GENERAL DRAWING SYMBOLS LEGEND

- SECTION — "1" - SECTION NUMBER; "H-1" - DRAWING LOCATION (symbol: 1 / H101)
- BREAK
- PIPE BREAK
- POINT OF DISCONNECTION
- POINT OF CONNECTION TO EXISTING
- KEYED NOTE (X)

HVAC PIPE FITTINGS LEGEND

- ELBOW TURNED UP
- ELBOW TURNED DOWN
- TEE TURNED UP
- TEE TURNED DOWN
- TEE
- RISE OR DROP IN PIPE
- UNION
- FLANGE
- PIPE CAP
- CLEANOUT (CO)
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- PIPE PITCH UP (UP)
- PIPE PITCH DOWN (DN)

HVAC PIPE LEGEND

- TAG — PIPE TO BE REMOVED (TAG IDENTIFIES TYPE OF PIPE)
- ETAG — EXISTING PIPE NOTED WITH PREFIX LETTER E
- BF — BOILER FEEDWATER
- CR — CONDENSER WATER RETURN
- CS — CONDENSER WATER SUPPLY
- DOMESTIC COLD WATER
- CWR — CHILLED WATER RETURN
- CWS — CHILLED WATER SUPPLY
- D — CONDENSATE DRAIN
- FOG — FUEL OIL GAUGE
- FOR — FUEL OIL RETURN
- FOS — FUEL OIL SUPPLY
- FOV — FUEL OIL VENT
- G — GAS
- HCR — HOT/CHILLED WATER RETURN
- HCS — HOT/CHILLED WATER SUPPLY
- HPC — HIGH PRESSURE CONDENSATE
- HPS — HIGH PRESSURE STEAM
- HTPR — HEAT PUMP WATER RETURN
- HTPS — HEAT PUMP WATER SUPPLY
- HWR — HOT WATER RETURN
- HWS — HOT WATER SUPPLY
- LPC — LOW PRESSURE CONDENSATE
- LPS — LOW PRESSURE STEAM
- MPC — MEDIUM PRESSURE CONDENSATE
- MPS — MEDIUM PRESSURE STEAM
- PC — PUMPED CONDENSATE
- RG — REFRIGERANT GAS
- RL — REFRIGERANT LIQUID
- RS — REFRIGERANT SUCTION
- ATMOSPHERIC VENT

CONTROLS SYMBOLS LEGEND

- (T) REMOVE TEMPERATURE SENSOR
- (T) TEMPERATURE SENSOR
- (T)S TEMPERATURE SENSOR WITH CAST ALUMINUM SECURITY COVER
- (TH) THERMOSTAT
- (H) HUMIDISTAT
- ( )E EXISTING DEVICE NOTED WITH LETTER E

HVAC EQUIPMENT SYMBOLS LEGEND

- TAG — REMOVE EXISTING EQUIPMENT (TAG IDENTIFIES TYPE OF EQUIPMENT)
- FTR-1 / 10'-0" — FINNED TUBE RADIATION; FTR-1 = TAG; 10'-0" = ACTIVE LENGTH
- FP | CS | OS — VERTICAL TYPE UNIT VENTILATOR CABINETRY; FP = FILLER PIECE; CS = CLOSED SHELVING UNIT; OS = OPEN SHELVING UNIT
- EF-X — ROOF EXHAUST FAN WITH DAMPER/ACTUATOR
- GRV-X — GRAVITY ROOF VENTILATOR WITH DAMPER/ACTUATOR
- COMBINATION MOTOR STARTER (FURNISHED BY MECHANICAL CONTRACT INSTALLED BY ELECTRIC CONTRACT)
- VFD — VARIABLE FREQUENCY DRIVE (FURNISHED BY MECHANICAL CONTRACT INSTALLED BY ELECTRIC CONTRACT)
- ETAG — EXISTING EQUIPMENT NOTED WITH PREFIX LETTER E (TAG IDENTIFIES TYPE OF EQUIPMENT)

HVAC VALVE AND SPECIALTIES LEGEND

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- BALL VALVE
- BALANCE VALVE
- RELIEF VALVE
- PRESSURE REDUCING VALVE
- STRAINER
- STRAINER WITH BLOWDOWN BALL VALVE
- SOLENOID VALVE
- 2-WAY CONTROL VALVE
- 3-WAY CONTROL VALVE
- FUSIBLE FIRE VALVE
- PUMP DISCHARGE VALVE
- BACKFLOW PREVENTER
- DRAIN VALVE WITH HOSE END CONNECTION
- UNION
- MANUAL AIR VENT
- AV — AUTOMATIC AIR VENT
- PRESSURE GAUGE WITH SHUT OFF
- THERMOMETER
- PRESSURE AND TEMPERATURE READOUT PORT
- EXPANSION JOINT
- PREFABRICATED EXPANSION LOOP
- FLEXIBLE PIPE CONNECTOR
- G — PIPE ALIGNMENT GUIDE
- PIPE ANCHOR
- INLINE PUMP
- AS — TANGENTIAL AIR SEPARATOR
- AS — INLINE AIR SEPARATOR
- ESD — END SUCTION DIFFUSER
- ET — EXPANSION TANK

DUCTWORK & ACCESSORIES SYMBOLS LEGEND

SINGLE LINE DUCT / DOUBLE LINE DUCT

- 20/8 — RIGID DUCT TO BE REMOVED; 20 = WIDTH (IN), 8 = HEIGHT (IN)
- E20/8 — EXISTING DUCT; 20 = WIDTH (IN), 8 = HEIGHT (IN)
- 20/8 — RIGID DUCT; 20 = WIDTH (IN), 8 = HEIGHT (IN)
- 20/8 — OVAL DUCT; 20 = WIDTH (IN), 8 = HEIGHT (IN)
- 20ø — ROUND DUCT; 20ø = 20 INCH DIAMETER
- ACOUSTICAL LINING (SIZE INDICATES INSIDE DIMENSION)
- SUPPLY DUCT SECTION
- RETURN OR EXHAUST DUCT SECTION
- SUPPLY DUCT ELBOW DOWN
- RETURN OR EXHAUST DUCT ELBOW DOWN
- SQUARE ELBOW WITH TURNING VANES
- SMOOTH RADIUS ELBOW; R = 3(W)/2
- DUCT TRANSITION ON CENTER
- DUCT TRANSITION WITH FLAT SIDE
- DUCT TRANSITION SQUARE TO ROUND
- BRANCH DUCT WITH 45° TAKE OFF FOR RECTANGULAR AND ROUND TAKEOFFS
- R — CHANGE OF ELEVATION; R = RISE, D = DROP; ARROW IN DIRECTION OF AIRFLOW
- AD — HORIZONTAL ACCESS DOOR; 12/12 MINIMUM UNLESS OTHERWISE NOTED (FULL WIDTH OF DUCT < 12 WIDTH)
- DIFFUSER/GRILLE NOMENCLATURE (S1-6 / 100; S1-14/8 / 100):
  - S = SUPPLY DIFFUSER/GRILLE TAG
  - R = RETURN GRILLE TAG
  - E = EXHAUST GRILLE TAG
  - 6 = ROUND NECK SIZE (IN)
  - 14/8 = RECTANGULAR NECK SIZE (IN)
  - 100 = AIRFLOW (CFM)
- (C) CABLE DAMPER
- AD — VERTICAL ACCESS DOOR; 12/12 MINIMUM UNLESS OTHERWISE NOTED (FULL HEIGHT OF DUCT < 12 HEIGHT)
- 24"x24" CEILING SUPPLY DIFFUSER WITH FLEX DUCT; ROUND NECK, 4-WAY SUPPLY, EQUAL SIZED BRANCH DUCT
- 24"x24" CEILING RETURN OR EXHAUST GRILLE WITH FLEX DUCT; ROUND NECK, PERFORATED FACE, EQUAL SIZED BRANCH DUCT
- 24"x24" DUCTED CEILING RETURN OR EXHAUST GRILLE; SQUARE NECK, PERFORATED FACE
- ROUND CEILING SUPPLY DIFFUSER WITH FLEX DUCT
- RECTANGULAR SUPPLY GRILLE/REGISTER
- RECTANGULAR RETURN OR EXHAUST GRILLE/REGISTER
- LINEAR CEILING SUPPLY DIFFUSER WITH FLEX DUCT; ROUND NECK, ADJUSTABLE SUPPLY, EQUAL SIZED BRANCH DUCT
- LINEAR CEILING RETURN OR EXHAUST WITH FLEX DUCT; ROUND NECK, EQUAL SIZED BRANCH DUCT
- HEAVY DUTY LINEAR BAR SUPPLY GRILLE
- HEAVY DUTY LINEAR BAR RETURN OR EXHAUST GRILLE
- WALL MOUNTED SUPPLY, RETURN OR EXHAUST GRILLE
- DS — DUCT SILENCER
- PARALLEL BLADE DAMPER WITH ACTUATOR
- OPPOSED BLADE DAMPER WITH ACTUATOR
- VOLUME DAMPER
- AIR FLOW DIRECTION
- (S) DUCT SMOKE DETECTOR; FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR; INSTALLED BY HVAC CONTRACTOR
- VERTICAL SMOKE DAMPER
- HORIZONTAL SMOKE DAMPER
- VERTICAL FIRE/SMOKE DAMPER
- HORIZONTAL FIRE/SMOKE DAMPER
- VERTICAL FIRE DAMPER
- HORIZONTAL FIRE DAMPER

STATE OF NEW YORK — RICHARD REIS SANGUINETTI — LICENSED PROFESSIONAL ENGINEER — No. 073716 — 2021.10.25

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ACC	AIR-COOLED CONDENSER
ACCU	AIR-COOLED CONDENSING UNIT
AD	ACCESS DOOR
AF	AIR FILTER
AFF	ABOVE FINISHED FLOOR
AFM	AIRFLOW MEASURING DEVICE
AHU	AIR HANDLING UNIT
APD	AIR PRESSURE DROP
AS	AIR SEPARATOR
AT	AIR TERMINAL UNIT
AV	AIR VENT
B	BOILER
BTUH	BRITISH THERMAL UNITS PER HOUR
C	CONVECTOR
CC	COOLING COIL
CHLR	CHILLER
CFM	CUBIC FEET PER MINUTE
CH	CABINET HEATER
CO	CLEAN OUT
CONT.	CONTINUED
CS	CLOSED SHELVING UNIT
CT	COOLING TOWER
DB	DECIBELS
DBT	DRY BULB TEMPERATURE
DIA	DIAMETER
DPT	DEW POINT TEMPERATURE
DS	DUCT SILENCER
DX	DIRECT EXPANSION
E'TAG'	EXISTING EQUIPMENT
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE

ABBREVIATION	DESCRIPTION
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EG	EXHAUST GRILLE OR REGISTER
EH	ELECTRIC HEATER
EHC	ELECTRIC HEATING COIL
ERC	ENERGY RECOVERY COIL
ET	EXPANSION TANK
EWT	ENTERING WATER TEMPERATURE
FC	FAN COIL UNIT
FD	FIRE DAMPER
FD/SD	COMBINATION FIRE/SMOKE DAMPER
FF	FINAL FILTER
FM	FLOW MEASURING STATION
FP	FILLER PIECE
FPM	FEET PER MINUTE
FT	FEET
FTR	FINNED TUBE RADIATION
GAL	GALLONS
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
GRV	GRAVITY ROOF VENTILATOR
H	HUMIDIFIER
HC	HEATING COIL
HE	HEAT EXCHANGER
HGT	HEIGHT
HP	HORSEPOWER
HTP	HEAT PUMP
HRU	HEAT RECOVERY UNIT
IN	INCH
KW	KILOWATT

ABBREVIATION	DESCRIPTION
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FOOT
LPC	LOW PRESSURE CONDENSATE RETURN
LPS	LOW PRESSURE STEAM (15 PSIG AND BELOW)
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	ONE THOUSAND BRITISH THERMAL UNITS PER HOUR
MCA	MINIMUM CURRENT AMPACITY
MIN	MINIMUM
M	DAMPER ACTUATOR
MOCP	MAXIMUM OVERCURRENT PROTECTION
MPC	MEDIUM PRESSURE CONDENSATE RETURN
MPS	MEDIUM PRESSURE STEAM (16-59 PSIG)
MV	MANUAL VENT
NIC	NOT IN CONTRACT
NOM	NOMINAL
OA	OUTSIDE AIR
OS	OPEN SHELVING UNIT
P	PUMP
PC	PUMPED CONDENSATE
PD	PRESSURE DROP
PF	PREFILTER
PRV	PRESSURE REDUCING VALVE
PSIG	POUNDS PER SQUARE INCH WATER GAUGE
RA	RETURN AIR
RF	RETURN AIR FAN
RG	RETURN GRILLE OR REGISTER
RM	ROOM

ABBREVIATION	DESCRIPTION
RP	RETURN PANEL
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
S	DUCT SMOKE DETECTOR
SA	SUPPLY AIR
SD	SUPPLY DIFFUSER
SKD	SMOKE DAMPER
SF	SUPPLY AIR FAN
SG	SUPPLY GRILLE OR REGISTER
SP	STATIC PRESSURE
SPS	STATIC PRESSURE SENSOR
SPG	SPECIFIC GRAVITY
TAG	EQUIPMENT IDENTIFICATION
TG	TOP GRILLE OR REGISTER (WALL TYPE)
TO	TRANSFER OPENING
TWU	THRU-THE-WALL UNIT
TYP	TYPICAL
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UV	UNIT VENTILATOR
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
VFD	VARIABLE FREQUENCY DRIVE
VP	VACUUM PUMP
VR	VACUUM STEAM CONDENSATE RETURN
WBT	WET BULB TEMPERATURE (°F)
WEF	WALL TYPE EXHAUST FAN
WG	WATER GAUGE
WPD	WATER PRESSURE DROP
ZD	ZONE DAMPER

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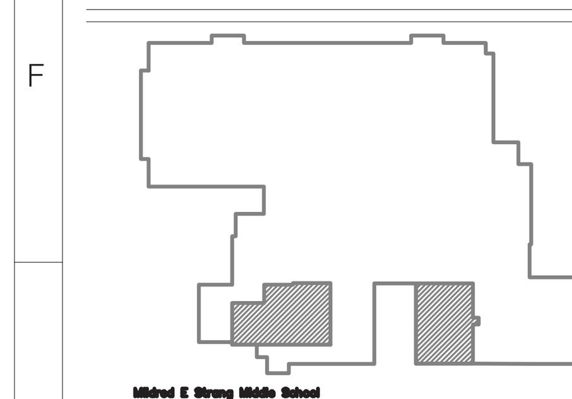
SED CONTROL NUMBERS

- YHS - #66-24-02-06-0-005-028
- MS - #66-24-02-06-0-007-027
- CES - #66-24-02-06-0-003-022
- MES - #66-24-02-06-0-004-025
- BES - #66-24-02-06-0-002-020



Yorktown CENTRAL SCHOOL DISTRICT

DISTRICT WIDE IMPROVEMENTS 2020 PHASE II

MILDRED E. STRANG MIDDLE SCHOOL
2701 CROMPOND RD.
YORKTOWN HEIGHTS, NY 10598

REVISIONS

No.	Description	Date

ISSUED: BID ISSUE

DATE: 10/25/2021

SCALE: AS NOTED

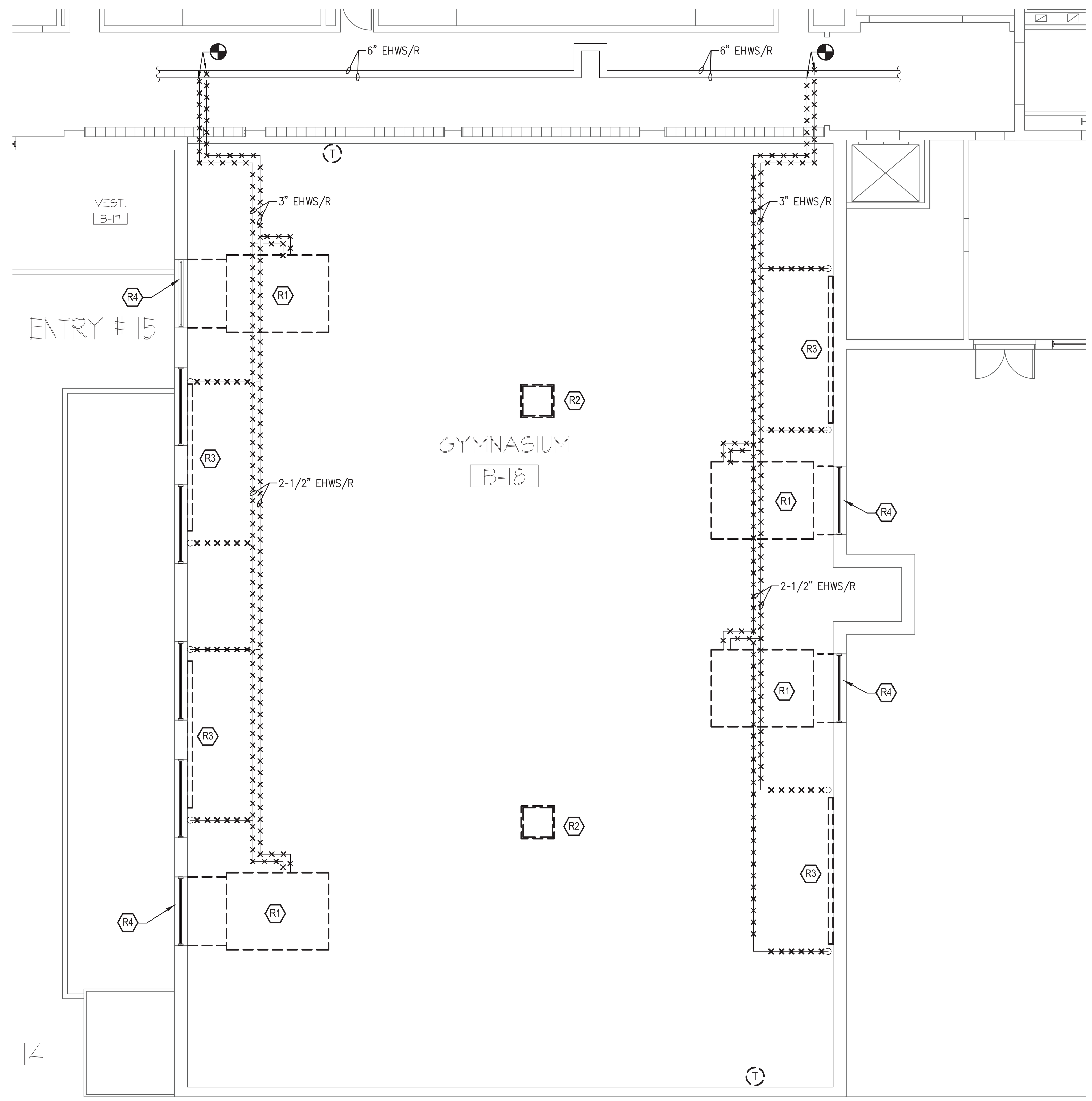
SHEET NAME: HVAC LEGENDS, SYMBOLS & ABBREVIATIONS

SHEET NUMBER: MS-H001

RELEASED: 10/25/2021 PROJECT NUMBER: 1710402

GENERAL NOTES	
1	THE CONTRACTOR SHALL PROTECT EXISTING SERVICES AND EQUIPMENT DURING THE WORK.

REMOVAL KEYED NOTES:	
R1	REMOVE EXISTING AIR HANDLER AND ALL ASSOCIATED DUCTWORK BACK TO EXTENT OF THE ROOM. REMOVE EXISTING CEILING SUPPORTS.. REMOVE PIPING BACK TO MAIN AND CAP. REMOVE EXISTING CONTROL WIRING. PREPARE PIPING FOR NEW INSTALLATION.
R2	REMOVE EXISTING EXHAUST FAN. MC TO PROVIDE AND INSTALL CAP AND INSULATION ON EXISTING ROOF CURB. EXISTING FLASHING ON FAN CURB IS HOT WITH ASBESTOS, AVOID CONTACT. REFER TO DETAIL 8/MS-H501
R3	DISCONNECT AND REMOVE EXISTING FIN TUBE HEATERS AND ASSOCIATED HOT WATER SUPPLY/RETURN PIPING
R4	EXISTING O.A. LOUVERS TO BE REMOVED BY M.C.. G.C.TO PROVIDE NEW WINDOWS TO MATCH EXISTING



1 MS-H101 GYMNASIUM HVAC REMOVAL PLAN
SCALE: 1/8" = 1'-0"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

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YHS - #66-24-02-06-0-005-028
MS - #66-24-02-06-0-007-027
CES - #66-24-02-06-0-003-022
MES - #66-24-02-06-0-004-025
BES - #66-24-02-06-0-002-020

Yorktown CENTRAL SCHOOL DISTRICT

DISTRICT WIDE IMPROVEMENTS 2020 PHASE II

MILDRED E. STRANG MIDDLE SCHOOL
2701 CROMPOND RD.
YORKTOWN HEIGHTS, NY 10598

REVISIONS

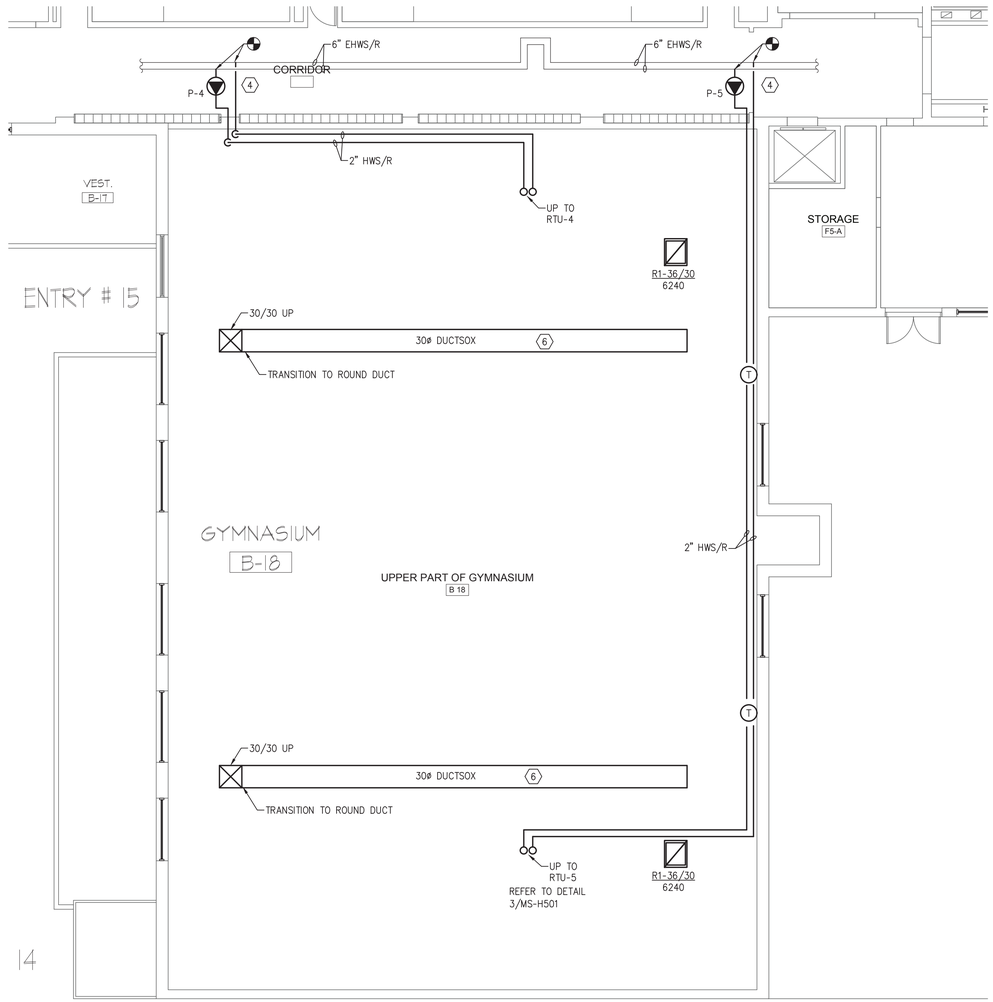
No.	Description	Date

STATE OF NEW YORK · RICHARD REIS SANGUINITO · LICENSED PROFESSIONAL ENGINEER · 2024.10.25

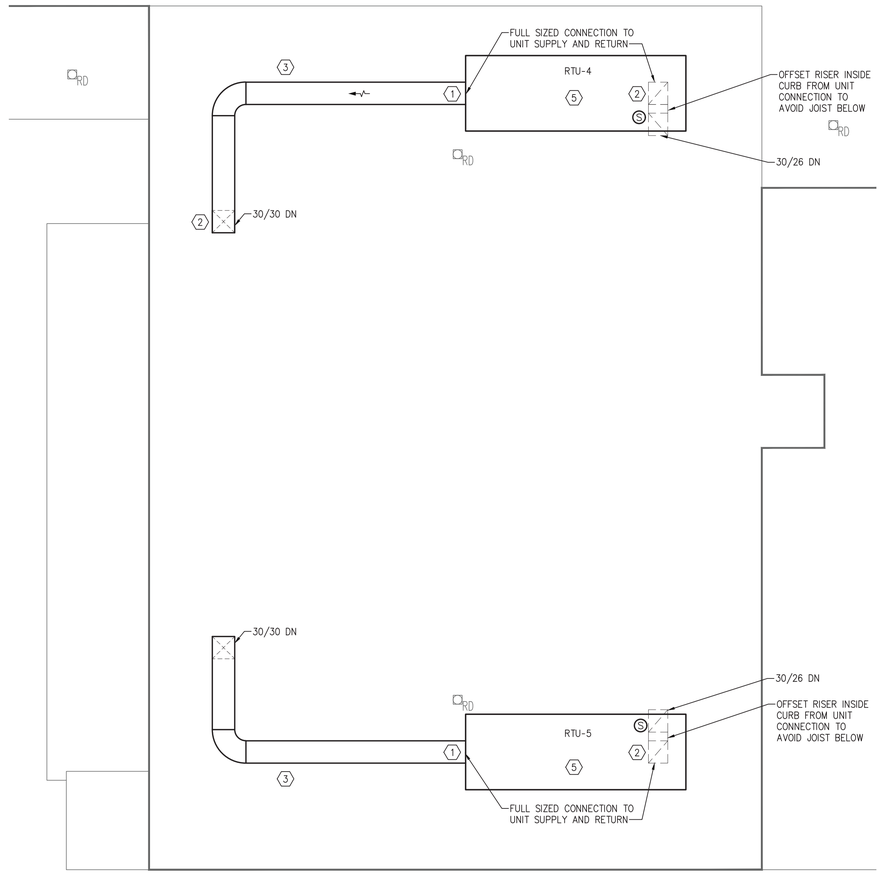
ISSUED: BID ISSUE
DATE: 10/25/2021
SCALE: AS NOTED
SHEET NAME: GYMNASIUM REMOVAL PLAN
SHEET NUMBER: MS-H101

GENERAL NOTES	
1	FIELD VERIFY ALL EXISTING DUCT DIMENSIONS AND CLEARANCES. REPORT DISCREPANCIES TO THE ENGINEER
2	ALL EXTERIOR DUCTS SHALL BE INSULATED WITH A MINIMUM OF 2" OF RIGID FIBER WITH PVC JACKET.
3	DUCTSOX SHALL BE PERMEABLE FABRIC WITH GROMMET NOZZLES SIZED BY THE MANUFACTURER TO PROVIDE THE CFM AND OPTIMUM FLOW VELOCITY. REFER TO SPECIFICATION 23.31.15.
4	MC TO REMOVE AND RE-INSTALL ANY STEEL JOIST BRIDGING IF NECCESSARY TO ACCOMODATE 30" DUCTSOX
5	THE CONTRACTOR SHALL PROTECT EXISTING SERVICES AND EQUIPMENT DURING THE WORK.

(#) RENOVATION KEYED NOTES:	
1	ALL EXTERIOR DUCTWORK TO BE INSULATED WITH A MINIMUM OF 2" FOAM BOARD INSULATION WITH PVC JACKET.
2	DUCT DOWN THROUGH ROOF. MOUNT DUCT SOCK FLUSH TO BOTTOM OF JOIST. PROVIDE ACOUSTICAL LINING ON R.A. DUCT RISER. PROVIDE VOLUME DAMPER BELOW ROOF. REFER TO DETAIL 4/MS-H501
3	SUPPORT DUCTS ON ROOF PER DETAIL 1/MS-H501 & 6/MS-H501. PROVIDE SUPPORTS AT BENDS AND AT MINIMUM 10'-0" OC.
4	REFER TO DETAIL 2/MS-H501 FOR PUMP PIPING ARRANGEMENT.
5	RTU TO SIT ON CURB AND MC TO PROVIDE STRUCTURAL SUPPORT FOR RTU BELOW ROOF. REFER TO MS-S101 & 5/MS-H501
6	DUCT SOCK SHALL HAVE A PERMEABLE FABRIC AND DOWNWARD VENTS ON LEFT AND RIGHT SIDES. REFER TO DETAIL 7/MS-H501
7	MC TO PAINT GYMNASIUM DUCTWORK. COORDINATE WITH ARCHITECT FOR PAINT COLOR



1 GYMNASIUM PLAN
MS-H102 SCALE: 1/8" = 1'-0"



2 GYMNASIUM ROOF PLAN
MS-H102 SCALE: 1/8" = 1'-0"

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

STATE OF NEW YORK
RICHARD REIS SAUGUSTINE
LICENSED PROFESSIONAL ENGINEER
2024.10.25

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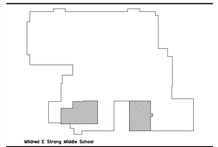
BES - #66-24-02-06-0-002-020



Yorktown CENTRAL SCHOOL DISTRICT

DISTRICT WIDE IMPROVEMENTS 2020 PHASE II

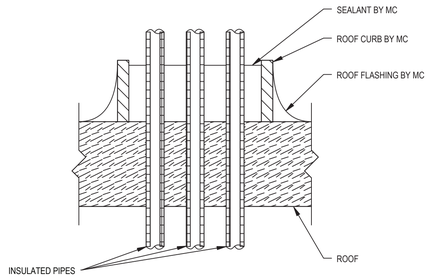
MILDRED E. STRANG MIDDLE SCHOOL
2701 CROMPOND RD.
YORKTOWN HEIGHTS, NY 10598

REVISIONS

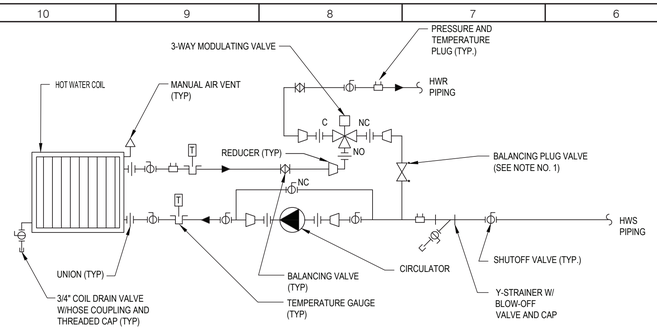
No.	Description	Date

ISSUED: BID ISSUE
DATE: 10/25/2021
SCALE: AS NOTED
SHEET NAME: GYMNASIUM RENOVATION PLANS
SHEET NUMBER: MS-H102

RELEASED: 10/25/2021 PROJECT NUMBER: 1710402



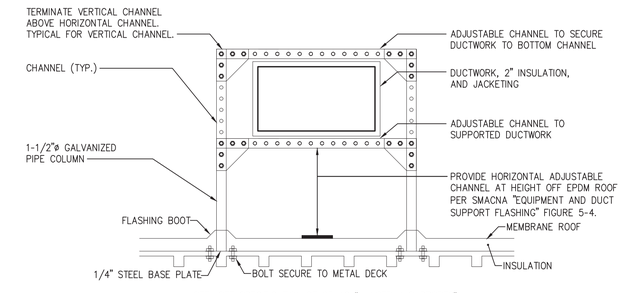
3 ROOF PIPING PENETRATION DETAIL
MS-H501 SCALE: NOT TO SCALE



SEQUENCE OF OPERATION
1. PUMP STARTS ON CALL FOR HEAT AND 3-WAY VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE WITHOUT CYCLING.
2. FREEZE PROTECTION OVERRIDE, OF OA. TEMPERATURE <35° PUMP IS ON 3-WAY OPENS TO BYPASS IF NOT HEATING.

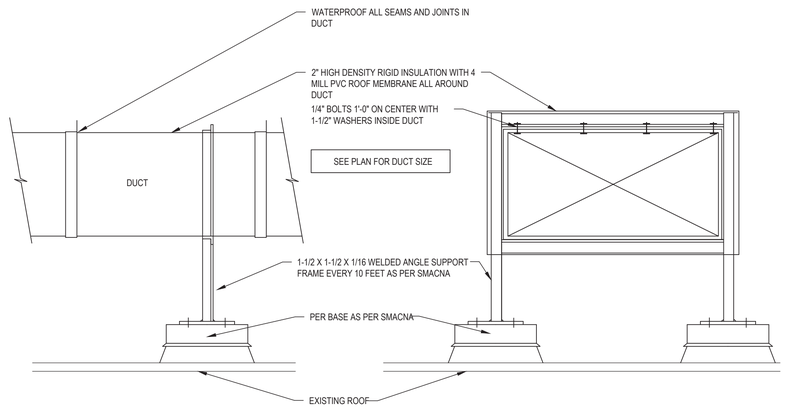
NOTE
1. SET BALANCING VALVES TO EQUAL THE PRESSURE DROP ACROSS THE HYDRONIC COIL

2 3-WAY COIL DETAIL
MS-H501 SCALE: NOT TO SCALE

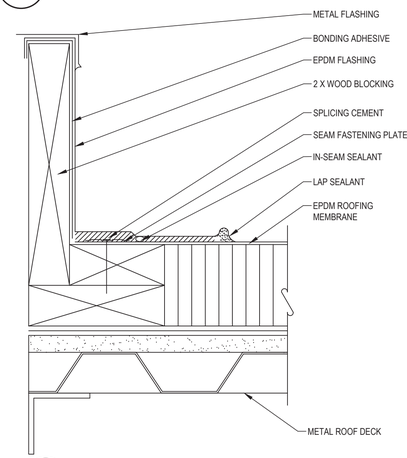


NOTE: SEE SPECIFICATION 23 05 40 "HANGER & SUPPORTS"
NOTE: ADD WIND RESTRAINTS AS NEEDED.
NOTE: SUPPORT DUCTWORK EVERY 10 FT. EVERY OTHER DUCT SUPPORT MAY BE MOUNTED ON FEET DIRECTLY ON ROOF MEMBRANE INSTEAD OF BEING ANCHORED TO THE ROOF DECK.
NOTE: REFER TO 6/MS-H501

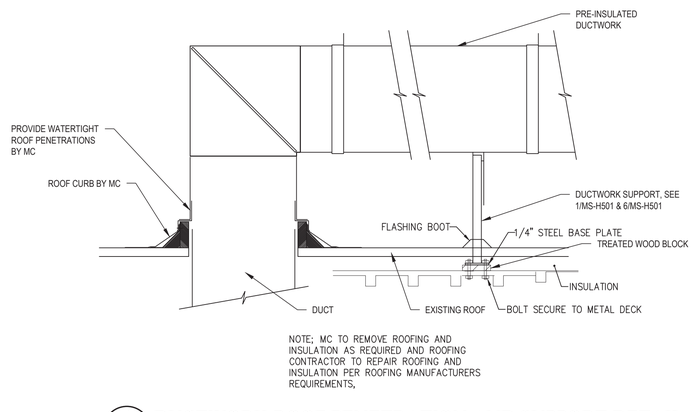
1 DUCTWORK ROOF SUPPORT DETAIL 1 (ANCHORED)
MS-H501 SCALE: NOT TO SCALE



6 DUCTWORK ROOF SUPPORT DETAIL 2 (UN-ANCHORED)
MS-H501 SCALE: NOT TO SCALE

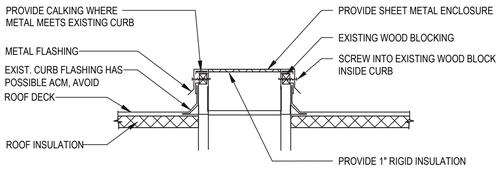


5 RTU ROOF CURB DETAIL
MS-H501 SCALE: NOT TO SCALE

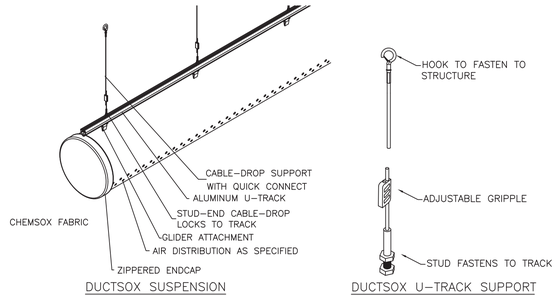


NOTE; MC TO REMOVE ROOFING AND INSULATION AS REQUIRED AND ROOFING CONTRACTOR TO REPAIR ROOFING AND INSULATION PER ROOFING MANUFACTURERS REQUIREMENTS,

4 DUCTWORK ROOF PENETRATION AND SUPPORT DETAIL
MS-H501 SCALE: NOT TO SCALE



8 ROOF CURB CAP DETAIL
MS-H501 SCALE: NOT TO SCALE



7 DUCTSOX SUSPENSION DETAIL
MS-H501 SCALE: NOT TO SCALE

VENTILATION REQUIREMENTS

Space Designation	Area Area SF	Ocuupants /1000 SF	Ocuupants Total	Ventilation Required Per Occup.	Ventilation Required Per SF	Uncorrected Ventilation	Efficiency Factor	Corrected CFM
MS Gym	6,100	7	43	20.00	0.18	1,950	80%	2,440
Total	6,100		43			1,950	80%	2,440

PUMP SCHEDULE

TAG	SERVICE	TYPE	FLUID	GPM	HEAD	RPM	ELECTRICAL HP	ELECTRICAL VOLTS/PH/HZ	DISCONNECT TYPE	DISCONNECT FURNISHED BY	DISCONNECT INSTALLED BY
P-4	RTU-4	IN-LINE CIRC.	HW	15	23	1725	3/4	120/1/60	SWITCH	EC	EC
P-5	RTU-5	IN-LINE CIRC.	HW	15	23	1725	3/4	120/1/60	SWITCH	EC	EC

ROOFTOP AIR-CONDITIONING UNIT SCHEDULE

TAG	SERVICE	TYPE	AIRFLOW (CFM)	OUTSIDE AIR (CFM)	SUPPLY FAN ESP (IN. WG)	SUPPLY FAN TOTAL SP (IN. WG)	SUPPLY FAN FAN TYPE	SUPPLY FAN HP	EXHAUST FAN ESP (IN. WG)	EXHAUST FAN TOTAL SP (IN. WG)	EXHAUST FAN FAN TYPE	EXHAUST FAN HP	DX COOLING CAPACITY IEER	CAPACITY NOMINAL TONAGE	CAPACITY TOTAL (MBH)	CAPACITY SENS. (MBH)	CAPACITY LATENT (MBH)	ENTERING AIR (MIXED) DRY BULB (°F)	ENTERING AIR (MIXED) WET BULB (°F)	LEAVING AIR DRY BULB (°F)	LEAVING AIR WET BULB (°F)	HEATING ENTERING WATER (°F)	LEAVING WATER (°F)	ENTERING AIR DRY BULB (°F)	LEAVING AIR DRY BULB (°F)	GPM	WATER PD (FT)	AIR PD (IN)	OUTPUT MBH	MEDIUM	NOTES	BASIS OF DESIGN
RTU-4	GYMNASIUM	RTU	6250	1300	1.5	3	PLENUM	7.5	.75		PLENUM	5	14.2	16	200.18	166.83	33	79	64.76	53.8	53.64	180	150	59.4	99	15	1.1	0.5	276	HW	1,2,3,4,5,6	AAON
RTU-5	GYMNASIUM	RTU	6250	1300	1.5	3	PLENUM	7.5	.75		PLENUM	5	14.2	16	200.18	166.83	33	79	64.76	53.8	53.64	180	150	59.4	99	15	1.1	0.5	276	HW	1,2,3,4,5,6	AAON

1. COORDINATE SIZE AND LOCATION OF UNIT WITH EXISTING FRAMING. MOUNT/SECURE/ANCHOR UNIT ON DUNNAGE PROVIDED BY GC.
2. COORDINATE SIZE AND LOCATION OF ROOF PENETRATIONS WITH GC FOR SUPPLY AND RETURN DUCT.
3. ALL WORK IS BY MC (ABATEMENT, STEEL, CURBS, ROOF FLASHING, ETC,). ONLY ITEM EXCLUDED IS ELECTRICAL BY EC.
4. PROVIDE SMOKE DETECTOR IN RETURN AIR STREAM
5. PROVIDE 2 STAGE FILTER; 2" MERV-8 & 4" MERV-14
6. RTU SHALL HAVE A FRONT, HORIZONTAL DISCHARGE AND BOTTOM, VERTICAL RETURN

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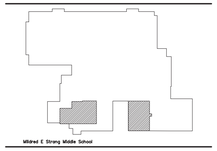
SED CONTROL NUMBERS

YHS - #66-24-02-06-0-005-028
MS - #66-24-02-06-0-007-027
CES - #66-24-02-06-0-003-022
MES - #66-24-02-06-0-004-025
BES - #66-24-02-06-0-002-020



Yorktown CENTRAL SCHOOL DISTRICT

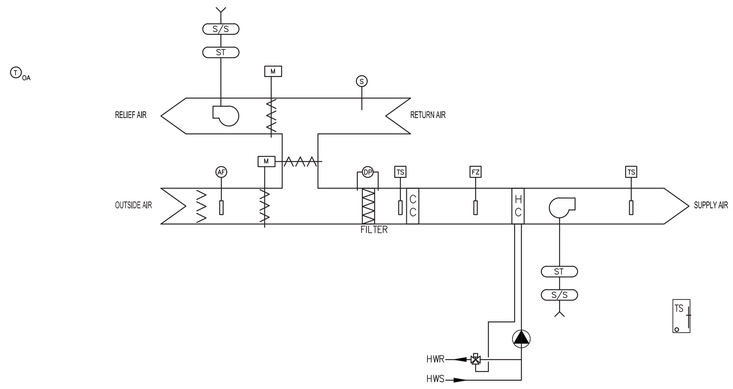
DISTRICT WIDE IMPROVEMENTS 2020 PHASE II

MILDRED E. STRANG MIDDLE SCHOOL
2701 CROMPOND RD.
YORKTOWN HEIGHTS, NY 10598

REVISIONS

No.	Description	Date

ISSUED: BID ISSUE
DATE: 10/25/2021
SCALE: AS NOTED
SHEET NAME: DETAILS & SCHEDULES
SHEET NUMBER: MS-H501



CAFETERIA RTU CONTROL DIAGRAM

GYM RTU SEQUENCE OF OPERATION

UNOCCUPIED MODE:

1. WITHOUT A CALL FOR HEAT THE RTU SHALL SHUT DOWN.
   A. THE FAN CONTROLLER SHALL BE IN THE OFF POSITION.
   B. THE OUTSIDE AIR AND RETURN AIR DAMPERS SHALL BE CLOSED.
2. UPON A CALL FOR HEAT THE RTU SHALL OPERATE AS FOLLOWS:
   A. THE NIGHT SETBACK TEMPERATURE SHALL BE:
      I. HEATING: 62 DEGREES (ADJUSTABLE)
      II. COOLING: NO OPERATION
   B. THE RETURN AIR DAMPER SHALL OPEN TO 100%
   C. THE SUPPLY FAN SHALL RAMP TO FULL SPEED
   D. THE 3-WAY HOT WATER CONTROL VALVE SHALL MODULATE FULLY OPEN AND THE CIRCULATING PUMP SHALL START.
   E. WHEN THE SPACE TEMPERATURE REACHES THE SETPOINT THE UNIT SHALL SHUT DOWN IN REVERSE ORDER OF THE STARTUP.

FREEZE PROTECTION

1. IF THE OAT < 40° F THE COIL CIRCULATING PUMP SHALL START
2. THE 3-WAY VALVE SHALL OPEN TO THE COIL A MINIMUM OF 10% FLOW.
3. THE 3-WAY VALVE SHALL FURTHER MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE.

PRE-OCCUPIED START-UP.

3. THE PRE-OCCUPIED START TIME SHALL BE ONE HOUR BEFORE THE START OF SCHOOL (ADJUSTABLE). AT THIS TIME:
   A. THE RETURN AIR DAMPER SHALL OPEN
   B. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED UNLESS THERE IS A CALL FOR "FREE COOLING"
   C. THE SUPPLY FAN SHALL START
   D. THE SYSTEM SHALL BRING THE SPACE TO NORMAL OCCUPIED TEMPERATURES.
   E. 30 MINUTES BEFORE NORMAL OCCUPANCY THE OA DAMPER SHALL OPEN TO 50% AND THE RELIEF AND RETURN AIR DAMPERS ADJUSTING TO MAINTAIN THE DESIGN AIR FLOW
4. SETPOINT TEMPERATURES ARE THE NORMAL OCCUPIED VALUES
5. ON A CALL FOR HEAT: THE 3-WAY CONTROL VALVE SHALL OPEN AND STARTING THE CIRCULATING PUMP SHALL START.
6. ON A CALL FOR COOLING THE VRF COMPRESSOR SHALL START IF FREE COOLING IS NOT AVAILABLE.
1. SETPOINT TEMPERATURES:
   A. HEATING: 68 ° F (ADJUSTABLE)
   B. COOLING: 72 ° F (ADJUSTABLE)
   C. FREE COOLING SETPOINT OAT 5° F < RAT (ADJUSTABLE)
2. OCCUPIED SCHEDULE OPERATION:
   A. THE OCCUPIED SCHEDULE SHALL BE UNIQUELY PROGRAMMABLE FROM THE BUILDING CONTROL HEAD END. INITIAL SETTINGS:
      I. FROM 30 MINUTES PRIOR TO THE FIRST LUNCH PERIOD UNTIL 30 MINUTES AFTER THE LAST LUNCH PERIOD.
      II. AFTER THE FINAL LUNCH PERIOD THE CAFETERIA RTU SHALL RETURN TO THE PRE-OCCUPIED MODE UNTIL THE END OF THE SCHOOL DAY.
   B. THE SUPPLY FAN SHALL CONTINUE TO OPERATE NORMALLY.
   C. THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM POSITION.
      I. MINIMUM OUTSIDE AIR/UNIT: 2800 CFM (ADJUSTABLE)
      II. IF IN COOLING MODE THE CONTROLLER SHALL EVALUATE THE POTENTIAL FOR FREE COOLING AND ADJUST THE OUTSIDE AIR, RETURN AIR, RELIEF DAMPERS AND POWERED EXHAUST ACCORDINGLY.
   D. THE CONTROLLER SHALL CONTINUE TO MONITOR THE SPACE TEMPERATURE AND MODULATE THE HOT WATER CONTROL VALVE OR THE VRF SYSTEM ACCORDINGLY.
3. SPECIAL EVENT OVERRIDE:
   A. THE SYSTEM SHALL HAVE AN OVERRIDE FUNCTION THAT MAY BE INITIATED BY THE HEAD END COMPUTER. THE OVERRIDE SHALL BE ABLE SPECIFY THE DATE, START AND FINISH TIMES OF THE EVENT.
   B. THE OVERRIDE COMMAND WILL HAVE A BUILT IN ONE-HOUR PRE-OCCUPIED CYCLE.

STATUS ALARMS AND SETPOINTS

1. THE CONTROLLER SHALL INTERFACE EITHER DIRECTLY OR VIA A BACNET CONNECTION WITH BUILDING AUTOMATION SYSTEM'S HEAD END.
2. THE HEAD SHALL AT A MINIMUM BE ABLE TO READ THE STATUS OF THE FOLLOWING:
   A. SPACE TEMPERATURE AND SETPOINT
   B. FAN STATUS
   C. CIRCULATING PUMP STATUS
   D. HOT WATER CONTROL VALVE POSITION
   E. DX COOLING STATUS.
      I. SUPPLY AIR TEMPERATURE
3. ADJUSTABLE SETPOINTS SHALL INCLUDE:
   A. SPACE TEMPERATURE
   B. OCCUPANCY SCHEDULE
   C. SPECIAL EVENT OVERRIDE
   D. MINIMUM SUPPLY AIR TEMPERATURE.
4. THE FOLLOWING ALARMS SHALL BE REPORTED:
   A. SPACE TEMPERATURE 3 DEGREES ABOVE OR BELOW THE SETPOINT (ADJUSTABLE)
   B. DIRTY FILTER AS MEASURED BY DIFFERENTIAL PRESSURE
   C. FAN FAILURE
   D. DX COMPRESSOR FAILURE
   E. HIGH FAN STATIC PRESSURE
5. SMOKE ALARM:
   A. THE SMOKE DETECTOR SHALL REPORT TO THE FIRE ALARM SYSTEM WHICH WILL SHUT THE RTU DOWN IN THE EVENT OF FIRE/SMOKE

1 MS-H701 CAFE ROOFTOP UNIT SEQUENCE OF OPERATIONS
SCALE: NTS

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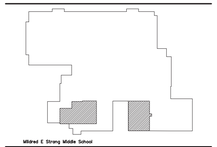

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SHEET NAME: CONTROL DIAGRAMS
SHEET NUMBER: MS-H701