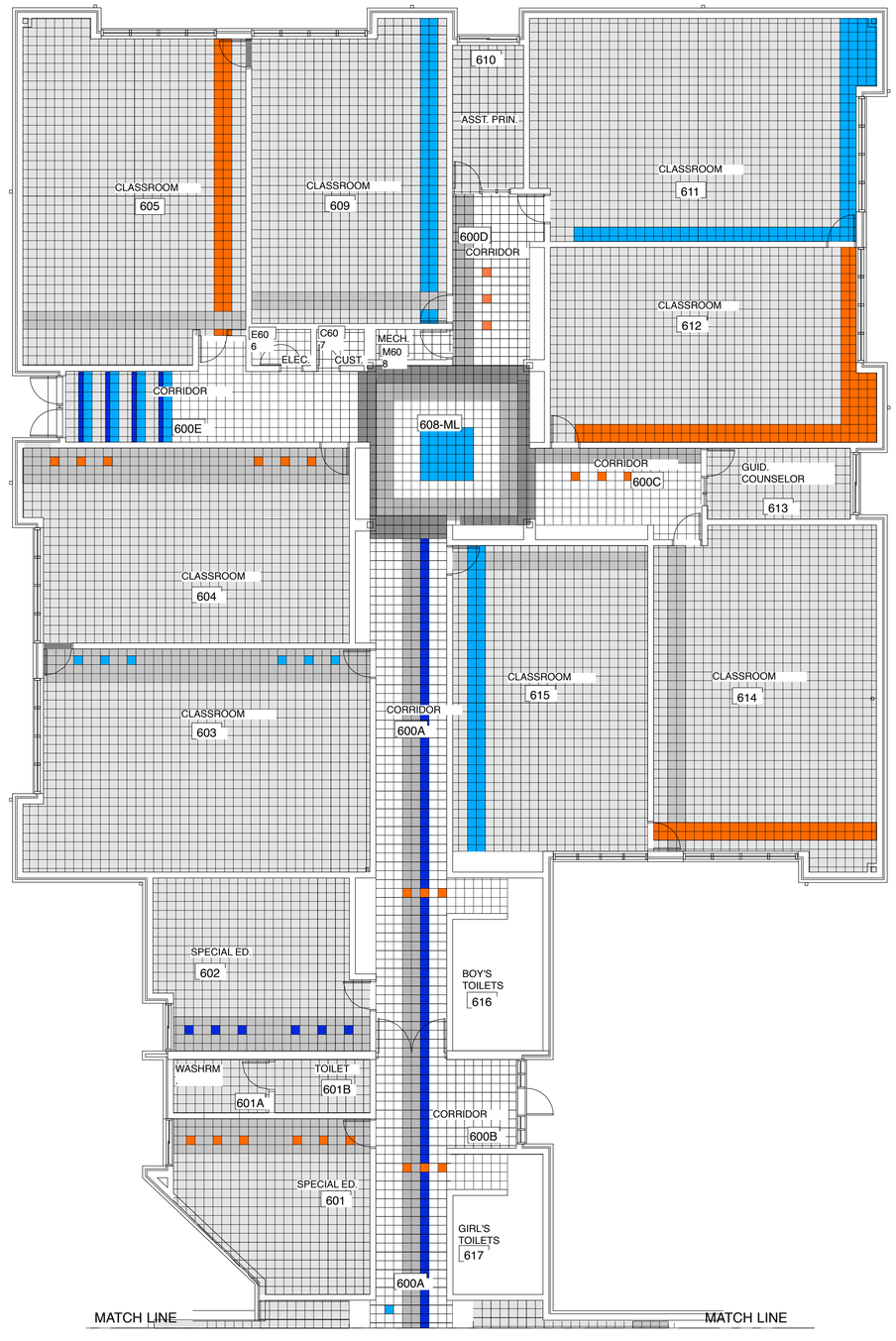
CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1. 2/15/18 - Exst. Floor
2. 2/20/18 - IN COLOR

SHEET NUMBER

ID-108



1
ID-109

Floor Pattern Plan 6th Grade Wing

Scale 1/8" = 1'-0"

FLOORING LEGEND

VCT-1	VCT-5	VCT-9	CPT-4
VCT-2	VCT-6	CPT-1	CPT-5
VCT-3	VCT-7	CPT-2	CPT-6
VCT-4	VCT-8	CPT-3	RBF-1

BOWMAN MURRAY HEMINGWAY
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BIGSKYDESIGN
4037 Masonboro Loop Road Suite 2K
Wilmington, NC 28409 • 910-793-3992
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Renovations to:
Myrtle Grove Middle School
901 Piner Road, Wilmington North Carolina 28409

FLOOR PATTERN PLAN 6TH GRADE WING

JOB NUMBER

DRAWN BY NL&JK

CHECKED BY NL&JK

DATE 1.24.2018

REVISIONS
1. 2/15/18 - VCT
2. 2/20/18 - IN COLOR

SHEET NUMBER

ID-109

Renovations to Myrtle Grove MS

CLH Project No: 17-114

Wilmington, North Carolina

CLH design, PA
400 Regency Forest Drive, Suite 120
Cary, NC 27518

Addendum #1 February 15, 2018

Where any article, division or subparagraph of the original contract documents or other addenda is supplemented herein, the provisions of the original documents shall remain in effect. All the supplemental provisions shall be considered as added thereto. Where any such article, division or subparagraphs are amended, voided or superseded thereby, the provisions of such article, division or subparagraph not so specifically amended, voided or superseded shall remain in effect.

The attention of the Contractor is called to the following clarifications, additions to and changes in the plans and specifications dated **January 22, 2018** on the above job. It will be the responsibility of each Contractor to call such clarifications, additions to and changes in the plans and specifications to the attention of subcontractors concerned. The Engineer in no way assumes any responsibility for notifying any subcontractor, material dealers or others not having received the original contract documents.

ITEM 1. GENERAL CONTRACT

Refer to Plan Sheets C-1.01 Existing Conditions & Demolition Plan

REPLACE sheet C-1.01 with revised drawings C-1.01 Addendum No. 1 dated February 15, 2018, attached hereto.

Revisions:

1. Revised Keynote 'G'.

ITEM 2. GENERAL CONTRACT

Refer to Plan Sheets C2-01: Staking & Landscaping Plan

REPLACE sheet C2-01 with revised drawings C2-01 Addendum No. 1 dated February 15, 2018, attached hereto.

Revisions:

1. Added block note referencing new volleyball court.

ITEM 3. GENERAL CONTRACT

Refer to Plan Sheets C4-01: Site Utility Plan

REPLACE sheet C4-01 with revised drawings C4-01 Addendum No. 1 dated February 15, 2018, attached hereto.

Revisions:

1. Revised sanitary sewer layout and grinder pumps.
2. Revised domestic water layout.

ITEM 4. GENERAL CONTRACT
Refer to Plan Sheets C5-02: Site Details

REPLACE sheet C5-02 with revised drawings C5-02 Addendum No. 1 dated February 15, 2018, attached hereto.

Revisions:
1. Added sand volleyball detail.

ITEM 5. GENERAL CONTRACT
Refer to Plan Sheets C5-04: Site Details

REPLACE sheet C5-04 with revised drawings C5-04 Addendum No. 1 dated February 15, 2018, attached hereto.

Revisions:
1. Revised Pump Station Detail.

END OF SITE/CIVIL ITEMS FOR THIS ADDENDUM

Division 23

230933 – Sequences of Operation

Page 10: 3.41 Heat Pump Water Loop, Variable Flow Sequence updated.

Page 16: 7.10 Type I Kitchen Hood Interface Sequence updated.

237433 – Packaged Dedicated Outdoor Air Water Source Heat Pump Units

Page 1: Extended Warranty updated to include the following:

Line 29: Contractor shall also provide maintenance of filters, belts, etc. during time between beneficial occupancy in each phase and Substantial Completion.

238146 – Packaged Water Source Heat Pump Units

Page 1: Extended Warranty updated to include the following:

Line 49: Contractor shall also provide maintenance of filters, belts, etc. during time between beneficial occupancy in each phase and Substantial Completion.

Division 26

260534 – Raceways

Page 1: Add specification for PVC type raceway.

Page 3: Add specification for PVC type raceway.

Page 5: Add specification for PVC type raceway.

SECTION 230993 - SEQUENCES OF OPERATION

PART 1 - GENERAL

SCOPE

This section includes basic requirements for sequences of operation for Division 23 equipment, as well for equipment furnished under other Divisions.

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to the work of this section.

The requirements of Sections 230913, 230923, 230924, and 230933 apply to the work of this section.

SUBMITTALS

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Sequences of Operation: Provide complete documentation of the sequences of operation required by this project, as hereinafter specified:

Include narrative sequence of operation for each HVAC system, subsystem, and component as defined herein, within other specification sections referenced herein, and/or defined on the project Drawings.

Narratives shall not be verbatim copies of the sequences provided herein, but shall reflect the actual sequence of operation as applied by the contractor.

Sequences of operation must include setpoints and/or control ranges, digital alarms, analog alarm setpoints (both high and low), time delays, I/O point names, hardware/software interlocks, analog control mode (e.g., proportional [P] or proportional plus integral [PI]), and any other specifics needed for the user to fully understand and utilize the DDC system for operation of each HVAC system and its individual components in compliance with the design intent.

Sequences of operation for each item of equipment that is controlled by integral original equipment manufacturer (OEM)controls, with or without control logic through the DDC system, shall be incorporated in the applicable narrative.

Control Schematics: Provide schematic diagrams of each HVAC system/subsystem sufficient to define the location of all control sensors, final control devices, etc. that are utilized as part of any sequence of operation and that confirm all input and output points required by any sequence of operation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

GENERAL REQUIREMENTS

Sequences of operation specified herein, which indicate the functional intent of HVAC systems, subsystems, and/or components operation, are general in nature and may not fully define every aspect of programming that may be required to fulfill the design intent. **Contractor shall provide all programming necessary to obtain the sequences/system operation indicated, resulting in stable HVAC system operation in accordance with the design intent.**

The following standard abbreviations, along with abbreviations defined on the Drawings, shall apply to all control schematics and sequences:

Abbreviation	Definition	Abbreviation	Definition
I/O Points		*HVAC Components/Conditions*	
AI	Analog Input	ACWS, ACWR	Air-Conditioning Water Supply, Return
AO	Analog Output	AHU	Air-Handling Unit
AV	Analog Value	BCU	Blower Coil Unit
DI	Digital (Binary) Input	CAV	Constant Air Volume
DO	Digital (Binary) Output	CC	Cooling Coil
DV	Digital (Binary) Value	CDWS, CDWR	Condenser Water Supply, Return
Control Conditions/Actions		CHWS, CHWR	Chilled Water Supply, Return
BP	Barometric Pressure	FCU	Fan Coil Unit
BTU	British Thermal Unit	HC	Heating Coil
DA	Direct Acting	HX	Heat Exchanger
DB	Dry Bulb	HWS, HWR	Hot Water Supply, Return
DP	Differential Pressure	OA	Outdoor Air
DPT	Dew Point Temperature	OEM	Original Equipment Manufacturer
DT	Differential Temperature (Range)	PHC	Preheat Coil
NC	Normally Closed	RA	Return Air
NO	Normally Open	RF	Return Air Fan
P	Pressure; Proportional	SA	Supply Air
RA	Reverse Acting	SF	Supply Fan
SP	Static Pressure	VA	Ventilation Air
T	Temperature	VAV	Variable Air Volume
TP	Total Pressure	XA	Relief Air
VP	Velocity Pressure	XF	Relief Air Fan
WB	Wet Bulb		

Sequences of operation shall incorporate the following control point/object requirements, as applicable:

Point Description	Hardware Point				Software Point				GRAPHIC
	AI	AO	DI	BI	AV	DV	SCHED	TREND	
BTU	X							X	X
Damper End Switch			X						X
DP	X							X	X
DPT					X			X	X
DT					X			X	X
Drain Pan Water Level Sensor			X						X
Electrical Power	X							X	X
Enthalpy					X			X	X
Flow (Air, Water, Steam, etc.)	X							X	X
Gas Concentration	X							X	X
Humidity	X							X	X
Occupancy/Vacancy			X					X	X
Occupied/Unoccupied				X			x	X	X
On/Off				X			x	X	X
Open/Close				X				X	X
Output (Percent)		X						X	X
Position (Percent from Normal)					X			X	X
P	X							X	X
Speed (%, setpoint)		X						X	
Speed (%, feedback)	X							X	X
Status			X					X	X
T	X							X	X

All sequences of operation are based on one or more sensed variables, with an associated controlled variable, changing in one direction. **Each sequence shall operate in reverse when the sensed variable(s) changes in the opposite direction.**

HVAC control setpoints are defined or implied within the sequences of operation specified hereinafter and/or elsewhere on the Drawings.

Where a setpoint is not explicitly defined or implied, determine the appropriate setpoint based on scheduled performance data for HVAC equipment. **Confirm setpoint with A-E**.

Defined or implied setpoints and setpoint reset requirements shall, as necessary, be adjusted based on test data provided by the testing/adjusting/balancing (TAB) subcontractor and control system calibration and verification testing as required by Section 230923 to provide stable, satisfactory HVAC systems operation in compliance with the design intent.

AO setpoints and control ranges shall be user-adjustable.

DO points that depend on a specific analog value to change shall be user-adjustable.

The minimum speed setting for each pump and fan under VFD control shall be as low as possible, while avoiding inertial stalling. Adjust each VFD minimum speed and ramp-up and -down times based on test data provided by the TAB subcontractor. Default times for acceleration/deceleration shall be 30 seconds for motors less than 40 hp and 60 seconds for motors 40 hp and larger.

Two independent schedules for HVAC system operation and control are required by Sequence 1.14, established as follows:

"ON/OFF" schedule(s) shall determine HVAC systems and/or equipment start/stop times, define applicable operating setpoints, and define when specific sequences of operation are to be utilized.

"ON" hour is defined as the estimated latest hour at which the HVAC system/equipment may be "ENABLED" and commanded "ON" so that setpoint conditions are maintained within the space(s) served at the "OCCUPIED" start hour. This "ON" hour shall be adjusted by the "Optimum Start" application specified in Section 230923.

"OFF" hour is defined as the hour at which the HVAC system/equipment shall be "DISABLED."

"OCCUPIED/UNOCCUPIED" schedule(s) shall determine ventilation modes.

These schedules define 5 specific operating periods for the HVAC systems to which they are applied:

"On" period is the elapsed time between the scheduled "On" hour, defined as the latest allowable hour at which the HVAC system must be "On," and the "Off" hour, during which the HVAC operates to maintain the spaces served at the defined "On" period temperature and/or humidity setpoints.

"Off" period is the elapsed time between the scheduled "Off" and "On" hours during which the HVAC system does not operate unless it is required to cycle "On" to maintain the spaces served at the defined "Off" period high and low limit temperature and/or humidity setpoints.

"Occupied" period is the elapsed time between the scheduled "Occupied" start and end hours during which people, to a greater or lesser extent, are expected to be present and required ventilation air.

"Unoccupied" period is the elapsed time between the scheduled "Occupied" end and start hours during which people, except at *de minimis* levels, are not expected to be present and, therefore, no ventilation air is required.

"Pre-Occupied" period is the elapsed time between the scheduled "On" hour and the actual "On" hour computed by the Optimum Start algorithm so that setpoint conditions are maintained within the space(s) served at the beginning of the "Occupied" period. (This period typically overlaps the "Unoccupied" period by 1-3 hours depending on input schedules.)

Provide operator-defined maintenance "lockout" for each HVAC component. When initiated, any component defined to be locked out for maintenance shall be deleted from any applicable control sequence of operation.

SEQUENCES OF OPERATION

Index to Sequences of Operation

Section	ID	Description
		GENERAL
	1.10	Emergency Stop Control
	1.14	Schedules of Operation
	1.18	Input Point Monitoring and Alarm Initiation
	1.20	Output Point Control
	1.21	Constant Speed Single-Phase or Polyphase Motor Control
	1.22	Two-Speed Polyphase Motor Control
	1.23	Variable Speed Single-Phase Motor Control
	1.24	Variable Speed Polyphase Motor Control
	1.25	Single-Phase and Polyphase Motor Status Monitoring
	1.27	Exhaust Air Fan Start/Stop
	1.30	Outdoor Piping/Equipment Trace Heating Cable
	1.33	Final Control Element Operators (Valves and Dampers)
		CENTRAL PLANTS
3.4		**Closed Loop Water Source Heat Pump Systems**
	3.41	Heat Pump Water Loop, Variable flow
		AIR-HANDLING SYSTEMS
4.0		**Air-Handling Systems Operations and Monitoring**
	4.00	Start/Stop Control
	4.01	Space Temperature/Humidity Setpoints and Monitoring
	4.05	Drain Pan Condensate Level Alarm
	4.06	Filter Differential Pressure Alarm
4.1		**Single Zone Air-Handling Systems**
	4.12	Minimum Outdoor Air Control, Single Zone System
	4.12.1	CAV (AC-24)
	4.14	Demand Control Ventilation Control (DCV) Enable/Disable, Single Zone System
	4.14.3	DCV Based on Occupancy Schedule + CO_2 Sensing (AC-24)
		PACKAGED DX COOLING SYSTEMS
	5.10	Packaged/Split Air-Cooled DX Unit, CAV or VAV Single Zone System
	5.15	Space Temperature and Humidity Control, Single Zone Water Source Heat Pump System
	5.30	Packaged Water Source Heat Pump Unit, Outdoor Air Preconditioning System
		SPECIAL EXHAUST SYSTEMS
	7.10	Type I Kitchen Hood Interface
	7.11	Type II Kitchen Hood

GENERAL DDC SEQUENCES

1.10 **Emergency Stop Control:**

The following elements shall be incorporated into sequences of operation, **whether specifically defined in individual sequences of operation hereinafter or not**, and shall initiate an alarm upon occurrence of any emergency stop:

Application	Configuration	Emergency Stop Requirements

Application	Configuration	Emergency Stop Requirements	
WSHPs			
	Unit serves multiple spaces and is capable of spreading smoke beyond the space in which smoke is generated.	Unit airflow ≤ 2,000 cfm	No duct smoke detectors required. Emergency stop by fire alarm system shutdown relay/ software interlock not required.
		Unit airflow > 2,000 cfm	Duct smoke detectors required in unit return air. Emergency stop of all unit fans shall be initiated by auxiliary contacts of duct smoke detectors or by fire alarm system shutdown relay/software interlock.
		Low limit thermostat not required.	

1.14. **Schedules of Operation**:

System(s)	Period	Hours (1-24) Each Day of The Week							Weeks to Apply (1-52)
		MON	TUE	WED	THR	FRI	SAT	SUN	
All Systems (School Year)	"ON" Hour for Latest System Start	7	7	7	7	7			1-23, 33-52
	"OFF" Hour to Stop System	17	17	17	17	17			1-23, 33-52
	Occupied Period Start Hour	8	8	8	8	8			1-23, 33-52
	Occupied Period End Hour	16	16	16	16	16			1-23, 33-52
All Systems (Summer)	"ON" Hour for Latest System Start	UNOCCUPIED							24-32
	"OFF" Hour to Stop System								24-32
	Occupied Period Start Hour								24-32
	Occupied Period End Hour								24-32

1.18 **Input Point Monitoring and Alarm Initiation**

Digital inputs (DI or DV):

MONITOR each DI and DV point for alarm condition.

MONITOR each motor status and initiate alarms in accordance with Sequence 1.25.

Set digital point alarm condition the basis of field adjusted differential setpoints.

Where start/stop or other two-position control sequence is based on a digital input status condition or input sensed variable value(s) (AI or AV), set time delays or digital filters to prevent any equipment item or final control element from "short-cycling" in response to small changes of the sensed variable(s).

Incorporate user-adjustable time inhibit alarm(s) to prevent nuisance alarms and/or "tripping" under normal operation and during equipment start-up and shut-down.

For devices that have Form "C" relay contacts available for alarm monitoring, use NC contacts for the "Off" or "Normal" condition and NO contacts on "Alarm" condition.

Analog inputs (AI or AV):

Set high and/or low alarm setpoints for each point.

The following default values shall be used if alarm setpoints are not defined within a specific sequence operation or indicated on the Drawings:

Space temperature	5ºF below low setpoint of comfort zone or 5ºF above high setpoint of comfort zone
Space humidity	≥70% RH
AHU mixed air low limit	≤38ºF
Cooling coil leaving air	≥60ºF

Heating coil leaving air	≤90ºF
CHW supply	≥48ºF
HW supply	≤120ºF
Low pressure steam supply	5 psig below setpoint
High pressure steam supply	15 psig below setpoint

1.20 **Output Point Control**

Set each control loop to utilize one of the following control modes:

Digital (binary) output: Two position (e.g., on-off, slow-fast)

Analog output: Proportional (P) or proportional + integral (PI) function control, as follows:

Controlled Variable	Control Mode
Space Temperature	P
Mixed Air Temperature	PI
Coil Discharge Temperature	PI (cooling), P (heating)
Chilled Water Supply Temperature	PI
Hot Water Supply Temperature	P
Airflow	PI (with wide proportional band and fast reset rate)
Fan Static Pressure (Fan Speed)	PI
Humidity	P
Dewpoint Temperature	P
Other (not listed above or indicated on the Drawings)	**Consult A-E**

Analog output proportional band and gain setpoints:

Set on basis of actual sensor span, zero bias, and minimum proportional bands/throttling ranges, as follows, for all analog control loops to prevent "hunting:"

Set proportional bands/throttling ranges to provide stable control around setpoints and as determined on an individual point basis **based on test data provided by the TAB subcontractor**.

Default deadbands/throttling ranges are as follows

Space temperature (cooling)	± 1.5°F
Space temperature (heating)	± 2.0°F
Space humidity	± 5% RH
Mixed/discharge air temperature	± 0.25°F
CHWS/CDWS temperature	± 0.50°F
HWS/ACWS temperature	± 2.0°F
Duct/plenum static pressure	± 0.05” wg
Building static pressure	± 0.01” wg
Airflow (cfm) and water flow (gpm)	± 2% of design flow
Water pressure	± 0.25 psi

Analog output integral gain setpoint:

Set to bring the measured variable to its setpoint without abrupt changes to HVAC equipment operation and, with the exception of condenser water bypass valve control, to limit every control loop output signal to a maximum rate of change of 25% per minute.

Only if this found to be impossible, may the proportional gain, as determined above, be adjusted.

Analog output derivative gain setpoint:

Derivative function for any control loop is prohibited unless reviewed by the A-E for each specific point. Set derivative gain to 0.

Setpoint reset: For air or water systems in which the sequence of operation requires temperature, pressure, etc. setpoint to be reset based on valve or damper position of the zone(s) requiring cooling or heating, the following method shall be employed:

A floating reset algorithm shall be used that increments the secondary variable (e.g., temperature, pipe or duct pressure) setpoint on a periodic basis to maintain primary variable (e.g. cooling valve, heating valve, damper position) setpoint of 85% open. The reset increment shall be calculated based on the average position of the quantity of the worst (most open valve/damper) zone(s) as specified. **The recalculation time, reset increment and control device position influence shall be chosen to maintain the primary variable within the specified maximum allowable variance while minimizing overshoot and settling time.**

Final control element operation:

Normally open/normally closed: Two-way final control element position in response to 0% control loop output signal. Except as otherwise specified herein or indicated on the Drawings, "OFF" or "NORMAL" position of final control elements shall be as follows:

Final Control Element	Off/Normal Position
Reheating coil control valve	closed
Heating/Preheating coil control valve	open
Cooling coil control valve	open
Outside air damper	closed
Return air damper	open
Exhaust/relief air damper	closed

Direct acting/response: 0% to 100% change of final control element state or position in response to 0% to 100% control loop output signal.

Reverse acting/response: 100% to 0% change of final control element state or position in response to 0% to 100% control loop output signal.

1.21 **Constant Speed Single-Phase or Polyphase Motor Control**:

Motor shall be commanded "ON/OFF" via DO point.

MONITOR motor status as DI point in accordance with Sequence 1.25.

Emergency stop:

Hard-wired contact(s) shall "STOP" motor in accordance with motor emergency stop requirements defined hereinbefore.

Initiate alarm upon emergency stop.

1.22 **Two-Speed Polyphase Motor Control**:

Motor shall be commanded "ON" at low speed, commanded to switch from one speed to the other (high to low or low to high), and commanded "OFF" via two (2) DO points.

MONITOR motor status as DI point in accordance with Sequence 1.25.

Emergency stop:

Hard-wired contact(s) shall "STOP" motor in accordance with motor emergency stop requirements defined by Sequence 1.10.

Initiate alarm upon emergency stop.

1.23 **Variable Speed Single-Phase Motor Control**:

Provide interface between DDC system and manufacturer-provided electronically commutated motor (ECM) integral speed controller.

Command motor "ON/OFF" via DO point.

MONITOR motor status as DI point in accordance with Sequence 1.25.

Emergency stop:

Hard-wired contact(s) shall "STOP" motor in accordance with motor emergency stop requirements defined by Sequence 1.10.

Initiate alarm upon emergency stop.

Modulate motor speed from minimum speed to 100% speed in direct response to AO point.

Adjust minimum speed setpoint to value, as reviewed by A-E, using the following procedure:

Manually set ECM controller minimum speed output to 6 Hz (10% of maximum) unless (1) dictated otherwise by the equipment manufacturer or (2) defined otherwise by sequence(s) of operation.

Observe driven equipment to ensure that it is visibly rotating.

If not, increase controller minimum speed output in increments of 2 Hz until the unit driven equipment is visibly rotating.

Ensure that the current sensing relay required by Sequence 1.25 confirms operation at the minimum speed setting.

Initiate alarm via DI point if ECM controller status/fault contact closes.

1.24 **Variable Speed Polyphase Motor Control**:

Provide interface between DDC system and manufacturer-provided variable frequency drive (VFD) for motor speed control.

Command motor "ON/OFF" via DO point.

MONITOR motor status in accordance with Sequence 1.25.

Emergency stop:

Hard-wired contact(s) shall "STOP" motor in accordance with motor emergency stop requirements defined by Sequence 1.10.

Initiate alarm upon emergency stop.

Modulate motor speed from minimum speed to maximum speed in direct response to AO point.

Set minimum speed setpoint to value, as reviewed by A-E, using the following procedure:

Manually set VFD minimum speed output to 6 Hz (10% of maximum) unless (1) dictated otherwise by the equipment manufacturer or (2) defined otherwise by sequence(s) of operation herein defined.

Observe driven equipment to ensure that it is visibly rotating. If not, increase controller minimum speed output in increments of 2 Hz until the unit driven equipment is visibly rotating.

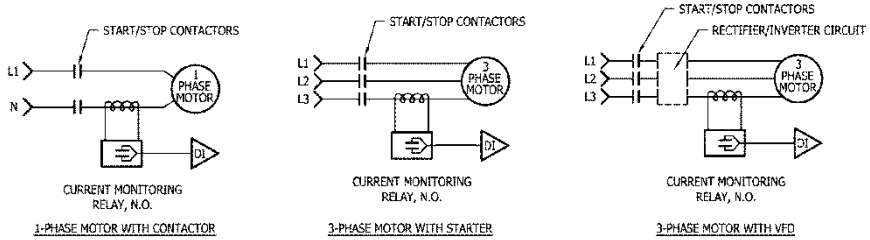
Ensure that the current sensing relay required by Sequence 1.25 confirms operation at the minimum speed setting.

Set maximum speed setpoint to value determined during TAB operations in order to obtain design flow.

MONITOR motor speed feedback from VFD via AI point.

Initiate alarm via DI point if VFD status/fault contact closes.

1.25 **Single-Phase and Polyphase Motor Status Monitoring**:



Motor "ON" or "OFF" status shall be determined via DI point contact closure by current monitoring relay as illustrated above.

Adjust current monitoring relay “trip” setpoint to 5% above the minimum operating motor amperage.

For variable speed motors, coordinate “trip” setpoint with minimum motor speed.

Monitor motor status anytime motor has been commanded “ON.”

Inhibit motor status monitoring for the first 10 seconds after motor is commanded “ON.”

If motor status DI point indicates motor failure:

For single pump or fan configurations, command motor “OFF,” terminate associated start sequence, and initiate pump/fan failure alarm.

For dual pumps or fans operating in lead/standby configuration in accordance with Sequence 1.26.2, command operating pump/fan “OFF,” command standby pump/fan “ON,” and initiate pump/fan failure alarm.

If standby pump/fan motor status DI point indicates motor failure, terminate associated start sequence and initiate pump/fan failure alarm.

For multiple pumps or fans operating in parallel lead/lag/cascade configuration in accordance with Sequence 1.26.1, command failed pump/fan “OFF,” initiate pump/fan failure alarm, and continue associated start sequence with remaining pump(s)/fan(s) in operation.

If two or more motor status DI points indicate motor failure, command all motors “OFF,” terminate associated start sequence, and initiate pump/fan failure alarm.

1.27 **Exhaust Fan Start/Stop**: Exhaust fan start/stop control methods shall be as indicated on the Drawings, in accordance with the following:

Indicated Control Method	Exhaust Fan Start/Stop Control Method
DDC (Interlock)	Start/stop exhaust fan(s) in accordance with (1) associated air-handling system "OCCUPIED/UNOCCUPIED" schedule or (2) operator command in compliance with Sequence 1.21.
DDC (Temperature)	Start and stop exhaust fan(s) based on (1) space temperature or (2) operator command in compliance with Sequence 1.21. On a rise in space temperature to above setpoint, exhaust fan shall be energized to maintain space temperature at setpoint. Space temperature setpoint shall be 80°F //VERIFY/EDIT AS NEEDED//.. MONITOR space temperature as AI point.
Independent Thermostat	Start/stop exhaust fan(s) based on stand-alone, wall-mounted line-voltage thermostat; no DDC connection required. On a rise in space temperature to above setpoint, exhaust fan shall be energized to maintain space temperature at setpoint.
Manual	Start/stop exhaust fan(s) via manual switches or breakers. See Division 26 Drawings, as applicable.

1.30 **Outdoor Piping/Equipment Trace Heating Cable**: On a fall in liquid temperature to below setpoint, trace heating cable, where indicated on the Drawings, shall be energized by pipe surface mounted line voltage thermostat ("aquastat") to maintain liquid temperature at setpoint.

1.33 **Final Control Element Operators (Valves and Dampers)**:

Two-position control operator shall "OPEN" or "CLOSE" final control element (valve/damper), as indicated on the Drawings, in direct response to DO point.

MONITOR final control element position as DI point equal to the DO point.

Final control element position shall be confirmed by visual inspection during the calibration and verification procedures required by Section 230923.

Modulating control operator shall modulate 0% to 100% from its Normal state, as indicated on the Drawings, in direct response to AO point.

MONITOR final control element position as AI point whose value (percent) is equal to the AO point value (percent).

Final control element position shall be confirmed as equal to the AO point value (percent) during the calibration and verification procedures required by Section 230923.

CENTRAL PLANTS

3.4 CLOSED LOOP WATER SOURCE HEAT PUMP SYSTEM

3.41 **Heat Pump Water Loop, Variable Flow**:

Existing pump system is constant volume. Existing pumps are equipped with VFDs. Test existing VFDs for full functionality. Alert Owner and A/E if there are any deficiencies. Heat pump Water Loop shall operate under variable flow based on the following sequence. Confirm existing building loop sequences with owner.

"ENABLE/DISABLE" system in accordance with (1) "ON/OFF" schedule defined by Sequence 1.14, (2) demand for heating or cooling indicated by any water source heat pumps being commanded "ON", or (3) operator command, as follows:

Command ACWS pump(s) "ON" via DO points in accordance with Sequence 1.24.

Confirm pump(s) operation based on motor status as DI point(s) in accordance with Sequence 1.25.

Confirm water flow via differential pressure flow switch via DI point.

If differential pressure flow switch indicates flow failure, command ACWS pump(s) “OFF” and initiate alarm.

Loop pump control:

Modulate ACWS pumps speed via interface with VFD to maintain differential pressure(s) at setpoint as read by differential pressure transmitters located in 6th grade and 8th grade wings as indicated on plans. ***During Test and Balance of Building Loop System, adjust differential pressure setpoint(s) to value(s) recommended by TAB subcontractor, as approved by A/E.***

Loop water temperature control:

Existing Loop water temperature control shall operate under existing sequence of operation.

Boiler system control:

Existing hot water boilers shall operate under existing sequence of operation.

Evaporative cooler system control:

Evaporative cooler system control shall operate under existing sequence of operation.

AIR-HANDLING SYSEMS

4.0 GENERAL AIR-HANDLING SYSTEMS OPERATIONS AND MONITORING

4.00 **Start/Stop Control**:

Start/stop air-handling system supply air fan(s), in accordance with Sequence 1.21, 1.22, 1.23, or 1.24, as applicable, based on (1) user-defined "ON/OFF" schedule defined by Sequence 1.14, or (2) operator command.

During "ON" periods, command air-handling system "ON" (start) unless inhibited, operator command, or an emergency stop interlock in accordance with Sequence 1.13.

During "OFF" periods, command air-handling system "OFF" via DO point

Each exhaust fan associated with an air-handling system, as tabulated below, shall be commanded "ON" via DO point when the air-handling system is "ON" and commanded "OFF" via DO point when the air-handling system is "OFF," in accordance with Sequence 1.27:

Air-Handling System Tag	Exhaust Fan Tag	Area(s) Served
DVA-1	F-1,2	Elective Wing
DVA-2	F-4,5,6,7	8th Grade Wing
DVA-3	F-10,11,12	Admin/Media Wing
DVA-4	F-13,23	7th Grade Wing
DVA-5	F-19,20,21	6th Grade Wing
AC-24	F-16,18	Cafeteria

MONITOR fan motors(s) status via DI point(s) in accordance with Sequence 1.25.

4.01 **Space Temperature/Humidity Setpoints and Monitoring**:

Space temperature and humidity control setpoints:

"ON" Period:	Temperature Range:	70-75ºF Comfort Zone
	Max. Humidity:	60% RH High Limit
	Min. Humidity:	30% RH Low Limit

"OFF" Period:	Max. Temperature:	85ºF High Limit
	Min. Temperature:	55ºF Low Limit
	Max. Humidity:	65% RH High Limit

Space temperature setpoints shall **not** be adjustable by space occupants.

Space humidity setpoints shall **not** be adjustable by space occupants.

MONITOR each space temperature and humidity as individual AI point.

4.05 **Drain Pan Condensate Level Alarm (All WSHPs and DVA-1,2,3,4,5)**:

MONITOR drain pan condensate level sensor integral NO dry contact as a DI point.

Upon sensor detection of drain pan moisture, and after user-defined time delay (default = 3 minutes), stop air-handling system via DO point and initiate an alarm.

4.06 **Filter Differential Pressure Alarm (DVA-1,2,3,4,5 Only)**:

MONITOR filter differential pressure gauge integral NO dry contact as DI point.
Upon filter differential pressure exceeding setpoint, initiate maintenance alarm for filter replacement.

4.12.1 **Minimum Outdoor Airflow Control, CAV Single Zone System, AC-24 (Cafeteria)**:

Set the minimum outdoor airflow to 1,000 CFM

Set the maximum outdoor airflow to 2,750 CFM

During “OCCUPIED” periods and during “UNOCCUPIED” periods prior to the air-handling system being commanded “OFF,” “ENABLE” minimum outdoor airflow and modulate outdoor air damper to preset “OPEN” positions to maintain **OA** at setpoint. ***Outdoor air damper positions [percent “OPEN”] for each outdoor airflow required by this sequence shall be determined by the TAB subcontractor.***

Anytime the air-handling system is “OFF,” modulate air damper 0% “OPEN” via AO point.

AC-24 shall start “OCCUPIED” period at maximum outdoor airflow. Outside air damper can modulate down to minimum outdoor airflow based on the following:

1. Demand control ventilation as outlined in 4.14.3 below.
2. If kitchen hood exhaust fan is energized, and unit is in “UNOCCUPIED” mode, energize AC-24 and open outdoor air damper to minimum outdoor airflow.

4.14 **Demand Control Ventilation (DCV) Enable/Disable, Single Zone System AC-24 (Cafeteria)**:

During “OCCUPIED” periods, ENABLE demand control ventilation, as follows:

Inhibit Sequence 4.14.3 during the first hour after beginning of each "OCCUPIED" period.

During “UNOCCUPIED” periods and anytime the air-handling system is “OFF,” DISABLE demand control ventilation.

4.14.3 **Demand Control Ventilation (DCV) Based on Occupancy Schedule + CO_2 Sensing, Single Zone System**:

MONITOR carbon dioxide (CO_2) indoor and outdoor concentration levels (ppm), as indicated on the Drawings, and average monitored levels over a sliding 5 minute period to establish input values for computation below:

Minimum outdoor airflow **VA** for Sequence 4.12.1 or 4.12.2, as applicable, shall be reduced in response to monitored CO_2 concentration levels, as follows:

Modulate the outdoor air damper to maintain the maximum **differentia**l between indoor and outdoor CO_2 levels in any space not to exceed 700 ppm.

Inhibit sequence if ventilation airflow, **VA,** is reduced to the greater of (**EA + PA**) or to the sum of zone area component of the minimum design ventilation airflows, **Va,** dictated by ASHRAE *Standard 62.1*.

Modulate the outdoor air damper to maintain the maximum indoor CO_2 level in any space not to exceed 1000 ppm.

Initiate alarm if indoor CO_2 level exceeds 1200 ppm for 30 minutes or more.

PACKAGED AIR-COOLED AND WATER-COOLED DX SYSTEMS

5.10 **Packaged/Split Air-Cooled DX Unit, CAV or VAV Single Zone System:**

PRIMARY UNIT CONTROL IS PROVIDED BY OEM CONTROLLER INTERFACED WITH DDC SYSTEM.

Thermostatic interface between the DDC system and each single zone packaged unit OEM controller shall be based on the following:

Packaged/Split Single Zone HVAC System		
DDC I/O Point	**Control Sequence Function**	**OEM Controller Thermostatic Interface Terminals**
L1	24v power	R, RC, RH
C	24v neutral	C
DO	Indoor fan start/stop	G
DO	First stage of cooling on/off	Y or Y1
DO	Second stage of cooling on/off	Y2
DO	First stage of heating on/off	W or W1
DO	Second stage of heating on/off	W2
DO	Third stage of heating on/off	W3
DO	Heat pump reversing valve actuation	O, B
DO	Hot gas reheat valve	HGV (on/off)
AO	Hot gas reheat valve	HGV (modulating)
DO	Auxiliary/back-up heating on/off	E
DI	Packaged unit internal fault/failure/alarm	Varies

5.15 **Space Temperature and Humidity Control, Single Zone CAV or VAV Water Source Heat Pump System**:

PRIMARY UNIT CONTROL IS PROVIDED BY OEM CONTROLLER INTERFACED WITH DDC SYSTEM.

Space temperature and humidity setpoints shall be in accordance with Sequence 4.01.
MULTIPLE SPACES: Where a single water source heat pump serves multiple classrooms or offices, provide temperature and humidity sensors for each space served and control the water source heat pump as defined below.

"On" period temperature and humidity control:

When the space temperature is within the limits of the minimum and maximum comfort zone temperature setpoints, neither cooling nor heating shall be initiated.

If either cooling or heating is initiated, command the N.C. ACWS control valve OPEN. When cooling or heating is no longer required, command the N.C. ACWS control valve CLOSED..

Cooling:

On a rise in space temperature to above the maximum comfort zone temperature setpoint, initiate stage 1 of cooling via DO point.

On a continued rise in space temperature to above the maximum comfort zone temperature setpoint, initiate stage 2 of cooling to maintain space at maximum comfort zone temperature setpoint.

Heating: At any ACWS temperature, on a fall in space temperature to below the minimum comfort zone temperature setpoint, initiate stage 1 of heating via DO point to maintain space at minimum comfort zone temperature setpoint.

On a continued fall in space temperature to below the minimum comfort zone temperature setpoint, initiate stage 2 of heating via DO point to maintain space at minimum comfort zone temperature setpoint.

Humidity: On a rise in any space humidity to above the high limit humidity setpoint, initiate stage 1 of cooling via DO point to maintain space humidity at high limit setpoint.

On a continued rise in any space humidity to above the high limit humidity setpoint, initiate stage 2 of cooling via DO point to maintain space humidity at high limit setpoint.

Modulate hot gas reheat valve via AO point to maintain space temperature at the maximum comfort zone temperature setpoint.

Where terminal unit serves multiple spaces, routinely (at least every 5 minutes) monitor and sort inputs from all space temperature sensors to determine which sensors are within the comfort temperature range.

For each sensor indicating a temperature not within the comfort range, minimize discomfort as follows:

If all sensors are above the maximum comfort space temperature, operate cooling mode until the highest sensor temperature is decreased to the maximum comfort space temperature setpoint.

If all sensors are below the minimum comfort space temperature, operate heating mode until the lowest sensor temperature is increased to the minimum comfort space temperature setpoint.

If at least 1 sensor is above the maximum comfort space temperature while 1 (or more) sensor is below the minimum comfort space temperature, compute the "percentage dissatisfied factor" (pdf) for each sensor as follows:

$$R = [-8.6479 + (0.2431 \times C)] + [0.3442 - (0.0073 \times C)] \times T$$

Where C = month of year (1-12)

T = sensor temperature, °c

$$PD = 100 - \{95 \, EXP \, [-(0.03353 \times R^4 + 0.2179 \times R^2)]\}$$

$$PDF = 0.9 \times (PD - 0.1)$$

Water source heat pump shall operate in heating/cooling mode to minimize the pdf at each sensor.

"OFF" period temperature and humidity limit control:

On a rise in space temperature to above the high limit setpoint temperature, command ACWS pump(s) “ON” via DO point(s), command unit fan "ON" via DO point, and initiate stage 1 of cooling via DO point to maintain space at high limit setpoint temperature **minus 5°F**.

On a continued rise in space temperature above the high limit setpoint temperature, initiate stage 2 of cooling to maintain space at high limit setpoint temperature **minus 5°F**.

If space humidity rises above high limit humidity setpoint, command ACWS pump(s) “ON” via DO point(s), command unit fan "ON" via DO point, on a rise in any space humidity to above the high limit humidity setpoint, initiate stage 1 of cooling via DO point to maintain space humidity at high limit setpoint **minus 5% RH**.

On a continued rise in any space humidity to above the high limit humidity setpoint, initiate stage 2 of cooling via DO point to maintain space humidity at high limit setpoint **minus 5% RH**.

Modulate hot gas reheat control valve via AO point to maintain space at minimum temperature setpoint.

On a fall in space temperature to below the low limit setpoint temperature, command ACWS pump(s) “ON” via DO point(s), command unit fan "ON" via DO point, and initiate stage 1 of heating via DO point to maintain space at the low limit setpoint temperature **plus 5°F**.

On a continued fall in space temperature to below the low limit setpoint temperature, initiate stage 2 of heating via DO point to maintain space at the low limit setpoint temperature **plus 5°F**.

Once space conditions return to within limit conditions, ± **5°F and/or minus 5% RH as above,** for 5 minutes, command unit "OFF".

5.30 **Packaged Water Source Heat Pump Unit, Outdoor Air Preconditioning System (DVA-1,2,3,4,5)**:

PRIMARY UNIT CONTROL IS PROVIDED BY OEM CONTROLLER INTERFACED WITH DDC SYSTEM.

Command unit and associated exhaust fans “ON/OFF,” as defined by Sequence 4.00, as defined below or upon operator command.

Where ventilation air is supplied directly to occupied spaces, unit shall start/stop in accordance with user-defined “ON/OFF” schedule defined by Sequence 1.14 or upon operator command.

MONITOR HVAC unit OEM controller fault/failure/alarm as DI point.

MONITOR fan motors(s) status as AI point(s) in accordance with Sequence 1.25.

Ventilation air temperature and humidity control:

MONITOR discharge air dry bulb temperature and discharge air dewpoint temperature as AI points.

Discharge air dry bulb temperature setpoint for OEM controller shall be input via AO point from the DDC system as follows:

Outdoor Air Temperature (ºF)	**Discharge Air Dry Bulb Temperature (ºF)**
≤ 50ºF	72ºF
≥ 85ºF	55ºF

OEM controller shall maintain discharge air dry bulb and dewpoint temperatures as follows:

Discharge air dry bulb temperature shall be maintained at setpoint temperature input to OEM controller from the DDC system.

Discharge air dewpoint temperature shall be maintained at or below 53ºF.

If either cooling or heating is initiated, command the N.C. ACWS control valve OPEN. When cooling or heating is no longer required, command the N.C. ACWS control valve CLOSED.

Cooling Mode:

If the outdoor air temperature is above the Outdoor Air Heating Setpoint (OAHS) and the controller is not calling for dehumidification then Cooling Mode shall be enabled. Compressor staging is identical to dehumidification however the control temperature is the Discharge Air Cooling Setpoint. Should the discharge temperature begin to fall too low the hot gas reheat shall be enabled and modulate to maintain the Discharge Air Cooling Setpoint

Dehumidification Mode:

Dehumidification Mode is enabled on Outdoor Air Dewpoint Setpoint (OADS). If there is no call for Heating Mode and the outdoor air dewpoint is above or equal to the OADS then Dehumidification Mode shall be enabled. Dehumidification Mode will remain active until the space or outdoor air dewpoints rise above the setpoints by

2°F, or if Heating Mode is enabled. Compressor control is based on Evaporator Leaving Air Temperature Setpoint. With dehumidification enabled, if evaporator leaving air temperature is above setpoint first stage dehumidification (Compressor 1) will start. If after a 3-minute minimum delay the evaporator leaving air temperature is still above the setpoint, the second, third, and fourth stages of dehumidification (Compressor 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. During operation in Dehumidification Mode, the main unit controller shall enable hot gas reheat and it will modulate to maintain the Discharge Air Cooling Setpoint.

Hot Gas Reheat Purge:

Following continuous 30-minute hot gas reheat operation at less than 100 percent reheat capacity a purge cycle will be initiated. During the purge cycle, the hot gas reheat signal is set and held at 100 percent for a period of 3 minutes. Following the purge cycle, normal operation resumes.

Heating Mode.

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS). If the outdoor air temperature is lower than the OAHS then Heating Mode shall be enabled. During Heating Mode Compressor 1 will be staged on. If after a 3-minute minimum delay the discharge temperature is still below the setpoint, the second, third, and fourth stages of heating (Compressors 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. During operation in heating mode, the main unit controller will enable hot gas reheat at 100 percent.

Ventilation Airflow Control:

When DVA unit is "ON":

MONITOR supply airflow as AI point, computed on the basis of velocity pressure input and supply duct cross sectional area.
MONITOR ventilation supply air duct static pressure as AI input.

When unit is "OFF", bypass damper shall be modulated “CLOSED” via AO point.

SPECIAL EXHAUST SYSTEMS

7.10 **Type I Kitchen Hood Interface:**

Unit start/stop control: start/stop unit based on interlock with kitchen hood controller.
KMUA-1 and GHE-1 shall be interlocked to operate together. Interlock with Cafeteria Unit AC-24. Local switch on kitchen hood shall energize kitchen hood exhaust fan and kitchen make up air unit. If AC-24 is “OFF”, AC-24 shall be commanded to start.

Temperature Control:
Upon a rise in supply temperature above 75°F (ADJ.), factory controller shall stage cooling “ON” to maintain supply temperature of 75°F (ADJ.)
Upon a drop in supply temperature below 65°F (ADJ.), modulate gas heat valve open to maintain supply temperature of 65°F (ADJ.)

Trend Log and Historical Data: Log and archive the following every 15 minutes:

Supply Air Temperature
GHE-1 Exhaust Fan Status
KMUA-1 Supply Fan Status

END OF SECTION 230993

SECTION 260534 - RACEWAYS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 specification sections, apply to work of this section.

QUALITY ASSURANCE

Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products are Listed and Labeled.

Codes and Standards:

NEMA Compliance: Comply with applicable requirements of NEMA Standards Publications pertaining to raceways.

Testing Laboratory Compliance and Labeling: Comply with applicable requirements of UL safety standards pertaining to electrical raceway systems. Provide raceway products and components that have been Listed and Labeled.

NEC Compliance: Comply with applicable requirements of the latest edition of the NEC pertaining to construction and installation of raceway systems.

SUBMITTALS

Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal requirements are defined in each section of this Division.

Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of raceway system required. Include data substantiating that materials comply with requirements.

PART 2 - PRODUCTS

METAL CONDUIT AND TUBING

General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each use indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements as stated herein while complying with applicable portions of NEC for raceways.

Rigid Metal Conduit (RMC): Provide rigid steel, zinc-coated, threaded type conforming to ANSI C80.1 and UL 6. Provide zinc coating fused to inside and outside walls.

Electrical Metallic Tubing (EMT): Provide electrical metallic conduit conforming to ANSI C80.3 and UL 797.

Flexible Metal Conduit (FMC): Provide steel flexible metal conduit conforming to UL 1. Conduit shall be formed from continuous length of spirally wound, interlocked zinc-coated strip steel.

Liquid-Tight Flexible Metal Conduit (LFMC): Provide flexible liquid-tight metal conduit constructed of single strip, flexible, continuous, interlocked, and double-wrapped steel. Inside and outside shall be galvanized; conduit shall be coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).

Rigid Metal Conduit Fittings: Provide cast malleable iron, galvanized or cadmium plated.

Use Type 1 fittings for raintight connections.
Use Type 2 fittings for concrete tight connections.

Conduit Locknuts: Provide case-hardened steel locknuts for use on threaded raceway.

Conduit Bushings:

Insulated: Provide Listed and Labeled, threaded, thermosetting plastic bushings at each end of all threaded raceway. Provide grounding type if same is indicated elsewhere.

Grounding (bonding type): Provide Listed and Labeled, threaded, insulated throat, bonding type bushings. Provide steel frame bushings for use on ferrous raceway. Provide bushings with tin-plated copper grounding saddle sized to accept grounding conductor size as indicated on the Drawings. Where grounding conductors are oversized, provide separate copper grounding lugs that are appropriately sized.

Flexible Metal Conduit Fittings: Provide steel conduit fittings for use with flexible steel conduit of threadless hinged clamp type. All flexible metal conduit fittings shall be Listed as suitable for grounding.

Straight Terminal Connectors: Provide insulated throat type, one piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with steel locknut.

45° or 90° Terminal Angle Connectors: Provide steel insulated throat type, two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with steel locknut.

Liquid-Tight Flexible Metal Conduit Fittings: Type 1, Class 3, Style G. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat and steel locknut. All liquid tight flexible metal conduit fittings shall be Listed as suitable for grounding.

EMT Fittings:

EMT Conduit Couplings: Cadmium plated steel, dual compression type with two (2) hexagon compression fittings. Fittings that can not be tightened with an open-end wrench of the appropriate size are not acceptable.

EMT Conduit Connectors: Cadmium plated steel, insulated throat, compression type with hexagon compression fitting and steel locknut. Fittings that can not be tightened with an open-end wrench of the appropriate size are not acceptable.

Unacceptable fitting types: Pot metal, set screw, and indenter type fittings, or connectors that do not have insulated throats, are not acceptable for use on this project.

Conduit Bodies: Provide galvanized steel conduit bodies of types, shapes and sizes as required to fulfill job and NEC requirements. Conduit bodies shall be constructed with threaded conduit entrance ends, removable covers, either cast or of galvanized steel, and corrosion-resistant screws.

Metallic Conduit, and Tubing Accessories: Provide metallic conduit and tubing accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.

NONMETALLIC CONDUIT

General: Provide nonmetallic conduit and fittings of types, sizes and weights for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements that comply with provisions of NEC for raceways.

Rigid Polyvinyl Chloride Conduit (PVC):

Schedule 40, 90°C., Listed and Labeled, conforming to NEMA TC-2 for direct burial, encasement in concrete, use in sunlight, or normal above ground use, and in conformity with NEC Article 352.

PART 3 - EXECUTION

INSPECTION

Examine areas and conditions under which raceways are to be installed, and substrate that will support raceways.

Notify A-E in writing of conditions detrimental to proper completion of the Work. Do not proceed with work until unsatisfactory conditions have been corrected.

SELECTION OF RACEWAY AND SIZE OF RACEWAY SYSTEM

General: Install concealed raceway system in new construction work, either in walls or above hung ceilings.

Do not route raceway below slabs unless such routing is specifically indicated on the Drawings.

Do not use surface metal raceway unless such use is specifically indicated on the Drawings.

Conduit Installation: Unless otherwise indicated on the Drawings, provide rigid steel zinc-coated conduit (RMC) where embedded in concrete, masonry, earth, or installed outdoors. Follow minimum requirements in other areas as follows:

Steel zinc-coated EMT may be installed in all areas except where specifically indicated otherwise in the Drawings or under the conditions of use listed below:

- Where it will be installed in exterior walls.
- Where it will be installed outdoors, in concrete or in direct contact with the earth.
- Where it will be subject to physical damage.
- Where it will be installed lower than four (4) feet from finished floor in areas where exposed to possible damage from area use activities.
- Where it will be subject to corrosive influence.
- Where it will be installed indoors in wet or damp locations.
- Where trade size is larger than 2".

Any of the above use conditions may be overridden by the Drawings.

Avoid use of dissimilar metals throughout system to reduce the possibility of galvanic action. Where dissimilar metals must be in contact, coat surfaces with corrosion inhibiting compound before assembling.

Use liquid-tight flexible metal conduit (LFMC) only where specifically indicated on the Drawings or where subjected to one or more of the following conditions:

- Flexible connection in an exterior location.
- Final 18" connection to motors.
- Equipment subject to movement or vibration.

Do not use PVC raceway unless such use is specifically indicated on the Drawings. Where PVC is permitted it must be installed in accordance with the following:

Where underground raceways turn up into equipment, cabinets or poles, the 90° and/or similar fittings and stub-ups shall be rigid steel conduit grounded by use of bonding bushings connected to the equipment grounding conductor.

Use Flexible Metal Conduit (FMC) only for final connections to light fixtures and utilization equipment. Any other use shall be limited to applications where specifically indicated on the Drawings

Flexible Metal Conduit may not be used to interconnect device or junction boxes, utilization equipment, fixtures.

Flexible Metal Conduit length shall not exceed six feet.

Size raceway and raceway systems as follows:

Size raceway to meet NEC requirements, or as indicated on the Drawings, whichever size is larger, except no conduit smaller than 3/4 inch trade size shall be installed.

For underground use external to the building foundation no raceway smaller than 3/4 inch trade size shall be installed.

INSTALLATION OF RACEWAY SYSTEMS

General: Install raceways as indicated, in accordance with manufacturer's written installation instructions, and in compliance with the NEC and NECA's "Standards of Installation." Install raceway and related boxes and fittings plumb and level, ±2°. Maintain manufacturer's recommended clearances.

Fasten heavy wall conduit terminations in sheet metal enclosures by two locknuts, one inside and one outside of enclosure, and terminate with insulated bushing; terminate other conduit systems with connectors listed for the purpose and as described above.

Conduit couplers shall be steel threaded type in all locations where such use is possible. Otherwise use 3-piece union.

Conduits are not to cross pipe shafts or ventilating duct openings. Conduit is not to be routed in elevator shafts unless necessary to serve items within the shaft.

Keep conduits a minimum distance of 6" from parallel runs of hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water piping.

Support riser conduit at each floor level with clamp hangers.

Use of running threads at conduit joints and terminations is prohibited. Where required, use threaded nipples and 3-piece unions.

Support exposed conduit by use of hangers, clamps or clips Listed for the purpose. Support conduit on each side of bends and on spacing not to exceed following:

- Rigid Metal Conduits Up to 1": 8'-0".
- Rigid Metal Conduits 1-1/4" and Over: 10'-0".
- EMT Up to 1": 8'-0".
- EMT 1-1/4" and Over: 10'-0".

Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers Listed for the purpose. Requirements for exposed conduits also apply to conduits installed in space above hung ceilings.

Concealed Conduits:

- Metallic raceways installed underground, in floors below grade (where permitted), or outside are to have conduit threads painted with corrosion inhibiting compound before couplings are assembled. Draw up coupling and conduit sufficiently tight to ensure a water tight joint.
- For floors-on-grade (where permitted), install conduits under crushed rock and concrete slabs.
- Install underground conduits 24" below finished grade (24" cover) as a minimum or as otherwise indicated on the Drawings if a greater depth is shown.

Exposed Conduits:

- Install conduits in a manner so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.
- Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.
- Install exposed conduit work as not to interfere with ceiling inserts, lights or ventilation ducts or outlets. Coordinate conduit installation with other trades as required.
- Install exposed conduit directly on structure using two hole straps. Provide offsets at all boxes and as required to avoid exiting utilities.
- Conduits installed on interior of exterior walls shall be spaced off the wall surface a minimum of ¼ inch with appropriate straps.

Run conduits for outlets on waterproof walls exposed where indicated on the Drawings. Set anchors for supporting conduit on waterproof wall in waterproof cement. Requirements for exposed conduit also apply to conduits installed in space above hung ceilings.

Non-Metallic Raceway:

- Make solvent cemented joints in accordance with recommendations of manufacturer.
- Install PVC raceway in accordance with NEC.

All PVC conduit connections to PVC junction boxes shall be made with listed connectors, approved for the application.

Raceway Fittings: Install connectors, couplers, and related fittings as required for a complete raceway system.

Install insulated bushings for terminating all types of raceway where termination is not made with an insulated throat connector.

Where concentric, eccentric or over-sized knockouts are encountered, a grounding-type insulated bushing shall be provided. Bushing shall be connected to the equipment grounding conductor.

Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, and plugs are to be constructed from steel and specifically designed and Listed for their particular application.

Coordinate with other work including wires/cables, boxes, and panel work, as necessary to interface installation of electrical raceways and components with other work.

Mechanically fasten together metal conduits, enclosures, and other components comprising raceway system to form a continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly.

Raceway must be installed as a complete system prior to the installation of cables, conductors, or pull wires into any part of the systems.

Install miscellaneous fittings such as reducers, chase nipples, 3-piece unions, and plugs that have been specifically designed and manufactured for their particular application. Install expansion fittings in raceways every 200' linear run maximum and wherever structural expansion joints are crossed.

Use roughing-in dimensions of electrically supplied utilization equipment furnished by supplier or by other divisions as appropriate. Set conduit and boxes for connection to units only after receiving review of dimensions and after verification of location with other trades.

Do not set final connections for fixtures and/or utilization equipment until connection points and requirements are accurately known. The Contractor is responsible for the relocation of mis-located connection points as required to match equipment at no additional cost.

Cut conduits straight, properly ream. Threads shall be cut into heavy wall conduit using equipment designed for the purpose.

Make changes in direction of raceway run by means of proper field bends or with proper fittings, supplied by raceway manufacturer.

Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.

Properly support and anchor raceways for their entire length by structural materials. Raceways are not to span any space unsupported for lengths in excess of the maximum support distance as previously specified. Raceways may not be used to support other raceways or other items of equipment.

Arrange conduit to maintain headroom and present a neat appearance.

Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

Group raceway in parallel runs where three (3) or more raceway are routed together. Use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25% additional conduit.

Do not fasten and/or hang conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used during construction for temporary conduit support.

Bring conduit to the shoulder of fittings and couplings and fasten securely. All raceway shall be cut to proper length so ends fit accurately in connectors or couplers.

Use conduit hubs for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.

Use conduit bodies to make sharp changes in direction, as around beams.

Use hydraulic one-shot conduit bender for all field bends in conduit. All field made conduit bends shall meet minimum bending radius requirements of the NEC. Bends in metallic conduit shall be made while "cold". Factory made conduit sections may be used in lieu of field made bends for conduit larger than 2".

Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

Where conduit penetrates fire rated partitions, provide penetration protection in accordance with the UL through-penetration detail indicated on the Drawings for the type of partition and conduit involved. All instructions furnished with firestopping materials shall be followed explicitly.

Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket. All pitch pockets shall be absolutely water tight; once conduit has been routed thought a pitch pocket the water integrity of the pitch pocket is the responsibility of the Division 26-28 Contractor.

Combining of circuits into raceway systems other than indicated on Drawings shall not be permitted.

Bolts, clamps, screws and expansion bolts shall be used in securing conduit, equipment, etc. Holes for lead shields or other anchors shall be the size recommended by the fastener manufacturer and shall be completely covered by the mounted item. Holes used for support of conduit on brick or block walls shall be located in mortar joints where such location is possible.

Provide nylon pull string in empty conduits where indicated, including conduit placed for telephone and data use. Conduit installed but left empty (with pull string) shall be tested with a ball mandrel. Clear any conduit that rejects ball mandrel. Any costs involved for restoration of conduit and surrounding surfaces to original condition are the responsibility of the Contractor.

END OF SECTION 260534

HVAC ABBREVIATIONS

Ø	ROUND; DIAMETER; PHASE
#	POUNDS; NUMBER
A	COMPRESSED AIR
ACFM	ACTUAL CUBIC FEET PER MINUTE
ACH	AIR CHANGES PER HOUR
AD	ACCESS DOOR
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ARCH	ARCHITECTURAL; ARCHITECT
AS	AIR SEPERATOR
AUTO	AUTOMATIC
AV	ACID VENT
AW	ACID WASTE
BAS	BUILDING AUTOMATION SYSTEM
BBD	BOILER BLOWDOWN
BFF	BELOW FINISHED FLOOR
BFW	BOILER FEED WATER
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BP	BACKFLOW PREVENTER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CELSIUS; COMMON PORT
CD	CONDENSATE DRAIN
CDWP	CONDENSER WATER PUMP
CDWR	CONDENSER WATER RETURN
CDWS	CONDENSER WATER SUPPLY
CF	CHEMICAL FEED
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CLG	CEILING
CO	CLEAN OUT; CARBON MONOXIDE
CO2	CARBON DIOXIDE
CONC	CONCRETE
COP	COEFFICIENT OF PERFORMANCE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CT	COOLING TOWER
CTR	CENTER
CU	COPPER; CONDENSING UNIT
CUFT	CUBIC FOOT; CUBIC FEET
CUH	CABINET UNIT HEATER
CUYD	CUBIC YARD
CW	COLD WATER
DB	DRY BULB
DD	DUCT MOUNTED SMOKE DETECTOR
DDC	DIRECT DIGITAL CONTROLS
DI	DUCTILE IRON
DIA	DIAMETER
DN	DOWN
DP	DIFFERENTIAL PRESSURE
DTWR	DUAL TEMPERATURE WATER RETURN
DTWS	DUAL TEMPERATURE WATER SUPPLY
DWG	DRAWING
DX	DIRECT EXPANSION
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EFF	EFFICIENCY
EL	ELEVATION
ELEC	ELECTRICAL
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
ESS	EMERGENCY STOP SWITCH
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST; EXHAUST AIR; EXHAUST FAN
EXIST	EXISTING
EXP	EXPANSION
F	FAHRENHEIT
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FFE	FINISHED FLOOR ELEVATION
FL	FLOOR
FLEX	FLEXIBLE
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FSD	FIRE/SMOKE DAMPER
FT	FEET; FOOT
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GC	GENERAL CONTRACTOR
GEX	GREASE EXHAUST AIR
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HD	HUB DRAIN; HEAT DETECTOR
HEX	HAZARDOUS EXHAUST
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HIGH PRESSURE
HPR	HIGH PRESSURE CONDENSATE RETURN
HPS	HIGH PRESSURE STEAM
HSTAT	HUMIDISTAT
HT	HEIGHT
HTG	HEATING
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HX	HEAT EXCHANGER
ID	INDIRECT DRAIN; INSIDE DIAMETER
IN	INCH
INV	INVERT
ISP	INTERNAL STATIC PRESSURE
KW	KILOWATT
KWH	KILOWATT HOUR
LAT	LEAVING AIR TEMPERATURE
LB/HR	POUNDS PER HOUR
LP	LOW PRESSURE
LPG	LIQUID PETROLEUM GAS
LPR	LOW PRESSURE CONDENSATE RETURN
LPS	LOW PRESSURE CONDENSATE SUPPLY
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	1000 BRITISH THEMAL UNITS PER HOUR
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MP	MEDIUM PRESSURE
MRT	MOTOR RATED TOGGLE SWITCH
MS	MOTOR STARTER
MS/D	COMBINATION MOTOR STARTER AND DISCONNECT
MTD	MOUNTED
MUA	MAKE UP AIR
MVD	MANUAL VOLUME DAMPER
N	NITROGEN
N.C.	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NITROUS OXIDE; NUMBER
N.O.	NORMALLY OPEN
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
O	OXYGEN
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
P	PUMP
PC	PLUMBING CONTRACTOR
PCHWP	PRIMARY CHILLED WATER PUMP
PD	PRESSURE DROP
PHWP	PRIMARY HOT WATER PUMP
PI	PRESSURE INDEPENDENT
PICV	PRESSURE INDEPENDENT CONTROL VALVE
PR	PUMPED CONDENSATE RETURN
PNL	PANEL
PPH	POUNDS PER HOUR
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCE ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POINT
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RA	RETURN AIR
RD	ROUND
RECIRC	RECIRCULATING
REINF	REINFORCING
REL	RELIEF; RELIEF AIR
REV	REVISION
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
RS	REFRIGERANT SUCTION
SA	SUPPLY AIR
SCFM	STANDARD CUBIC FEET MER MINUTE
SCHWP	SECONDARY CHILLED WATER PUMP
SD	SMOKE DAMPER
SECT	SECTION
SF	SUPPLY FAN; SQUARE FEET
SHWP	SECONDARY HOT WATER PUMP
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SPL	STATIC PRESSURE LOSS
SF	SQUARE FEET
SS	STAINLESS STEEL; SANITARY SEWER
STM	STEAM
TA	TRANSFER AIR
TAB	TEST AND BALANCE
TOD	TOP OF DUCT
TOP	TOP OF PIPE
TOS	TOP OF STEEL
TSP	TOTAL STATIC PRESSURE
T'STAT	THERMOSTAT
TU	TERMINAL UNIT
TYP	TYPICAL
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES INC.
V	VENT
VA	VENTILATION AIR
VAC	VACUUM (SUCTION)
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
WB	WET BULB
WG	WATER GAUGE
W/O	WITHOUT
XT	EXPANSION TANK

GENERAL SYMBOLS

- PLAN OR DETAIL NUMBER / SHEET NUMBER
- ELEVATION LETTER / SHOWN ON SHEET NUMBER
- SECTION NUMBER / SHOWN ON SHEET NUMBER
- DIMENSION LINE
- DETAIL NUMBER WITH SHEET NO.
- COLUMN NUMBER OR LETTER
- DRAWING REVISION NUMBER
- KEYED NOTE NUMBER
- CONNECT TO EXISTING
- REMOVE TO THIS POINT
- NORTH ARROW

ELECTRICAL SYMBOLS

- VFD — VARIABLE FREQUENCY DRIVE
- MOTOR STARTER
- COMBINATION MOTOR STARTER/DISCONNECT
- FUSED DISCONNECT
- NF — NON-FUSED DISCONNECT
- DISCONNECT, EXISTING OR BY OTHERS
- PNL — POWER PANEL, EXISTING OR BY OTHERS
- S — TOGGLE SWITCH

PIPING SYMBOLS

- #" SYSTEM — PIPE SIZE AND SYSTEM IDENTIFICATION (SEE ABBREVIATIONS FOR SYSTEM TYPES)
- #" SYSTEM
- VALVE (REFER TO SPECIFICATIONS)
- BALANCING VALVE (REFER TO SPECIFICATIONS)
- CALIBRATED BALANCING VALVE
- BUTTERFLY VALVE
- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- PLUG VALVE
- BALL VALVE
- 2-WAY CONTROL VALVE
- 3-WAY CONTROL VALVE
- PRESSURE REDUCING VALVE
- PRESSURE RELIEF VALVE
- GAS COCK
- Y-TYPE STRAINER
- BASKET STRAINER
- PIPE TURNING UP
- PIPE TURNING DOWN
- PIPE CONNECTION AT BOTTOM OF MAIN
- PIPE CAP
- PIPE UNION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- PIPE ALIGNMENT GUIDE
- PIPE ANCHOR
- FLEXIBLE PIPE CONNECTION
- PRESSURE GAUGE
- THERMOMETER
- STEAM TRAP
- DIRECTION OF FLOW IN PIPE
- SLOPE PIPE IN DIRECTION OF ARROW
- PUMP
- PETES PLUG (P & T PORT)
- BACKFLOW PREVENTER
- EXISTING PIPING
- PIPING TO BE DEMOLISHED
- NEW PIPING

DUCTWORK SYMBOLS

- SUPPLY, VENTILATION, OUTSIDE AIR DUCT SECTION
- RETURN AIR DUCT SECTION
- EXHAUST OR RELIEF AIR DUCT SECTION
- 24x24 — RECTANGULAR DUCT DIMENSIONS (IN PLAN WIDTH x HEIGHT INCHES)
- 24/12 — FLAT OVAL DUCT DIMENSIONS
- 24Ø — ROUND DUCT DIMENSIONS
- EXISTING DUCT
- DUCT TO BE DEMOLISHED
- NEW DUCT
- #/1'-0" — SLOPE DUCT IN DIRECTION OF ARROW
- BELL MOUTH TAP FOR MEDIUM PRESSURE
- CONICAL TAP WITH BALANCING DAMPER WITH LOCKING QUADRANT OPERATOR FOR LOW PRESSURE TAKEOFFS
- 45° TAP WITH BALANCING DAMPER WITH LOCKING QUADRANT OPERATOR
- SUPPLY DIFFUSER
- RETURN GRILLE
- EXHAUST GRILLE
- MITERED ELBOW
- RADIUS ELBOW
- FLEXIBLE DUCT
- VOLUME DAMPER WITH MANUAL OPERATOR AND LOCKING QUADRANT
- D — DUCT MOUNTED MOTORIZED DAMPER
- H — DUCT MOUNTED STEAM HUMIDIFIER
- DD — DUCT MOUNTED SMOKE DETECTOR
- FD / FD ▲ FD — FIRE DAMPER, DAMPER TO MATCH WALL RATING
- SD / SD ▲ SD — SMOKE DAMPER, DAMPER TO MATCH WALL RATING
- FSD / FSD ▲ FSD — COMBINATION FIRE/SMOKE DAMPER, DAMPER TO MATCH WALL RATING
- R — CEILING RADIATION DAMPER, DAMPER TO MATCH CEILING RATING
- A | 100 — AIR DISTRIBUTION SYMBOL, LETTER(S) DENOTES TYPE, NUMBER INDICATES CFM
- T — THERMOSTAT OR ROOM SENSOR
- H — HUMIDISTAT OR ROOM SENSOR

HVAC GENERAL NOTES :

1. COORDINATE WORK WITH OTHER TRADES PRIOR TO PURCHASE AND INSTALLATION OF ANY PIPING, DUCTWORK OR EQUIPMENT. NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO INSTALLATION.
2. REFER TO THE ARCHITECTURAL PLANS FOR DIMENSIONS. DO NOT SCALE THESE DRAWINGS.
3. ALL DUCT AND PIPING LAYOUTS AND LOCATIONS SHOWN ARE DIAGRAMMATIC AND DO NOT INDICATE ALL FITTINGS REQUIRED TO COMPLETE WORK. COORDINATE THE DUCT AND PIPING LAYOUT WITH ALL CONTRACTORS PRIOR TO INSTALLATION, INCLUDING CONDUITS AND CABLE TRAYS. PROVIDE ALL DUCT AND/OR PIPING OFFSETS REQUIRED FOR THE COMPLETE INSTALLATION OF THE SYSTEM WHETHER OR NOT THE OFFSETS ARE INDICATED ON THE PLANS. INSTALL DUCTWORK AND PIPING HIGH ENOUGH TO AVOID LIGHTS, CONDUIT AND MISCELLANEOUS PIPING, BUT LOW ENOUGH TO ALLOW FOR EASY ACCESS TO SYSTEM BALANCING DEVICES. DO NOT BLOCK ACCESS TO DEVICES.
4. REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS AND ARCHITECTURAL DETAILS FOR EXACT LOCATION OF ALL CEILING AND SIDEWALL AIR DISTRIBUTION AND DEVICES.
5. LOCATE UNITS SUCH THAT ACCESS PANELS MAY BE FULLY OPENED (VIA TILE CEILING) FOR SERVICING UNIT. COORDINATE LOCATION WITH LIGHTING FIXTURES OR ANY OTHER EQUIPMENT.
6. ROUND DUCT RUN-OUTS TO DIFFUSERS SHALL BE SAME SIZE AS INLET DIAMETER SCHEDULED, UNLESS NOTED OTHERWISE.
7. ALL DUCT DIMENSIONS ARE INSIDE CLEAR. SEE DETAILS AND SPECIFICATIONS FOR INSULATION REQUIREMENTS.
8. COORDINATE WORK WITH OTHER TRADES PRIOR TO PURCHASE AND INSTALLATION OF EQUIPMENT AND MATERIALS. NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES IMMEDIATELY.
9. PROVIDE BALANCING DAMPERS WHERE INDICATED ON THE PLANS AND WHERE REQUIRED FOR SYSTEM BALANCING.
10. INSTALL ALL EQUIPMENT WITH THE MANUFACTURER'S RECOMMENDATION AND CODE REQUIRED CLEARANCES. INSURE ALL ITEMS FURNISHED WILL FIT IN THE SPACE AVAILABLE. MAKE NECESSARY FIELD MEASUREMENTS TO ASCERTAIN SPACE REQUIREMENTS AND FURNISH AND INSTALL SUCH SIZES AND SHAPES OF EQUIPMENT THAT ARE THE TRUE INTENT AND MEANING OF THE PLANS AND SPECIFICATIONS. NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO PURCHASE AND INSTALLATION.
11. COORDINATE EXACT SIZE AND LOCATION OF ALL PENETRATIONS THROUGH THE ROOF WITH ALL TRADES.
12. COORDINATE LOCATIONS AND ELEVATIONS OF ALL EXPOSED MECHANICAL ITEMS WITH ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS. THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: SENSORS, WALL DEVICES, SIDEWALL GRILLES, CONTROL PANELS, AND ALARMS.
13. FURNISH 24"x24" ACCESS DOORS (UNLESS OTHERWISE INDICATED) AT ALL MAINTENANCE ITEMS THAT ARE CONCEALED; SUCH AS EQUIPMENT, VALVES, DAMPERS, SENSORS, ETC. COORDINATE EXACT LOCATIONS WITH ARCHITECT/ENGINEER PRIOR TO INSTALLATION.

HVAC DEMOLITION NOTES :

1. SEE REQUIREMENTS OF SECTION 019916 OF THE SPECIFICATION.
2. THIS DEMOLITION PLAN MAY OR MAY NOT REFLECT ALL EXISTING HVAC COMPONENTS AND SYSTEMS. THIS DRAWING IS BASED ON AVAILABLE DRAWINGS AND/OR VISUAL OBSERVATIONS AND IS INTENDED TO INDICATE THE MAGNITUDE OF DEMOLITION WORK REQUIRED BUT NOT TO EXCLUDE WORK NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO SUBMISSION OF BID.
3. THE SCOPE OF THE DEMOLITION WORK REQUIRED INCLUDES REMOVAL OF ITEMS THAT MUST BE REINSTALLED OR REPLACED IN ORDER TO REMOVE ANOTHER ITEM OR INSTALL NEW WORK.
4. ALL EXISTING EQUIPMENT REMOVED SHALL BE DISPOSED OF BY THIS CONTRACTOR (UNLESS NOTED OTHERWISE).
5. CONTRACTOR TO PATCH BUILDING CONSTRUCTION (WALLS, FLOORS, CEILINGS, ROOF, ETC.) DISTURBED BY HVAC DEMOLITION TO MATCH EXISTING. HVAC CONTRACTOR TO MINIMIZE DISTURBANCE OF REMAINING CONSTRUCTION AND SHALL COORDINATE DEMOLITION AND REPAIR WITH GENERAL CONTRACTOR.
6. CAPTURE REFRIGERANT FOR RECYCLING FROM ALL HVAC EQUIPMENT TO BE REMOVED OR RELOCATED. WORK SHALL BE CONDUCTED UNDER THE SUPERVISION OF EPA CERTIFIED TECHNICIAN AND PERFORMED IN ACCORDANCE WITH SECTION 608 F THE EPA CLEAN AIR ACT.
7. THERMOSTATS AND SENSORS CONTAINING MERCURY SHALL BE DISPOSED IN ACCORDANCE WITH THE EPA RESOURCE CONSERVATION ANS RECOVERY ACT (RCRA). CONTRACTORS SHALL REFER TO EPA WEBSITE FOR HANDLING PROCEDURES FOR DISPOSAL AND SPILL MANAGMENT OF PRODUCTS CONTAINING MERCURY.
8. MECHANICAL CONTRACTOR SHALL SALVAGE EXISTING GREASE HOOD EXHAUST FAN AND RETURN TO OWNER.
9. MECHANICAL CONTRACTOR SHALL VERIFY THAT EXISTING RELIEF AIR DUCTWORK IN MECHANICAL LOFTS ARE CLEAR OF ANY EXISTING DAMPERS.

HVAC DRAWING LIST

NO.	TITLE
H001	STANDARDS, SYMBOLS & ABBREVIATIONS
H010	ELECTIVE WING - DEMOLITION PLAN
H011	8TH GRADE WING - DEMOLITION PLAN
H012	GYMNASIUM - DEMOLITION PLAN
H013	ADMIN & MEDIA CENTER - DEMOLITION PLAN
H014	7TH GRADE WING - DEMOLITION PLAN
H015	CAFETERIA - DEMOLITION PLAN
H016	6TH GRADE WING - DEMOLITION PLAN
H100	ELECTIVE WING PLAN - DUCT
H101	6TH GRADE WING PLAN - DUCT
H102	GYMNASIUM PLAN - DUCT
H103	ADMIN & MEDIA CENTER PLAN - DUCT
H104	7TH GRADE WING PLAN - DUCT
H105	CAFETERIA PLAN - DUCT
H106	8TH GRADE WING PLAN - DUCT
H110	ELECTIVE WING PLAN - PIPING
H111	6TH GRADE WING PLAN - PIPING
H112	GYMNASIUM PLAN - PIPING
H113	ADMIN & MEDIA CENTER PLAN - PIPING
H114	7TH GRADE WING PLAN - PIPING
H115	CAFETERIA PLAN - PIPING
H116	8TH GRADE PLAN - PIPING
H201	ALTERNATES
H300	DETAILS
H301	DETAILS
H302	DETAILS
H303	DETAILS
H304	DETAILS
H305	DETAILS
H400	CONTROLS
H401	CONTROLS
H402	CONTROLS
H500	SCHEDULES

MECHANICAL SUMMARY

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

THERMAL ZONE — 2009 ASHRAE FUNDAMENTALS, WILMINGTON, N.C., HEATING 99.6% / COOLING 1%

- winter dry bulb: 23°F
- summer dry bulb: 93°F
- summer wet bulb: 79°F

INTERIOR DESIGN CONDITIONS

- winter dry bulb: 70°F (EXCEPT AS NOTED)
- summer dry bulb: 75°F (EXCEPT AS NOTED)
- relative humidity: 60% MAXIMUM

BUILDING HEATING LOAD: 3842MBH

BUILDING COOLING LOAD: 318TONS

MECHANICAL SPACING CONDITIONING SYSTEM

UNITARY
- description of unit:
- heating efficiency:
- cooling efficiency:
- size category of unit:

} SEE PLANS AND SPECIFICATIONS

BOILER
Size category. If oversized, state reason.: _____

CHILLER
Size category. If oversized, state reason.: _____

LIST EQUIPMENT EFFICIENCIES: SEE PLANS AND SPECIFICATIONS

Ventilation Air Summary

System Name and Number	System Type	All zones included in the VRP calculation?	Condition Analyzed	System Floor Area *As* (sq ft)	System Population *Ps* (people)	Outdoor Air Intake Flow (required by 62.1) *Vot* (cfm)	Outdoor Air Intake Flow Provided (measured or design) (cfm)	Outdoor air intake flow provided meets or exceeds Vot?	Zone outdoor airflow provided meets or exceeds Voz for all zones?
100% Outdoor Air Systems									
DVA-1 - Elective Wing	100% Outdoor air	n/a	Heating	11,363	216.89	3,023	3,100	Yes	Yes
DVA-2 - 8th Grade Wing	100% Outdoor air	n/a	Heating	10,554	235.98	2,824	2,900	Yes	Yes
DVA-3 - 7th Grade Wing	100% Outdoor air	n/a	Heating	16,702	342.43	4,450	4,500	Yes	Yes
DVA-4 - Admin & Media	100% Outdoor air	n/a	Heating	13,288	235.39	2,854	2,900	Yes	Yes
DVA-5 - 6th Grade Wing	100% Outdoor air	n/a	Heating	10,583	233.85	3,028	3,100	Yes	Yes
AC-24 - Cafeteria	100% Outdoor air	n/a	Heating	3500	250	2,500	2,500	Yes	Yes
Totals				66,165	1,514.54	19,583	20,185		

ALTERNATE #5 NOTES:

CLEAN ALL EXISTING SUPPLY, RETURN, AND EXHAUST DUCTWORK IN BUILDING. REFER TO SPECIFICATIONS.

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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORRIS 5/20/16

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

STANDARDS, SYMBOLS & ABBREVIATIONS

JOB NUMBER 0594-01-00-13

DRAWN BY SW

CHECKED BY

DATE 01/24/18

REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER H001

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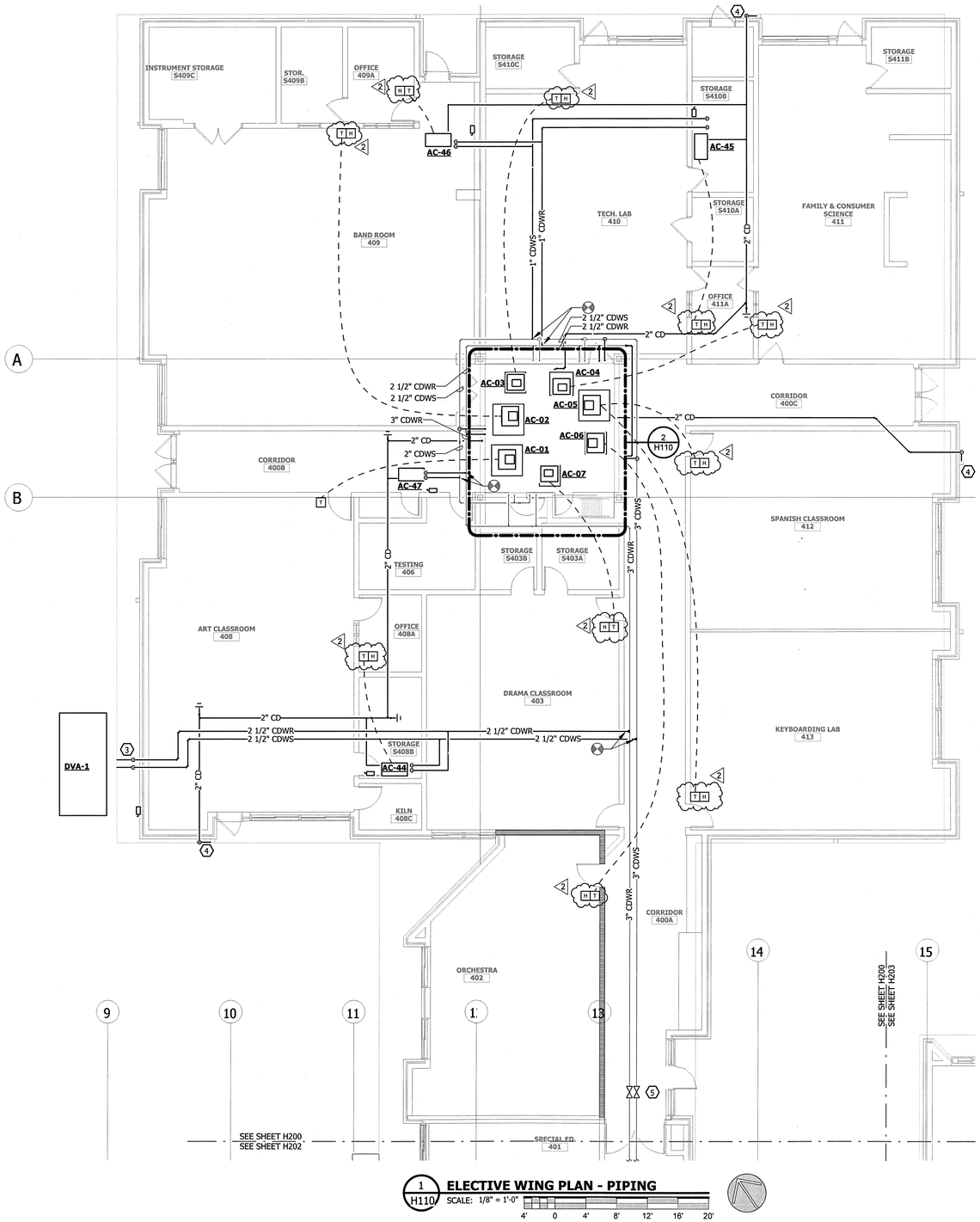
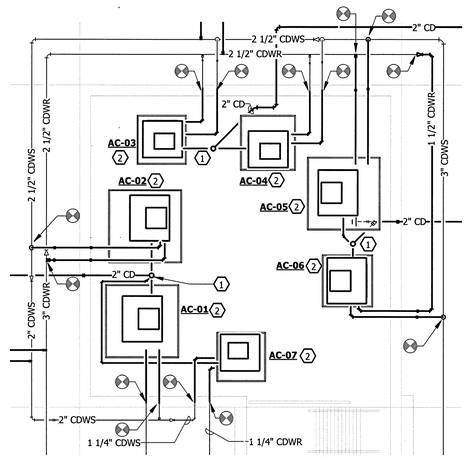


1 H110 **ELECTIVE WING PLAN - PIPING**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'



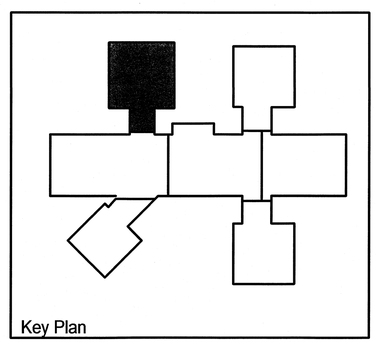
2 H110 **ELECTIVE WING MECHANICAL LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'

GENERAL NEW CONSTRUCTION NOTES

1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

KEY NOTES TO H110

#	
1	DISCHARGE CONDENSATE FROM WSHPs IN LOFT TO NEW HUB DRAIN, SEE DETAIL 3/H302. SEE DETAIL 1/H300 FOR CONDENSATE DRAIN SIZE.
2	CONNECT TO EXISTING CONDENSER WATER PIPING. PROVIDE NEW HOSE CONNECTION KITS.
3	PROVIDE NEW CONDENSER WATER PIPING TO DEDICATED VENTILATION AIR UNIT. OUTSIDE PIPING SHALL HAVE HEAT TRACE.
4	ROUTE NEW CONDENSATE PIPING FROM HUB DRAIN TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
5	PROVIDE NEW ISOLATION VALVES IN ACCESSIBLE LOCATION. PROVIDE LABEL ON CEILING GRID.



Key Plan

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ELECTIVE WING PLAN - PIPING

JOB NUMBER 0594-01-00-13
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CHECKED BY
DATE 01/24/18

REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER H110

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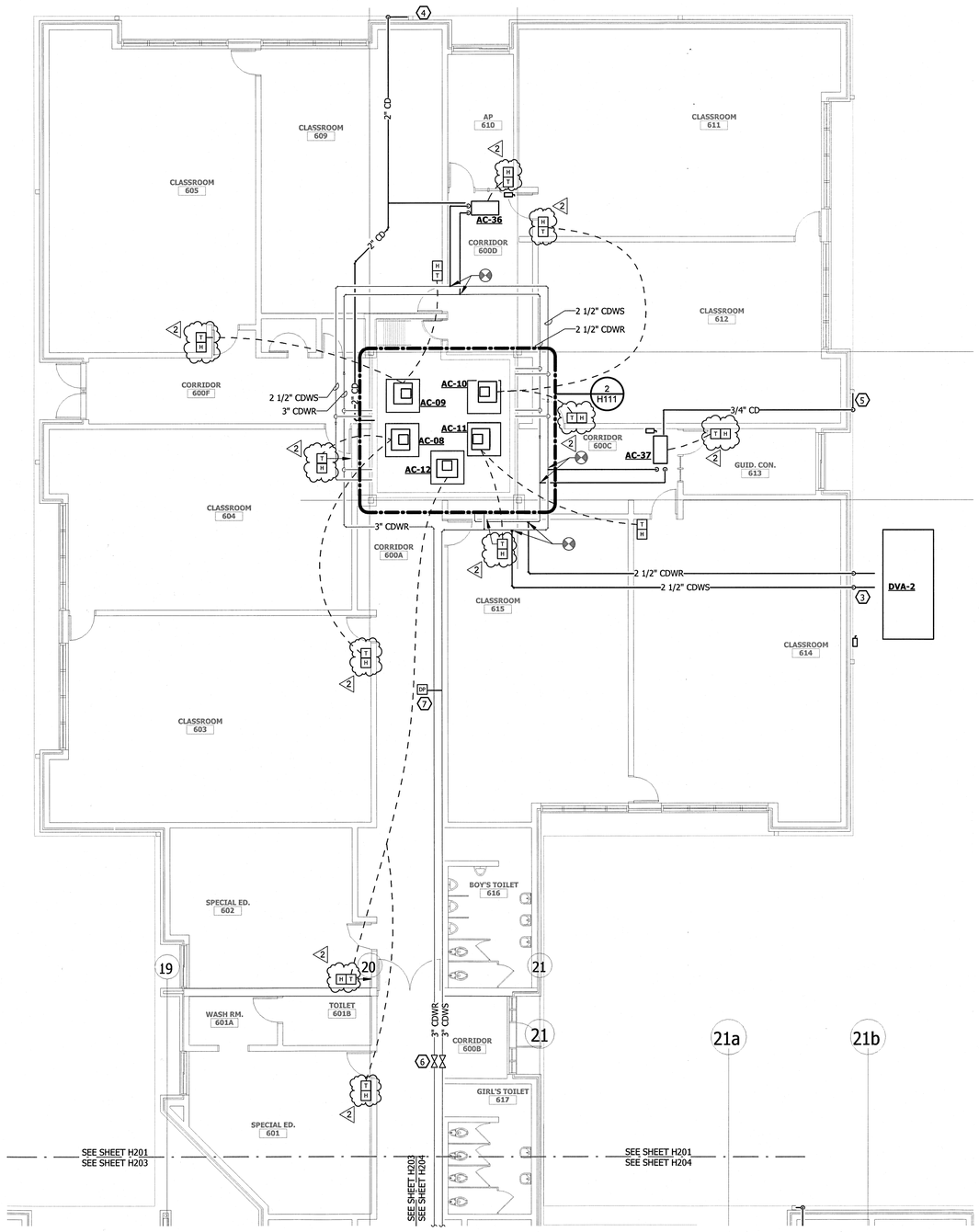
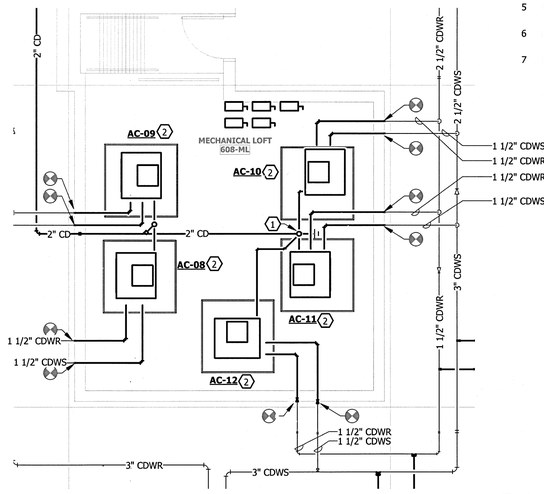


1 H111 **6TH GRADE WING - PIPING**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'



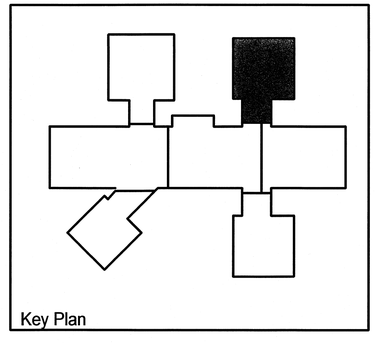
2 H111 **6TH GRADE WING MECHANICAL LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'

GENERAL NEW CONSTRUCTION NOTES

1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

KEY NOTES TO H111

#	
1	DISCHARGE CONDENSATE FROM WSHPs IN LOFT TO NEW HUB DRAIN, SEE DETAIL 3/H302. SEE DETAIL 1/H300 FOR CONDENSATE DRAIN SIZE.
2	CONNECT TO EXISTING CONDENSER WATER PIPING. PROVIDE NEW HOSE CONNECTION KITS.
3	PROVIDE NEW CONDENSER WATER PIPING TO DEDICATED VENTILATION AIR UNIT. OUTSIDE PIPING SHALL HAVE HEAT TRACE.
4	ROUTE NEW CONDENSATE PIPING FROM HUB DRAIN TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
5	ROUTE NEW CONDENSATE PIPING FROM WSHP TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
6	PROVIDE NEW ISOLATION VALVES IN ACCESSIBLE LOCATION. PROVIDE LABEL ON CEILING GRID.
7	PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER


Key Plan

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Renovations and Additions to: Myrtle Grove Middle School

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6TH GRADE WING PLAN - PIPING

JOB NUMBER 0594-01-00-13
DRAWN BY SW
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DATE 01/24/18
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1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER H111

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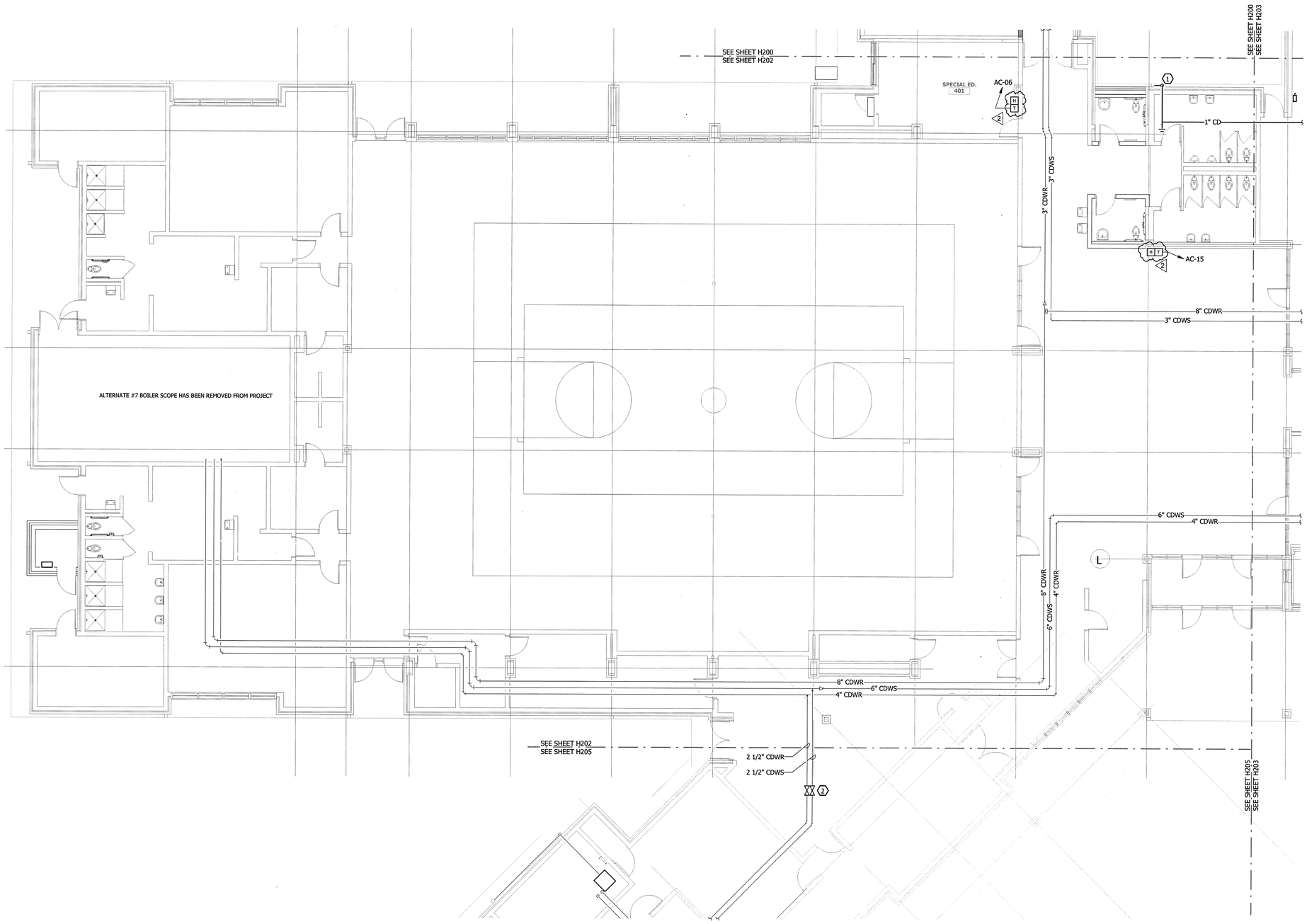
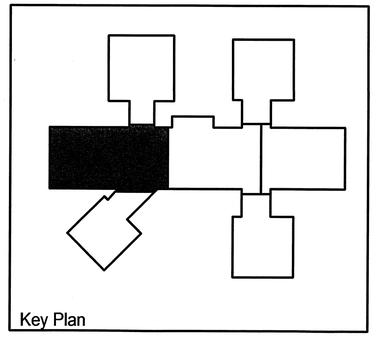
KEY NOTES TO H112

#	
1	ROUTE NEW CONDENSATE PIPING FROM WSHP TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
2	PROVIDE NEW ISOLATION VALVES IN ACCESSIBLE LOCATION. PROVIDE LABEL ON CEILING GRID.





1 H112 **GYMNASIUM - PIPING**
SCALE: 1/8" = 1'-0"

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GYMNASIUM PLAN - PIPING

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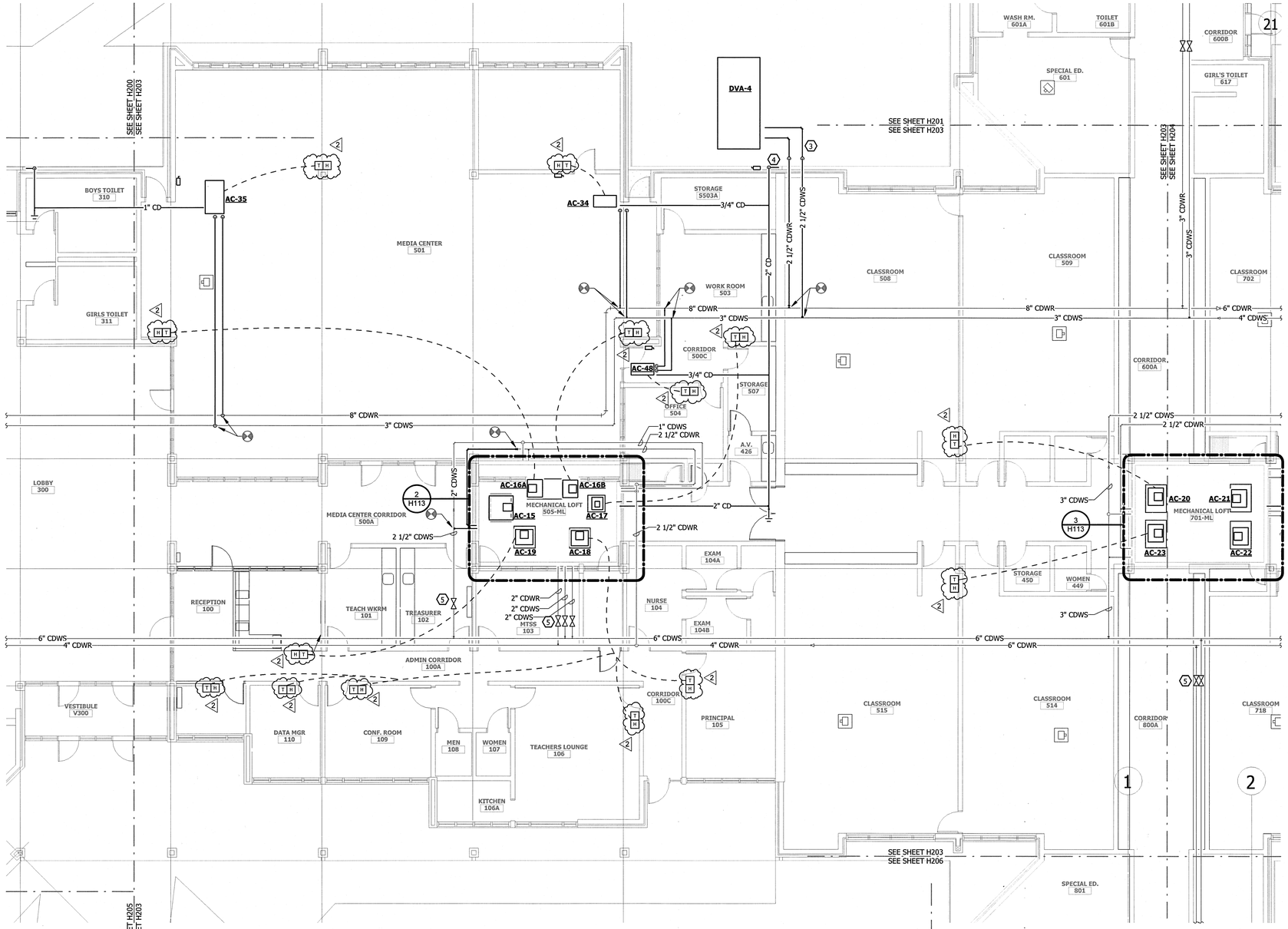
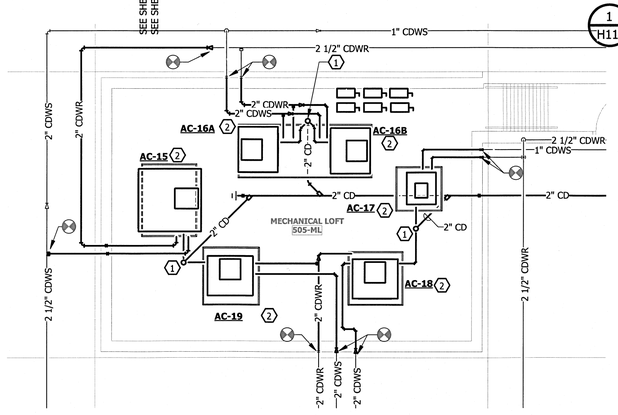


GENERAL NEW CONSTRUCTION NOTES

1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

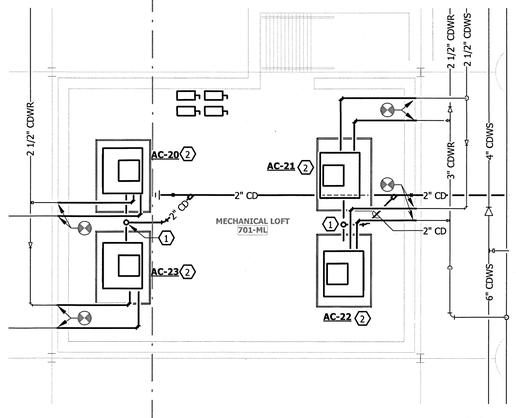
KEY NOTES TO H113

#	
1	DISCHARGE CONDENSATE FROM WSHPs IN LOFT TO NEW HUB DRAIN, SEE DETAIL 3/H302. SEE DETAIL 1/H300 FOR CONDENSATE DRAIN SIZE.
2	CONNECT TO EXISTING CONDENSER WATER PIPING. PROVIDE NEW HOSE CONNECTION KITS.
3	PROVIDE NEW CONDENSER WATER PIPING TO DEDICATED VENTILATION AIR UNIT. OUTSIDE PIPING SHALL HAVE HEAT TRACE.
4	ROUTE NEW CONDENSATE PIPING FROM HUB DRAIN TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
5	PROVIDE NEW ISOLATION VALVES IN ACCESSIBLE LOCATION. PROVIDE LABEL ON CEILING GRID.

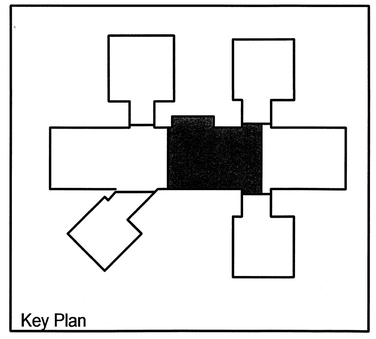


1 H113 **ADMIN & MEDIA CENTER - PIPING**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'

2 H113 **ADMIN & MEDIA CENTER WEST MECH LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'



3 H113 **ADMIN & MEDIA CENTER EAST MECH LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'



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ADMIN & MEDIA CENTER PLAN - PIPING

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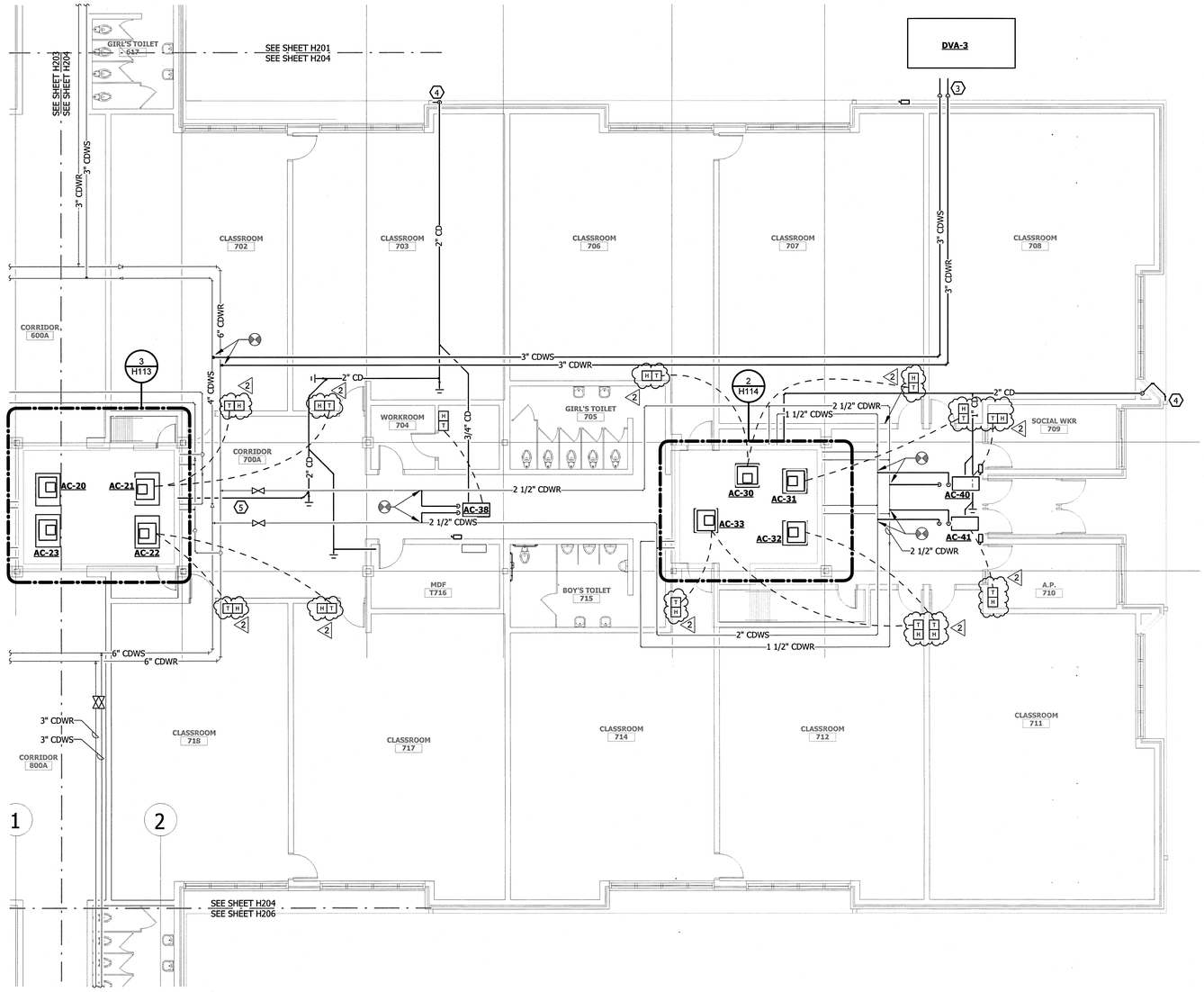


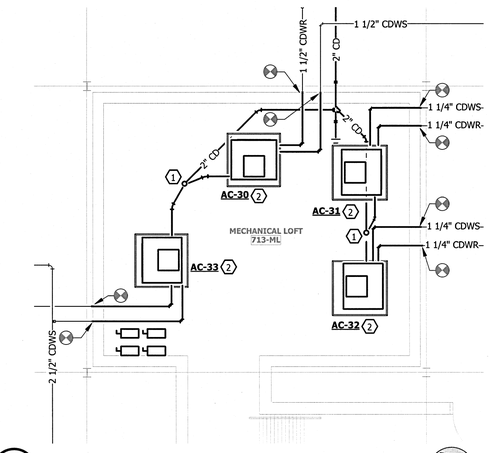
1 H114 **7TH GRADE WING - PIPING**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'

GENERAL NEW CONSTRUCTION NOTES

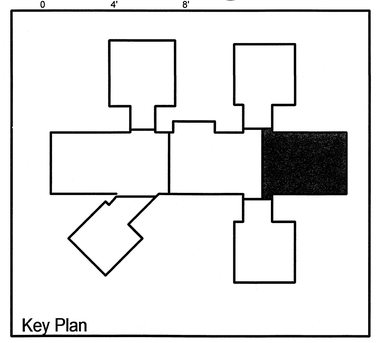
1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

KEY NOTES TO H114

#	
1	DISCHARGE CONDENSATE FROM WSHPs IN LOFT TO NEW HUB DRAIN, SEE DETAIL 3/H302. SEE DETAIL 1/H300 FOR CONDENSATE DRAIN SIZE.
2	CONNECT TO EXISTING CONDENSER WATER PIPING. PROVIDE NEW HOSE CONNECTION KITS.
3	PROVIDE NEW CONDENSER WATER PIPING TO DEDICATED VENTILATION AIR UNIT. OUTSIDE PIPING SHALL HAVE HEAT TRACE.
4	ROUTE NEW CONDENSATE PIPING FROM HUB DRAIN TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
5	PROVIDE NEW ISOLATION VALVES IN ACCESSIBLE LOCATION. PROVIDE LABEL ON CEILING GRID.



2 H114 **7TH GRADE WING MECHANICAL LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'



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7TH GRADE WING PLAN - PIPING

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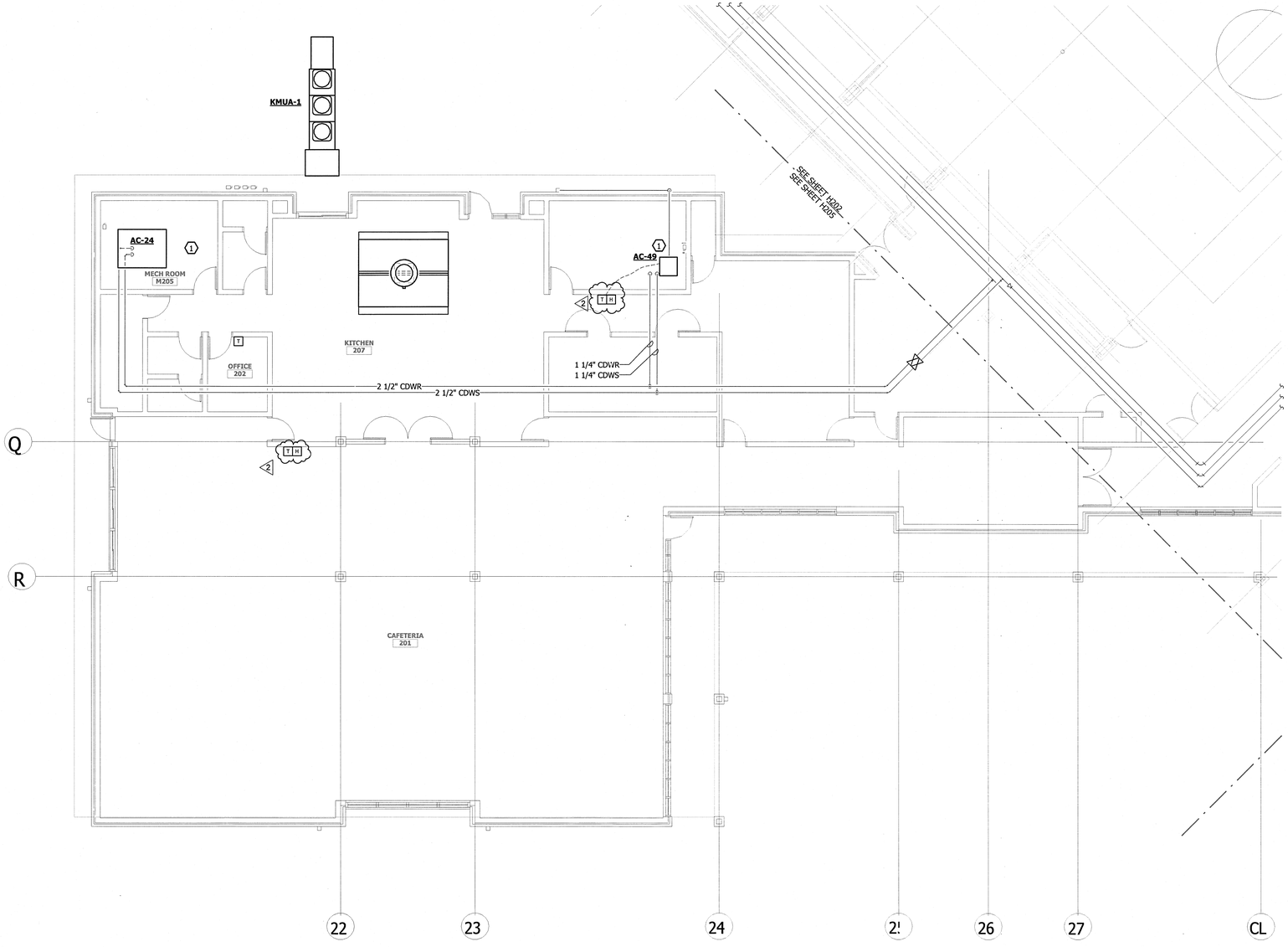


1 H115 **CAFETERIA - PIPING**
SCALE: 1/8" = 1'-0"

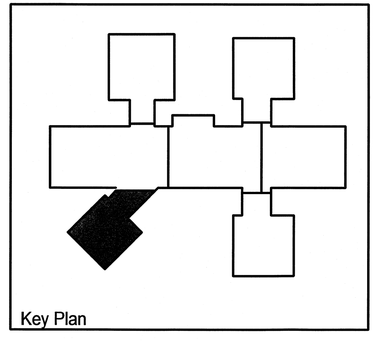
4' 0 4' 8' 12' 16' 20'

GENERAL NEW CONSTRUCTION NOTES

1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

KEY NOTES TO H115

1 CONNECT TO EXISTING CONDENSATE DRAIN PIPING.



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CAFETERIA PLAN - PIPING

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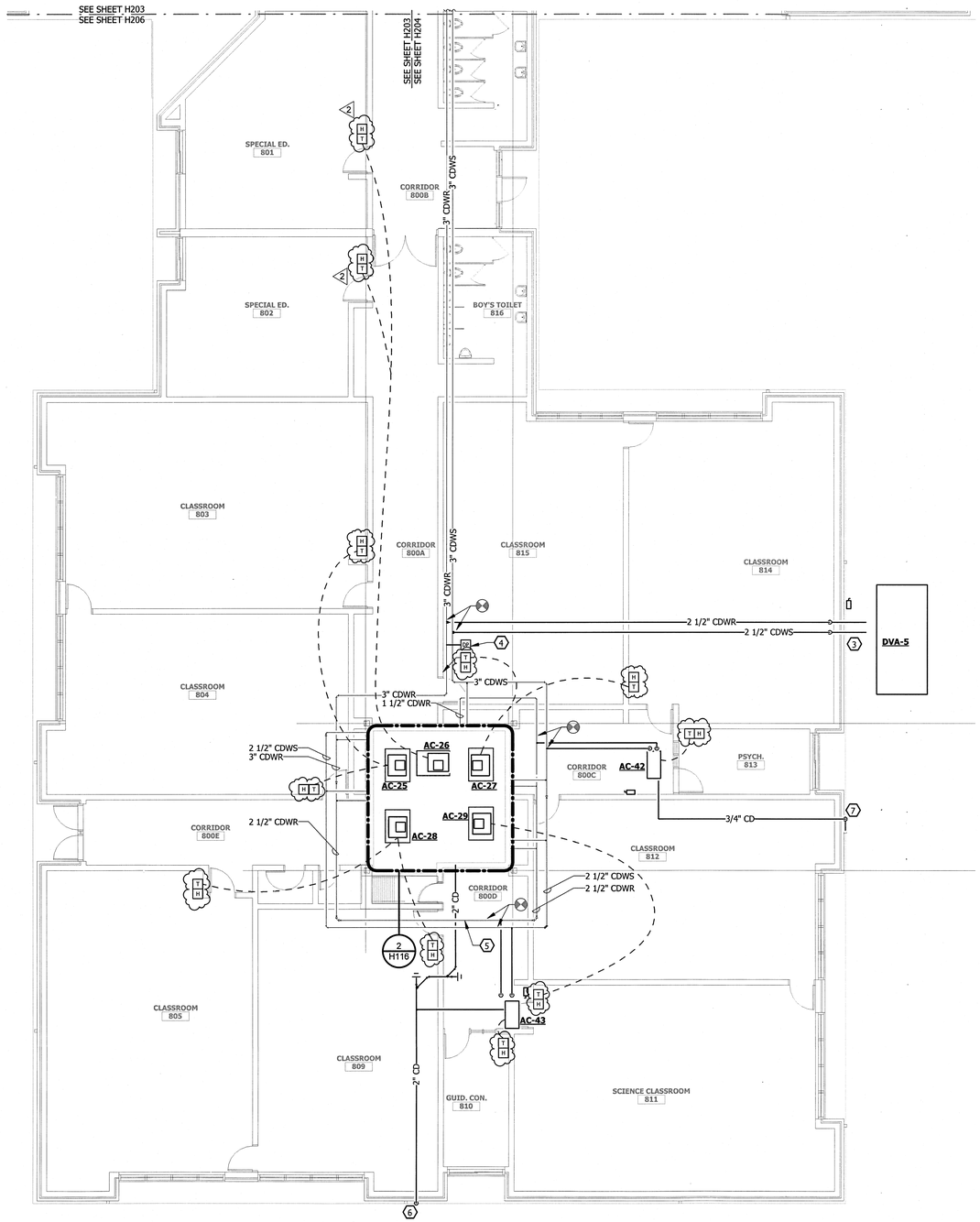
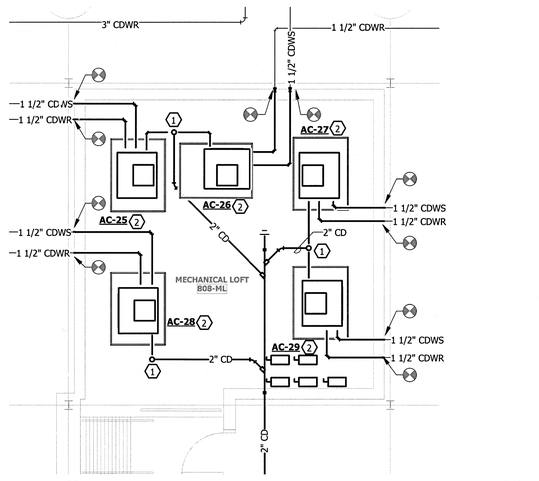


1 H116 **8TH GRADE WING - PIPING**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'



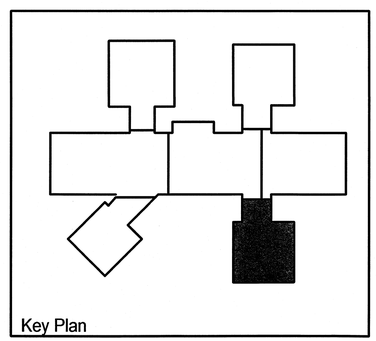
2 H116 **8TH GRADE WING MECHANICAL LOFT - PIPING**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'

GENERAL NEW CONSTRUCTION NOTES

1. FOR NEW HORIZONTAL WSHPs ABOVE CEILING, MOUNT UNIT HIGH ENOUGH TO TIE IN TO CONDENSATE DRAIN.

KEY NOTES TO H116

#	
1	DISCHARGE CONDENSATE FROM WSHPs IN LOFT TO NEW HUB DRAIN, SEE DETAIL 3/H302. SEE DETAIL 1/H300 FOR CONDENSATE DRAIN SIZE.
2	CONNECT TO EXISTING CONDENSER WATER PIPING. PROVIDE NEW HOSE CONNECTION KITS.
3	PROVIDE NEW CONDENSER WATER PIPING TO DEDICATED VENTILATION AIR UNIT. OUTSIDE PIPING SHALL HAVE HEAT TRACE.
4	PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER
5	PROVIDE AUTOMATIC AIR VENT. PIPE TO DRAIN IN MECHANICAL LOFT.
6	ROUTE NEW CONDENSATE PIPING FROM HUB DRAIN TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.
7	ROUTE NEW CONDENSATE PIPING FROM WSHP TO EXTERIOR DOWNSPOUT, SEE DETAIL 4/H302.



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8TH GRADE PLAN - PIPING

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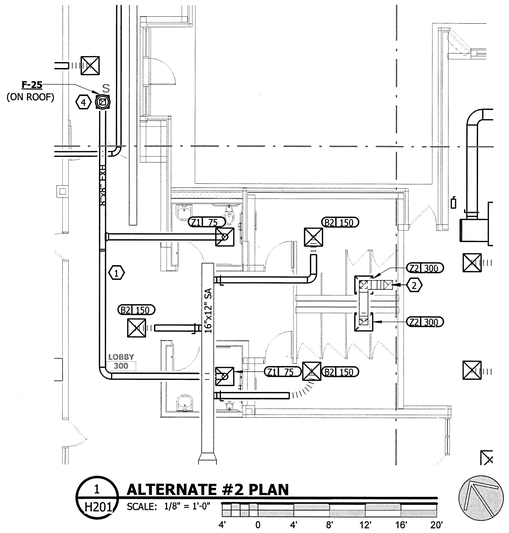
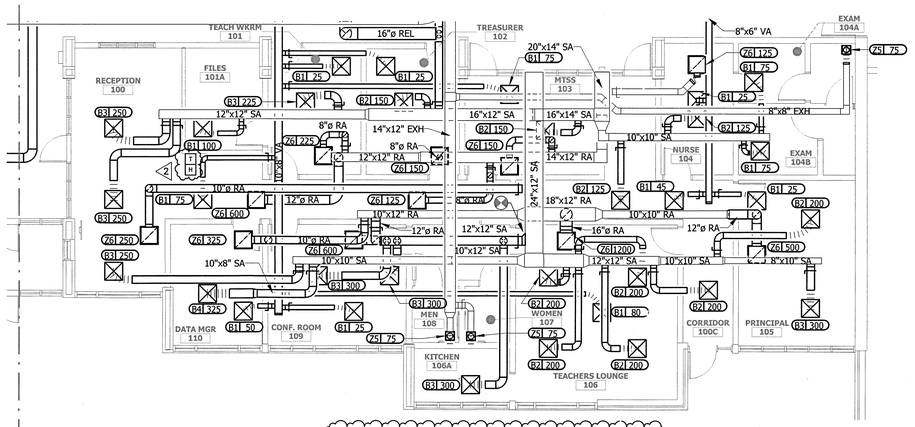


1 H201 **ALTERNATE #2 PLAN**

SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'



2

HVAC SCOPE OF WORK FOR ALTERNATE #3:
1. LOCATE THERMOSTAT/HUMIDISTAT OUTSIDE OF FILES 101A.
2. THERMOSTAT/HUMIDISTAT NOT NEEDED AT EXTERIOR WALL OF RECEPTION 100.
3. VENTILATION DUCT AND DIFFUSER NOT NEEDED AT EXTERIOR WALL OF RECEPTION 100.

2 H201 **ALTERNATE #3 - ADMIN & MEDIA CENTER**

SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'

KEY NOTES TO H201

#	
1	ALTERNATE #2: PROVIDE EXHAUST FAN, DUCTWORK AND GRILLES FOR NEW SINGLE TOILET ROOMS.
2	EXISTING 12"X12" UP TO EXISTING EXHAUST FAN F-11.
3	EXISTING 14"X14" UP TO EXISTING EXHAUST FAN F-12.
4	8"X8" EXH UP TO F-25 ON ROOF.

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ALTERNATES

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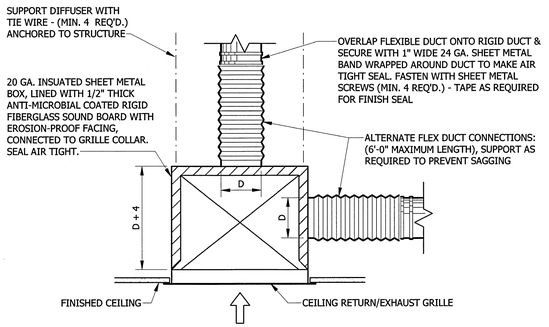


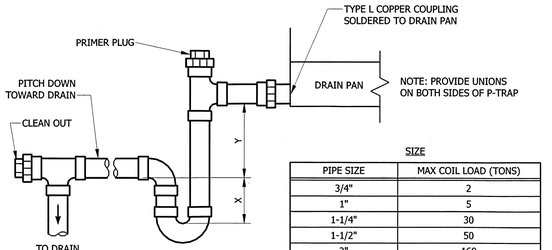
SW DETAIL: D08

7 H300 DUCTED RETURN/EXHAUST GRILLE INSTALLATION

SCALE: 12" = 1'-0"

2

DETAIL 4/H300 DELETED



DIMENSIONS

P = PRESSURE IN AHU PLENUM (IN. WG)
Y = P + 2"
X = 1/2 Y

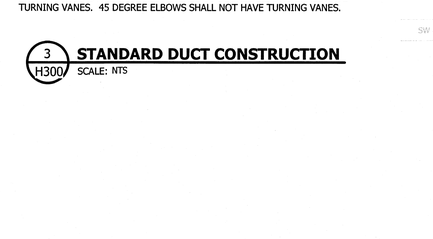
SIZE

PIPE SIZE	MAX COIL LOAD (TONS)
3/4"	2
1"	5
1-1/4"	30
1-1/2"	50
2"	160
3"	300
4"	430
6"	1000

SW DETAIL: C02

1 H300 COOLING COIL DRAIN PIPING

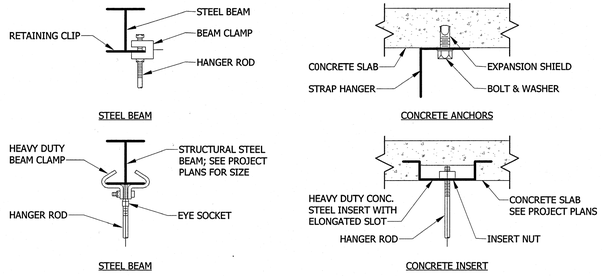
SCALE: NTS



SW DETAIL: CL11

2 H300 SPACE THERMOSTAT/SENSOR INSTALLATION

SCALE: NTS



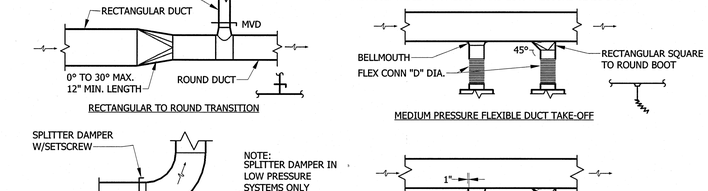
SW DETAIL: V006

8 H300 HANGER SUPPORT DETAILS

SCALE: NTS

2

DETAIL 5/H300 DELETED

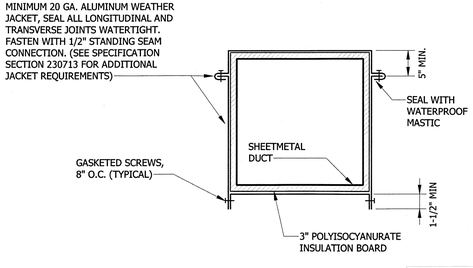


NOTE:
UNLESS NOTED OTHERWISE ALL MITERED 90 DEGREE ELBOWS SHALL HAVE TURNING VANES. 45 DEGREE ELBOWS SHALL NOT HAVE TURNING VANES.

SW DETAIL: D01

3 H300 STANDARD DUCT CONSTRUCTION

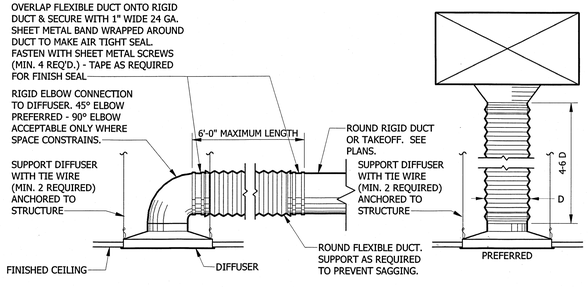
SCALE: NTS



SW DETAIL: D09

9 H300 EXPOSED EXTERIOR DUCTWORK INSULATION

SCALE: NTS



SW DETAIL: D06

6 H300 CEILING DIFFUSER INSTALLATION

SCALE: NTS

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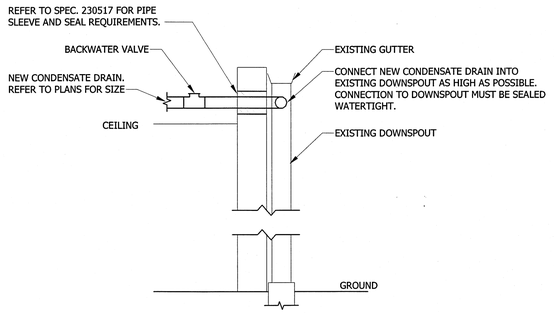

4 / H302 STORM LEADER CONDENSATE DRAIN DETAIL
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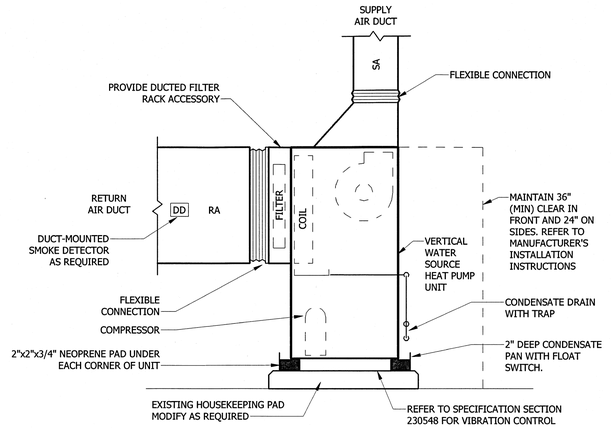
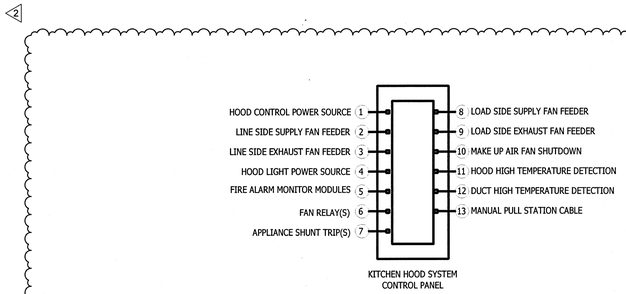


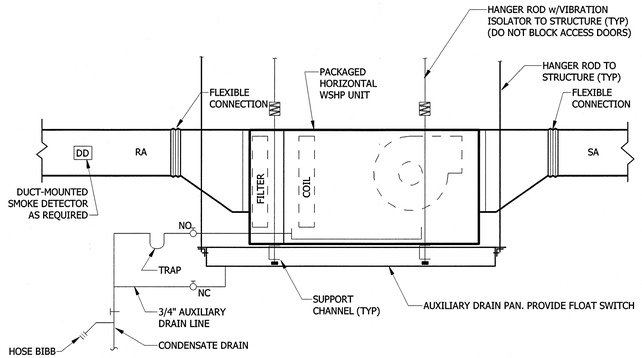
1 / H302 VERTICAL PACKAGED WSHP DETAIL
SCALE: NTS



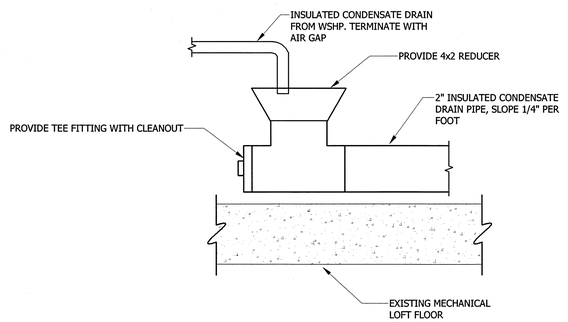
FOOD SERVICE HOOD CONNECTION SCHEDULE

MARK	DESCRIPTION	RESPONSIBILITY	REMARKS
1	HOOD CONTROL POWER SOURCE	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING POWER SOURCE AND TERMINATE IN HOOD CONTROL PANEL
2	LINE SIDE SUPPLY FAN FEEDER	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO PROVIDE SOURCE AND TERMINATE IN HOOD CONTROL PANEL
3	LINE SIDE EXHAUST FAN FEEDER	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO PROVIDE SOURCE AND TERMINATE IN HOOD CONTROL PANEL
4	HOOD LIGHT POWER SOURCE	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING CIRCUIT AND TERMINATE IN HOOD CONTROL PANEL
5	FIRE ALARM MONITOR MODULES	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING FIRE ALARM MODULES TO SUPERVISE 120 VAC FOR APPLIANCE SHUNT TRIP, TROUBLE AT HOOD CONTROL PANEL AND ACTIVATION OF HOOD SUPPRESSION SYSTEM. REFER TO FIRE ALARM MATRIX.
6	FAN RELAY(S)	MECHANICAL DIVISION	RELAYS IN CONTROL PANEL PROVIDED WITH HOOD PACKAGE
7	APPLIANCE SHUNT TRIP	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO CONNECT HOOD OUTPUT SIGNAL TO EXISTING APPLIANCE SHUNT TRIP BREAKERS. ALL APPLIANCES UNDER HOOD SHALL POWER DOWN FROM ACTIVATION OF HOOD SYSTEM.
8	LOAD SIDE SUPPLY FAN(S) FEEDER(S)	MECHANICAL DIVISION	MECHANICAL DIVISION PROVIDES LOAD SIDE FEEDER FROM HOOD CONTROL PANEL TO FAN AND PROVIDES UNIT DISCONNECT
9	LOAD SIDE EXHAUST FAN FEEDER	MECHANICAL DIVISION	MECHANICAL DIVISION PROVIDES LOAD SIDE FEEDER FROM HOOD CONTROL PANEL TO FAN AND PROVIDES UNIT DISCONNECT
10	MAKE UP AIR FAN SHUTDOWN	MECHANICAL DIVISION	MECHANICAL DIVISION TO PROVIDE CONTROL WIRING TO ENABLE MAKE UP AIR SHUTDOWN
11	HOOD HIGH TEMPERATURE DETECTION	MECHANICAL DIVISION	FUSIBLE LINK STYLE
12	DUCT HIGH TEMPERATURE DETECTION	MECHANICAL DIVISION	MECHANICAL DIVISION TO PROVIDE SENSOR AND CONTROL WIRING
13	MANUAL PULL STATION CABLE	MECHANICAL DIVISION	MECHANICAL DIVISION INSTALLS BOX, RACEWAY AND CABLE OPERATOR

5 / H302 KITCHEN HOOD CONNECTIONS
SCALE: NTS



2 / H302 HORIZONTAL PACKAGED WSHP DETAIL
SCALE: NTS



3 / H302 MECHANICAL PIPING THRU FLOOR
SCALE: NTS

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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORTH
5/20/18

Renovations and Additions to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

DETAILS

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DRAWN BY SW
CHECKED BY
DATE 01/24/18
REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER H302

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SW Project No: 0594-13-00-17

HOOD INFORMATION - Job#3190508

HOOD NO.	TAG	MODEL	LENGTH	MAX. COOKING TEMP.	EXHAUST PLENUM							TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIG.	
					TOTAL EXH. CFM	RISER(S) WIDTH	LENG.	HEIGHT	DIA.	CFM	VEL.	S.P.			
1		5424-ND-2-PSP-F	12'-0"	450 Deg.	2580	10"	24"	4"		2580	1548	-0.371"	2064	430 SS Where Exposed	ALONE FRONT
2		5424-ND-2-PSP-F	12'-0"	450 Deg.	2580	10"	24"	4"		2580	1548	-0.371"	2064	430 SS Where Exposed	ALONE BACK

PATENT NUMBERS
AC-PSP (United States) - US Patent 7963850 B2
AC-PSP Wall (Canada) - CA Patent 2620308
AC-PSP Island (Canada) - CA Patent 2620330

HOOD INFORMATION

HOOD NO.	TAG	TYPE	FILTER(S) QTY.	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	LIGHT(S) QTY.	TYPE	WIRE GUARD	LOCATION	SIZE	UTILITY CABINET(S) FIRE SYSTEM TYPE	FIRE SYSTEM SIZE	ELECTRICAL SWITCHES MODEL #	SWITCHES QUANTITY	FIRE SYSTEM PIPING	HOOD FUNCTION WIGHT
1		SS Baffle with Handles	9	20"	16"	30%	3	12" x 12" LED	NO	Left	12"x54"x24"					YES	769 LBS
2		SS Baffle with Handles	9	20"	16"	30%	3	12" x 12" LED	NO	Right	12"x54"x24"	Ansul R102	3.0	DCV-1111	1 Light 1 Fan	YES	782 LBS

HOOD OPTIONS

HOOD NO.	TAG	OPTION
1		FIELD WRAPPER 17.00" High Front, Left, Right
		BACK STANDOFF (FLAT) 9" Wide 106" Long
2		FIELD WRAPPER 17.00" High Front, Left, Right

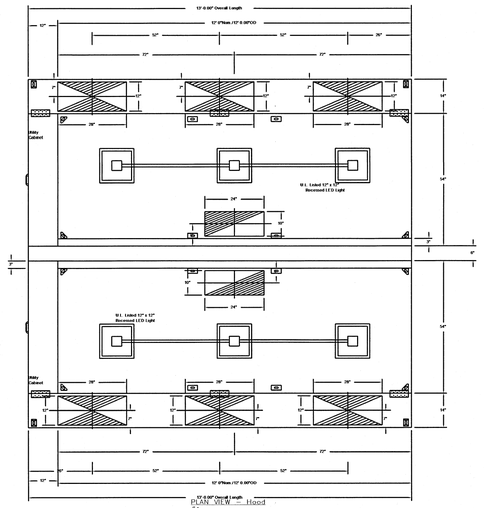
PERFORATED SUPPLY PLENUM(S)

HOOD NO.	TAG	POS.	LENGTH	WIDTH	HEIGHT	TYPE	RISER(S) WIDTH	LENG.	DIA.	CFM	S.P.
1		Front	156"	14"	6"	MUA	12"	28"		688	0.179"
						MUA	12"	28"		688	0.179"
						MUA	12"	28"		688	0.179"
2		Front	156"	14"	6"	MUA	12"	28"		688	0.179"
						MUA	12"	28"		688	0.179"

NOTE: Additional hanging angles provided for hoods 10' and longer.

PLAN VIEW – Hood #2

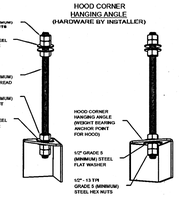
12' 0.00" LONG
5424ND-2-PSP-F



PLAN VIEW – Hood #1

12' 0.00" LONG
5424ND-2-PSP-F
NOTE: Additional hanging angles provided for hoods 10' and longer.

HOOD CORNER HANGING ANGLE (HARDWARE BY INSTALLER)



ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" - 13 TPI GRADE 5 (MINIMUM) ALL-THREAD. SANDWICH HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 (MINIMUM) STEEL FLAT WASHERS AND 1/2" - 13 TPI GRADE 5 (MINIMUM) HEX NUTS AS SHOWN. MUST USE DOUBLED HEX NUT CONFIGURATION BENEATH HOOD HANGING ANGLES AND ABOVE CEILING ANCHORS. MAINTAIN 1/4" OF EXPOSED THREADS BENEATH BOTTOM HEX NUT. TORQUE ALL HEX NUTS TO 57 FT-LBS.

EXHAUST FAN INFORMATION - Job#3190508

FAN UNIT NO.	TAG	FAN UNIT MODEL #	CFM	ESP.	RPM	H.P.	B.H.P.	#	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS.)	SONES
1	KEF-1	DUZ140HFA	5160	1.000	839	5.000	3.8250	3	460	7.2	1173 FPM	301	15.9

CONDENSER DETAILS

FAN UNIT NO.	TAG	FAN UNIT MODEL #	CONDENSER NO.	TONNAGE	VOLTAGE	PHASE	FREQUENCY	MCA	RLA	MAX. FUSE SIZE	MIN. WIRE SIZE	SEER
2	KMUA-1	A3-D.500-G18-MPU	1	5	460	3 PHASE	60 Hz	90.5 Amps	8.5 Amps	15 Amps	14 AWG	14
			2	5	460	3 PHASE	60 Hz	90.5 Amps	8.5 Amps	15 Amps	14 AWG	14
			3	5	460	3 PHASE	60 Hz	90.5 Amps	8.5 Amps	15 Amps	14 AWG	14

MUA FAN INFORMATION - Job#3190508

FAN UNIT NO.	TAG	FAN UNIT MODEL #	BLOWER	HOUSING	MIN CFM	DESIGN CFM	ESP.	RPM	H.P.	B.H.P.	#	VOLT	FLA	COOLING COIL ENTERING DB TEMP.	COOLING COIL ENTERING WB TEMP.	COOLING COIL LEAVING DB TEMP.	COOLING COIL LEAVING WB TEMP.	COOLING COIL TOTAL CAPACITY	COOLING COIL SENSIBLE CAPACITY	COOLING COIL LATENT CAPACITY	WEIGHT (LBS.)	SONES	BURNER EFFICIENCY(%)
2	KMUA-1	A3-D.500-G18-MPU	G18-PS	A3-D.500	3000	4128	0.500	897	5.000	2.6160	3	460	6.6	91.0°F	78.0°F	74.4°F	67.1°F	180.0 MBH	73.8 MBH	106.2 MBH	2473	16.8	92

GAS FIRED MAKE-UP AIR UNIT(S)

FAN UNIT NO.	TAG	INPUT BTUs	OUTPUT BTUs	TEMP. RISE	REQUIRED INPUT GAS PRESSURE	GAS TYPE
2	KMUA-1	227758	399637	47 deg F	7 in. w.c. - 14 in. w.c.	Natural

FAN OPTIONS

FAN UNIT NO.	TAG	OPTION (Qty. - Descr.)
1	KEF-1	1 - Grease Box
2	KMUA-1	1 - Motorized Backdraft Damper for A3-D Housing
		1 - Low Fire Start
		1 - Mod Pressure Gauge, 0-30"
		1 - Manifold Pressure Gauge, -5 to 15" wc
		1 - Cooling Thermostat and Relay (Not req for evap)
		1 - Separate 120V Wiring Package (Required and used only for DCV or Prewire with VFD) - Three Phase Only
		1 - Condenser Support for Size 3, 15 Ton Mod Package Unit
		1 - 15 Ton 3 Circuit (S/S/S) Modular Packaged AC Cooling Option for Size 3 MUA (2250 to 4000 cfm), 460V, 3 phase. Cooling Thermostat or Programmable Stat Required for Proper Operation.
		1 - Downturn Plenum for Size 3 DX Coil Module

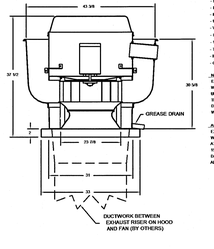
FAN ACCESSORIES

FAN UNIT NO.	TAG	EXHAUST GREASE CUP	EXHAUST GRAVITY DAMPER	EXHAUST WALL MOUNT	SUPPLY SIDE DISCHARGE	SUPPLY GRAVITY DAMPER	SUPPLY MOTORIZED DAMPER	SUPPLY WALL MOUNT
1	KEF-1	YES						
2	KMUA-1						YES	

CURB ASSEMBLIES

NO.	ON FAN	TAG	WEIGHT	ITEM	SIZE
1	# 1	KEF-1	48 LBS	Curb	31.500"W x 31.500"L x 22.000"H Vented Hinged
2	# 2	KMUA-1	61 LBS	Curb	35.000"W x 84.000"L x 15.000"H Insulated
	# 2			Rail	6.000"W x 35.000"L x 15.000"H
	# 2			Rail	6.000"W x 35.000"L x 15.000"H
	# 2			Rail	6.000"W x 35.000"L x 15.000"H

FAN #1 DIMENSIONAL DRAWING (KEF-1)



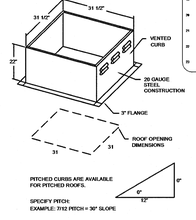
FEATURES:

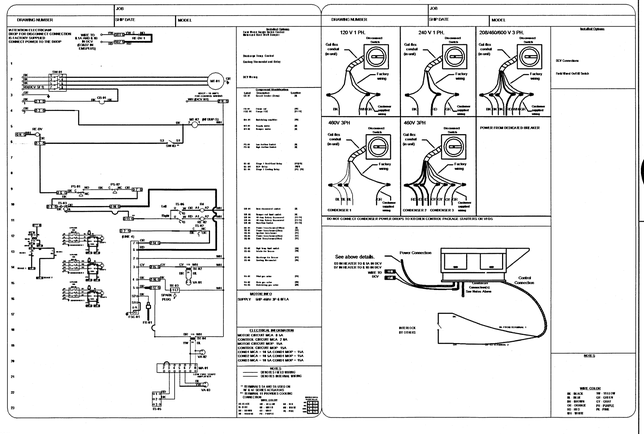
- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS)
- BACK MOUNTED FANS
- ELSTAR/MUST MODEL
- 115V/1PH WIRING
- VARIABLE SPEED CONTROL
- INTERNAL WIRING
- WEATHERPROOF DISCONNECT
- THERMAL OVER-LOAD PROTECTION (SINGLE PHASE)
- HIGH HEAT OPERATION 300°F (149°C)
- GREASE CLASSIFICATION TESTING

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) BTUS. ALL FAN PARTS MUST BE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLAME JET TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 10 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS
GREASE BOX





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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORRIS
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2	REVISION # 2	2/20/18

SHEET NUMBER
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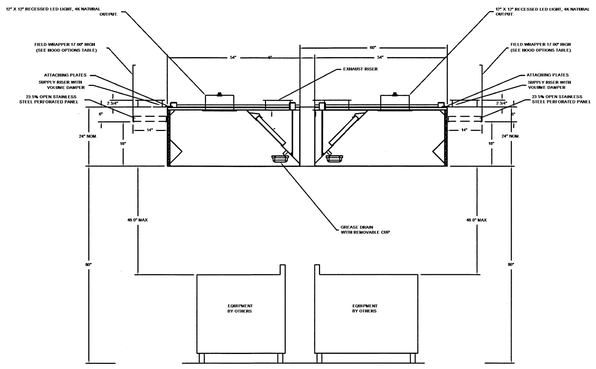


SECTION VIEW – MODEL 5424ND-2-PSP-F HOOD – #1

SECTION VIEW – MODEL 5424ND-2-PSP-F HOOD – #2

ELECTRICAL PACKAGES – Job#3190508

NO.	TAG	PACKAGE #	LOCATION	SWITCHES		FANS CONTROLLED				
				LOCATION	QUANTITY	FAN TAG	TYPE	#	H.P.	VOLT	FLA
1		DCV-1111	Utility Cabinet Right	Inf / Utility Cabinet Right	1 Light	KEF-1	Exhaust	3	5.000	460	7.2
				Hood # 2	1 Fan	KMUA-1	Supply	3	5.000	460	6.8

JOB NO 3190508 | MODEL NUMBER DCV-1111 | CUST. NAME MYRTLE GROVE MIDDLE SCHOOL NC

BREAKER PANEL TO PRIMARY CONTROL PANEL
Responsibility Electrician
BREAKER SIZE SHOWN IS SIZE BUILDING ALLOWS

BREAKER PANEL TO FANS
Responsibility Electrician

CONTROL PANEL TO FANS
Responsibility Electrician

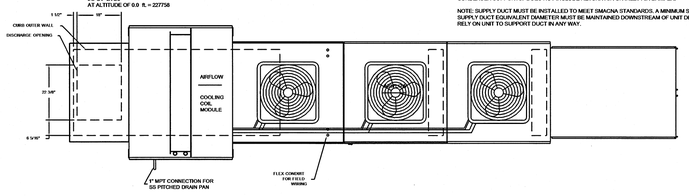
CONTROL PANEL TO ACCESSORY ITEMS
Responsibility Electrician

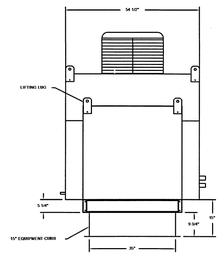
FAN #2 AS-D-500-G16-MPU - HEATER (KMUA-1)
1. DIRECT GAS FIRED HEATED MAKE UP AIR UNIT WITH 16" BLOWER AND 12" BURNER.
2. INTAKE HOOD WITH EZ FILTERS
3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT
4. MOTORIZED BACK DRAFT DAMPER 30" X 30" FOR SIZE 3 STANDARD & MODULAR HEATER UNITS W/EXTENDED SHAFT, STANDARD GALVANIZED CONSTRUCTION, 3/4" REAR FLANGE, NFB/UP-S ACTUATOR INCLUDED
5. LOW FIRE START. ALLOWS THE BURNER CIRCUIT TO ENERGIZE WHEN THE MODULATION CONTROL IS IN A LOW FIRE POSITION.
6. GAS PRESSURE GAUGE, 0-30", 2.5" DIAMETER, 1/4" THREAD SIZE
7. GAS PRESSURE GAUGE, -5 TO +15 INCHES WC, 2.5" DIAMETER, 1/4" THREAD SIZE
8. DX COOLING INTAKE AIR THERMOSTAT AND RELAYS MOUNTED IN UNIT - SET POINT FOR THERMOSTAT SHOULD BE 85°F.
9. 15 TON, 3 CIRCUIT (5/5/5) MODULAR PACKAGED AC COOLING OPTION FOR SIZE 3 MODULAR PACKAGED UNIT. INCLUDES CONDENSER, DX COIL, FILTER/DRYER KIT, HARD START KIT, THERMAL EXPANSION VALVE, R410A REFRIGERANT, AND REFRIGERANT PIPING. (2250 TO 4600 CFM). NOT BUILT WITH OPPOSITE SIDE CONTROLS OR OPPOSITE AIRFLOW DIRECTION. CONDENSERS REQUIRE SEPARATE 208V, 3 PHASE POWER SUPPLY. COIL = 3DTY4037
10. DOWNTURN PLENUM FOR SIZE 3 COOLING COIL MODULE - REQUIRED FOR DOWN DISCHARGE COOLING COIL APPLICATIONS
11. SET OF FACTORY INSTALLED WIRING PACKAGE FOR MAKE-UP AIR UNITS. OPTION MUST BE SELECTED WHEN MOUNTING VTO IN PREWIRE
12. 120V ON WHEN FAN ON SIGNAL. PROVIDES SEPARATE 120VAC INPUT TO SUPPLY FAN. THIS 120V SIGNAL MUST BE RUN BY ELECTRICIAN FROM DCV TO MUA SWITCH.
13. SUPPORT SHELL FOR SIZE 3 MODULAR PACKAGE UNIT FOR THIRD CONDENSER. INCLUDES CONTROL VESTIBULE. INCLUDES CONDENSER SUPPORTS. DOES NOT INCLUDE RETURN AIR OR INLET AIR DAMPER.

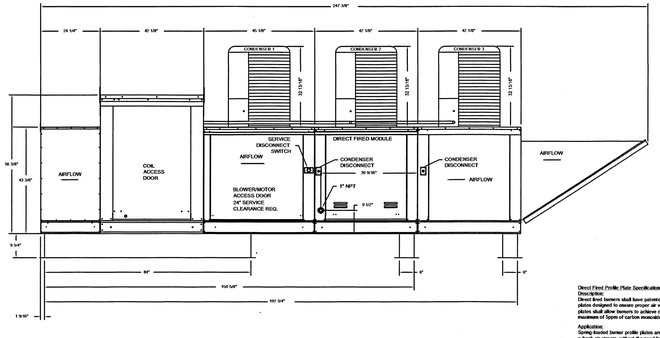
NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH EQUAL TO THREE TIMES THE SUPPLY DUCT EQUIVALENT DIAMETER MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE UNLESS OTHERWISE SPECIFIED. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY.

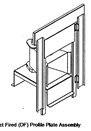
SUPPLY SIDE HEATER INFORMATION:

WINTER TEMPERATURE = 28°F.
TEMP. RISE = 47°F.
BTUs CALCULATED OFF STANDARD AIR
OUTPUT: BTUs
AT ALTITUDE OF 0.0 ft. = 227758
INPUT: BTUs
AT ALTITUDE OF 0.0 ft. = 227758









Direct Fired (DF) Profile Plate Assembly

Direct Fired Profile Plate Specifications:
Description:
Direct fired burners shall have patented (US Patent No.: US6629623B2), self-adjusting profile plates designed to ensure proper air velocity and pressure drop across the burner. Profile plates shall allow burners to achieve clean combustion by limiting by-product levels to a maximum of 50 ppm of carbon monoxide (CO), and 0.2ppm of nitrogen dioxide (NO2).

Application:
Spring loaded burner profile plates are engineered to automatically react to the inconsistencies of a fresh air stream, without the need for any motors or actuators to mechanically adjust them. With this feature, all DF units are designed for demand control ventilation (DCV) requirements.

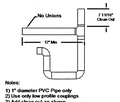
Certifications:
All profile plate assemblies shall be included in the DF unit's ETL listing and comply with combined safety standards ANSI Z83.4 and CSA 3.7 (non-recirculating DF heaters) and ANSI Z83.18 (recirculating DF heaters).

General Construction:
-Profile plates shall be formed from G90 galvanized steel.
-Profile plates shall be 16 gauge thickness.
-Profile plates shall be installed along the same plane as the discharge of the burner.
-Design shall incorporate properly torqued, permanently mounted spring hangers.
-Spring hangers shall be made from plated steel.

Typical Drain Trap Install



Recommended Cooling Coil Drain Trap Configuration



Notes:
1) 1" diameter PVC Pipe only
2) Use only low profile couplings
3) Add clean out as shown

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REVISIONS

2	REVISION # 2	2/20/18

SHEET NUMBER H304

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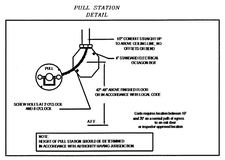
SW Project No: 0594-13-00-17

UL 300 HOOD FIRE SUPPRESSION SYSTEM

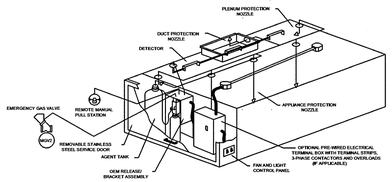


FIRE SYSTEM OPERATION

1. Kitchen hood shall be constructed and installed per NFPA 96.
2. Hood Electrical Control Panel and Fire Control System shall shut down kitchen hood make up air fan upon activation of fire extinguishing system. Kitchen hood exhaust fan shall continue to operate or power on upon activation. The hood electrical panel and fire system will provide interlock for automatic operation of fire suppression system with:
   a. Mechanical gas valve (installed by mechanical/plumbing contractor, if gas used)
   b. Hood supply and exhaust fan (wiring by elec)
   c. Remote manual pull station (by hood fire system distr)
   d. Fire alarm system notification (if Bldg Fire Alarm present, by Fire alarm Contractor)
2. See Hood details for drawings
3. All exposed piping with fire suppression system shall be covered with a a chrome sleeve.
4. Mechanical contractor shall install conduit in wall for manual pull station. Pull Station shall be located at or near a means of egress from the cooking area.
5. Fire suppression system shall be in accordance with UL 300.

All Fire System Piping will be 3/8" schedule 40 black iron.

NC FIRE CODE 904.11.2
System Interconnection:
The Actuation of the fire extinguishing system shall automatically shut down the fuel or electrical power supply to the cooking equipment. The Fuel and electrical supply reset shall be manual.



TYPICAL ANSUL R-102 SYSTEM LAYOUT

SPECIFICATIONS

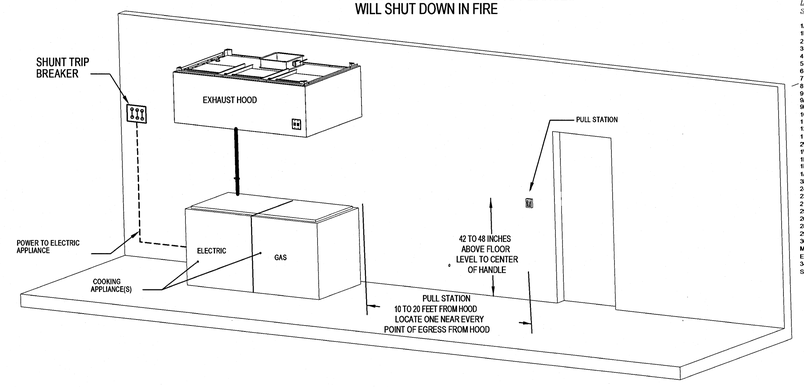
THE RESTAURANT FIRE SUPPRESSION SYSTEM SHALL BE THE PRE-ENGINEERED TYPE WITH A FIXED NOZZLE AGENT DISTRIBUTION NETWORK. IT SHALL BE LISTED WITH UNDERWRITERS LABORATORIES, INC. (UL)

THE SYSTEM SHALL BE CAPABLE OF AUTOMATIC DETECTION AND ACTUATION WITH LOCAL OR REMOTE MANUAL ACTUATION. ACCESSORIES SHALL BE AVAILABLE FOR MECHANICAL OR ELECTRICAL GAS LINE SHUT-OFF APPLICATIONS.

THE EXTINGUISHING AGENT SHALL BE A POTASSIUM CARBONATE, POTASSIUM ACETATE-BASED FORMULATION DESIGNED FOR FLAME KNOCKDOWN AND SECUREMENT OF GREASE RELATED FIRES. IT SHALL BE AVAILABLE IN PLASTIC CONTAINERS WITH INSTRUCTIONS FOR LIQUID AGENT HANDLING AND USAGE.

THE REGULATED RELEASE MECHANISM SHALL BE COMPATIBLE WITH A FUSIBLE LINK DETECTION SYSTEM. THE FUSIBLE LINK SHALL BE SELECTED AND INSTALLED ACCORDING TO THE OPERATING TEMPERATURE IN THE VENTILATING SYSTEM. THE FUSIBLE LINK SHALL BE SUPPORTED BY A DETECTOR BRACKET/ LINKAGE ASSEMBLY.

FUEL SHUTOFF IN FIRE CONDITION
ELECTRICAL TO COOKING APPLIANCES
WILL SHUT DOWN IN FIRE



LEGEND — FIRE CABINET ANSUL SYSTEM

1A	1.5 GALLON TANK
1D	3 GALLON TANK
2	OEM AUTOMAN RELEASE
3	OEM REGULATED RELEASE
4	OEM REGULATED ACTUATOR
5	ANSULEX LIQUID AGENT (3 GAL.)
6	ANSULEX LIQUID AGENT (1.5 GAL.)
7	CARTRIDGE (101-20)
8	CARTRIDGE (101-10)
9	CARTRIDGE (101-30)
9A	CARTRIDGE (LT-A-101-30)
9B	DOUBLE TANK CARTRIDGE
10	TEST LINK
11	DOUBLE MICROSWITCH
12	HOSE ASSEMBLY
1100	DUCT NOZZLE (430913)
2W	DUCT NOZZLE (419337)
1W	NOZZLE ASSEMBLY (419336)
1F	NOZZLE ASSEMBLY (419333)
1N	NOZZLE ASSEMBLY (419335)
1CN	NOZZLE ASSEMBLY (419334)
3N	NOZZLE ASSEMBLY (419338)
245	NOZZLE ASSEMBLY (419340)
230	NOZZLE ASSEMBLY (419339)
2120	NOZZLE ASSEMBLY (419343)
290	NOZZLE ASSEMBLY (419342)
260	NOZZLE ASSEMBLY (419341)
28	DETECTOR BRACKET
29	LOW TEMP FUSIBLE LINK
30	HIGH TEMP FUSIBLE LINK
MGV	MECHANICAL GAS VALVE
EGV	ELECTRICAL GAS VALVE
34	REMOTE MANUAL PULL STATION
S	SWIVEL ADAPTOR

MGV1-1/2

CAPTIVE-AIRE HOODS ARE BUILT IN COMPLIANCE WITH:

CAPTIVE-AIRE HOODS ARE BUILT IN COMPLIANCE WITH

NFPA #96
NSF
UL 710 & ULC710 STANDARDS
E.T.L. LISTED 3054804-001

NFPA®
NSF®

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3190508

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MASTER DRAWING

3

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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORTHERN 2/20/18

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901 Piner Road, Wilmington, North Carolina 28409

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STANDARD CONTROL SYMBOLS

CONTROLLERS / SENSORS

- T — SPACE THERMOSTAT OR TEMPERATURE SENSOR
- T — THERMOSTAT OR TEMPERATURE SENSOR WITH AIRFLOW AVERAGING ELEMENT
- T — THERMOSTAT OR TEMPERATURE SENSOR WITH SENSING BULB IN HYDRONIC PIPE WELL
- T — THERMOSTAT OR TEMPERATURE SENSOR WITH SENSING BULB AND PROTECTIVE SHIELD
- H — SPACE HUMIDISTAT OR HUMIDITY SENSOR
- H — DUCT-MOUNTED HUMIDISTAT OR HUMIDITY SENSOR
- P — PRESSURE SENSOR
- DP — DIFFERENTIAL PRESSURE SENSOR
- SP — AIR STATIC PRESSURE SENSOR
- VP — AIR VELOCITY PRESSURE SENSOR
- O — SPACE OCCUPANCY/VACANCY SENSOR
- CO_2 — CARBON DIOXIDE CONCENTRATION SENSOR
- CL — DRAIN PAN CONDENSATE LEVEL SENSOR
- DD — DUCT SMOKE DETECTOR
- R — REFRIGERANT CONCENTRATION SENSOR
- FM — FLOW METER

DDC I/O SYMBOLS

- DI — DIGITAL (BINARY) INPUT POINT
- AI — ANALOG INPUT POINT
- DO — DIGITAL (BINARY) OUTPUT POINT
- AO — ANALOG OUTPUT POINT

FINAL CONTROL ELEMENTS

- V — TWO-WAY CONTROL VALVE, HYDRONIC OR STEAM
- V — THREE-WAY CONTROL VALVE, HYDRONIC
- M — ELECTRIC MOTOR
- M — FAN AND MOTOR
- M — PUMP AND MOTOR
- D — ELECTRIC / ELECTRONIC DAMPER ACTUATOR
- V — ELECTRIC / ELECTRONIC VALVE ACTUATOR
- VFD — VARIABLE FREQUENCY DRIVE
- AFMS — AIR FLOW MONITORING STATION

SWITCHES

- DS — DAMPER END SWITCH
- ES — EMERGENCY START OR STOP SWITCH
- M — MOTOR STARTER HOLDING COIL
- C — CONTACTOR HOLDING COIL
- R — CONTROL RELAY HOLDING COIL

PNEUMATIC COMPONENTS

- AS 20 — MAIN AIR SUPPLY, 20 PSIG
- AS 80 — MAIN AIR SUPPLY, 80 PSIG
- P D — DAMPER VALVE ACTUATOR WITH PILOT POSITIONER
- P V — CONTROL VALVE OPERATOR WITH PILOT POSITIONER
- E/P — ELECTRONIC-TO-PNEUMATIC TRANSDUCER

STANDARD ELECTRICAL SWITCH SYMBOLS

PRESSURE AND VACUUM SWITCHES		LIQUID LEVEL SWITCH		TEMPERATURE ACTUATED SWITCH		FLOW SWITCH (AIR, WATER, ETC.)	
N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
							

CONTACTS						OVERLOAD RELAY	
INSTANT OPERATING		TIMED CONTACTS; CONTACT ACTION RETARDED AFTER COIL IS:					
N.O.	N.C.	ENERGIZED		DE-ENERGIZED			
		N.O.T.C.	N.C.T.O.	N.O.T.C.	N.C.T.O.		



ALTERNATE #8:

1. PREFERRED BRAND ALTERNATE:

   EXISTING CONTROLS IN BUILDING ARE JOHNSON CONTROLS.

GENERAL CONTROLS REQUIREMENT

1. EXISTING CONTROLS IN BUILDING ARE JCI. EXISTING WSHP CONTROLLERS ARE TO BE RECOMMISSIONED FOR NEW WSHPs INSTALLED IN SAME LOCATION. PROVIDE NEW WSHP CONTROLLERS FOR ALL ADDITIONAL NEW WSHPs.
2. ALL CONTROL SEQUENCES ARE BASED ON ONE OR MORE SENSED VARIABLES WITH AN ASSOCIATED CONTROLLED VARIABLE CHANGING IN ONE DIRECTION. EACH SEQUENCE SHALL OPERATE IN REVERSE WHEN THE SENSED VARIABLE(S) CHANGES IN THE OPPOSITE DIRECTION.
3. HVAC CONTROL SETPOINTS ARE DEFINED WITHIN CONTROL SEQUENCES AND/OR ELSEWHERE ON THE DRAWINGS. WHERE A SETPOINT IS NOT EXPLICITLY DEFINED, DETERMINE THE APPROPRIATE SETPOINT BASE ON SCHEDULED PERFORMANCE DATA FOR HVAC EQUIPMENT. ***DEFINED OR IMPLIED SETPOINTS AND SETPOINT RESET REQUIREMENTS SHALL, AS NECESSARY, BE ADJUSTED BASED ON TEST DATA PROVIDED BY THE TAB SUBCONTRACTOR AND CONTROL SYSTEM VERIFICATION TESTING TO PROVIDE STABLE, SATISFACTORY HVAC SYSTEMS OPERATION.*** ALL AO OR DO SETPOINTS SHALL BE USER-ADJUSTABLE.
4. WHERE START/STOP OR OTHER TWO-POSITION CONTROL SEQUENCE IS BASED ON AN INPUT STATUS CONDITION (DI) OR INPUT SENSED VARIABLE(S) VALUE (AI), FIELD ADJUST DIFFERENTIAL SETPOINTS TO PREVENT ANY EQUIPMENT ITEM OR FINAL CONTROL ELEMENT FROM "SHORT-CYCLING" IN RESPONSE TO SMALL CHANGES OF THE SENSED VARIABLE(S).
5. FIELD ADJUST EACH OUTPUT POINT'S USER-ADJUSTABLE TIME DELAY TO PREVENT NUISANCE "TRIPPING" UNDER NORMAL OPERATION AND DURING EQUIPMENT START-UP AND SHUT-DOWN.
6. ***ENSURE THAT STATUS ALARM CONDITIONS ARE IMPLEMENTED FOR EACH DI POINT AND HIGH AND/OR LOW ALARM SETPOINTS ARE DEFINED FOR ALL AI POINTS.*** SEE SECTION 230923 FOR DEFAULT VALUES IF NOT INDICATED ON THE DRAWINGS.
7. THE MINIMUM SPEED SETTING FOR EACH FAN UNDER VFD CONTROL SHALL BE OPTIMIZED DURING SYSTEM TAB TO BE AS LOW AS POSSIBLE WHILE AVOIDING INERTIAL STALLING OF FAN, TYPICALLY ABOUT 5% ABOVE THE MEASURED STALL SPEED OF THE FAN.
8. AS APPLICABLE, FIELD ADJUST EACH VFD MINIMUM SPEED AND RAMP-UP AND -DOWN TIMES ***BASED ON TEST DATA PROVIDED BY THE TAB SUBCONTRACTOR***. DEFAULT TIMES FOR ACCELERATION/DECELERATION SHALL BE 30 SECONDS FOR MOTORS LESS THAN 40 HP AND 60 SECONDS FOR MOTORS 40 HP AND LARGER.
9. PROVIDE DEADBANDS FOR ALL AO CONTROL LOOPS TO PREVENT "HUNTING". DEADBANDS SHALL BE SET TO PROVIDE ADEQUATE CONTROL AROUND SETPOINTS AND SHALL BE DETERMINED ON AN INDIVIDUAL AO POINT BASIS ***BASED ON TEST DATA PROVIDED BY THE TAB SUBCONTRACTOR***. DEFAULT DEADBANDS SHALL BE AS FOLLOWS:

SENSED VARIABLE	DEFAULT DEADBAND
TEMPERATURE	+/- 0.5° F
HUMIDITY	+/- 1.0 RH
AIRFLOW	+/- 2% OF SPAN
STATIC PRESSURE	+/- 0.01 IN. W.G.

10. CONTROL SEQUENCES ARE BASED ON THE FOLLOWING DEFINITIONS FOR FINAL CONTROL ELEMENT OPERATION:

    NORMALLY OPEN/NORMALLY CLOSED: TWO-WAY FINAL CONTROL ELEMENT POSITION IN RESPONSE TO 0% CONTROL LOOP OUTPUT SIGNAL.

    DIRECT RESPONSE: 0% TO 100% CHANGE OF FINAL CONTROL ELEMENT STATE OR POSITION IN RESPONSE TO 0% TO 100% CONTROL LOOP OUTPUT SIGNAL.

    REVERSE RESPONSE: 100% TO 0% CHANGE OF FINAL CONTROL ELEMENT STATE OR POSITION IN RESPONSE TO 0% TO 100% CONTROL LOOP OUTPUT SIGNAL.

11. WHERE SEQUENCES CALL FOR "LEAD/LAG" OR "ROTATING START/STOP" FOR EQUIPMENT, PROVIDE CONTROL ALGORITHM SO THAT EACH EQUIPMENT MODULE IS COMMANDED "ON" IN SEQUENCE IN REVERSE RELATIONSHIP TO THE MODULES' RUNTIMES (I.E., THE MODULE WITH THE LEAST NUMBER OF RUN HOURS IS THE FIRST ONE STARTED, ETC.) EACH EQUIPMENT MODULE SHALL BE COMMANDED "OFF" OR "STOP" IN SEQUENCE IN DIRECT RELATIONSHIP TO THE MODULES' RUNTIMES (I.E., THE MODULE WITH THE GREATEST NUMBER OF RUN HOURS IS THE FIRST ONE STOPPED, ETC.)
12. TWO, INDEPENDENT SCHEDULES FOR HVAC SYSTEM OPERATION AND CONTROL ARE DEFINED AS FOLLOWS:

    "ON/OFF" SCHEDULES SHALL DETERMINE HVAC SYSTEMS AND/OR EQUIPMENT START/STOP TIMES, DEFINE APPLICABLE OPERATING

    SETPOINTS, AND DEFINE WHEN SPECIFIC SEQUENCES OF OPERATION ARE TO BE UTILIZED.

    "OCCUPIED/UNOCCUPIED" SCHEDULES SHALL DETERMINE VENTILATION MODES.

    SEE "SCHEDULES OF OPERATION" FOR DAILY "ON/OFF" HOURS AND "OCCUPIED" HOURS FOR EACH SYSTEM, ALONG WITH THE MONTHS OF THE YEAR FOR WHICH EACH SCHEDULE APPLIES.

13. CONTROL SEQUENCES SHALL INCORPORATE MOTOR EMERGENCY STOP ELEMENTS AS FOLLOWS, WHETHER SPECIFICALLY DEFINED IN INDIVIDUAL CONTROL SEQUENCES OR NOT, AND SHALL INITIATE AN ALARM UPON OCCURRENCE OF ANY EMERGENCY STOP:

DESCRIPTION

FAN, PUMP, OR OTHER DIVISION 23 SINGLE- OR VARIABLE-SPEED MOTOR REQUIRED TO BE STARTED/STOPPED BY DDC SYSTEM.

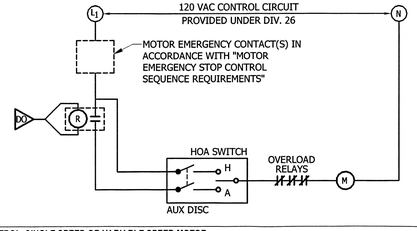
SEQUENCE OF OPERATION

MOTOR SHALL START/STOP BASED ON BINARY CONTROL OUTPUT SIGNAL.

EMERGENCY STOP:

EMERGENCY CONTACT(S) IN ACCORDANCE WITH "GENERAL CONTROL REQUIREMENTS" SHALL STOP THE MOTOR.

INITIATE ALARM.



5/H100 | START/STOP CONTROL, SINGLE SPEED OR VARIABLE SPEED MOTOR

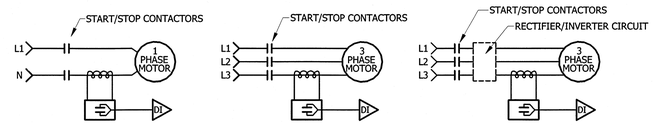
DESCRIPTION

OPERATING STATUS OF DIVISION 23 MOTOR REQUIRED TO BE STARTED/STOPPED BY DDC SYSTEM.

SEQUENCE OF OPERATION

MOTOR "ON" OR "OFF" STATUS SHALL BE DETERMINED ON THE BASIS OF BINARY CONTACT CLOSURE IF AMPERAGE DRAWN BY MOTOR IS EQUAL TO OR GREATER THAN SETPOINT VALUE.

MOTOR STATUS MAY BE UTILIZED AS AN INPUT POINT FOR OTHER CONTROL SEQUENCES DEFINED FOR THIS PROJECT.



1/H400 | MOTOR STATUS

DESCRIPTION

EXHAUST FAN, AS SCHEDULED OR OTHERWISE INDICATED ON THE DRAWINGS.

SEQUENCE OF OPERATION

EXHAUST FAN START/STOP CONTROL SHALL BE AS INDICATED ON THE DRAWINGS, IN ACCORDANCE WITH THE FOLLOWING:

WHERE EXHAUST FAN CONTROL IS INDICATED TO "LOCAL," PROVIDE MANUAL START/STOP CONTROL ONLY (WALL SWITCH, INTERLOCK WITH LIGHTING, ETC.) NO DDC CONNECTION REQUIRED.

WHERE EXHAUST FAN CONTROL IS INDICATED TO "DDC," START/STOP EXHAUST FAN(S) AS REQUIRED BY (1) ASSOCIATED FCU/BCU/AHU OR DVA OPERATION OR (2) OPERATOR COMMAND AND MONITOR FAN STATUS.

WHERE EXHAUST FAN CONTROL IS INDICATED TO "INDEPENDENT THERMOSTAT," START/STOP EXHAUST FAN BASED ON STAND-ALONE LINE-VOLTAGE THERMOSTAT. NO DDC CONNECTION REQUIRED.

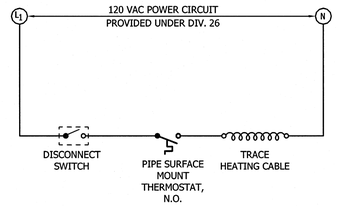
2/H400 | EXHAUST FANS START/STOP CONTROL

DESCRIPTION

ELECTRIC TRACE HEATING CABLE, AS SCHEDULED OR OTHERWISE INDICATED ON THE DRAWINGS.

SEQUENCE OF OPERATION

ON A FALL IN LIQUID TEMPERATURE TO SETPOINT, TRACE HEATING CABLE SHALL BE ENERGIZED BY PIPE SURFACE-MOUNT THERMOSTAT ("AQUASTAT") TO MAINTAIN LIQUID TEMPERATURE AT SETPOINT.



3/H400 | TRACE HEATING CABLE FOR PIPING

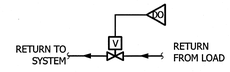
DESCRIPTION

ELECTRONICALLY OPERATED HYDRONIC CONTROL VALVE, TWO-WAY CONFIGURATION.

SEQUENCE OF OPERATION

TWO-WAY TWO-POSITION CONTROL VALVE SHALL OPEN OR CLOSE, AS INDICATED ON THE DRAWINGS, IN DIRECT RESPONSE TO BINARY CONTROL OUTPUT SIGNAL.

TWO-WAY MODULATING CONTROL VALVE SHALL MODULATE 0% TO 100% FROM ITS NORMALLY CLOSED OR NORMALLY OPEN POSITION, AS INDICATED ON THE DRAWINGS, IN DIRECT RESPONSE TO CONTROL LOOP OUTPUT SIGNAL.



ELECTRONIC VALVE OPERATOR

2

4/H400 | HYDRONIC CONTROL VALVE

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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORRIS 2/20/18

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

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SHEET NUMBER H400

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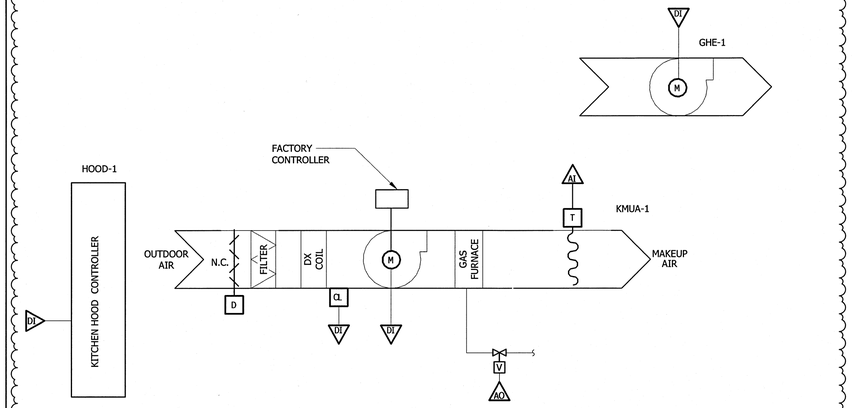
DESCRIPTION

PACKAGED MAKE UP AIR UNIT WITH DX COOLING AND DIRECT FIRED GAS FURNACE AND GREASE HOOD EXHAUST FAN.

SEQUENCE OF OPERATIONS

REFER TO SPECIFICATIONS 230993.



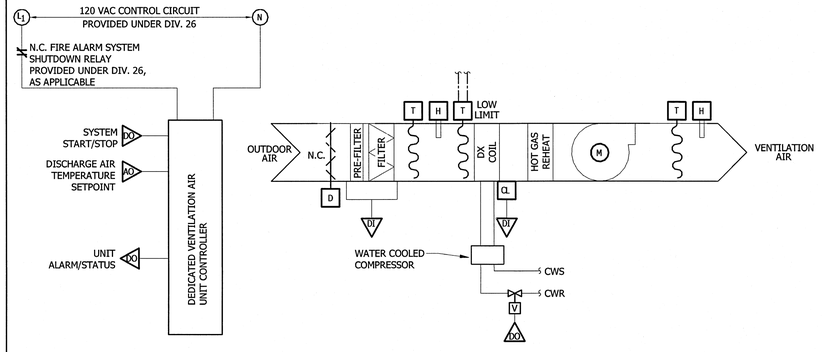
2/H402 | KITCHEN HOOD EXHAUST/MAKE UP AIR SYSTEM (HOOD-1, GHE-1, KMUA-1)

DESCRIPTION

PACKAGED WATER COOLED DX 100% OUTSIDE AIR VENTILATION HEAT PUMP UNIT WITH MODULATING HOT GAS REHEAT. FACTORY CONTROLLER SHALL CONTROL INTERNAL OPERATION OF UNIT. BAS SHALL BE CAPABLE OF START/STOP, DISCHARGE AIR TEMPERATURE SETPOINT AND UNIT ALARMS/STATUS.

SEQUENCE OF OPERATIONS:

REFER TO SPECIFICATIONS 230993.



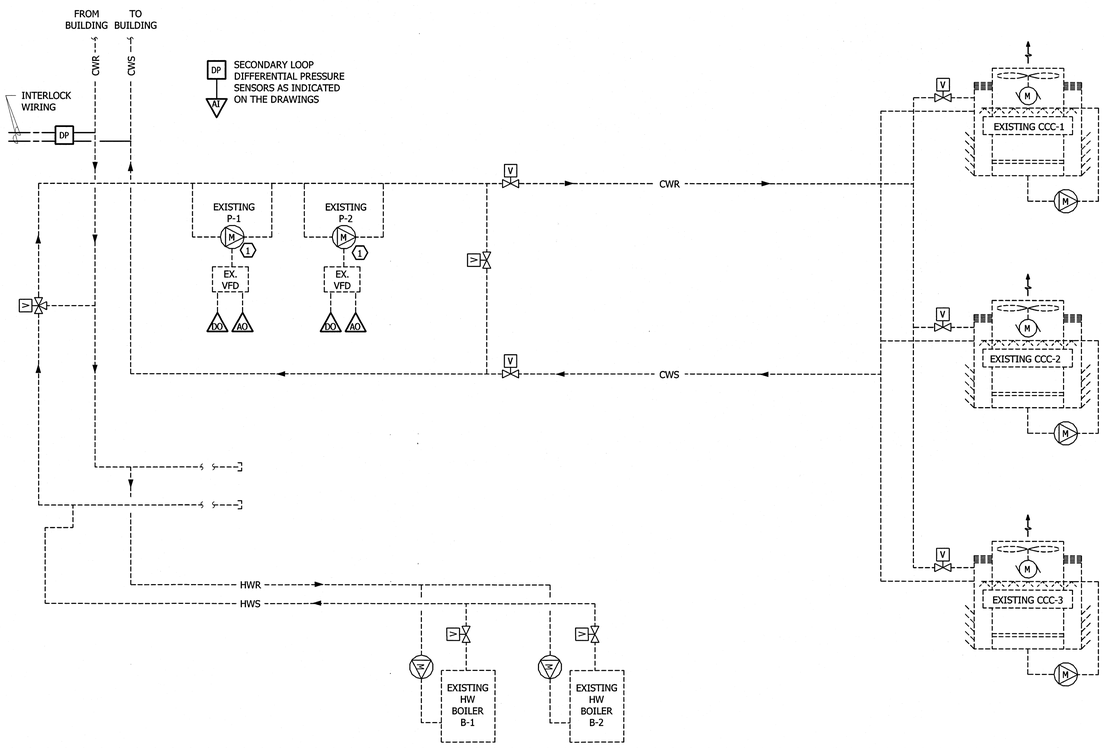
3/H402 | DEDICATED VENTILATION AIR (DVA) UNIT WITHOUT EXHAUST AIR HEAT RECOVERY (DVA-1 THRU DVA-5)

DESCRIPTION

VARIABLE FLOW CLOSED LOOP WATER SYSTEM THAT SERVES AS HEAT SOURCE/SINK FOR WATER SOURCE HEAT PUMPS. LOOP ELEMENTS CONSIST OF EXISTING CIRCULATING PUMPS, EXISTING BOILERS (SUPPLEMENT HEAT SOURCE), AND EXISTING EVAPORATIVE COOLER (HEAT SINK). BOILER AND EVAPORATIVE COOLER ARE PIPED WITH INDIVIDUAL PRIMARY/SECONDARY LOOP CONFIGURATIONS, EACH WITH ITS OWN PRIMARY PUMP. COOLER FAN IS TWO-SPEED. ***PRIMARY BOILER CONTROL IS PROVIDED BY FACTORY CONTROLLER INTERFACED WITH DDC SYSTEM.***

SEQUENCE OF OPERATIONS:

REFER TO SPECIFICATIONS 230993.



1/H402 | WATER SOURCE HEAT PUMP SYSTEM, WATER LOOP

KEY NOTES TO H402

1 EXISTING SECONDARY PUMPS ARE EQUIPPED WITH VFDs, BUT RUN AT CONSTANT SPEED. NEW CONTROL SEQUENCE SHALL INCORPORATE VARIABLE SPEED CONTROL, REFER TO SPECIFICATIONS 230993.

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UNIT HEATER SCHEDULE

DESIGNATION	SERVICE	TYPE	ELEC COIL CAPACITY (kW)	ELEC COIL VOLTAGE/PHASE
H-1	RISER ROOM	SURFACE MOUNT	2	208/3

NOTES:

1. PROVIDE INTEGRAL DISCONNECT. BASIS OF DESIGN: MARKEL 3422
2. PROVIDE UNIT-MOUNTED THERMOSTAT.

DEDICATED VENTILATION UNIT SCHEDULE

DESIGNATION	SERVICE	TYPE	SUPPLY FAN: TOTAL SA AIRFLOW (CFM)	SUPPLY FAN: OA AIRFLOW (CFM)	SUPPLY FAN: ESP (IN)	SUPPLY FAN: MOTOR SIZE (HP)	COOLING: TOTAL CAPACITY (MBH)	COOLING: SENSIBLE CAPACITY (MBH)	COOLING: EAT (FDB/FWB)	COOLING: LAT (FDB/FWB)	COOLING: EFFICIENCY (EER/SEER)	COOLING: AMBIENT TEMP (F)	COOLING: No. OF COMPRESSORS	COOLING: No. OF CIRCUITS	COOLING: REFRIGERANT	HEATING: EAT (F)	HEATING: LAT (F)	HEATING: HEAT PUMP CAPACITY (MBH)	HEATING: HEAT PUMP EFFICIENCY (COP)	HEATING: HEAT PUMP AMBIENT TEMP (F)	CDW FLOW (GPM)	CDW MAX WPD (F)	CDW BRANCH PIPING SIZE (IN)	CDW CONTROL VALVE TYPE	ELECTRIC: MCA	ELECTRIC: MOCP	ELECTRIC: VOLTAGE/ PHASE
DVA-1	ELECTIVE WING	100 % OA DX WATER COOLED	3100	3100	0.75	2	250	117	93/79	54/53	14 / -	95	2	2	R-410A	23	80	280	4.9	45	53	10	2 1/2"	2A	71	80	480/3
DVA-2	6TH GRADE WING	100 % OA DX WATER COOLED	2900	2900	0.75	2	244	113	93/79	54/53	14 / -	95	2	2	R-410A	23	80	280	4.9	45	53	10	2 1/2"	2A	71	80	480/3
DVA-3	7TH GRADE WING	100 % OA DX WATER COOLED	4500	4500	0.75	2	430	197	93/79	54/53	14 / -	95	4	2	R-410A	23	80	480	4.9	45	70	10	3"	2A	86	100	480/3
DVA-4	ADMIN/MEDIA WING	100 % OA DX WATER COOLED	2900	2900	0.75	2	244	113	93/79	54/53	14 / -	95	2	2	R-410A	23	80	280	4.9	45	53	10	2 1/2"	2A	71	80	480/3
DVA-5	8TH GRADE WING	100 % OA DX WATER COOLED	3100	3100	0.75	2	250	117	93/79	54/53	14 / -	95	2	2	R-410A	23	80	280	4.9	45	53	10	2 1/2"	2A	71	80	480/3

NOTES:

1. PROVIDE EXTERNAL DISCONNECT FOR SINGLE POINT ELECTRICAL CONNECTION.
2. PROVIDE MODULATING HOT GAS REHEAT ON ALL REFRIGERANT CIRCUITS.
3. PROVIDE VFD OR ECM MOTOR FOR SUPPLY FAN.
4. PROVIDE VARIABLE SPEED COMPRESSOR.
5. PROVIDE MERV 8 PRE FILTER AND MERV 13 MAIN FILTER.
6. PROVIDE EXTERNAL DISCONNECT SWITCH FOR PIPING HEAT TAPE. (120/1).

BASIS OF DESIGN: TRANE. ACCEPTABLE MANUFACTURERS: VALENT, AAON.

WATER SOURCE HEAT PUMP SCHEDULE

DESIGNATION	TYPE	SERVICE	FAN: SA AIRFLOW (CFM)	FAN: OA AIRFLOW (CFM)	FAN: ESP (IN)	FAN: MOTOR SIZE (HP)	COOLING: EAT (FDB/FWB)	COOLING: LAT (FDB/FWB)	COOLING: TOTAL CAPACITY (MBH)	COOLING: SENSIBLE CAPACITY (MBH)	COOLING: EWT (F)	COOLING: LWT (F)	COOLING: MIN. EFFICIENCY (EER)	HEATING: EAT (FDB)	HEATING: LAT (FDB)	HEATING: CAPACITY (MBH)	HEATING: EWT (F)	HEATING: LWT (F)	HEATING: MIN EFFICIENCY (COP)	CDW: FLOW (GPM)	CDW: MAX WPD (FT)	CDW: BRANCH PIPING SIZE (IN)	CDW: CONTROL VALVE TYPE	ELEC: MCA	ELEC: MOCP	ELEC: VOLTAGE /PHASE	FILTER: THICKNESS (IN) & TYPE	FILTER: EFFICIENCY (MERV)
AC-01	VERTICAL	ART CLASSROOM 408	1600	-	0.35	3/4	75/63	55/54	48	36	85	98	14	70	95	48	70	62	4.5	11.2	10	1 1/4"	2A	9.28	15	480/3	2" FLAT	MERV 8
AC-02	VERTICAL	BAND ROOM 409	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-03	VERTICAL	TECH LAB 410	1000	-	0.35	3/4	75/63	55/54	30	22.5	85	98	14	70	95	30	70	62	4.5	7	10	1 1/4"	2A	6.2	15	480/3	2" FLAT	MERV 8
AC-04	VERTICAL	FAM & CONSUMER SCIENCE 411	1200	-	0.35	3/4	75/63	55/54	36	27	85	98	14	70	95	36	70	62	4.5	8.4	10	1 1/4"	2A	8.95	15	480/3	2" FLAT	MERV 8
AC-05	VERTICAL	CLASSROOM 412, 413	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-06	VERTICAL	SPECIAL ED 401, ORCHESTRA 402	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-07	VERTICAL	DRAMA CLASSROOM 403	1000	-	0.35	3/4	75/63	55/54	30	22.5	85	98	14	70	95	30	70	62	4.5	7	10	1 1/4"	2A	6.2	15	480/3	2" FLAT	MERV 8
AC-08	VERTICAL	CLASSROOM 603, 604	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-09	VERTICAL	CLASSROOM 605, 609	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-10	VERTICAL	CLASSROOM 611, 612	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-11	VERTICAL	CLASSROOM 614, 615	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-12	VERTICAL	SPECIAL ED 601, 602	1600	-	0.35	3/4	75/63	55/54	48	36	85	98	14	70	95	48	70	62	4.5	11.2	10	1 1/4"	2A	9.28	15	480/3	2" FLAT	MERV 8
AC-15	VERTICAL	LOBBY 315	3000	-	0.35	1.5	75/63	55/54	90	67.5	85	98	14	70	95	90	70	62	4.5	22.5	10	2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-16A	VERTICAL	MEDIA CENTER 401	1400	-	0.35	3/4	75/63	55/54	42	31.5	85	98	14	70	95	42	70	62	4.5	14	10	1 1/4"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-16B	VERTICAL	MEDIA CENTER 401	1400	-	0.35	3/4	75/63	55/54	42	31.5	85	98	14	70	95	42	70	62	4.5	14	10	1 1/4"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-17	VERTICAL	WORKROOM 503	400	-	0.35	1/3	75/63	55/54	12	9	85	98	14	70	95	12	70	62	4.5	2.8	10	3/4"	2A	8.5	15	208/1	2" FLAT	MERV 8
AC-18	VERTICAL	ADMIN INTERIOR	1600	-	0.35	3/4	75/63	55/54	48	36	85	98	14	70	95	48	70	62	4.5	11.2	10	1 1/4"	2A	9.28	15	480/3	2" FLAT	MERV 8
AC-19	VERTICAL	ADMIN EXTERIOR	2800	-	0.35	1	75/63	55/54	72	45	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-20	VERTICAL	CLASSROOM 508, 509	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-21	VERTICAL	CLASSROOM 702, 703	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-22	VERTICAL	CLASSROOM 717, 718	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-23	VERTICAL	CLASSROOM 514, 515	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-24	VERTICAL	CAFETERIA	8000	2750	0.9	10	83.6/71.9	55/54	365	195	85	98	14	44	95	365	70	62	4.5	60	10	2 1/2"	2A	58.4	70	480/3	2" FLAT	MERV 8
AC-25	VERTICAL	CLASSROOM 803, 804	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-26	VERTICAL	SPECIAL ED 801, 802	1600	-	0.35	3/4	75/63	55/54	48	36	85	98	14	70	95	48	70	62	4.5	11.2	10	1 1/4"	2A	9.28	15	480/3	2" FLAT	MERV 8
AC-27	VERTICAL	CLASSROOM 814, 815	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-28	VERTICAL	CLASSROOM 805, 809	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-29	VERTICAL	CLASSROOM 811, 812	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-30	VERTICAL	CLASSROOM 706, 707	2000	-	0.35	1	75/63	55/54	60	45	85	98	14	70	95	60	70	62	4.5	14	10	1 1/2"	2A	12.45	20	480/3	2" FLAT	MERV 8
AC-31	VERTICAL	CLASSROOM 708	1400	-	0.35	3/4	75/63	55/54	42	31.5	85	98	14	70	95	42	70	62	4.5	9.8	10	1 1/4"	2A	9.2	15	480/3	2" FLAT	MERV 8
AC-32	VERTICAL	CLASSROOM 711	1400	-	0.35	3/4	75/63	55/54	42	31.5	85	98	14	70	95	42	70	62	4.5	9.8	10	1 1/4"	2A	9.2	15	480/3	2" FLAT	MERV 8
AC-33	VERTICAL	CLASSROOM 712, 714	2400	-	0.35	1	75/63	55/54	72	54	85	98	14	70	95	72	70	62	4.5	18	10	1 1/2"	2A	17.5	25	480/3	2" FLAT	MERV 8
AC-34	HORIZONTAL	WORKROOM 502	600	-	0.35	1/3	75/63	55/54	18	13.5	85	98	14	70	95	18	70	62	4.5	4.2	10	1"	2A	4.53	15	208/1	2" FLAT	MERV 8
AC-35	HORIZONTAL	MEDIA CENTER EXTERIOR	1400	-	0.35	1/2	75/63	55/54	42	31.5	85	98	14	70	95	42	70	62	4.5	9.8	10	1 1/4"	2A	20.48	30	480/3	2" FLAT	MERV 8
AC-36	HORIZONTAL	AP 610	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-37	HORIZONTAL	GUIDANCE COUNSELOR 613	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-38	HORIZONTAL	WORKROOM 704	200	-	0.35	1/3	75/63	55/54	6	4.5	85	98	14	70	95	6	70	62	4.5	1.8	10	3/4"	2A	4.53	15	208/1	2" FLAT	MERV 8
AC-40	HORIZONTAL	SOCIAL WORKER 709	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-41	HORIZONTAL	AP 710	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-42	HORIZONTAL	PSYCH 813	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-43	HORIZONTAL	GUIDANCE COUNSELOR 810	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-44	HORIZONTAL	OFFICE 408A	200	-	0.35	1/3	75/63	55/54	6	4.5	85	98	14	70	95	6	70	62	4.5	1.8	10	3/4"	2A	4.53	15	208/1	2" FLAT	MERV 8
AC-45	HORIZONTAL	OFFICE 411A	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-46	HORIZONTAL	OFFICE 409A	400	-	0.35	1/3	75/63	55/54	12	9	85	98	14	70	95	12	70	62	4.5	2.8	10	3/4"	2A	4.53	15	208/1	2" FLAT	MERV 8
AC-47	HORIZONTAL	TESTING 406	200	-	0.335	1/3	75/63	55/54	6	4.5	85	98	14	70	95	6	70	62	4.5	1.8	10	3/4"	2A	4.53	15	208/1	2" FLAT	MERV 8
AC-48	HORIZONTAL	OFFICE 504	300	-	0.35	1/3	75/63	55/54	9	6.75	85	98	14	70	95	9	70	62	4.5	2.1	10	3/4"	2A	5.23	15	208/1	2" FLAT	MERV 8
AC-49	VERTICAL	KITCHEN	4000	-	0.35	1.5	75/63	55/54	120	90	85	98	14	70	95	120	70	62	4.5	37.5	10	2"	2A	24.15	30	480/3	2" FLAT	MERV 8

NOTES:

1. PROVIDE DISCONNECT FOR SINGLE POINT ELECTRICAL CONNECTION.
2. PROVIDE ECM SUPPLY FAN MOTOR.
3. PROVIDE HOT GAS REHEAT.
4. REFER TO DETAIL 7/H301 FOR CONTROL VALVE AND PIPING SCHEMATIC.

BASIS OF DESIGN: TRANE ACCEPTABLE MANUFACTURERS: WATER FURNACE, CLIMATEMASTER.

FAN SCHEDULE

DESIGNATION	SERVICE	TYPE	AIRFLOW (CFM)	FAN ESP (IN)	DRIVE TYPE	FAN SPEED (RPM)	BRAKE MOTOR SIZE (BHP)	MOTOR SIZE (HP)	VOLTAGE/PHASE	EXT START/DISCONNECT MEANS	MAX SOUND LEVEL (SONES)	DAMPER TYPE
F-25	RESTROOM ADDITION	CENTRIFUGAL ROOF DOWNBLAST	150	0.5	DIRECT	1,300	0.01	1/60	120/1	MRT	-	GRAVITY BACKDRAFT
GHE-1	GREASE EXHAUST	CENTRIFUGAL ROOF UPBLAST	5160	1	DIRECT	839	1.925	5	480/3	INTEGRAL DISCONNECT	-	-

(ALTERNATE #2)
(ALTERNATE #6)

NOTES:

1. F-25: PROVIDE WITH ECM MOTOR. START/STOP VIA BAS SYSTEM.
2. GHE-1: PROVIDE UL762 RATING. PROVIDE INTERNAL WIRING, WEATHERPOOF DISCONNECT, HIGH HEAT OPERATION 300°F. PROVIDE GREASE BOX.

KITCHEN HOOD SCHEDULE

DESIGNATION	SERVICE	TYPE	LENGTH	WIDTH	HEIGHT	CONTROL PANEL DIMENSIONS	PERFORATED SUPPLY PLENUM DIMENSIONS	TOTAL EXHAUST CFM	TOTAL SUPPLY CFM	FIRE SYSTEM: SIZE	FIRE SYSTEM: TYPE
HOOD-1	KITCHEN COOKING EQUIP.	TYPE 1 ISLAND	12'-0"	4'-6"	2'-0"	12" x 4'-6"	13'-0" x 1'-2"	2580	2064	-	-
HOOD-2	KITCHEN COOKING EQUIP.	TYPE 1 ISLAND	12'-0"	4'-6"	2'-0"	12" x 4'-6"	13'-0" x 1'-2"	2580	2064	3.0	ANSUL R102

NOTES:

1. PROVIDE FRONT, LEFT, RIGHT FIELD WRAPPER PANEL 17" HIGH.
2. PROVIDE BACK STANDOFF (FLAT) 6" WIDE 156" LONG.

BASIS OF DESIGN: CAPTIVE AIRE.

KITCHEN MAKEUP AIR UNIT SCHEDULE

DESIGNATION	SERVICE	TYPE	SUPPLY FAN: TOTAL AIRFLOW (CFM)	SUPPLY FAN: ESP (IN)	SUPPLY FAN: MOTOR SIZE (HP)	DX COOLING: # OF CONDENSERS	DX COOLING: TOTAL CAPACITY (TONS)	DX COOLING: MCA	DX COOLING: MOCP	DX COOLING: VOLTAGE/ PHASE	GAS HEAT: GAS INPUT (MBH)	GAS HEAT: GAS OUTPUT (MBH)	GAS HEAT: TEMP RISE (F)	GAS HEAT: FUEL TYPE	ELECTRICAL: MCA	ELECTRICAL: MOCP	ELECTRICAL: VOLTAGE/ PHASE
KMUA-1	KITCHEN HOOD MAKE UP AIR	MODULAR PACKAGED UNIT	5760	0.5	5	3	15	10.5	15	480/3	320	290	47	NATURAL GAS	6.8	15	480/3

NOTES:

1. PROVIDE 4 SEPARATE POWER CONNECTIONS. (1 FOR EACH CONDENSER, AND 1 FOR THE FAN MOTOR).
2. PROVIDE MODULATING GAS CONTROL WITH SUPPLY AIR TEMPERATURE CONTROLLER.
3. PROVIDE COOLING THERMOSTAT AND RELAY.
4. PROVIDE HORIZONTAL DISCHARGE.
5. PROVIDE LOW FIRE START.
6. PROVIDE INLET PRESSURE GAUGE, (0-35")
7. PROVIDE MANIFOLD PRESSURE GAUGE, (-5 TO 15" WC).
8. PROVIDE MOTORIZED BACKDRAFT DAMPER.
9. PROVIDE INTAKE BIRDSCREEN.
10. BASIS OF DESIGN IS CAPTIVEAIRE.

AIR DISTRIBUTION SCHEDULE

TYPE	B1	B2	B3	B4	B5	F1	V1	Z1	Z2	Z3	Z4	Z5	Z6
SERVICE	SUPPLY	SUPPLY	SUPPLY	SUPPLY	SUPPLY	SUPPLY	RETURN/EXHAUST	RETURN/EXHAUST	RETURN/EXHAUST	RETURN/EXHAUST	RETURN/EXHAUST	RETURN/EXHAUST	RETURN/EXHAUST
TYPE	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	STD BLADE SIDEWALL	STD BLADE SIDEWALL	PERFORATED	PERFORATED	PERFORATED	PERFORATED	PERFORATED	PERFORATED
MAX. AIRFLOW (CFM)	125	200	300	450	600	400	2800	200	325	450	600	800	1300
FACE SIZE (INxIN, ø IN)	24x24	24x24	24x24	24x24	24x24	14x12	32x32	12x12	24x24	24x24	24x24	24x12	24x24
NECK SIZE (INxIN, ø IN)	6	8	10	12	14	12x10	30x30	10x10	10	12	14	22x10	22x22
APD (IN)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MAX. NC	20	20	20	20	20	20	20	20	20	20	20	20	20
VOL. CONTROL DAMPER (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N	N

NOTES:

1. VERIFY MOUNTING FRAME STYLE WITH ARCHITECTURAL REFLECTED CEILING PLAN & FINISH SCHEDULE.
2. NOTE 2 DELETED

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NORTH CAROLINA PROFESSIONAL SEAL 037462 ENGINEER THOMAS B. NORD 2/20/18

Renovations and Additions to:
Myrtle Grove Middle School
901 Piner Road, Wilmington, North Carolina 28409

SCHEDULES

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18
REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER H500

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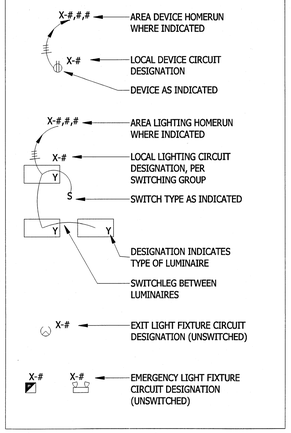
SW Project No: 0594-13-00-17

ELECTRICAL ABBREVIATIONS

Ø	ROUND; DIAMETER; PHASE	LS	LIFE SAFETY
A	AMPERES OR AMP METER	LTG	LIGHTING
AC	ALTERNATING CURRENT	M	MOTOR; METERING
AF	AMP FRAME	MC	METAL CLAD
AFC	ABOVE FINISHED CEILING	MCB	MAIN CIRCUIT BREAKER
AFF	ABOVE FINISHED FLOOR	MCC	MOTOR CONTROL CENTER
AFG	ABOVE FINISHED GRADE	MCP	MOTOR CONTROL PROTECTOR
AIC	AMPERE INTERRUPTING CAPACITY	MCS	MOLDED CASE SWITCH
ALT	ALTERNATE	MH	MANHOLE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MIN	MINIMUM
ARCH	ARCHITECTURAL	MLO	MAIN LUG ONLY
AT	AMP TRIP	N, NEU	NEUTRAL
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRICAL CODE
AWG	AMERICAN WIRE GAGE	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
BFC	BELOW FINISHED CEILING		
BFG	BELOW FINISHED GRADE	NF	NON-FUSED
C	CELSIUS; COIL	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
CB	CIRCUIT BREAKER	NIC	NOT IN CONTRACT
CCTV	CLOSED CIRCUIT TELEVISION SYSTEM	NL	NIGHT LIGHT
CD/Cd	CANDELA	NO	NORMALLY OPEN; NUMBER
CLG	CEILING	NOM	NOMINAL
COAX	COAXIAL CABLE	NTS	NOT TO SCALE
CONTR	CONTRACTOR	OC	ON CENTER
CT	CURRENT TRANSFORMER	OL	OVERLOAD
CTV	CABLE TELEVISION	P	POLE
CU	COPPER	PB	PULL BOX
DWG	DRAWING	PC	PHOTOCELL
EC	ELECTRICAL CONTRACTOR	PF	POWER FACTOR
ECB	ENCLOSED CIRCUIT BREAKER	PH	PHASE
EF	EXHAUST FAN	PNL	PANEL
EGC	EQUIPMENT GRAOUNDING CONDUCTOR	PT	POINT; POTENTIAL TRANSFORMER
ELEC	ELECTRICAL	PUN	PER UNIT NAMEPLATE
EM	EMERGENCY	PVC	POLYVINYL CHLORIDE (CONDUIT)
EMT	ELECTRICAL METALLIC TUBING	RD	ROUND
EPO	EMERGENCY POWER OFF	REV	REVISION
ETR	EXISTING TO REMAIN	RLA	RATED LOAD AMPS
EWC	ELECTRIC WATER COOLER	RMC	RIDGID METAL CONDUIT
FACP	FIRE ALARM CONTROL PANEL	SN	SOLID NEUTRAL
FATC	FIRE ALARM TERMINATION CABINET	SNAC	SIGNAL NOTIFICATION APPLIANCE CIRCUIT
FFE	FINISHED FLOOR ELEVATION	SP	SURGE PROTECTED
FL	FLOOR	SPD	SURGE PROTECTED DEVICE
FLA	FULL LOAD AMPS	SPDT	SINGLE POLE DOUBLE THROW
FLC	FLEXIBLE LIQUIDTIGHT CONDUIT	SPST	SINGLE POLE SINGLE THROW
FLEX	FLEXIBLE	SPEC	SPECIFICATION
FMC	FLEXIBLE METAL CONDUIT	SQ	SQUARE
FT	FEET; FOOT	SWGR	SWITCHGEAR
FU	FUSE	SWBD	SWITCHBOARD
GA	GAUGE; GAGE	TBB	TELEPHONE BACK BOARD
GB	GROUND BUS	TELECOM	TELECOMMUNICATIONS
GC	GENERAL CONTRACTOR	TEMP	TEMPERATURE
GEC	GROUNDING ELECTRODE CONDUCTOR	THD	TOTAL HARMONIC DISTORTION
GFI, GFCI	GROUND FAULT (CIRCUIT) INTERRUPTER	TYP	TYPICAL
GND	GROUND	TV	TELEVISION
HD	HEAVY DUTY	UL	UNDERWRITERS LABORATORIES INC.
HOA	HANDS-OFF-AUTOMATIC	UNO	UNLESS NOTED OTHERWISE
HP	HORSEPOWER	V	VOLTAGE; VOLT
HVAC	HEATING, VENTILATING & AIR CONDITIONING	VAC	VOLTS ALTERNATING CURRENT
HZ	HERTZ	VDC	VOLTS DIRECT CURRENT
IG	ISOLATED GROUND	VFD	VARIABLE FREQUENCY DRIVE
IMC	INTERMEDIATE METAL CONDUIT	VOL	VOLUME
JB	JUNCTION BOX	W/	WITH
KV	KILOVOLT	W	WIRE
KVA	KILOVOLT AMPERE	WP	WEATHERPROOF
KW	KILOWATT	WG	WIREGUARD
KWH	KILOWATT HOUR	XFMR	TRANSFORMER
LED	LIGHT EMMITING DIODE	XP	EXPLOSION PROOF
LRA	LOCKED ROTOR AMPS	Z	IMPEDANCE

ELECTRICAL CIRCUITING KEY



ELECTRICAL SYMBOLS

- WALL MTD LIGHTING FIXTURE AND OUTLET
- PENDENT LIGHTING FIXTURE AND OUTLET
- DOWNLIGHT LIGHTING FIXTURE AND OUTLET
- WALL MTD LIGHTING FIXTURE AND OUTLET
- CEILING MTD LIGHTING FIXTURE AND OUTLET
- WALL MTD EXIT SIGN AND OUTLET, SINGLE FACE. ARROW INDICATES DIRECTION.
- CEILING MTD EXIT SIGN AND OUTLET, DUAL FACE. ARROWS INDICATE DIRECTION.
- EMERGENCY LIGHT BATTERY PACK - TWO HEAD UNIT.
- CEILING MOUNTED EMERGENCY BATTERY LIGHT
- EMERGENCY LIGHT REMOTE HEAD
- GROUND MOUNTED FLOODLIGHT AND OUTLET
- AREA LUMINAIR AND STANDARD
- FLUSH MTD TOGGLE SWITCH, SPST, 20A, 120/277V
- FLUSH MTD TOGGLE SWITCH, DPST, 20A, 120/277V
- FLUSH MTD 3-WAY TOGGLE SWITCH, 20A, 120/277V
- FLUSH MTD 4-WAY TOGGLE SWITCH, 20A, 120/277V
- FLUSH MTD DIMMER SWITCH, 20A, 120/277V
- FLUSH MTD KEY SWITCH, 20A, 120/277V
- FLUSH MOUNTED OCCUPANCY SENSOR SWITCH, 20A, 120/277V
- FLUSH MTD LIGHTED HANDLE TOGGLE SWITCH, SPST, 20A, 120V. LIGHT ON WITH OPEN SWITCH
- FLUSH MTD TOGGLE SWITCH WITH PILOT LIGHT. LIGHT ON WITH CLOSED SWITCH.
- TIMED SWITCH
- CEILING MTD INFRA-RED OCCUPANCY SENSOR SWITCH, 20A, 120/277V
- CEILING MTD ULTRASONIC OCCUPANCY SENSOR SWITCH, 20A, 120/277V
- CEILING MTD DUAL TECHNOLOGY (IR, U) OCCUPANCY SENSOR SWITCH, 20A, 120/277V
- PHOTOCELL, 120/277V, 2000W, 1800VA, 600VA LED, UNO
- FLUSH MTD DUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W
- FLUSH MTD SINGLE RECEPTACLE AND OUTLET, 20A, 125V, 3W
- FLUSH MTD QUADRUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W
- FLUSH MTD DUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W, SPLIT WIRED WITH TOP OUTLET SWITCHED.
- FLUSH MTD DUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W, INSTALLED VERTICALLY 4" ABOVE BACKSPASH OR COUNTERTOP IF NO BACKSPASH EXISTS.
- FLUSH MTD QUADRUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W, INSTALLED VERTICALLY 4" ABOVE BACKSPASH OR COUNTERTOP IF NO BACKSPASH EXISTS.
- FLOOR MTD OUTLET WITH DUPLEX RECEPTACLE AND FITTING, 20A, 125V, 3W
- WALL MOUNTED POWER DEVICE, REFER TO SCHEDULES FOR MARK
- FLOOR BOX WITH DEVICE(S). REFER TO SCHEDULES FOR MARK
- WALL MTD TELECOM OUTLET, REFER TO SCHEDULES FOR MARK
- FLOOR MTD TELECOM OUTLET, REFER TO SCHEDULES FOR MARK
- CEILING MTD DUPLEX RECEPTACLE AND OUTLET, 20A, 125V, 3W
- CEILING MTD TELECOM OUTLET, REFER TO SCHEDULES FOR MARK
- CEILING MTD DUPLEX RECEPTACLE & TELECOM OUTLET, REFER TO SCHEDULES FOR MARK
- CEILING MTD PUBLIC ADDRESS SPEAKER
- FLUSH MTD VOLUME CONTROL FOR SPEAKER
- WALL MTD TELEVISION ANTENNA/ELECTRICAL OUTLET
- CEILING MTD TELEVISION ANTENNA/ELECTRICAL OUTLET
- WALL MTD CLOCK AND OUTLET
- CEILING MTD DOUBLE FACE CLOCK AND OUTLET
- WALL MTD ELAPSED TIME CLOCK AND OUTLETWITH SEPARATE START/STOP RESET CONTROL MOUNTED BELOW
- PANELBOARD, 250V LEVEL
- PANELBOARD, 600V LEVEL
- HOMERUN; ARROW HEADS INDICATE NUMBER OF CIRCUITS, LETTERS AND NUMBERS DESIGNATE PANEL AND CIRCUITS. SHORT TICK MARKS INDICATE NUMBER OF CURRENT CARRYING PHASE CONDUCTORS. LONG TICK MARK(S) INDICATE NEUTRAL(S). GROUNDING CONDUCTORS REQUIRED BY SPECIFICATIONS ARE NOT SHOWN. CONDUCTOR SIZES SPECIFIED ON THE PANEL SCHEDULES ARE MANDATORY FOR THE ENTIRE CIRCUIT EXCEPT WHERE SPECIFICATIONS REQUIRE A SIZE INCREASE FOR VOLTAGE DROP.
- SURFACE METAL RACEWAY WITH DEVICES, LETTER DESIGNATES TYPE
- PENDENT MTD, PLUG-IN BUS DUCT WITH PLUG-IN CIRCUIT BREAKER OR FUSIBLE SWITCH AND TAP BOX. DUCT AND SWITCH RATING AS NOTED.
- TOP # - DEVICE MAXIMUM RATING OR FRAME SIZE BOTTOM # - FUSE SIZE OR DEVICE SETTING
- DISCONNECT SWITCH. TOP NUMBER IS DISCONNECT RATING; LOWER NUMBER IS FUSE SIZE. SINGLE NO REPRESENTS UNFUSED DISCONNECT.
- COMBINATION DISCONNECT SWITCH AND MAGNETIC MOTOR STARTER. SEE SCHEDULE OR NOTE.
- FLUSH MTD MANUAL MOTOR STARTER SWITCH WITHOUT OVERLOAD HEATERS
- MAGNETIC MOTOR STARTER
- 3 POLE CIRCUIT BREAKER IN ENCLOSURE. NO INDICATES CB RATING.
- VARIABLE FREQUENCY DRIVE CONTROLLER, 40" AFF, PROVIDED BY HVAC OR PLUMBING CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR
- MAGNETIC CONTACTOR, SIZE PER SCHEDULE
- JUNCTION, PULL, TAP OR OUTLET BOX (CODE SIZE)
- TIME SWITCH
- MAGNETIC RELAY, SIZE PER SCHEDULE
- FLUSH MOUNTED MUSHROOM HEAD PUSH BUTTON
- FLUSH MOUNTED PUSH BUTTON
- SUPPLEMENTAL GROUND BAR
- GROUND PER NEC
- GROUND TO STRUCTURAL STEEL
- ELECTRICAL DEMAND METER
- SURGE PROTECTOR
- WALL MTD FIRE ALARM PULL STATION
- SMOKE DETECTOR, CEILING MTD
- SMOKE DETECTOR WITH SOUNDER BASE, CEILING MTD
- SMOKE DETECTOR, CEILING MTD, MULTI SENSOR
- CEILING MTD REMOTE ALARM INDICATOR LAMP
- SMOKE DETECTOR, DUCT MTD (WITH RAIL)
- HEAT DETECTOR, CEILING MTD
- SMOKE DETECTOR, WALL MTD
- SMOKE DETECTOR WITH SOUNDER BASE, WALL MTD
- WALL MTD HEAT DETECTOR
- WALL MTD REMOTE ALARM INDICATOR LAMP (RAIL)
- WALL MTD HORN TYPE AUDIO/VISUAL APPLIANCE
- WALL MTD SPEAKER TYPE AUDIO/VISUAL APPLIANCE
- WALL MTD CHIME TYPE AUDIO/VISUAL APPLIANCE
- WALL MTD VISUAL ALARM APPLIANCE
- CEILING MTD HORN TYPE AUDIO/VISUAL ALARM APPLIANCE
- CEILING MTD SPEAKER TYPE AUDIO/VISUAL ALARM APPLIANCE
- CEILING MTD CHIME TYPE AUDIO/VISUAL ALARM APPLIANCE
- CEILING MTD FIRE ALARM VISUAL DEVICE
- DOOR HOLDER
- FIRE ALARM MONITOR MODULE
- MONITOR MODULE FOR FLOW SWITCH, SWITCH PROVIDED BY OTHERS
- MONITOR MODULE FOR TAMPER SWITCH, SWITCH PROVIDED BY OTHERS
- MONITOR MODULE FOR POST INDICATOR VALVE, VALVE PROVIDED BY OTHERS
- FIRE ALARM CONTROL MODULE OR RELAY
- CEILING MTD FIRE ALARM SPEAKER
- RECESSED CEILING MTD AUDIBLE ALARM APPLIANCE
- WALL MTD FIRE ALARM AUDIBLE DEVICE
- WALL MTD BUZZER
- FIRE ALARM BELL; # INDICATED DIAMETER IN INCHES
- LINEAR BEAM TRANSMITTER
- LINEAR BEAM RECEIVER
- FIRE ALARM WALL MTD SPEAKER
- WALL MTD "DO NOT USE ELEVATOR" LIGHT
- WALL MTD AUDIBLE ALARM APPLIANCE
- FIREMAN'S 2-WAY TELEPHONE
- FIRE ALARM ISOLATION MODULE
- DIGITAL ALARM COMMUNICATIONS TRANSMITTER
- FIRE ALARM ANNUNCIATOR PANEL
- FIRE ALARM CONTROL PANEL
- FIRE ALARM TERMINAL CABINET
- SUPPLEMENTAL NOTIFICATION APPLIANCE CABINET
- DOOR CONTROL ID TAG
- SECURITY SYSTEM KEYPAD, 60" AFF
- ACCESS CONTROL CARD READER
- SECURITY PANIC BUTTON
- CCTV CAMERA WITH PTZ FEATURES
- CCTV CAMERA WITH FIXED MOUNT
- CCTV CAMERA DOME CEILING MOUNT ARROW INDICATES DIRECTION
- MASTER RESCUE ASSISTANCE STATION
- RESCUE ASSISTANCE STATION
- RESCUE ASSISTANCE LIGHT
- NEW WORK
- EXISTING TO REMAIN
- EXISTING TO BE DEMOLISHED

ELECTRICAL SUMMARY

ELECTRICAL SYSTEM AND EQUIPMENT

Method of Compliance

Energy Code: ☐ Prescriptive ☐ Performance
ASHRAE 90.1: ☒ Prescriptive ☐ Performance

Lighting schedule (each fixture type)

lamp type required in fixture
number of lamps in fixture
ballast type used in the fixture
number of ballasts in fixture
total wattage per fixture
— See fixture Schedule on Drawing Sheet

total interior wattage specified vs. allowed: (whole building or space by space) 47382 W vs. 93378 W

total exterior wattage specified vs. allowed: 840 W vs. 2430 W

Additional Prescriptive Compliance

- ☐ 506.2.1 More Efficient Mechanical Equipment
- ☒ 506.2.2 Reduced Lighting Power Density
- ☐ 506.2.3 Energy Recovery Ventilation Systems
- ☐ 506.2.4 Higher Efficiency Service Water Heating
- ☐ 506.2.5 On-Site Supply of Renewable Energy
- ☐ 506.2.6 Automatic Daylighting Control Systems

ELECTRICAL GENERAL NOTES :

1. ALL SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED FOR THIS PROJECT.
2. SYMBOLS NOT SHOWN ON THIS ELECTRICAL SYMBOL LEGEND ARE IDENTIFIED ON THE DRAWINGS WHERE THEY OCCUR.
3. UNLESS OTHERWISE INDICATED IN THE SPECIFICATIONS OR ON THE DRAWINGS, MOUNTING HEIGHT OF DEVICES IS TO BE THE CENTERLINE OF THE DEVICE.
4. UNLESS OTHERWISE INDICATED, SWITCHES AND SIMILAR DEVICES ARE TO BE LOCATED 48" AFF; RECEPTACLES ARE TO BE VERTICALLY MOUNTED AT 18" AFF WITH THE GROUNDING TERMINAL ON THE BOTTOM.
5. TELEPHONE & DATA OUTLETS ARE TO BE MOUNTED AT 18" AFF UNLESS OTHERWISEINDICATED. "W" INDICATES MOUNTING AT 48" AFF; "C" INDICATES MOUNTING ABOVECOUNTERTOP WITH ALIGNMENT AND HEIGHT AS INDICATED FOR RECEPTACLES SIMILARLY MOUNTED.
6. FIRE ALARM PULL STATIONS ARE TO BE VERTICALLY MOUNTED AT 48" AFF.
7. FIRE ALARM INDICATING APPLIANCES SHALL BE 15 Cd RATING, UNLESS NOTED OTHERWISE ON THE PLANS.
8. FIRE ALARM INDICATING APPLIANCES ARE TO BE MOUNTED WITH THE LOWER EDGE OF THE VISUAL ELEMENT AT 6'-8" AFF OR 6" BFC, WHICHEVER IS LOWER. WHERE DUCTWORK, CONDUIT, OR OTHER OBSTRUCTIONS BLOCK DIRECT VIEW OF APPLIANCE, MOUNT 6" BELOW SUCH OBSTRUCTIONS.
9. CEILING MOUNTED SMOKE DETECTORS ARE SHOWN IN APPROXIMATE LOCATION. COORDINATE EXACT LOCATION WITH CEILING FEATURES. WALL MOUNTED SMOKE DETECTECTORS ARE TO BE MOUNTED 10" BELOW FINISHED CEILING TO THE CENTER OF DEVICE AND A MINIMUM OF 12" FROM ADJACENT WALLS OR OTHER OBSTRUCTIONS.
10. COORDINATE SMOKE DETECTOR AND HEAT DETECTOR LOCATIONS WITH HVAC SUPPLY AND RETURN GRILLES. MAINTAIN 3'-0" CLEARANCE BETWEEN EDGE OF SUPPLY GRILL AND EDGE OF SMOKE DETECTOR.
11. UPPER CASE LETTER (OR LETTER/NUMBER COMBINATION) ADJACENT TO FIXTURE OR SWITCH DESIGNATES TYPE. SEE FIXTURE SCHEDULE FOR DETAILS.
12. LOWER CASE LETTER ADJACENT TO FIXTURE OR SWITCH DESIGNATES CONTROL RELATIONSHIP.
13. NUMBER ADJACENT TO FIXTURE, SWITCH, OR RECEPTACLE DESIGNATES CIRCUIT CONNECTION.
14. SINGLE DIAGONAL LINE ACROSS A FIXTURE INDICATES FIXTURE IS UNSWITCHED FOR 24 HOUR OPERATION.

ELECTRICAL DEMOLITION NOTES :

1. ALL DEMOLITION WORK IS TO BE COORDINATED WITH PHASING OF CONSTRUCTION AND BID ALTERNATES AS OUTLINED ON ARCHITECTURAL SHEETS.
2. REMOVE ALL ELECTRICAL CONDUIT, CABLE, WIRING, DEVICES, JUNCTION BOXES, FITTINGS, AND RELATED ITEMS FROM ALL WALLS, CEILINGS, FLOORS, AND/OR PORTIONS OF SAME INDICATED AS BEING DEMOLISHED BY ANY DIVISION OF THE CONTRACT DOCUMENT SET OR INDICATED ELSEWHERE IN THE CONTRACT DOCUMENT SET AS REQUIRING ELECTRICAL DEMOLITION.
3. REMOVE ALL LIGHTING FIXTURES AND RELATED ITEMS FROM THE DEMOLITION AREA OR OTHER AREAS WHERE NEW LIGHTING FIXTURES ARE TO BE INSTALLED. EXISTING CONDUIT OR CABLE SERVING ITEMS OUTSIDE THE DEMOLITION AREA MAY REMAIN IF THEY ARE CONCEALED BY THE NEW CONSTRUCTION AND MEET THE SPECIFICATIONS REQUIREMENTS OF THE PRESENT PROJECT. NEW FIXTURES ARE TO BE SUPPLIED BY NEW (OR REUSED) CIRCUITS AS INDICATED.
4. EXTEND OR RELOCATE ALL EXISTING CIRCUITS AND RELATED ITEMS SERVING EXISTING UTILIZATION OR OTHER EQUIPMENT WHERE SUCH CIRCUITS OR ITEMS ARE DISRUPTED DUE TO DEMOLITION ACTIVITIES OF ANY DIVISION OF THIS PROJECT. RELOCATE ALL EXISTING JUNCTION BOXES OR SIMILAR ITEMS THAT WILL BE RENDERED INACCESSIBLE BY NEW CONSTRUCTION FURNISHED UNDER ANY DIVISION OF THIS PROJECT. PROVIDE ANY AND ALL TEMPORARY ELECTRICAL SUPPLY (SUPPLIES) AS NEEDED TO MEET THIS REQUIREMENT.
5. REMOVE ALL ABANDONED CIRCUITS BACK TO THE POINT OF SUPPLY OR BACK TO THE POINT WHERE OTHER REMAINING LOADS ARE CONNECTED. LABEL ANY UNUSED OVERCURRENT DEVICES AS "SPARE".
6. WHERE EQUIPMENT OR DEVICES ARE REMOVED AND NOT REPLACED BY A SIMILAR ITEM OR EQUIPMENT, REPAIR WALL SURFACES TO MATCH EXISTING SURROUNDING SURFACE. PAINT AS REQUIRED TO MATCH EXISTING FINISHES.
7. PROVIDE NEW SUPPORT(S) OR RE-SUPPORT AS REQUIRED ALL EXISTING CONDUIT, JUNCTION BOXES, CABLES, AND/OR OTHER ELECTRICAL ITEMS AS REQUIRED TO MEET THE SUPPORT REQUIREMENTS OF THE PRESENT PROJECT.
8. PROVIDE NEW, OR REWORK EXISTING, FIRE STOPPING AT ALL THROUGH-PENETRATIONS OF CONDUIT OR OTHER ELECTRICAL ITEMS THAT WILL REMAIN AT THE CONCLUSION OF THE PROJECT. FIRE STOPPING PROVIDED FOR EXISTING ITEMS MUST MEET THE REQUIREMENTS OF THE PRESENT PROJECT.
9. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING ALL PHASES OF CONSTRUCTION.

ELECTRICAL DRAWING LIST

NO.	TITLE
E001	STANDARDS, SYMBOLS & ABBREVIATIONS
E002	ELECTRICAL SITE PLAN
E100	ELECTIVE WING - POWER PLAN
E101	6TH GRADE WING - POWER PLAN
E102	GYMNASIUM - POWER PLAN
E103	ADMIN & MEDIA CENTER - POWER PLAN
E104	7TH GRADE WING - POWER PLAN
E105	CAFETERIA - POWER PLAN
E106	8TH GRADE WING - POWER PLAN
E200	ELECTIVE WING - LIGHTING AND FIRE ALARM
E201	6TH GRADE WING - LIGHTING AND FIRE ALARM PLAN
E202	GYMNASIUM - LIGHTING PLAN
E203	ADMIN & MEDIA CENTER - LIGHTING AND FIRE ALARM PLAN
E204	7TH GRADE WING - LIGHTING AND FIRE ALARM PLAN
E205	CAFETERIA - LIGHTING AND FIRE ALARM PLAN
E206	8TH GRADE WING - LIGHTING AND FIRE ALARM PLAN
E300	ALTERNATES
E401	ELECTRICAL DISTRIBUTION
E402	ELECTRICAL DISTRIBUTION & PANEL SCHEDULES
E403	PANEL SCHEDULES
E501	LIGHTING AND FIRE ALARM DETAILS
E601	ELECTRICAL GENERAL DETAILS

LEAD BASE PAINT WARNING

LEAD BASE PAINT MAY EXIST ON BUILD STRUCTURE(S) OR OTHER ITEMS IN THE CONSTRUCTION AREA. THE CONTRACTOR IS HEREBY ADVISED OF THE NEED FOR COMPLIANCE WITH OSHA STANDARD 1926.62, SUBPART D, TITLED "LEAD", [29 CFR 1910] DURING WORK WITH LEAD CONTAINING MATERIALS.

ALL TESTING AND/OR OTHER COMPLIANCE ACTIVITIES ARE THE COMPLETE RESPONSIBILITY OF THE CONTRACTOR.

ASBESTOS WARNING

MATERIALS CONTAINING ASBESTOS ARE OFTEN ENCOUNTERED IN BUILDING RENOVATIONS PROJECTS. IN THE EVENT ASBESTOS CONTAINING MATERIALS ARE ENCOUNTERED THE CONTRACTOR WILL IMMEDIATELY CEASE WORK IN THE INVOLVED AREA, SECURE THE AREA TO PREVENT INADVERTENT CONTAMINATION OR EXPOSURE, AND NOTIFY OWNER. UNDER NO CIRCUMSTANCES WILL THE CONTRACTOR DISTURB ASBESTOS OR ASBESTOS CONTAINING MATERIALS.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039503 ENGINEER MATTHEW A. JOHNSON

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

STANDARDS, SYMBOLS & ABBREVIATIONS

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18

REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER E001

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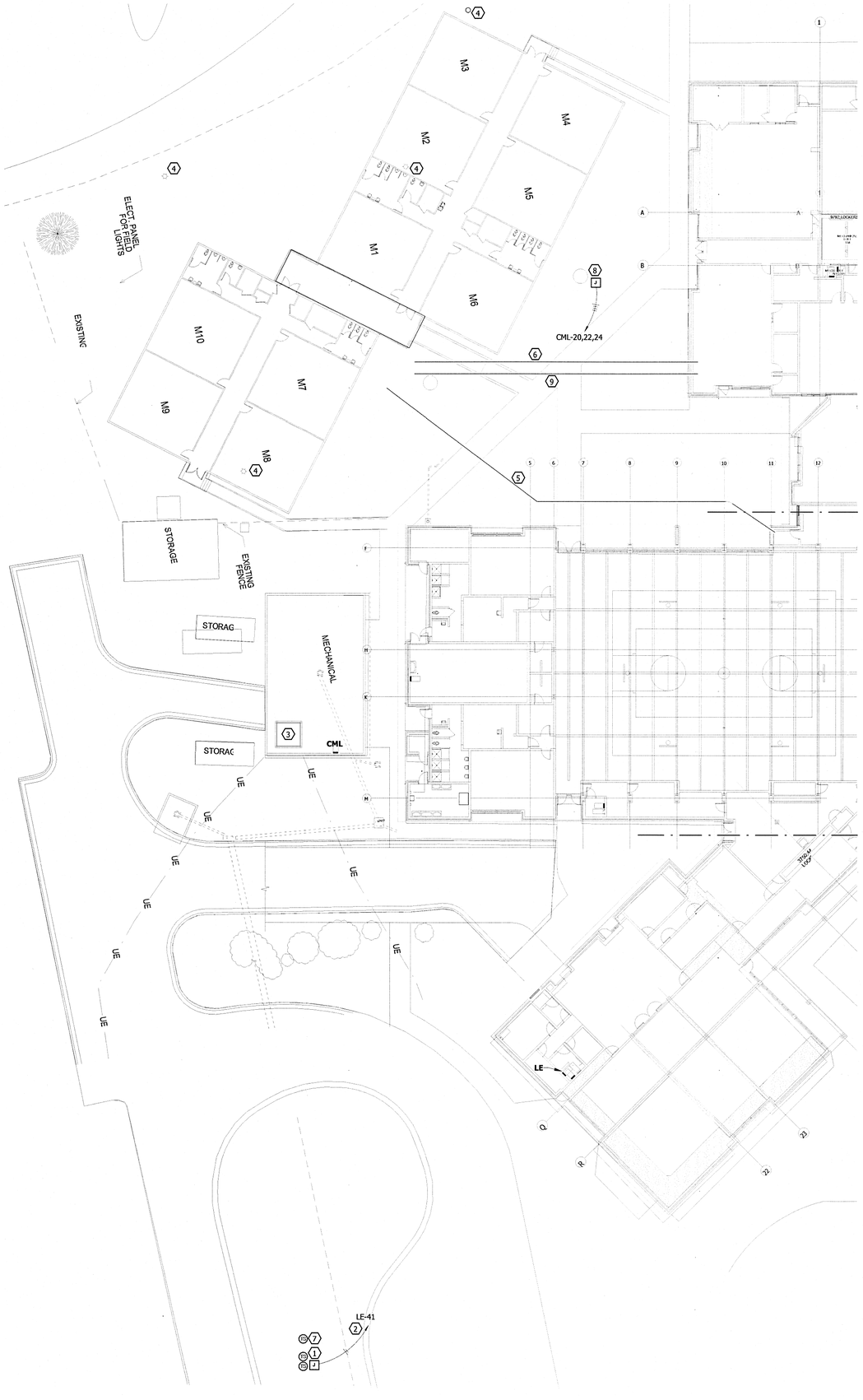

KEY NOTES TO E002

#	
1	POWER AND TAMPER SWITCHES FOR HOT BOX. TAMPER SWITCH MONITOR MODULES SHALL BE LOCATED ABOVE CAFETERIA CEILING. MAKE CONNECTIONS AS REQUIRED. COORDINATE EXACT LOCATIONS WITH CIVIL.
2	PROVIDE NEW 20A/1P CIRCUIT BREAKER IN EXISTING SPACE INDICATED. MATCH EXISTING PANEL MANUFACTURER AND AIC RATING. CIRCUIT SHALL BE (2) #10, #10 GRD, 1"C.
3	APPROXIMATE LOCATION OF EXISTING UTILITY TRANSFORMER.
4	TEMPORARILY REMOVE EXISTING LIGHT POLE. STORE AND PROTECT DURING CONSTRUCTION. REINSTALL IN SAME LOCATION AND RECONNECT TO EXISTING CIRCUIT AFTER MODULAR BUILDINGS ARE REMOVED.
5	4" CONDUIT ROUTED UNDERGROUND TO EXISTING IDF ROOM. PVC IS ACCEPTABLE FOR USE, PER SPECIFICATIONS, UNDERGROUND ONLY.
6	2"C FOR FIRE ALARM CONNECTION TO MODULAR BUILDINGS. PVC IS ACCEPTABLE FOR USE, PER SPECIFICATIONS, UNDERGROUND ONLY.
7	TAMPER SWITCH FOR PIV. MONITOR MODULES SHALL BE LOCATED ABOVE CAFETERIA CEILING. MAKE CONNECTIONS AS REQUIRED. COORDINATE EXACT LOCATION OF PIV WITH CIVIL. PVC IS ACCEPTABLE FOR USE, PER SPECIFICATIONS, UNDERGROUND ONLY.
8	CONNECT TO GRINDER PUMP DISCONNECTING MEANS PROVIDED BY CIVIL. COORDINATE EXACT LOCATION WITH CIVIL. PROVIDE NEW 20A/3P CIRCUIT BREAKER IN EXISTING SPACE NOTED. CIRCUIT SHALL BE (4) #10, #10 GRD, 1"C. PROVIDE CONDUIT SEAL WHERE CONDUIT STUBS OUT OF GROUND. PVC IS ACCEPTABLE FOR USE, PER SPECIFICATIONS, UNDERGROUND ONLY.
9	2"C FOR P/A CONNECTION TO MODULAR BUILDINGS. PVC IS ACCEPTABLE FOR USE, PER SPECIFICATIONS, UNDERGROUND ONLY.

1 E002 **ELECTRICAL SITE PLAN**
SCALE: 1" = 20'-0"

20' 10' 0 20' 40'

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Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

ELECTRICAL SITE PLAN

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18
REVISIONS

1	REVISION # 1	2/15/18
2	REVISION #2	2/20/18

SHEET NUMBER
E002

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SW Project No: 0594-13-00-17

GENERAL NOTES

1. COORDINATE EXACT LOCATION AND ELECTRICAL REQUIREMENTS OF ALL HVAC AND PLUMBING EQUIPMENT WITH RESPECTIVE CONTRACTORS. NOTIFY ENGINEER IMMEDIATELY, IN WRITING, OF ANY DISCREPANCIES.
2. ALL CEILING MOUNTED POWER AND DATA DEVICES SHALL BE PROTECTED DURING DEMOLITION AND REINSTALLED IN NEW CEILING IN SAME LOCATION.
3. PROTECT ALL EXISTING SECURITY AND ACCESS CONTROL DEVICES, WIRING, EQUIPMENT, ETC.

KEY NOTES TO E101

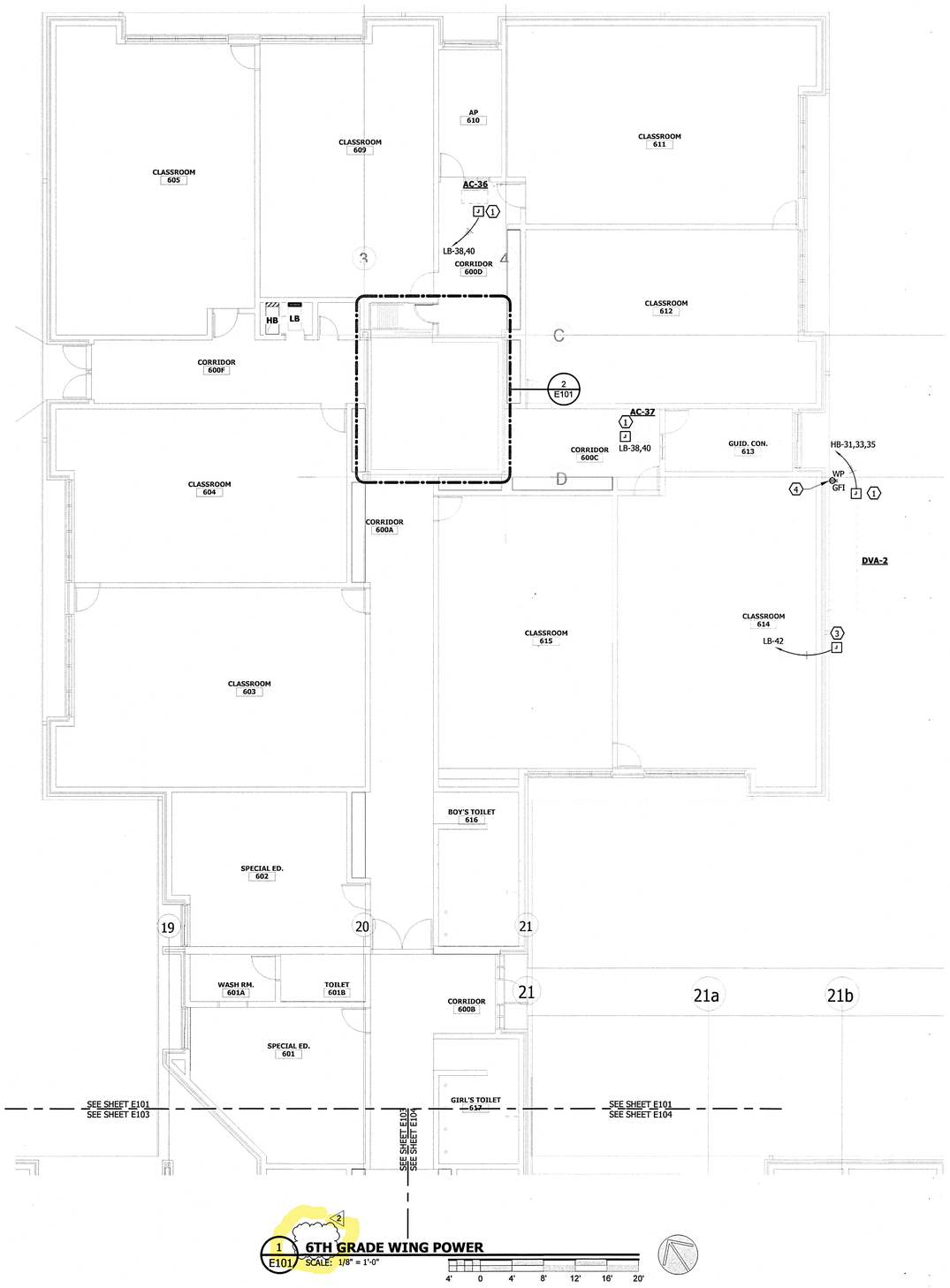
(#)

1 MAKE CONNECTION TO DISCONNECT PROVIDED BY TRADE PROVIDING EQUIPMENT.

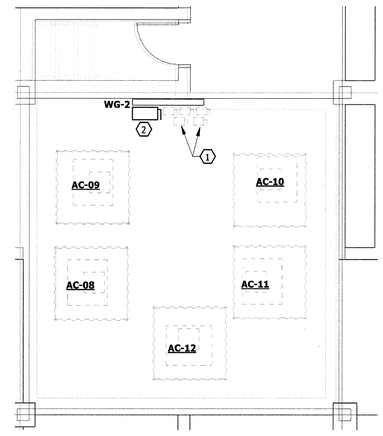
2 REPLACE EXISTING DISCONNECT SWITCH WITH NEW.

3 MAKE CONNECTION TO HEAT TAPE DISCONNECTING MEANS.

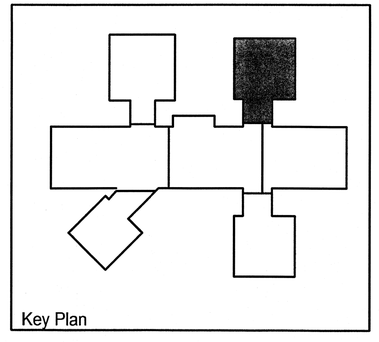
4 CONNECT TO NEAREST CORRIDOR RECEPTACLE.



1 E101 **6TH GRADE WING POWER**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'



2 E101 **8TH GRADE WING - MECHANICAL LOFT PLAN**
SCALE: 1/4" = 1'-0"
4' 0 4' 8'


Key Plan

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NORTH CAROLINA PROFESSIONAL SEAL 039503 ENGINEER MATTHEW J. JOHNSON

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

2 6TH GRADE WING - POWER PLAN

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18
REVISIONS

1	REVISION # 1	2/15/18
2	REVISION # 2	2/20/18

SHEET NUMBER
E101

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GENERAL NOTES

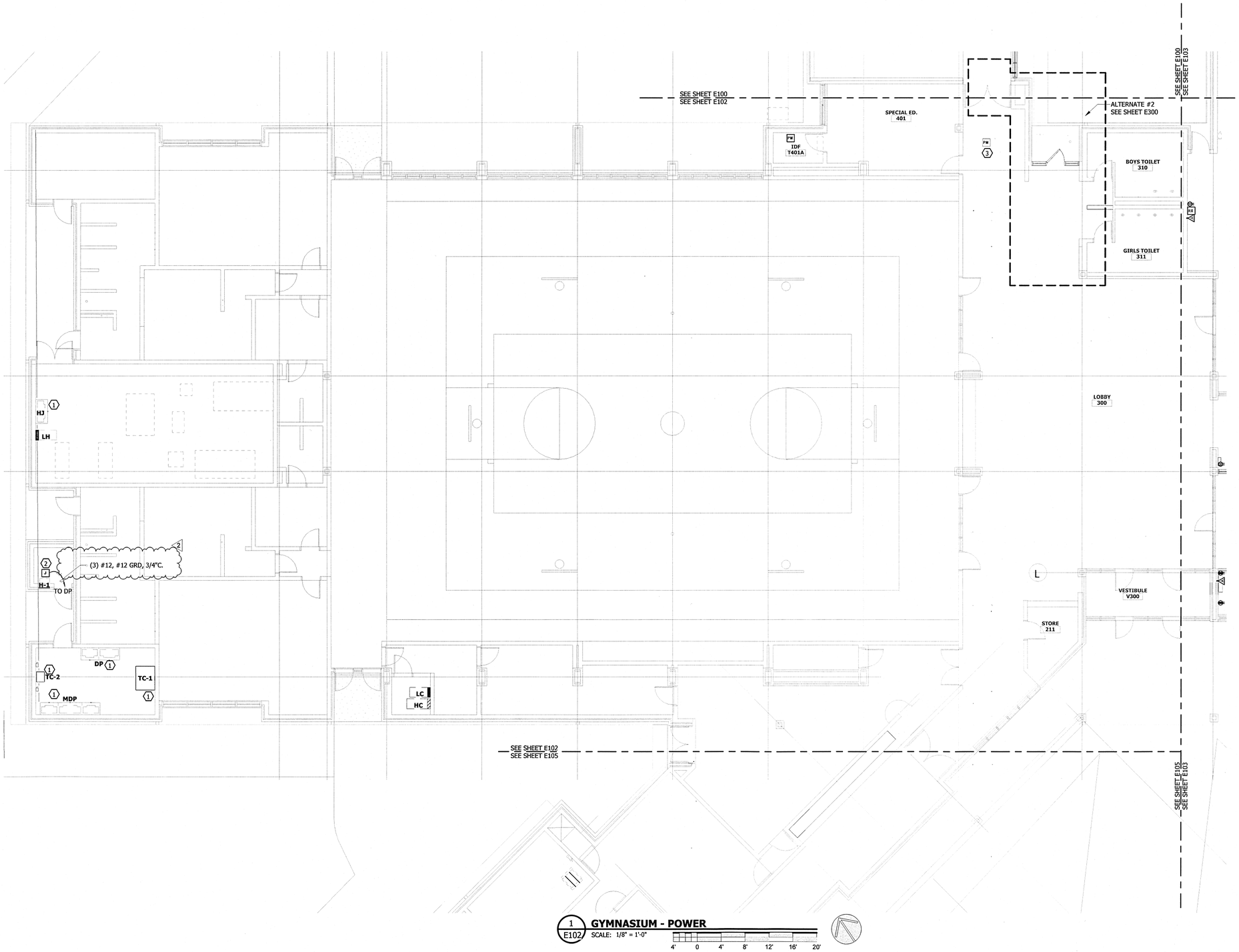
1. COORDINATE EXACT LOCATION AND ELECTRICAL REQUIREMENTS OF ALL HVAC AND PLUMBING EQUIPMENT WITH RESPECTIVE CONTRACTORS. NOTIFY ENGINEER IMMEDIATELY, IN WRITING, OF ANY DISCREPANCIES.
2. ALL CEILING MOUNTED POWER AND DATA DEVICES SHALL BE PROTECTED DURING DEMOLITION AND REINSTALLED IN NEW CEILING IN SAME LOCATION.
3. PROTECT ALL EXISTING SECURITY AND ACCESS CONTROL DEVICES, WIRING, EQUIPMENT, ETC.

KEY NOTES TO E102

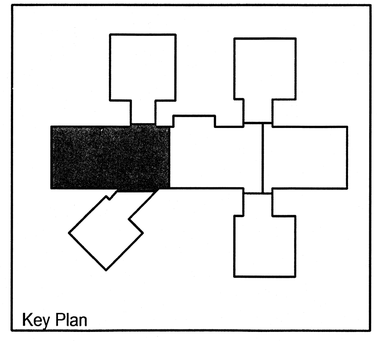
1 ALTERNATE BID #1 - REPLACE EXISTING EQUIPMENT IN PLACE. RECONNECT EXISTING CONDUITS AND CONDUCTORS TO NEW CABINET AS REQUIRED. EXTEND CONDUCTORS TO NEW CIRCUIT BREAKERS AS REQUIRED.

2 MAKE CONNECTION TO DISCONNECT PROVIDED BY TRADE PROVIDING EQUIPMENT.

3 EXISTING ACCESS CONTROL PIM. RELOCATE TO IDF T401A. DEMOLISH EXISTING DATA CABLE. PROVIDE NEW CAT 6 DATA CABLE TO NEW LOCATION.



1 E102 **GYMNASIUM - POWER**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'



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GYMNASIUM - POWER PLAN

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SHEET NUMBER
E102

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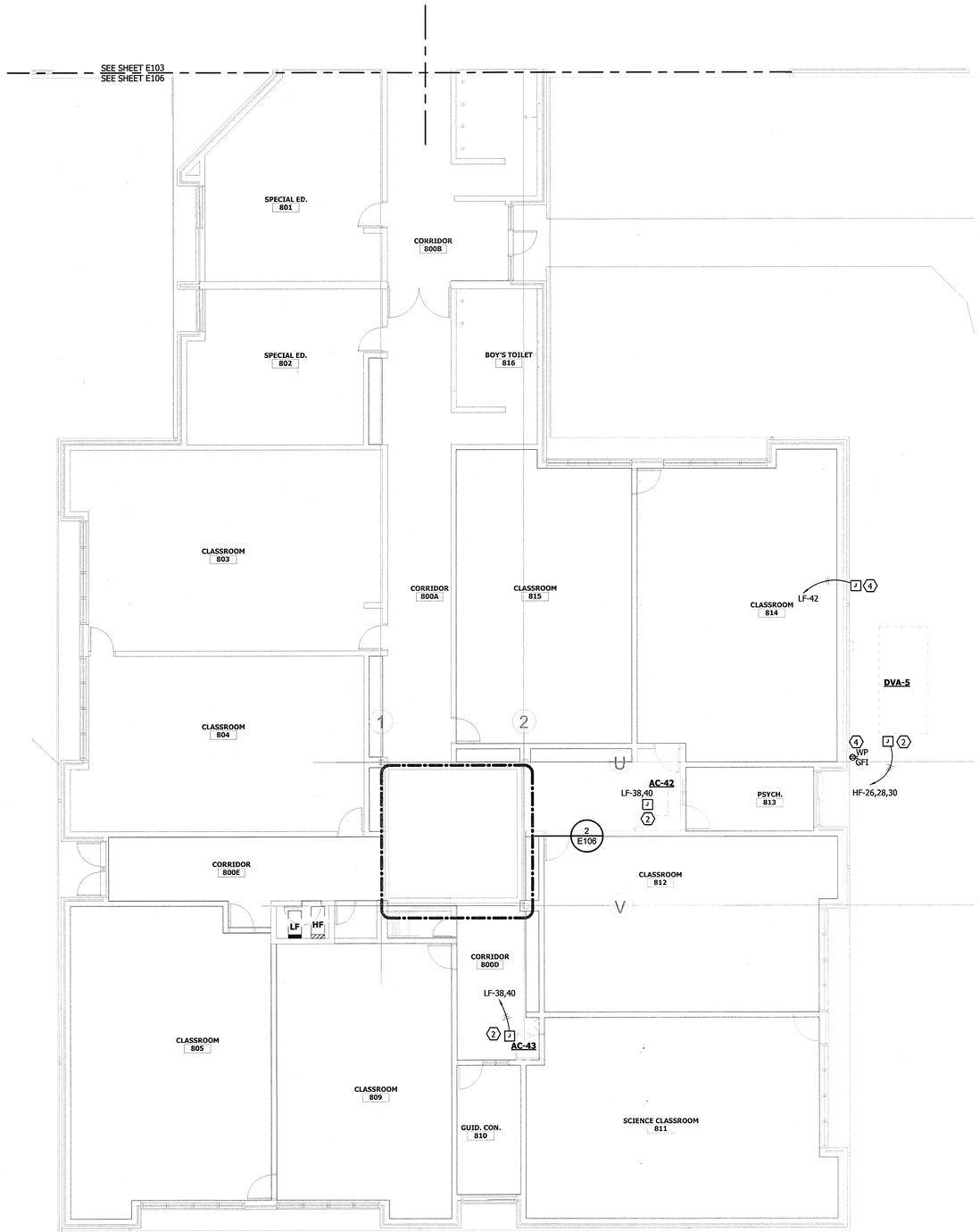


1 E106 **8TH GRADE WING POWER**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'

GENERAL NOTES

1. COORDINATE EXACT LOCATION AND ELECTRICAL REQUIREMENTS OF ALL HVAC AND PLUMBING EQUIPMENT WITH RESPECTIVE CONTRACTORS. NOTIFY ENGINEER IMMEDIATELY, IN WRITING, OF ANY DISCREPANCIES.
2. ALL CEILING MOUNTED POWER AND DATA DEVICES SHALL BE PROTECTED DURING DEMOLITION AND REINSTALLED IN NEW CEILING IN SAME LOCATION.
3. PROTECT ALL EXISTING SECURITY AND ACCESS CONTROL DEVICES, WIRING, EQUIPMENT, ETC.

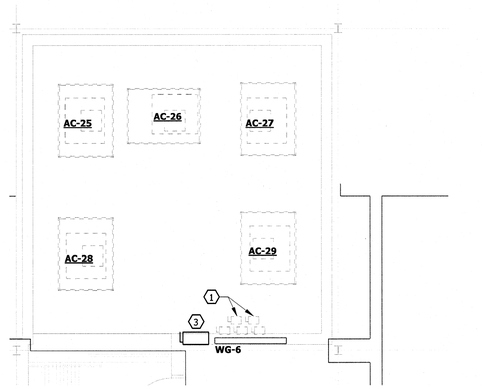
(#) KEY NOTES TO E106

1 MAKE CONNECTION TO DISCONNECT PROVIDED BY TRADE PROVIDING EQUIPMENT.

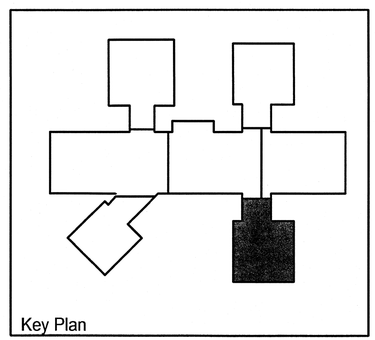
2 CONNECT EXISTING CIRCUIT TO NEW DISCONNECTING MEANS.

3 DEMOLISH ELECTRICAL CONNECTION TO EXISTING EQUIPMENT SCHEDULE FOR DEMOLITION.

4 CONNECT TO NEAREST GENERAL RECEPTACLE CIRCUIT.



2 E106 **6TH GRADE WING - MECHANICAL LOFT PLAN**
SCALE: 1/4" = 1'-0"
4' 0 4' 8' 12' 16' 20'



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NORTH CAROLINA PROFESSIONAL SEAL 039503 ENGINEER MATTHEW J. JOHNSON 2/20/18

Renovations and Additions to: Myrtle Grove Middle School

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8TH GRADE WING - POWER PLAN

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SHEET NUMBER E106

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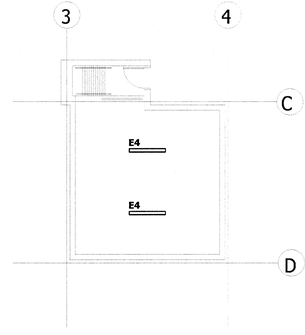
1 E201 **6TH GRADE WING - LIGHTING AND FIRE ALARM**
SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'

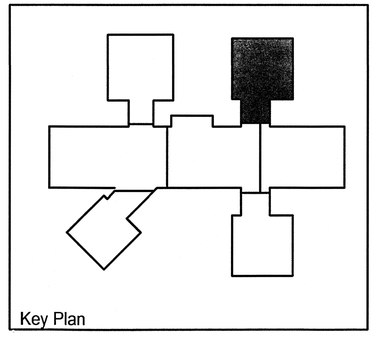
GENERAL NOTES

1. COORDINATE EXACT LOCATION AND MOUNTING OF ALL CEILING MOUNTED DEVICES WITH REFLECTED CEILING PLAN PRIOR TO ROUGH IN.
2. ALL OCCUPANCY SENSORS WITHOUT INTEGRAL ON/OFF SWITCHES SHALL BE LOW VOLTAGE. PROVIDE POWER PACKS (NOT SHOWN) AS REQUIRED FOR SWITCHING INDICATED.
3. COORDINATE LOCATIONS AND QUANTITIES OF FLOW AND TAMPER SWITCHES WITH FIRE PROTECTION CONTRACTOR.
4. ALL LIGHT FIXTURES SHALL REPLACED ONE FOR ONE. NEW LIGHT FIXTURES SHALL BE INSTALLED IN SAME LOCATION AS EXISTING LIGHT FIXTURES. WHERE INDICATED, REPLACE EXISTING SWITCHES WITH NEW 0-10V DIMMER SWITCHES. WHERE INDICATED, PROVIDE NEW OCCUPANCY SENSORS AND DIMMING CONTROL WIRING. MODIFY ALL WIRING AS REQUIRED.
5. ALL CEILING MOUNTED DEVICES (SPEAKERS, ETC.) SHALL BE PROTECTED DURING DEMOLITION AND INSTALLED IN NEW CEILING IN THE SAME LOCATION.
6. REPLACE ALL SMOKE DETECTORS WITH NEW. PROVIDE ALL HARDWARE, LABOR, AND PROGRAMMING REQUIRED.
7. PROTECT ALL EXISTING EQUIPMENT, CABLING, ETC ABOVE CEILING.
8. TEST, LABEL, REMOVE, STORE, REINSTALL, AND RETEST ALL PROJECTORS, WIRELESS ACCESS POINTS, ETC. ALL WORK SHALL BE DONE BY FACTORY TRAINED AND LISCENSED PERSONEL.
   ALL EQUIPMENT SHALL BE TESTED PRIOR TO REMOVAL. SUBMIT TEST RESULTS FOR EACH PIECE OF EQUIPMENT TO OWNER AND ENGINEER. PROVIDE A UNIQUE LABEL FOR EACH PIECE OF EQUIPMENT. CAREFULLY REMOVE EACH DEVICE AND PROTECT FOR STORAGE AND REINSTALLATION OF EACH DEVICE. UPON COMPLETION OF CEILING WORK, REINSTALL EQUIPMENT IN SAME LOCATION EQUIPMENT WAS REMOVED FROM. TEST AND RECOMMISSION EQUIPMENT TO ENSURE PROPER FUNCTIONALITY. SUBMIT TEST RESULTS FOR EACH PIECE OF EQUIPMENT TO OWNER AND ENGINEER.



2 E201 **LOFT - 8TH GRADE WING - LIGHTING AND FIRE ALARM**
SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'



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NORTH CAROLINA PROFESSIONAL SEAL 039503 ENGINEER MATTHEW V. JOHNSON 01/24/18

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

6TH GRADE WING - LIGHTING AND FIRE ALARM PLAN

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1 E202 **GYMNASIUM - LIGHTING AND FIRE ALARM**
SCALE: 1/8" = 1'-0"
4' 0 4' 8' 12' 16' 20'

GENERAL NOTES

1. COORDINATE EXACT LOCATION AND MOUNTING OF ALL CEILING MOUNTED DEVICES WITH REFLECTED CEILING PLAN PRIOR TO ROUGH IN.
2. ALL OCCUPANCY SENSORS WITHOUT INTEGRAL ON/OFF SWITCHES SHALL BE LOW VOLTAGE. PROVIDE POWER PACKS (NOT SHOWN) AS REQUIRED FOR SWITCHING INDICATED.
3. COORDINATE LOCATIONS AND QUANTITIES OF FLOW AND TAMPER SWITCHES WITH FIRE PROTECTION CONTRACTOR.
4. ALL LIGHT FIXTURES SHALL REPLACED ONE FOR ONE. NEW LIGHT FIXTURES SHALL BE INSTALLED IN SAME LOCATION AS EXISTING LIGHT FIXTURES. WHERE INDICATED, REPLACE EXISTING SWITCHES WITH NEW 0-10V DIMMER SWITCHES. WHERE INDICATED, PROVIDE NEW OCCUPANCY SENSORS AND DIMMING CONTROL WIRING. MODIFY ALL WIRING AS REQUIRED.
5. ALL CEILING MOUNTED DEVICES (SPEAKERS, ETC.) SHALL BE PROTECTED DURING DEMOLITION AND INSTALLED IN NEW CEILING IN THE SAME LOCATION.
6. REPLACE ALL SMOKE DETECTORS WITH NEW. PROVIDE ALL HARDWARE, LABOR, AND PROGRAMMING REQUIRED.
7. PROTECT ALL EXISTING EQUIPMENT, CABLING, ETC ABOVE CEILING.
8. TEST, LABEL, REMOVE, STORE, REINSTALL, AND RETEST ALL PROJECTORS, WIRELESS ACCESS POINTS, ETC. ALL WORK SHALL BE DONE BY FACTORY TRAINED AND LISCENSED PERSONEL.
   ALL EQUIPMENT SHALL BE TESTED PRIOR TO REMOVAL. SUBMIT TEST RESULTS FOR EACH PIECE OF EQUIPMENT TO OWNER AND ENGINEER. PROVIDE A UNIQUE LABEL FOR EACH PIECE OF EQUIPMENT. CAREFULLY REMOVE EACH DEVICE AND PROTECT FOR STORAGE AND REINSTALLATION OF EACH DEVICE. UPON COMPLETION OF CEILING WORK, REINSTALL EQUIPMENT IN SAME LOCATION EQUIPMENT WAS REMOVED FROM. TEST AND RECOMMISSION EQUIPMENT TO ENSURE PROPER FUNCTIONALITY. SUBMIT TEST RESULTS FOR EACH PIECE OF EQUIPMENT TO OWNER AND ENGINEER.

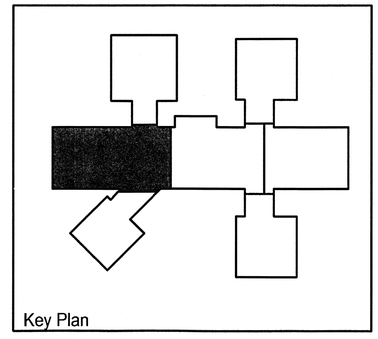
KEY NOTES TO E202

1 PROTECT ANY AND ALL LINEAR BEAM SMOKE DETECTORS DURING CONSTRUCTION. CLEAN, REALIGN, AND TEST LINEAR BEAM DETECTORS TO INSURE THEY ARE IN PROPER WORKING ORDER FOR A FULLY FUNCTIONAL SYSTEM.

2 CONNECT EMERGENCY LIGHTING TO LOCAL LIGHTING CIRCUIT UNSWITCHED.

3 CONNECT NEW LIGHTING TO EXISTING LOCAL LIGHTING CIRCUIT AS INDICATED.

4 PROVIDE WIRE GUARD FOR FIXTURE (TYP IN GYMNASIUM) 2


Key Plan

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NORTH CAROLINA PROFESSIONAL SEAL 039503 ENGINEER MATTHEW J. JOHNSON 2/20/18

Renovations and Additions to: Myrtle Grove Middle School

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GYMNASIUM - LIGHTING PLAN

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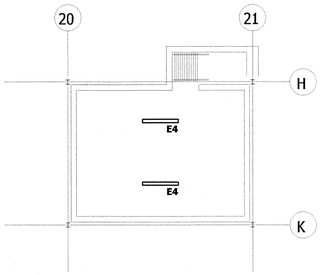
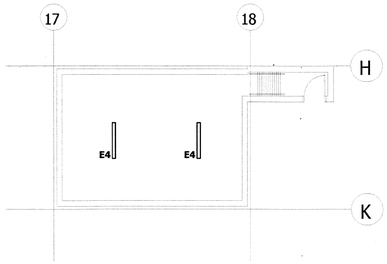




2 E203 LOFT - ADMIN EAST LIGHTING AND FIRE ALARM

SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'

3 E203 LOFT - ADMIN WEST LIGHTING AND FIRE ALARM

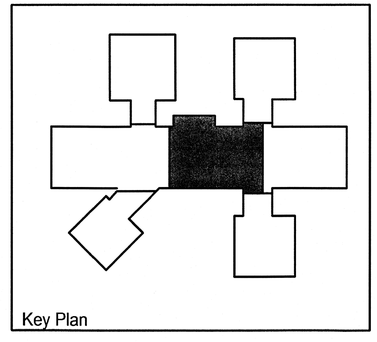
SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'



1 E203 ADMIN & MEDIA CENTER - LIGHTING AND FIRE ALARM

SCALE: 1/8" = 1'-0"



GENERAL NOTES

1. COORDINATE EXACT LOCATION AND MOUNTING OF ALL CEILING MOUNTED DEVICES WITH REFLECTED CEILING PLAN PRIOR TO ROUGH IN.
2. ALL OCCUPANCY SENSORS WITHOUT INTEGRAL ON/OFF SWITCHES SHALL BE LOW VOLTAGE. PROVIDE POWER PACKS (NOT SHOWN) AS REQUIRED FOR SWITCHING INDICATED.
3. COORDINATE LOCATIONS AND QUANTITIES OF FLOW AND TAMPER SWITCHES WITH FIRE PROTECTION CONTRACTOR.
4. ALL LIGHT FIXTURES SHALL REPLACED ONE FOR ONE. NEW LIGHT FIXTURES SHALL BE INSTALLED IN SAME LOCATION AS EXISTING LIGHT FIXTURES. WHERE INDICATED, REPLACE EXISTING SWITCHES WITH NEW 0-10V DIMMER SWITCHES. WHERE INDICATED, PROVIDE NEW OCCUPANCY SENSORS AND DIMMING CONTROL WIRING. MODIFY ALL WIRING AS REQUIRED.
5. ALL CEILING MOUNTED DEVICES (SPEAKERS, ETC.) SHALL BE PROTECTED DURING DEMOLITION AND INSTALLED IN NEW CEILING IN THE SAME LOCATION.
6. REPLACE ALL SMOKE DETECTORS WITH NEW. PROVIDE ALL HARDWARE, LABOR, AND PROGRAMMING REQUIRED.
7. PROTECT ALL EXISTING EQUIPMENT, CABLING, ETC ABOVE CEILING.
8. TEST, LABEL, REMOVE, STORE, REINSTALL, AND RETEST ALL PROJECTORS, WIRELESS ACCESS POINTS, ETC. ALL WORK SHALL BE DONE BY FACTORY TRAINED AND LISCENSED PERSONEL.
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(#) KEY NOTES TO E203

1 CONNECT TYPE J FIXTURES TO EXISTING 120V CIRCUIT IN MEDIA CENTER DAYLIGHTING MONITOR. PROVIDE SEPARATE DIMMER SWITCHES TO CONTROL UPLIGHT SEPARATELY FROM DOWNLIGHT.

2 CONNECT EMERGENCY LIGHTING TO LOCAL LIGHTING CIRCUIT UNSWITCHED.

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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 039503 MATTHEW J. MORRISON

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

ADMIN & MEDIA CENTER - LIGHTING AND FIRE ALARM PLAN

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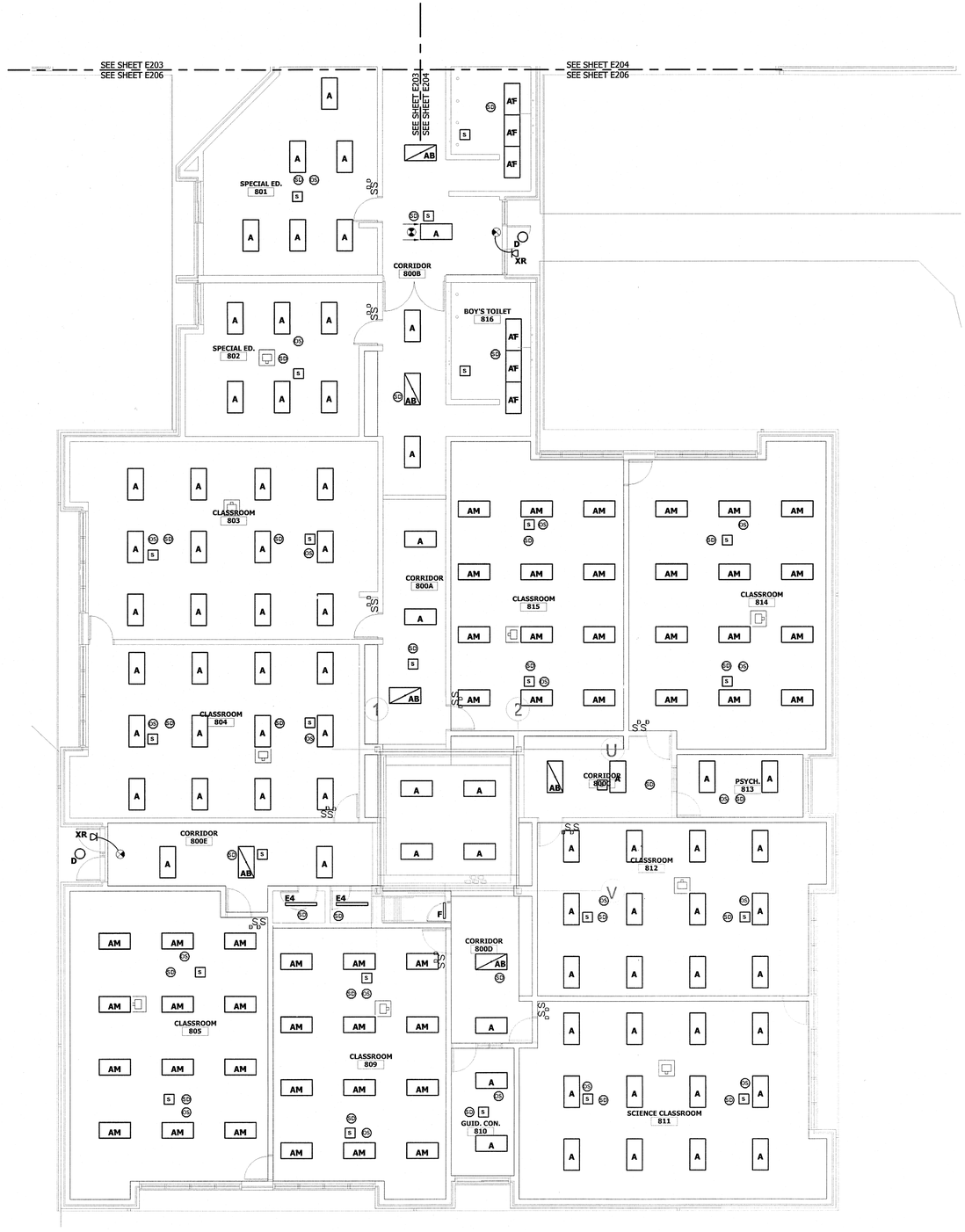
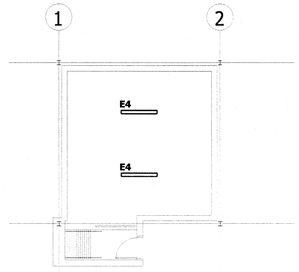


1 E206 **8TH GRADE WING LIGHTING AND FIRE ALARM**
SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'



2 E206 **LOFT - 6TH GRADE WING LIGHTING AND FIRE ALARM**
SCALE: 1/8" = 1'-0"

4' 0 4' 8' 12' 16' 20'

GENERAL NOTES

1. COORDINATE EXACT LOCATION AND MOUNTING OF ALL CEILING MOUNTED DEVICES WITH REFLECTED CEILING PLAN PRIOR TO ROUGH IN.
2. ALL OCCUPANCY SENSORS WITHOUT INTEGRAL ON/OFF SWITCHES SHALL BE LOW VOLTAGE. PROVIDE POWER PACKS (NOT SHOWN) AS REQUIRED FOR SWITCHING INDICATED.
3. COORDINATE LOCATIONS AND QUANTITIES OF FLOW AND TAMPER SWITCHES WITH FIRE PROTECTION CONTRACTOR.
4. ALL LIGHT FIXTURES SHALL REPLACED ONE FOR ONE. NEW LIGHT FIXTURES SHALL BE INSTALLED IN SAME LOCATION AS EXISTING LIGHT FIXTURES. WHERE INDICATED, REPLACE EXISTING SWITCHES WITH NEW 0-10V DIMMER SWITCHES. WHERE INDICATED, PROVIDE NEW OCCUPANCY SENSORS AND DIMMING CONTROL WIRING. MODIFY ALL WIRING AS REQUIRED.
5. ALL CEILING MOUNTED DEVICES (SPEAKERS, ETC.) SHALL BE PROTECTED DURING DEMOLITION AND INSTALLED IN NEW CEILING IN THE SAME LOCATION.
6. REPLACE ALL SMOKE DETECTORS WITH NEW. PROVIDE ALL HARDWARE, LABOR, AND PROGRAMMING REQUIRED.
7. PROTECT ALL EXISTING EQUIPMENT, CABLING, ETC ABOVE CEILING.
8. TEST, LABEL, REMOVE, STORE, REINSTALL, AND RETEST ALL PROJECTORS, WIRELESS ACCESS POINTS, ETC. ALL WORK SHALL BE DONE BY FACTORY TRAINED AND LISCENSED PERSONEL.
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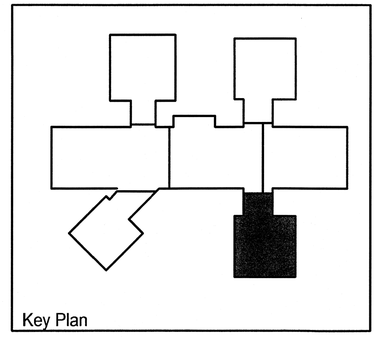

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8TH GRADE WING - LIGHTING AND FIRE ALARM PLAN

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SHEET NUMBER
E206

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FEEDER SCHEDULE		
Mark	Ampacity	Description
20G	20A	3-#12 PHASE & 1-#12 GND IN 3/4" C.
30G	35A	3-#10 PHASE & 1-#10 GND IN 3/4" C.
50G	50A	3-#8 PHASE & 1-#10 GND IN 1" C.
100G	100A	3-#3 PHASE & 1-#8 GND IN 1 1/4" C.
150NG	150A	3-#1/0 PHASE, 1-#1/0 NEU, & 1-#6 GND IN 2" C.
150G	150A	3-#1/0 PHASE & 1-#6 GND IN 1 1/2" C.
200G	200A	3-#3/0 PHASE & 1-#6 GND IN 2" C.

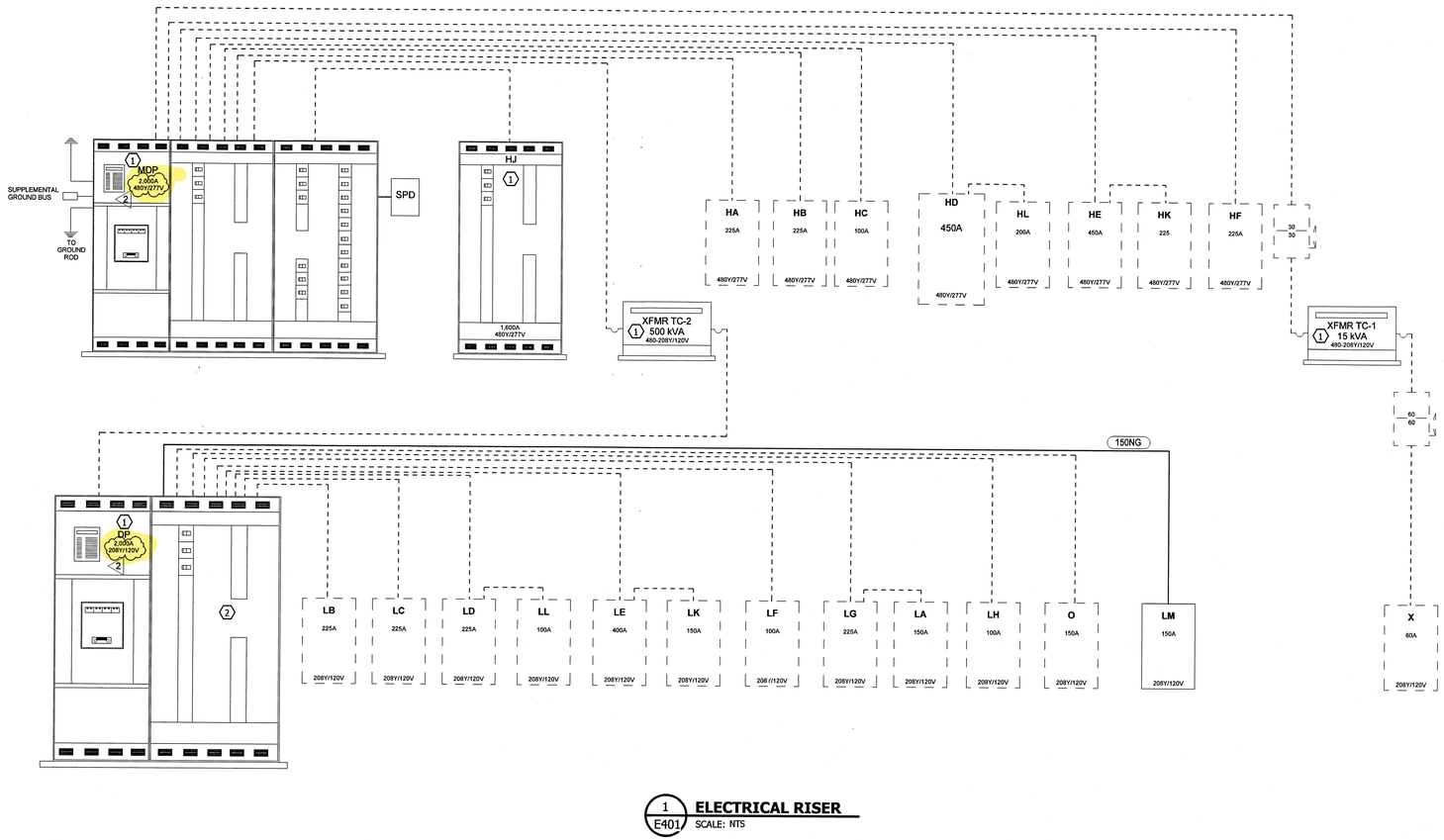
NOTES TO FEEDER SCHEDULE:

1. ALL AMPACITIES ARE BASED ON 75° C. RATING. CONTRACTOR IS RESPONSIBLE FOR THE MODIFICATION OF CONDUCTOR SIZES AS NECESSARY TO MEET THE REQUIREMENTS OF NEC 110-14(C) WHERE TERMINATIONS ARE NOT LISTED AND LABELED FOR USE AT 75° C. THIS REQUIREMENT APPLIES TO TERMINATIONS IN BOTH NEW EQUIPMENT AND IN EXISTING EQUIPMENT TO WHICH TERMINATIONS ARE MADE AS A PART OF THIS PROJECT.
2. DESIGNATION "C" IN THE ABOVE TABLE REFERS TO "CONDUIT". SEE SPECIFICATIONS FOR EXACT TYPE OF RACEWAY REQUIRED. TYPE OF RACEWAY, UNLESS INDICATED IN TABLE OR ELSEWHERE IN THE DRAWINGS, IS TO BE DETERMINED BY USE CONDITIONS.
3. PROVIDE A BONDING BUSHING AT THE EQUIPMENT END OF THIS CONDUIT RUN AND A BONDING HUB AT THE CONNECTION TO THE GROUNDING ELECTRODE.

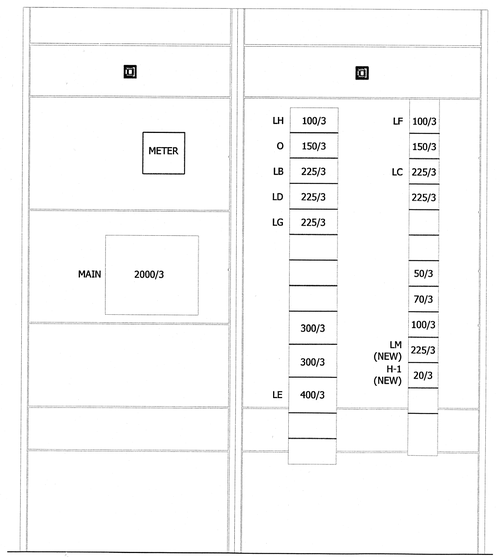
KEY NOTES TO E401

1 ALTERNATE BID #1 - REPLACE EXISTING EQUIPMENT IN PLACE. RECONNECT EXISTING CONDUITS TO NEW CABINET AS REQUIRED. EXTEND CONDUCTORS TO NEW CIRCUIT BREAKERS AS REQUIRED.

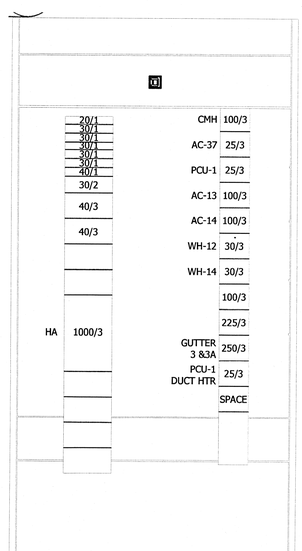
2 BASE BID: PROVIDE NEW 225A/3P AND 20A/3P CIRCUIT BREAKERS IN EXISTING SPACES TO FEED PANEL LM AND H-1 RESPECTIVELY.



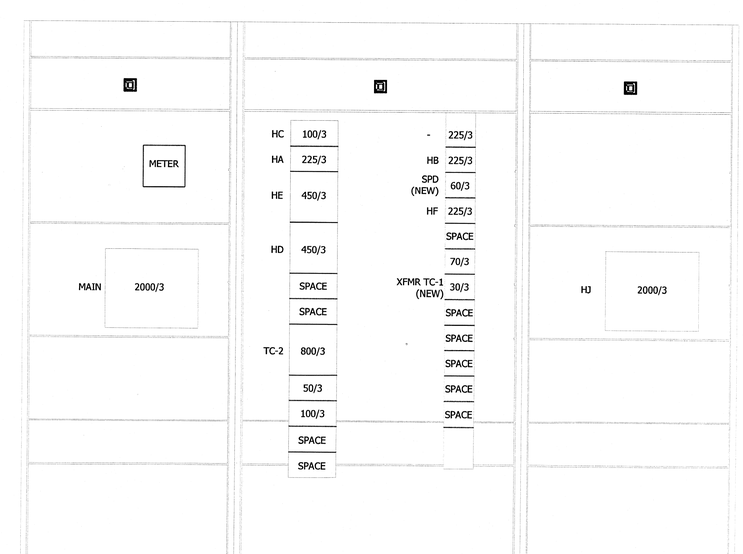
1 E401 **ELECTRICAL RISER**
SCALE: NTS



4 E401 **DP ELEVATION**
SCALE: NO SCALE



3 E401 **HJ ELEVATION**
SCALE: NO SCALE



2 E401 **MDP ELEVATION**
SCALE: NO SCALE

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NORTH CAROLINA PROFESSIONAL SEAL 039503 ENGINEER MATTHEW A. JOHNSON

Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

ELECTRICAL DISTRIBUTION

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18

REVISIONS

1	REVISION # 1	2/15/18
2	REVISION #2	2/20/18

SHEET NUMBER E401

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SW Project No: 0594-13-40-17

PANEL ID: HA

VOLTAGE: 480Y/277 | LOCATION: ELECTRICAL 405 | MOUNTING: SURFACE
AMPS: 200 | SOURCE: MDP | TYPE: EXIST SQD NEHB

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A	B	C	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
EXIST CKT		--	--	--	--	1	20	1	0	0		2	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	3		0	0	4	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	5			0	6	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	7	0	0		8	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	9		0	0	10	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	11			0	12	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	13	0	0		14	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	15		0	0	16	20	1	--	--	--	--		EXIST CKT
EXIST CKT		--	--	--	--	1	20	17			0	18	20	1	--	--	--	--		EXIST CKT
								19	19676	0		20	--	--	--	--	--	--	--	SPACE
DVA-1	1	1	8	-	4	3	80	21			19676	22	--	--	--	--	--	--	--	SPACE
								23			19676	24	--	--	--	--	--	--	--	SPACE
								25	0	0		26	--	--	--	--	--	--		SPACE
EXIST CKT		--	--	--	--	3	100	27		0	0	28	--	--	--	--	--	--	--	SPACE
								29			0	30	--	--	--	--	--	--	--	SPACE
								31	30885	0		32								
WG-1						3	200	33			30885	34	100	3	--	--	--	--		EXIST CKT
								35			30885	36								

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 225 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	50.6	50.6	50.6	151683 W PANEL TOTAL
AMPS/PHASE	183 A	183 A	183 A	

NOTES:
1. PROVIDE NEW CIRCUIT BREAKER SIZED AS INDICATED. MATCH EXISTING MANUFACTURER AND AIC RATING.

PANEL ID: HB

VOLTAGE: 480Y/277 | LOCATION: ELECTRICAL 606 | MOUNTING: SURFACE
AMPS: 225 | SOURCE: MDP | TYPE: EXIST SQD NEHB

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A	B	C	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
EXIST LTG CORR		--	--	--	--	1	20	1	1000	1000		2	20	1	--	--	--	--		EXIST LTG 206
EXIST LTG 201		--	--	--	--	1	20	3		1000	1000	4	20	1	--	--	--	--		EXIST LTG 204
EXIST LTG 202		--	--	--	--	1	20	5			1000	6	20	1	--	--	--	--		EXIST LTG 214
EXIST LTG 216		--	--	--	--	1	20	7	1000	1000		8	20	1	--	--	--	--		EXIST LTG 215
EXIST LTG 217		--	--	--	--	1	20	9		1000	1000	10	20	1	--	--	--	--		EXIST LTG 219-223
SPARE		--	--	--	--	1	20	11			0	12	20	1	--	--	--	--		EXIST LTG RESTROOMS
SPARE		--	--	--	--	1	20	13	0	0		14	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	15		0	0	16	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	17			0	18	20	1	--	--	--	--		SPARE
								19	0	0		20	--	--	--	--	--	--	--	SPACE
SPARE		--	--	--	--	3	50	21			0	22	--	--	--	--	--	--	--	SPACE
								23			0	24	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	25	0	0		26								
SPACE	--	--	--	--	--	--	--	27		0	0	28	70	3	--	--	--	--		SPARE
SPACE	--	--	--	--	--	--	--	29			0	30								
								31	19676	0		32	--	--	--	--	--	--	--	SPACE
DVA-2	1	1	8	-	4	3	80	33			19676	34	--	--	--	--	--	--	--	SPACE
								35			19676	36	--	--	--	--	--	--	--	SPACE
UNUSABLE	--	--	--	--	--	--	--	37	0	22031		38								
UNUSABLE	--	--	--	--	--	--	--	39		0	22031	40	200	3						EXIST WG-2 VIA FEED THRU BREAKER
UNUSABLE	--	--	--	--	--	--	--	41			0	22031	42							

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 225 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	45.7	45.7	44.7	136120 W PANEL TOTAL
AMPS/PHASE	166 A	166 A	161 A	

NOTES:
1. PROVIDE NEW CIRCUIT BREAKER SIZED AS INDICATED. MATCH EXISTING MANUFACTURER AND AIC RATING.

PANEL ID: HD

VOLTAGE: 480Y/277 | LOCATION: ELECTRICAL 510 | MOUNTING: SURFACE
AMPS: 450 | SOURCE: MDP | TYPE: EXIST SQD I-LINE

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A (VA)	B (VA)	C (VA)	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
EXIST LTG LIBRARY		--	--	--	--	1	20	1	1000	1000		2	20	1	--	--	--	--		EXIST LTG 452
EXIST HALLWAY AREA 3		--	--	--	--	1	20	3		1000	1000	4	20	1	--	--	--	--		EXIST LTG 451
EXIST LTG 440		--	--	--	--	1	20	5			1000	6	20	1	--	--	--	--		EXIST LTG 444
EXIST LTG 439		--	--	--	--	1	20	7	1000	1000		8	20	1	--	--	--	--		EXIST LTG 445
EXIST LTG 433		--	--	--	--	1	20	9		1000	1000	10	20	1	--	--	--	--		EXIST LTG 434, 450
EXIST LTG 432		--	--	--	--	1	20	11			1000	12	20	1	--	--	--	--		EXIST CKT
EXIST LTG 401		--	--	--	--	1	20	13	1000	1000		14	20	1	--	--	--	--		EXIST LTG 412-414
EXIST LTG 401		--	--	--	--	1	20	15		1000	1000	16	20	1	--	--	--	--		EXIST EM LTG AREA 1
EXIST LTG 427,8, 31		--	--	--	--	1	20	17			1000	18	20	1	--	--	--	--		EXIST EM LTG AREA 2
EXIST LTG 422, 418		--	--	--	--	1	20	19	1000	1000		20	20	1	--	--	--	--		EXIST LTG CORR
EXIST LTG 405,6 10		--	--	--	--	1	20	21		1000	1000	22	20	1	--	--	--	--		EXIST EM LTG AREA 411
SPARE		--	--	--	--	1	20	23			0	24	20	1	--	--	--	--		EXIST EM LTG AREA 5
EXIST LTG MECH RM 424		--	--	--	--	1	20	25	1000	19676		26								
SPARE		--	--	--	--	1	20	27		0	19676	28	80	3	4	-	8	1	1	DVA-4
								29			26105	19676	30							
WG-4A						3	150	31	26105	22068		32								
								33		26105	22068	34	150	3						WG-4B
								35			27832	22068	36							
HL						3	200	37	25832	15713		38								
								39			25832	15713	40	150	3					WG-4C
SPACE	--	--	--	--	--	--	--	41			0	15713	42							

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 600 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	118.4	117.4	118.4	354180 W PANEL TOTAL
AMPS/PHASE	428 A	424 A	428 A	

NOTES:
1. PROVIDE NEW CIRCUIT BREAKER SIZED AS INDICATED. MATCH EXISTING MANUFACTURER AND AIC RATING.

PANEL ID: HE

VOLTAGE: 480Y/277 | LOCATION: MECH ROOM M205 | MOUNTING: SURFACE
AMPS: 450 | SOURCE: MDP | TYPE: EXIST SQD NEHB

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A	B	C	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
SPARE		--	--	--	--	1	20	1	0	0		2	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	3		0	0	4	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	5			0	6	20	1	--	--	--	--		SPARE
								7	10253	4927		8								
AC-24		1	10	-	6	3	60	9		10253	4927	10	25	3	10	-	10	3/4		AC-49
								11			10253	4927	12							
								13	10614	5000		14								
WG-5A (K-MUA)		1	10	-	8	3	50	15			10614	5000	16	30	3	--	--	--		EXIST UNIT HEATER
								17				10614	5000	18						
								19	2106	5000		20								
GHE-1		3/4	10	-	10	3	30	21			2106	5000	22	30	3	--	--	--		EXIST UNIT HEATER
								23				2106	5000	24						
SPACE	--	--	--	--	--	--	--	25	0	10000		26								
SPACE	--	--	--	--	--	--	--	27		0	10000	28	60	3	--	--	--	--		EXIST WATER HEATER
SPACE	--	--	--	--	--	--	--	29			0	10000	30							
SPACE	--	--	--	--	--	--	--	31	0	10000		32								
SPACE	--	--	--	--	--	--	--	33		0	10000	34	60	3	--	--	--	--		EXIST WATER HEATER
SPACE	--	--	--	--	--	--	--	35			0	10000	36							
								37	50000	0		38	--	--	--	--	--	--	--	UNUSABLE
HK						3	225	39			50000	40	--	--	--	--	--	--	--	UNUSABLE
								41			50000	42	--	--	--	--	--	--	--	UNUSABLE

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 600 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	107.9	107.9	107.9	323701 W PANEL TOTAL
AMPS/PHASE	390 A	390 A	390 A	

NOTES:

PANEL ID: HF

VOLTAGE: 480Y/277 | LOCATION: ELECTRICAL 806 | MOUNTING: SURFACE
AMPS: 225 | SOURCE: MDP | TYPE: EXIST SQD NEHB

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A (VA)	B (VA)	C (VA)	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
EXIST LTG CORRIDOR		--	--	--	--	1	20	1	1000	1000		2	20	1	--	--	--	--		EXIST LTG 618
EXIST LTG 621		--	--	--	--	1	20	3		1000	1000	4	20	1	--	--	--	--		EXIST LTG 617
EXIST LTG 622		--	--	--	--	1	20	5			1000	6	20	1	--	--	--	--		EXIST LTG 608
EXIST LTG 607		--	--	--	--	1	20	7	1000	1000		8	20	1	--	--	--	--		EXIST LTG 609
EXIST LTG 606		--	--	--	--	1	20	9		1000	1000	10	20	1	--	--	--	--		EXIST LTG 601-603
EXIST CKT		--	--	--	--	1	20	11			1000	12	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	13	0	0		14	20	1	--	--	--	--		SPARE
EXIST LTG RESTROOMS		--	--	--	--	1	20	15		1000	0	16	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	17			0	18	20	1	--	--	--	--		SPARE
								19	0	0		20	--	--	--	--	--	--	--	SPACE
SPARE		--	--	--	--	3	70	21			0	22	--	--	--	--	--	--	--	SPACE
								23			0	24	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	25	0	19676		26								
SPACE	--	--	--	--	--	--	--	27		0	19676	28	80	3	4	-	8	1	1	DVA-5
SPACE	--	--	--	--	--	--	--	29			0	19676	30							
SPACE	--	--	--	--	--	--	--	31	0	0		32	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	33		0	0	34	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	35			0	36	--	--	--	--	--	--	--	SPACE
UNUSABLE	--	--	--	--	--	--	--	37	0	22031		38								
UNUSABLE	--	--	--	--	--	--	--	39		0	22031	40	200	3						WG-6 (VIA FEED THRU BREAKER)
UNUSABLE	--	--	--	--	--	--	--	41			0	22031	42							

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 225 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	45.7	46.7	44.7	137120 W PANEL TOTAL
AMPS/PHASE	166 A	169 A	161 A	

NOTES:
1. PROVIDE NEW CIRCUIT BREAKER SIZED AS INDICATED. MATCH EXISTING MANUFACTURER AND AIC RATING.

PANEL ID: HL

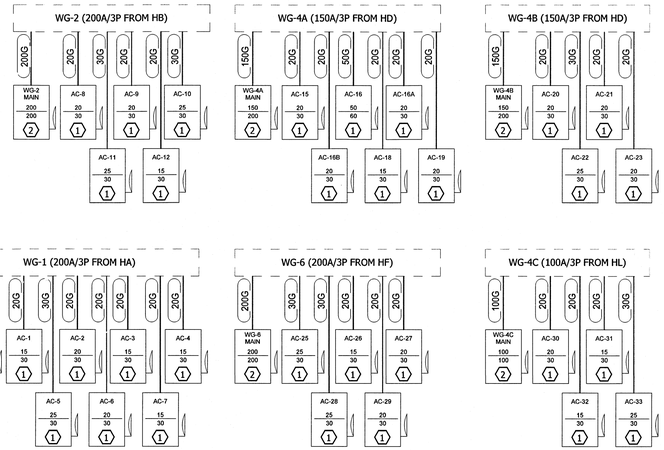
VOLTAGE: 480Y/277 | LOCATION: MECH ACCESS M713 | MOUNTING: SURFACE
AMPS: 200 | SOURCE: HD | TYPE: EXIST SQD NEHB

LOAD	NOTE	COND SIZE	GND SIZE	NEU SIZE	Ø	POLE	BKR SIZE	CKT NO.	A (VA)	B (VA)	C (VA)	CKT NO.	BKR SIZE	POLE	Ø	NEU SIZE	GND SIZE	COND SIZE	NOTE	LOAD
EXIST LTG RESTROOM		--	--	--	--	1	20	1	1000	1000		2	20	1	--	--	--	--		EXIST LTG 461
EXIST LTG 460		--	--	--	--	1	20	3		1000	1000	4	20	1	--	--	--	--		EXIST LTG ENTRANCE
EXIST LTG 464		--	--	--	--	1	20	5			1000	6	20	1	--	--	--	--		EXIST LTG RESTROOM
EXIST LTG HALL 457		--	--	--	--	1	20	7	1000	1000		8	20	1	--	--	--	--		EXIST LTG 455
SPARE		--	--	--	--	1	20	9		0	0	10	20	1	--	--	--	--		SPARE
SPARE		--	--	--	--	1	20	11			0	12								
SPARE		--	--	--	--	1	20	13	0	0		14	50	3	--	--	--	--		SPARE
SPACE	--	--	--	--	--	--	--	15		0	0	16								
								17			23832	0	18	--	--	--	--	--	--	SPACE
DVA-3	1	1 1/4	8	-	3	3	100	19	23832	0		20	--	--	--	--	--	--	--	SPACE
								21		23832	0	22	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	23			0	24	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	25	0	0		26	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	27		0	0	28	--	--	--	--	--	--	--	SPACE
SPACE	--	--	--	--	--	--	--	29			0	30	--	--	--	--	--	--	--	SPACE

MAIN BKR: N/A | PANEL AIC: EXIST
BUS: 200 | SERVICE EQPT: No
LUGS: EXIST | SUBFEED: No
APPROX. DIM. EXIST

TOTALS	PHASE A	PHASE B	PHASE C	
TOTAL (kVA)	27.8	25.8	25.8	79497 W PANEL TOTAL
AMPS/PHASE	100 A	93 A	93 A	

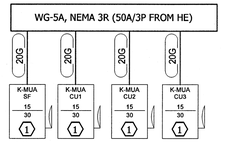
NOTES:
1. PROVIDE NEW CIRCUIT BREAKER SIZED AS INDICATED. MATCH EXISTING MANUFACTURER AND AIC RATING.



KEY NOTES TO E402

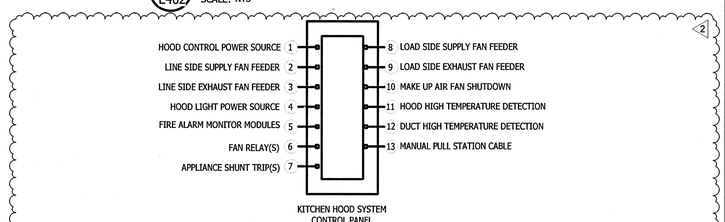
1 DISCONNECT PROVIDED BY HVAC CONTRACTOR. CONNECT TO LINE SIDE OF DISCONNECT.

2 REPLACE EXISTING DISCONNECT SWITCH WITH NEW.



1 E402 ELECTRICAL HVAC WIREWAY RISERS

SCALE: NTS



FOOD SERVICE HOOD CONNECTION SCHEDULE

MARK	DESCRIPTION	RESPONSIBILITY	REMARKS
1	HOOD CONTROL POWER SOURCE	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING POWER SOURCE AND TERMINATE IN HOOD CONTROL PANEL
2	LINE SIDE SUPPLY FAN FEEDER	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO PROVIDE SOURCE AND TERMINATE IN HOOD CONTROL PANEL
3	LINE SIDE EXHAUST FAN FEEDER	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO PROVIDE SOURCE AND TERMINATE IN HOOD CONTROL PANEL
4	HOOD LIGHT POWER SOURCE	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING CIRCUIT AND TERMINATE IN HOOD CONTROL PANEL
5	FIRE ALARM MONITOR MODULES	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO RECONNECT TO EXISTING FIRE ALARM MODULES TO SUPERVISE 120 VAC FOR APPLIANCE SHUNT TRIP, TROUBLE AT HOOD CONTROL PANEL AND ACTIVATION OF HOOD SUPPRESSION SYSTEM. REFER TO FIRE ALARM MATRIX.
6	FAN RELAY(S)	MECHANICAL DIVISION	RELAYS IN CONTROL PANEL PROVIDED WITH HOOD PACKAGE
7	APPLIANCE SHUNT TRIP	ELECTRICAL DIVISION	ELECTRICAL DIVISION TO CONNECT HOOD OUTPUT SIGNAL TO EXISTING APPLIANCE SHUNT TRIP BREAKERS. ALL APPLIANCES UNDER HOOD SHALL POWER DOWN FROM ACTIVATION OF HOOD SYSTEM.
8	LOAD SIDE SUPPLY FAN(S) FEEDER(S)	MECHANICAL DIVISION	MECHANICAL DIVISION PROVIDES LOAD SIDE FEEDER FROM HOOD CONTROL PANEL TO FAN AND PROVIDES UNIT DISCONNECT
9	LOAD SIDE EXHAUST FAN FEEDER	MECHANICAL DIVISION	MECHANICAL DIVISION PROVIDES LOAD SIDE FEEDER FROM HOOD CONTROL PANEL TO FAN AND PROVIDES UNIT DISCONNECT
10	MAKE UP AIR FAN SHUTDOWN	MECHANICAL DIVISION	MECHANICAL DIVISION TO PROVIDE CONTROL WIRING TO ENABLE MAKE UP AIR SHUTDOWN
11	HOOD HIGH TEMPERATURE DETECTION	MECHANICAL DIVISION	FUSIBLE LINK STYLE
12	DUCT HIGH TEMPERATURE DETECTION	MECHANICAL DIVISION	MECHANICAL DIVISION TO PROVIDE SENSOR AND CONTROL WIRING
13	MANUAL PULL STATION CABLE	MECHANICAL DIVISION	MECHANICAL DIVISION INSTALLS BOX, RACEWAY AND CABLE OPERATOR

2 E402 KITCHEN HOOD CONNECTIONS - ELECTRICAL

SCALE: NTS

PANEL KEY	
HA	HB
HD	HE
HF	HL

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Renovations and Additions to: Myrtle Grove Middle School

901 Piner Road, Wilmington, North Carolina 28409

ELECTRICAL DISTRIBUTION & PANEL SCHEDULES

JOB NUMBER 0594-01-00-13
DRAWN BY SW
CHECKED BY
DATE 01/24/18

REVISIONS

1	REVISION # 1	2/15/18
2	REVISION #2	2/20/18

SHEET NUMBER E402

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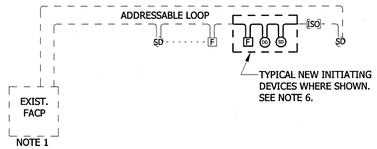
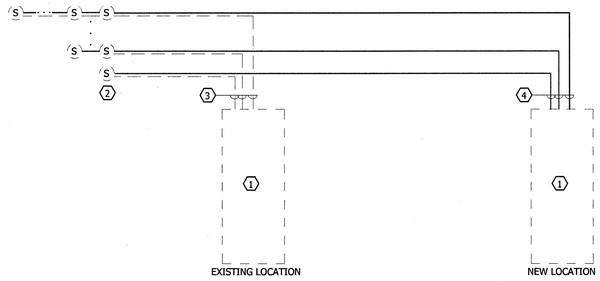


GENERAL NOTES TO :

1. EXISTING FIRE ALARM CONTROL PANEL IS A FULLY ADDRESSABLE NOTIFIER NFS 2020. DEVICES INSTALLED SHALL BE COMPATIBLE WITH EXISTING SYSTEM.
2. ALL FIRE ALARM SYSTEM MODIFICATIONS TO BE PERFORMED BY A FACTORY TRAINED AND APPROVED VENDOR AND TECHNICIANS.
3. PROVIDE PROGRAMMING AT BEGINNING AND END OF EACH PHASE TO REMOVE DEVICES WHITHIN THE AREA OF WORK ASSOCIATED WITH THE NEXT PHASE AND TO ADD THE DEVICES WITHIN THE COMPLETED AREA. NEW ROOM NUMBERING SHALL BE INCLUDED WITH THIS PROGRAMMING.
4. VERIFY PROPER OPERATION OF FIRE ALARM SYSTEM AND COMPONENTS PRIOR TO STARTING WORK AND NOTIFY ENGINEER OF ANY IDENTIFIED PROBLEMS.
5. PROVIDE SEPARATE CONDUITS FOR OPPOSITE ENDS OF LOOP CONDUCTORS. DO NOT COMBINE LOOP CONDUCTORS INTO SINGLE CONDUIT RUNS EXCEPT AS PERMITTED BY THE SPECIFICATIONS.
6. RISER DIAGRAM SHOWS FUNCTIONAL CONNECTIONS. WORK REQUIRED ON FLOORS TO RELOCATE DEVICES, AS REQUIRED TO PERMIT FIRE PROTECTION WORK, IS NOT SHOWN. EXACT WIRING AND CONNECTIONS FOR ALL DEVICES (NEW AND REWORKED/RELOCATED) ARE TO BE PROVIDED AS A PART OF THE FIRE ALARM SHOW DRAWING SUBMITTAL PACKAGE SUPPLIED BY THE CONTRACTOR.
7. CONNECT NEW INITIATING DEVICES TO EXISTING ADDRESSABLE LOOP (IF AVAILABLE). PROVIDE ADDITIONAL ISOLATION MODULES AS NECESSARY FOR NEW EQUIPMENT SUCH THAT 20 DEVICES (MAX) ARE ISOLATED ALONG THE ENTIRE LOOP. PROVIDE ALL PROGRAMMING REQUIRED TO ACTUATE NEW DEVICES.
8. PROTECT ALL LINEAR BEAM DETECTORS WITHIN THE BUILDING DURING CONSTRUCTION.
9. AT END OF EACH PHASE AND END OF PROJECT, COMPLETELY TEST SYSTEM INCLUDING 100% OF ALL NEW AND REWORKED DEVICES. IN ADDITION, TEST 10% OF ALL DEVICES ON EACH ADDRESSABLE LOOP IN SYSTEM. PROVIDE A PRINT OUT SHOWING RESULTS OF TEST AND SENSITIVITIES OF ALL SMOKE DETECTORS.
10. REPROGRAM SYSTEM TO ACCOUNT FOR NEW ROOM NUMBERS.

1 / E501 **FIRE ALARM RISER DIAGRAM**
SCALE: NTS



KEY NOTES TO E501

1 EXISTING PUBLIC ADDRESS TOWER. RELOCATE PER PLANS.

2 EXISTING PUBLIC ADDRESS SPEAKER. PROTECT DURING CEILING WORK. (TYP)

3 DEMOLISH ALL EXISTING P/A CABLING.

4 PROVIDE NEW P/A SPEAKER CABLING TO ALL SPEAKERS WITHIN AND EXTERIOR TO THE BUILDING.

PUBLIC ADDRESS SYSTEM NOTES:

1. THE PUBLIC ADDRESS DRAWINGS ARE DIAGRAMMATIC IN NATURE. THE EXACT DESIGN, CONSTRUCTION PLAN METHODS, ETC SHALL BE DETERMINED BY THE PUBLIC ADDRESS VENDOR. THE PUBLIC ADDRESS VENDOR SHALL PROVIDE WORKING DRAWINGS IN ACCORDANCE WITH SPECIFICATIONS FOR APPROVAL BY THE ENGINEER AND OWNER.
2. ALL WORK SHALL BE COMPLETED AND PERFORMED BY A FACTORY TRAINED AND AUTHORIZED VENDOR.
3. ALL EXISTING ZONING SHALL BE MAINTAINED.
4. ALL EXISTING SPEAKERS (INTERIOR, GYMNASIUM, AND EXTERIOR) SHALL HAVE NEW CABLE PROVIDED.
5. ALL EXISTING INTERCOM PHONES SHALL HAVE NEW CABLE PROVIDED.

3 / E501 **PUBLIC ADDRESS DETAIL**
SCALE: NTS

LIGHT FIXTURE SCHEDULE

TYPE MARK	DESCRIPTION	MANUFACTURER	SERIES/MODEL	LUMENS	MOUNTING	FINISH	VOLTAGE	WATTAGE	CONTROL	COMMENTS	ICON
A	2X4 LED TROFFER	COLUMBIA	LCAT24-40MWG-EDU	3518	RECESSED, GRID		MVOLT	31 VA	0-10V		
AB	2X4 LED TROFFER	COLUMBIA	LCAT24-40MWG-EDU-ELL14	3518	RECESSED, GRID		MVOLT	31 VA	0-10V		
AF	2X4 LED TROFFER	COLUMBIA	LCAT24-40MLG-EDU	4990	RECESSED, FLANGE		MVOLT	39 VA	0-10V	PROVIDE FK24 FLANGE KIT	
AM	2X4 LED TROFFER	COLUMBIA	LCAT24-40MLG-EDU	4990	RECESSED, GRID		MVOLT	39 VA	0-10V		
AMB	2X4 LED TROFFER	COLUMBIA	LCAT24-40MLG-EDU-ELL14	4990	RECESSED, GRID		MVOLT	39 VA	0-10V		
BF	1X4 LED TROFFER	COLUMBIA	LCAT14-40MLG-EDU	4905	RECESSED, GRID		MVOLT	38 VA	0-10V		
C	6" RECESSED DOWNLIGHT	GOTHAM	EVO 40/25 6AR MWD LSS MVOLT EZ1 TRW	2500	RECESSED	WHITE PAINTED TRIM	MVOLT	30 VA	0-10V		
D	15" SURFACE DOWNLIGHT	KENALL	RHR15 -W-PP-25L40K-DV	3093	SURFACE	WHITE	MVOLT	29 VA			
E4	4' STRIP	COLUMBIA	LCS4-40ML-EU					48 VA			
F	2' STRIP	COLUMBIA	LCS2-40ML-EU	3000	WALL MOUNT ABOVE DOOR		MVOLT	26 VA			
G	LED HIGHBAY	LITHONIA	JHBL 24000LM PCL WD MVOLT GZ10 40K 80CRI	21,276	PENDANT		MVOLT	197 VA	0-10V	PROVIDE SAFETY CABLE	
H	LED DISPLAY CASE LIGHTING	ECOSENSE	SCIS-48-40-120-CL	1392	SURFACE, DISPLAY CASE		120	16 VA			
J	DECORATIVE PENDANT	Delray Lighting Inc.	UCD4 S W40 CS SS	16350	PENDANT	SILVER	120	94 VA	0-10V	CONTROL UPLIGHT SEPARATELY FROM DOWNLIGHT	
X	EXIT SIGN	LITHONIA	LHQM LED R HO RO		UNIVERSAL MOUNT, SINGLE OR DOUBLE FACE AS INDICATED ON DRAWINGS.	WHITE. RED LETTERS	MVOLT	5 VA		PROVIDE WIREGUARD FOR EXIT LIGHTS MOUNTED IN GYM	
X-BAT	EMERGENCY LIGHTING UNIT	LITHONIA	ELMLT W LP06VS LPT		WALL	WHITE	MVOLT	5 VA		PROVIDE ELA VS VANDAL SHIELD. MOUNT 9'-0" AFF	
XR	REMOTE EMERGENCY HEAD	LITHONIA	ELA LED T WP M12		UNIVERSAL MOUNT	GRAY	9.6-VOLT REMOTE	5 VA			

FIXTURE SCHEDULE NOTES:

1. THIS FIXTURE SCHEDULE USES MANUFACTURER'S NAMES AS A MEANS TO DESIGNATE A FIXTURE TYPE AND A LEVEL OF QUALITY. **THESE MANUFACTURER'S NAMES AND FIXTURE SERIES ARE NOT INTENDED AS A BRAND NAME SPECIFICATION.** FIXTURES PROVIDED OUT OF THE COOPER GROUP, LITHONIA GROUP, HUBBELL GROUP, THOMAS INDUSTRIES OR WILLIAMS/INFINITY MAY BE SUBMITTED FOR APPROVAL.
2. PROVIDE DRIVERS WITH CURRENT TOTAL HARMONIC DISTORTION (THD) OF <10% AND A POWER FACTOR >0.90. IN ADDITION, DRIVERS MUST BE RF SUPPRESSED FOR MINIMUM INJECTION OF OF FEEDBACK INTO SUPPLY LINES. MAXIMUM CURRENT THD AND MINIMUM POWER FACTOR MUST BE SUBMITTED AS A PART OF THE FIXTURE SUBMITTAL DATA.
3. PROVIDE MOUNTING FRAME AND RELATED ACCESSORIES FOR ALL FIXTURES AS REQUIRED TO MATCH CEILING CONSTRUCTION. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT CEILING CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR MODIFICATION OF FIXTURE SCHEDULE MANUFACTURER'S PART NUMBERS FOR PURPOSES OF MATCHING CEILING CONSTRUCTION.
4. EQUIVALENT FIXTURES BY MANUFACTURERS OTHER THAN THOSE LISTED MAY BE SUBMITTED FOR CONSIDERATION.
5. PROVIDE 0-10V DIMMING WHERE DIMMING CONTROLS ARE INDICATED ON THE PLANS.
6. ALL FIXTURES TO HAVE A COLOR TEMPERATURE OF 4000°K UNLESS NOTED OTHERWISE.
7. UNLESS NOTED OTHERWISE, ALL FIXTURES SHALL INCLUDE INTEGRAL DRIVER.
8. ALL FIXTURES SHALL BE UL OR THIRD PARTY LISTED AS COMPLETE ASSEMBLY.

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