RIANG - WARWICK ARMORY

UPGRADES TO BUILDINGS 1 & 3

541 Airport Road
Warwick, RI 02886

EDS JOB # 16096RS

ISSUED: MARCH 20, 2018

M.E.P ENGINEER:

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

ARCHITECT:

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STRUCTURAL:

Steere ENGINEERING INC

CLIENT:

RHODE ISLAND NATIONAL GUARD

RHODE ISLAND NATIONAL GUARD

645 NEW LONDON AVENUE
CRANSTON, RI 02920

DESIGN INDEX

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MD102 EXISTING MECHANICAL FLOOR PLAN BUILDING 1 PIPING
MD103 EXISTING MECHANICAL ROOF PLAN BUILDING 1
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AE201 BUILIDNG 3 EXISTING FLOOR PLAN
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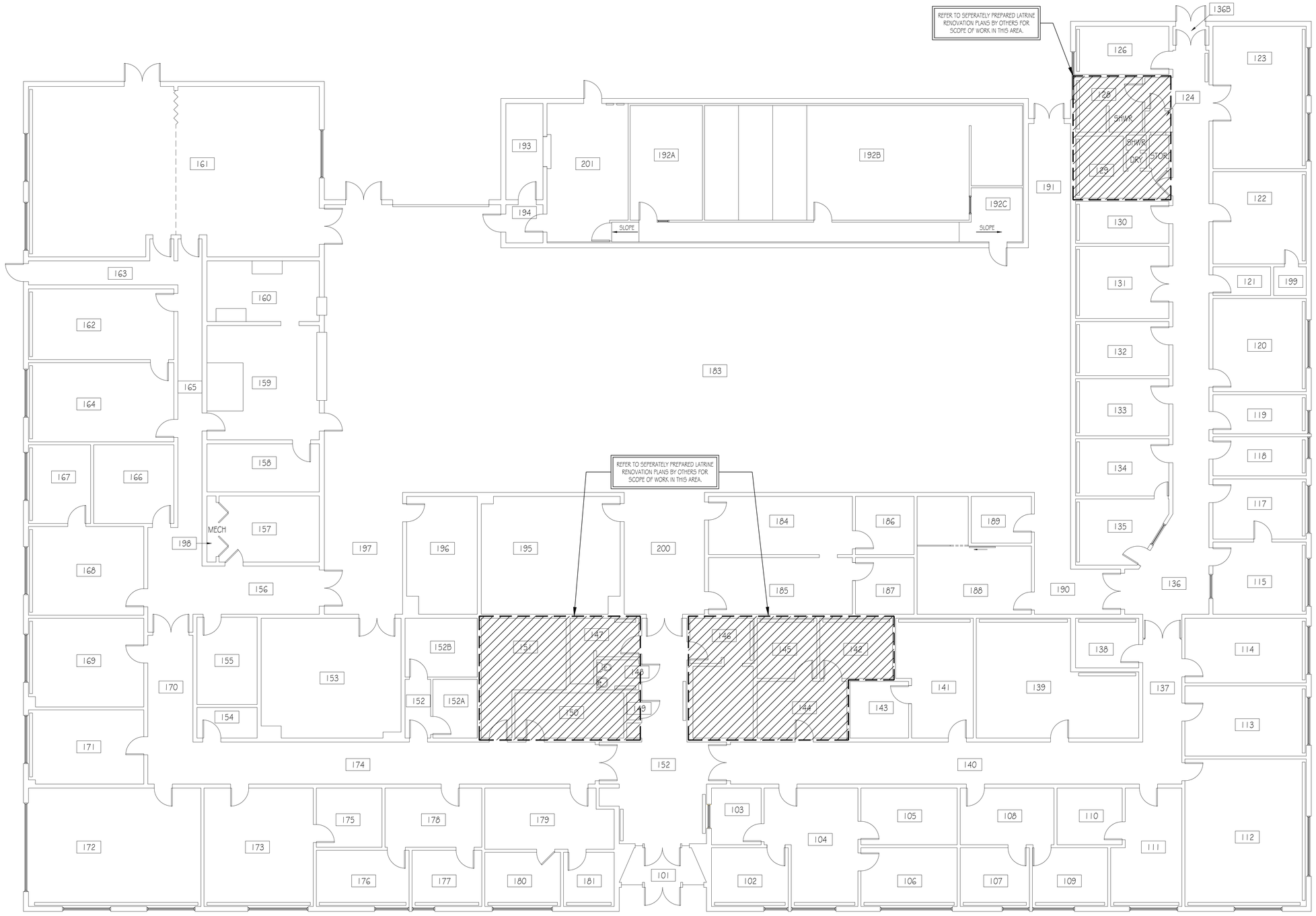
AE203 BUILDING 3 PROPOSED REFLECTED CEILING PLAN

S101 ROOF EQUIPMENT AND ROOF OPENING SUPPORT DETAILS

DIVISION 1 SPECIFICATION
REFERENCE KEYES SITE UTILITY PLAN SE-3 DATED 4/3/87

APPLICABLE CODES:

SBC-1 RHODE ISLAND STATE BUILDING CODE
SBC-3 RHODE ISLAND STATE PLUMBING CODE
SBC-4 RHODE ISLAND STATE MECHANICAL CODE
SBC-5 RHODE ISLAND STATE ELECTRICAL CODE
SBC-8 RHODE ISLAND STATE ENERGY CONSERVATION CODE
RHODE ISLAND FIRE SAFETY CODE



GENERAL NOTES

1. FLOOR PLAN IS PROVIDED FOR REFERENCE / COORDINATION PURPOSES ONLY. REFER TO ALL OTHER DOCUMENTS FOR COMPLETE PROJECT SCOPE.

01 AE101 BUILDING 1 - EXISTING FLOOR PLAN

1/8" = 1'-0"

0 8 16 24 FT

CERTIFICATION :

GEORGE A. BENNETT JR. REGISTERED ARCHITECT No. 1100

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.02.2018	ISSUED FOR CONSTRUCTION

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 1
EXISTING FLOOR PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

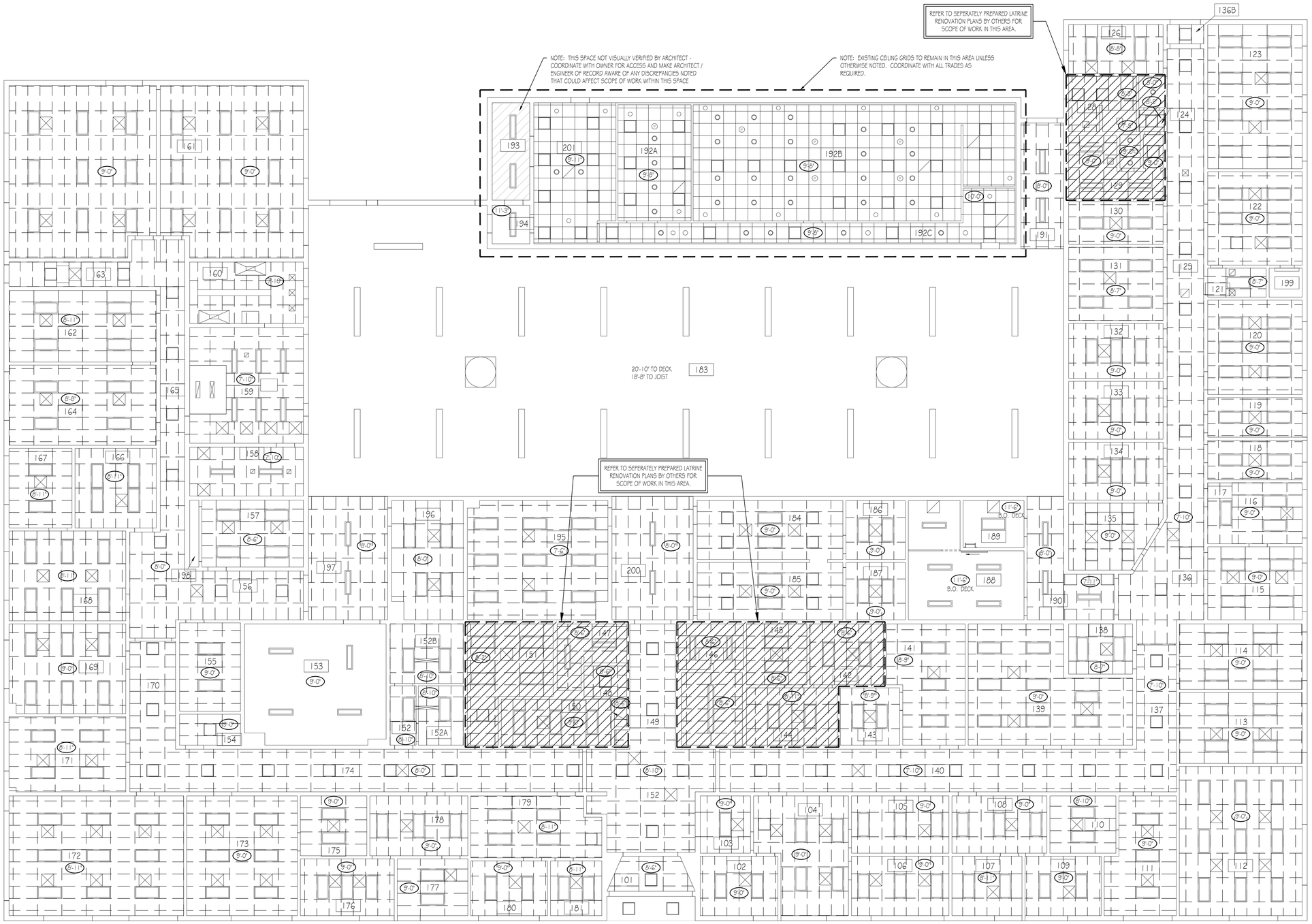
CHECKED BY: GAB

DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE101



DEMOLITION GENERAL NOTES

1. BY SUBMITTING A BID, THE DEMOLITION CONTRACTOR CERTIFIES THAT HE HAS VISITED THE SITE AND HAS EXAMINED AND UNDERSTANDS THE SCOPE OF WORK, FIELD CONDITIONS, DIMENSIONS AND CONDITIONS UNDER WHICH HE WILL BE OBLIGATED TO PERFORM THE CONTRACT WORK. HE FURTHER CONFIRMS THAT THE WORK WILL BE PERFORMED AND ACCOMPLISHED AS INDICATED AND AS NECESSARY PRIOR TO PROCEEDING. NO ALLOWANCES WILL BE MADE SUBSEQUENTLY TO THE DEMOLITION CONTRACTOR FOR ANY ERRORS ON HIS PART IN EXAMINING THE DOCUMENTS OR THE BUILDING AND SITE.

2. THIS SHEET REPRESENTS THE SCOPE OF DEMOLITION WORK FOR ARCHITECTURAL FINISHES ONLY. REFER TO ALL OTHER DOCUMENTS AND SPECIFICATIONS FOR DEMOLITION SCOPE RELATED TO ALL OTHER TRADES. COORDINATE WITH THE GENERAL CONTRACTOR AND OTHER TRADES TO DEFINE EXACTLY THE LIMITS OF THE DEMOLITION IN ALL AREAS. CAREFULLY LOCATE NEW OPENINGS IN WALLS AND FLOORS.

3. IT IS THE DESIGN INTENT OF THESE DOCUMENTS TO REPLACE ALL EXISTING SUSPENDED ACOUSTICAL CEILING SYSTEMS IN THEIR ENTIRETY WITH NEW SUSPENDED ACOUSTICAL CEILING SYSTEMS MATCHING THE EXISTING CEILING HEIGHT. G.C. TAKE CARE TO MAKE NOTE OF EXISTING CEILING GRID ALIGNMENT AND HEIGHT IN EACH AFFECTED SPACE PRIOR TO DEMOLITION WORK BEING PERFORMED. NEW GRID SYSTEMS PROPOSED ARE TO MATCH EXISTING HEIGHT AND GRID ALIGNMENT AS REQUIRED TO MAINTAIN EXISTING LIGHTING AND / OR SPRINKLER HEAD CONFIGURATION. COORDINATE WITH MEP DRAWINGS AS REQUIRED THROUGHOUT.

4. THE DEMOLITION SUBCONTRACTOR SHALL BE RESPONSIBLE FOR MAKING THE ENGINEER OF RECORD AND CONSTRUCTION MANAGER AWARE OF ANY DISCREPANCIES NOTICED OR DISCOVERED REGARDING THE SCOPE OF WORK, EXISTING CONDITIONS, ACCESSIBILITY TO THE PREMISES, OR INTENT OF THE DOCUMENTS. THE DEMOLITION CONTRACTOR SHALL REQUEST WRITTEN CLARIFICATION FROM THE ENGINEER OF RECORD PRIOR TO PROCEEDING WITH ANY WORK WHICH MAY VARY FROM THE CONTRACT DOCUMENTS.

5. ALL WORK PERFORMED, EQUIPMENT AND METHODS USED AND MATERIALS PROVIDED SHALL BE IN STRICT ACCORDANCE WITH THE MINIMUM STANDARDS SET FORTH BY ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES, ORDINANCES, RULES AND REGULATIONS AND ORDERS FROM AUTHORITIES HAVING JURISDICTION. ALL WORK, BOTH TEMPORARY OR PERMANENT, SHALL COMPLY WITH ALL APPLICABLE OSHA REGULATIONS.

6. EXCEPT AS REQUIRED BY THE CONTRACT DOCUMENTS, DO NOT ALTER STRUCTURAL ELEMENTS IN ANY WAY.

7. AVOID EXCEEDING ALLOWABLE FLOOR OR ROOF LOADING CAPACITY AT ANY LOCATION BY ANY CONSTRUCTION PROCESS AND SPECIFICALLY BY THE USE OF HOISTS, VEHICLES, CRANES, ETC., OR BY STORAGE OF DEBRIS OR CONSTRUCTION MATERIALS OR EQUIPMENT.

8. WHERE CUTTING AND PATCHING IS REQUIRED, PROTECT ADJACENT COMPONENTS FROM DAMAGE.

9. DISPOSE OF ALL MATERIALS IN A LEGAL MANNER.

10. PERFORM THE DEMOLITION WORK IN SUCH A MANNER AS TO PREVENT FIRES. NO MATERIALS SHALL BE BURNED AT THE SITE. PROVIDE FIRE EXTINGUISHERS AND SMOKE DETECTION EQUIPMENT IN GOOD WORKING CONDITION, PROPER LOCATION, AND IDENTIFIED SO THAT IT WILL BE IMMEDIATELY AVAILABLE FOR USE IF NEEDED.

11. CAREFULLY REMOVE ALL EXISTING CEILING FINISHES AS INDICATED UTILIZING METHODS THAT WILL NOT DAMAGE SUBSTRATES OR SURROUNDING CONSTRUCTION SCHEDULED TO REMAIN. PROTECT ALL EXISTING CONSTRUCTION / FINISHES TO REMAIN AS REQUIRED DURING DEMOLITION ACTIVITIES SO AS NOT TO BE DAMAGED. G.C. TO BE RESPONSIBLE FOR REPAIRING (OR REPLACING AS REQUIRED) ANY FINISHES DAMAGED BY CONSTRUCTION ACTIVITIES.

12. DIFFUSER AND LIGHTING LOCATIONS INDICATED ARE APPROXIMATE - COORDINATE IN THE FIELD AND WITH THOSE RESPECTIVE TRADES AS REQUIRED. SEE MEP DRAWINGS FOR FULL SCOPE OF LIGHTING, MECHANICAL WORK AND / OR DIFFUSER RELOCATION OR DEMOLITION AND REPLACEMENT. ALL LIGHTING TO BE REMOVED AND REINSTALLED AS INDICATED ON THE ELECTRICAL DRAWINGS OR AS OTHERWISE REQUIRED (AT THEIR ORIGINAL LOCATIONS UNLESS OTHERWISE NOTED) TO PERFORM WORK INDICATED IN THESE DOCUMENTS.

13. COORDINATE ALL DEMOLITION WORK WITH ABATEMENT CONTRACTOR AS REQUIRED.

01
AE102

BUILDING 1 - DEMOLITION RCP
1/8" = 1'-0"
0 8 16 24 FT

CERTIFICATION :

GEORGE A. BENNETT JR. No. 1100 REGISTERED ARCHITECT

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 1
DEMOLITION REFLECTED
CEILING PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

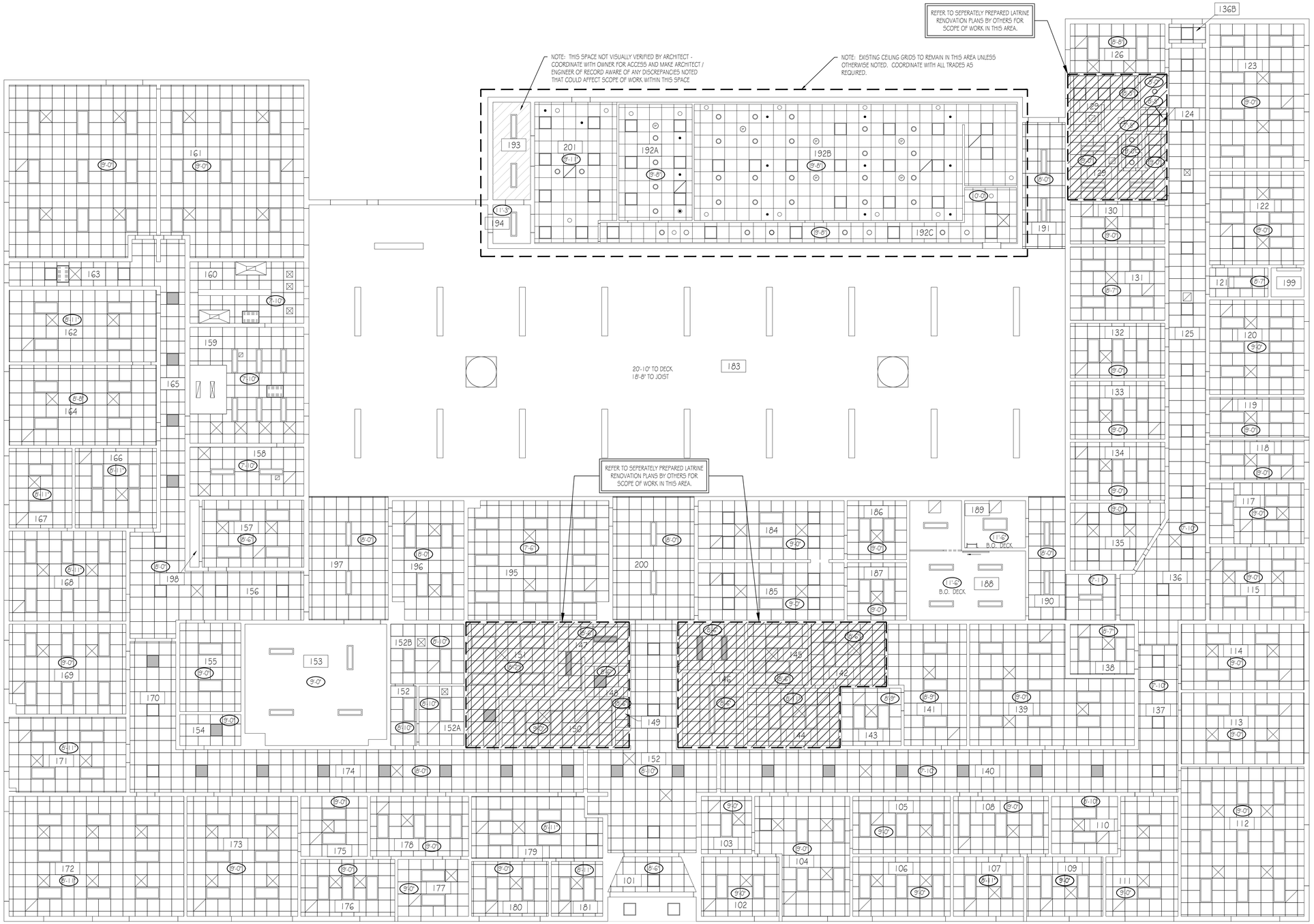
CHECKED BY: GAB

DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE102



GENERAL NOTES

1. NEW SUSPENDED ACOUSTICAL TILE CEILINGS TO BE:
   1.1. KITCHEN AREAS: CERTAINTEED PERFORMA RX SYMPHONY 1342B-RX5-1 IN A WHITE 15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
   1.2. TOILET ROOMS: CERTAINTEED PERFORMA RX SYMPHONY 1342B-RX5-1 IN A WHITE 15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
   1.3. ALL OTHER AREAS: CERTAINTEED PERFORMA BAROQUE PBT-154 IN A WHITE15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
2. INSTALL ALL NEW SUSPENDED ACOUSTICAL CEILING SYSTEMS PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS BY A CERTIFIED INSTALLER. G.C. TO COORDINATE INSTALLATION SEQUENCING / TIMING WITH OWNER AND ALL WORK BY OTHER TRADES AS REQUIRED.
3. ALL NEW CEILING GRIDS TO BE INSTALLED TO MATCH FORMER EXISTING FINISHED CEILING HEIGHTS. FINISHED CEILING HEIGHTS INDICATED ARE APPROXIMATE AND SHOULD BE VERIFIED IN FIELD AS REQUIRED.
4. ALL LIGHTING FIXTURES SHOWN SHADED DESIGNATE FIXTURES THAT NEED TO BE SHIFTED / RELOCATED TO ALIGN WITH PROPOSED NEW CEILING GRID LAYOUT. COORDINATE WITH MEP DRAWINGS IN THE FIELD WITH MEP TRADES AS REQUIRED.
5. EXISTING SPRINKLER SYSTEM / HEAD LOCATION NOT VERIFIED OR SHOWN. COORDINATE LAYOUT WITH EXISTING SPRINKLER HEAD LOCATIONS AND ENGINEER OF RECORD AS REQUIRED.
6. ALIGN ALL MECHANICAL EQUIPMENT / DIFFUSERS / GRILLS WITH NEW CEILING GRID. FIXTURES INDICATED ARE FOR REFERENCE / COORDINATION ONLY. SEE MECHANICAL DRAWINGS FOR FULL SCOPE OF MECHANICAL WORK.
7. PREPARE EXISTING PAINTED CONCRETE FLOOR IN ROOM #153 AS REQUIRED TO RECEIVE NEW FINISH. FINISH TO BE SERIES 290 CRU BY TNEMEC OR APPROVED EQUAL. PREPARE EXISTING SURFACE AND APPLY NEW FINISH PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS.

REFLECTED CEILING PLAN LEGEND

- SUSPENDED CEILING SYSTEM - ALIGN IN SPACE AS INDICATED UNLESS OTHERWISE NOTED
- RECESSED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- SURFACE MOUNTED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- PAINTED GYPSUM BOARD CEILING / SOFFIT
- RECESSED CAN LIGHT - SEE ELECTRICAL DRAWINGS
- SUPPLY DIFFUSER - SEE MECHANICAL DRAWINGS
- RETURN DIFFUSER - SEE MECHANICAL DRAWINGS
- ELECTRIC CEILING HEATER - SEE MECHANICAL DRAWINGS
- CEILING HEIGHT
- SMOKE DETECTOR

GENERAL NOTES:-

- COORDINATE MOUNTING REQUIREMENTS / ROUGH OPENING REQUIREMENTS OF ALL FIXTURES WITH MANUFACTURER AS REQUIRED.

01 AE103

BUILDING 1 - PROPOSED RCP

1/8" = 1'-0"

0 8 16 24 FT

CERTIFICATION :

GEORGE A. BENNETT, JR. No. 1100 REGISTERED ARCHITECT

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 1
PROPOSED REFLECTED
CEILING PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

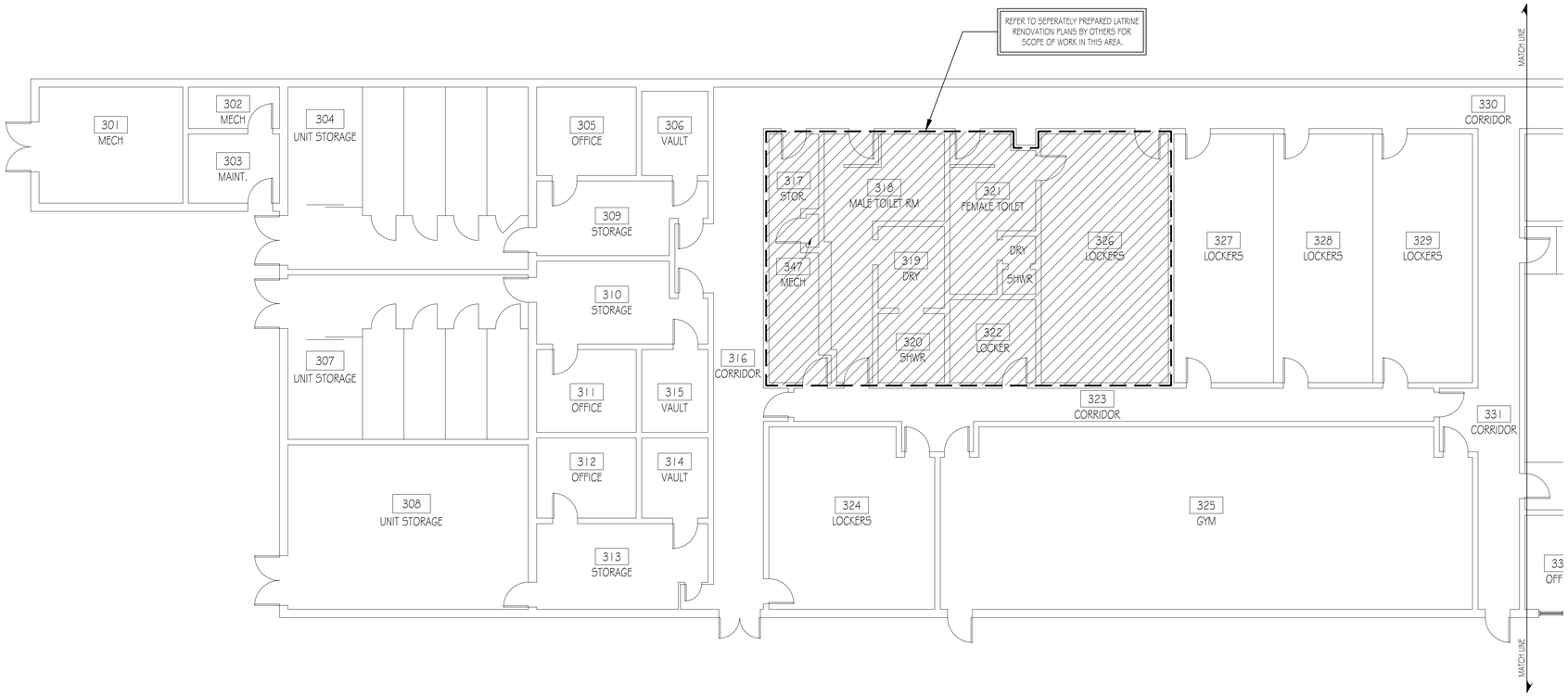
CHECKED BY: GAB

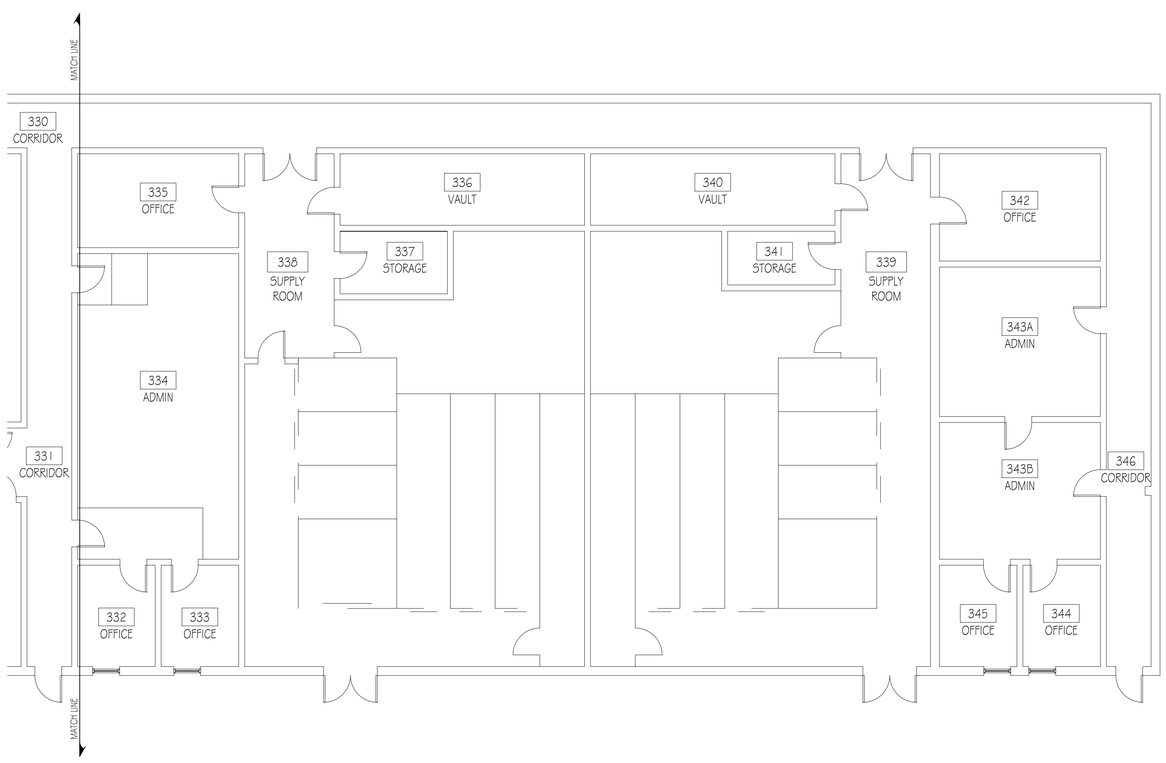
DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE103





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01 AE201 BUILDING 3 - EXISTING FLOOR PLAN

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 3
EXISTING FLOOR PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

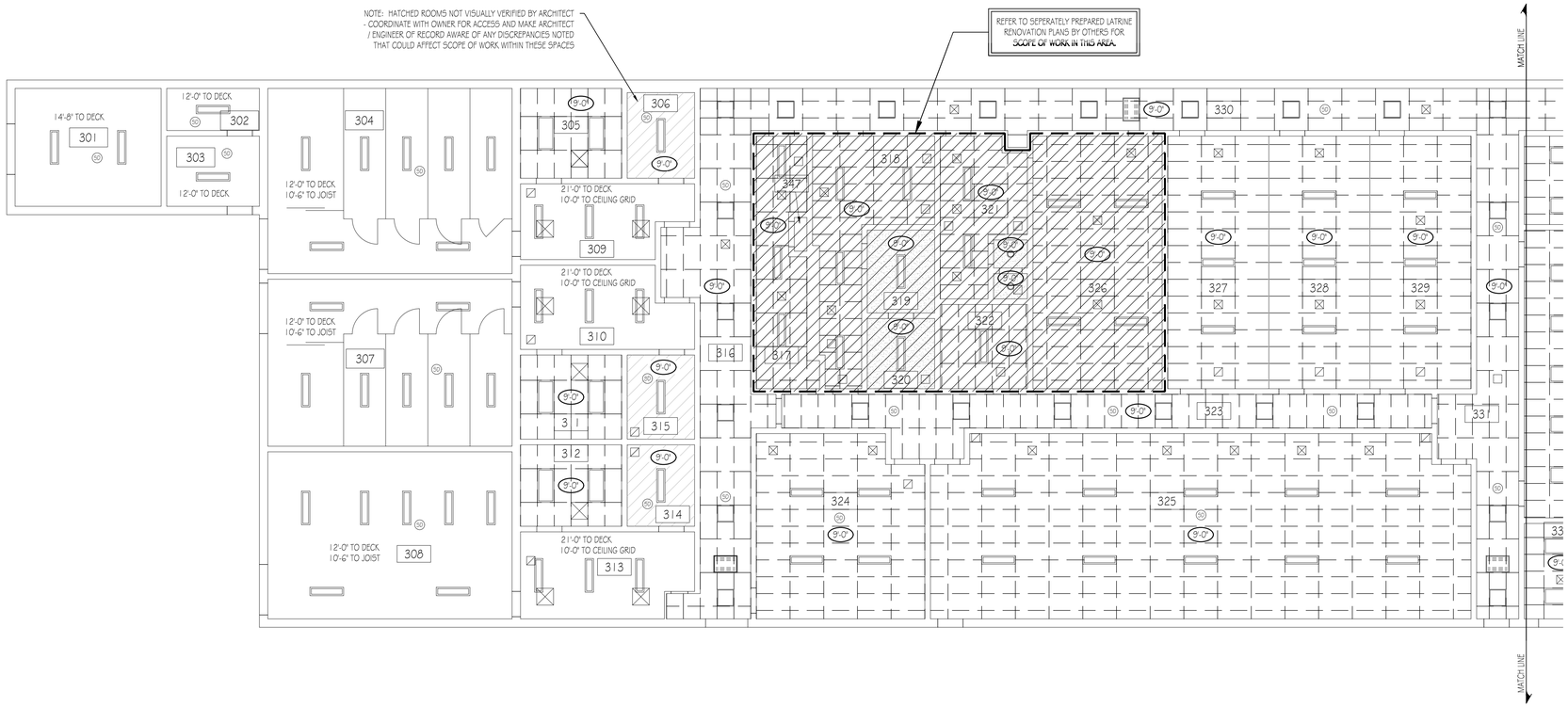
CHECKED BY: GAB

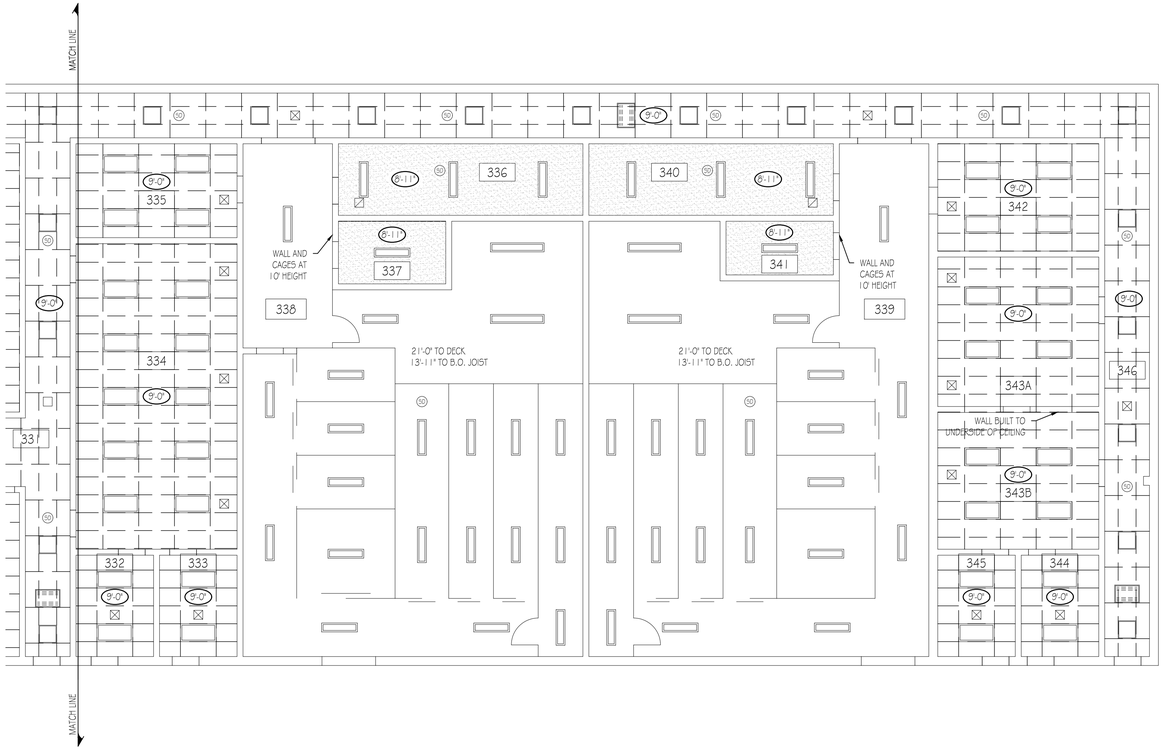
DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE201





DEMOLITION GENERAL NOTES

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13. COORDINATE ALL DEMOLITION WORK WITH ABATEMENT CONTRACTOR AS REQUIRED.

01 AE202

BUILDING 3 - DEMOLITION RCP

1/8" = 1'-0"

0 8 16 24 FT

CERTIFICATION :

GEORGE A. BENNETT JR. No. 1100 REGISTERED ARCHITECT

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 3
DEMOLITION REFLECTED CEILING PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

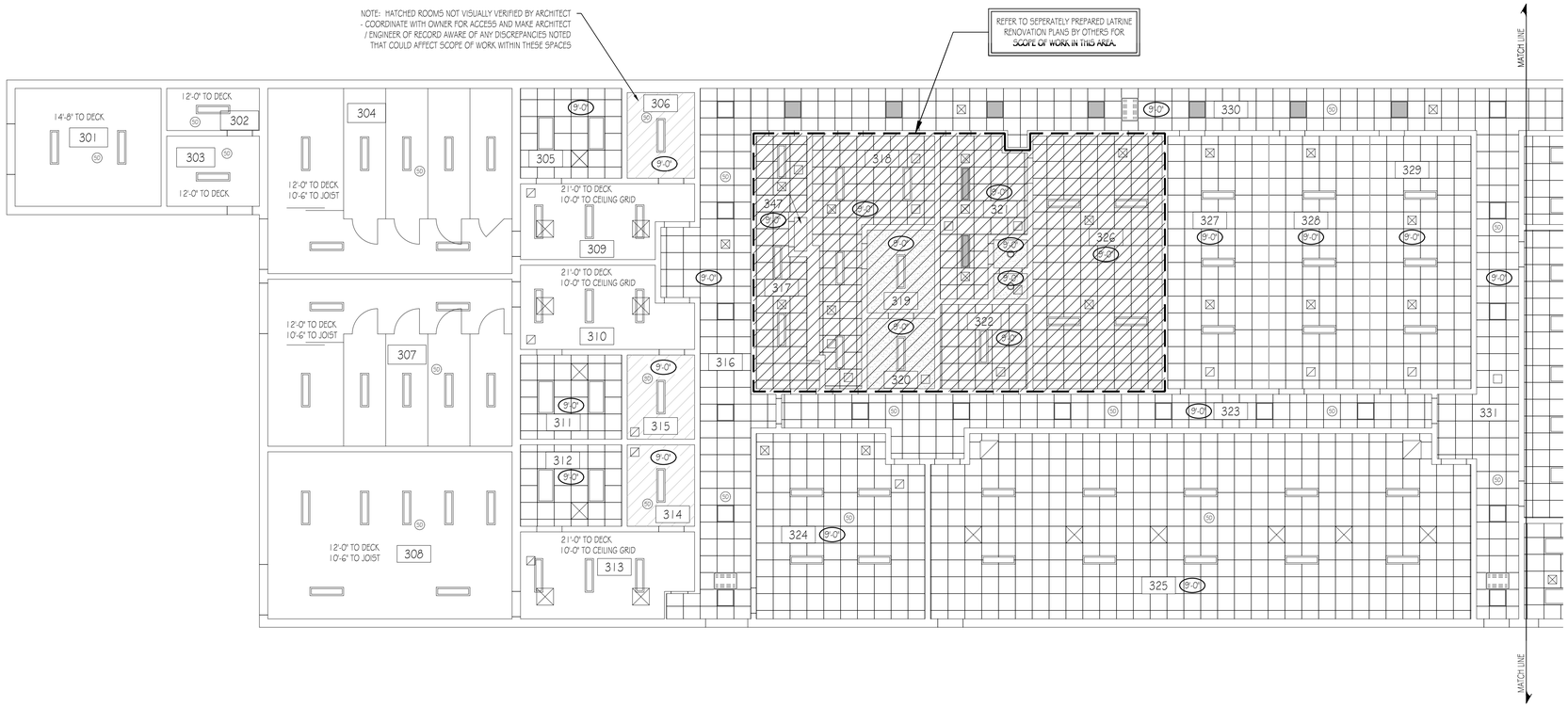
CHECKED BY: GAB

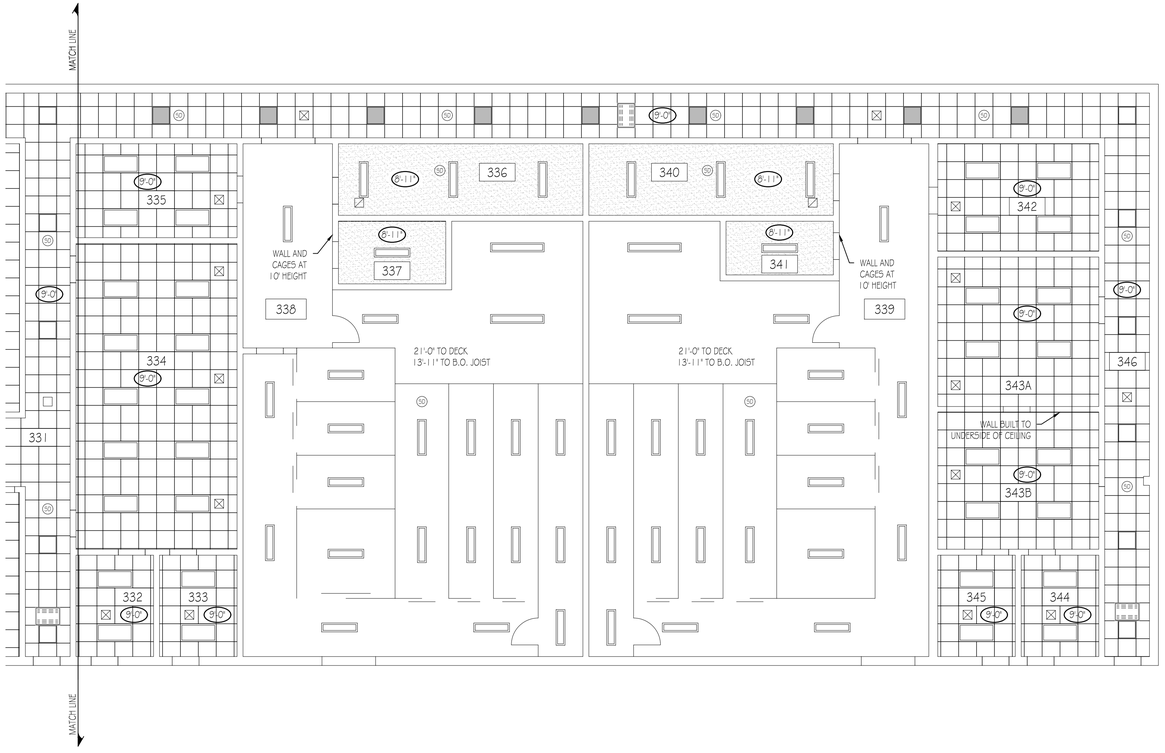
DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE202





GENERAL NOTES

1. NEW SUSPENDED ACOUSTICAL TILE CEILINGS TO BE:
   1.1. KITCHEN AREAS: CERTAINTEED PERFORMA RX SYMPHONY 1342B-RXS-1 IN A WHITE 15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
   1.2. TOILET ROOMS: CERTAINTEED PERFORMA RX SYMPHONY 1342B-RXS-1 IN A WHITE 15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
   1.3. ALL OTHER AREAS: CERTAINTEED PERFORMA BAROQUE PBT-154 IN A WHITE 15/16 CLASSIC ALUMINUM CAPPED HOOK GRID SYSTEM.
2. INSTALL ALL NEW SUSPENDED ACOUSTICAL CEILING SYSTEMS PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS BY A CERTIFIED INSTALLER. G.C. TO COORDINATE INSTALLATION SEQUENCING / TIMING WITH OWNER AND ALL WORK BY OTHER TRADES AS REQUIRED.
3. ALL NEW CEILING GRIDS TO BE INSTALLED TO MATCH FORMER EXISTING FINISHED CEILING HEIGHTS. FINISHED CEILING HEIGHTS INDICATED ARE APPROXIMATE AND SHOULD BE VERIFIED IN FIELD AS REQUIRED.
4. ALL LIGHTING FIXTURES SHOWN SHADED DESIGNATE FIXTURES THAT NEED TO BE SHIFTED / RELOCATED TO ALIGN WITH PROPOSED NEW CEILING GRID LAYOUT. COORDINATE WITH MEP DRAWINGS IN THE FIELD WITH MEP TRADES AS REQUIRED.
5. EXISTING SPRINKLER SYSTEM / HEAD LOCATION NOT VERIFIED OR SHOWN. COORDINATE LAYOUT WITH EXISTING SPRINKLER HEAD LOCATIONS AND ENGINEER OF RECORD AS REQUIRED.
6. ALIGN ALL MECHANICAL EQUIPMENT / DIFFUSERS / GRILLS WITH NEW CEILING GRID. FIXTURES INDICATED ARE FOR REFERENCE / COORDINATION ONLY. SEE MECHANICAL DRAWINGS FOR FULL SCOPE OF MECHANICAL WORK.
7. PREPARE EXISTING PAINTED CONCRETE FLOOR IN ROOM #301 AS REQUIRED TO RECEIVE NEW FINISH. FINISH TO BE SERIES 290 CRU BY TNEMEC OR APPROVED EQUAL. PREPARE EXISTING SURFACE AND APPLY NEW FINISH PER MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS.

REFLECTED CEILING PLAN LEGEND

- SUSPENDED CEILING SYSTEM - ALIGN IN SPACE AS INDICATED UNLESS OTHERWISE NOTED
- RECESSED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- SURFACE MOUNTED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- PAINTED GYPSUM BOARD CEILING / SOFFIT
- RECESSED CAN LIGHT - SEE ELECTRICAL DRAWINGS
- SUPPLY DIFFUSER - SEE MECHANICAL DRAWINGS
- RETURN DIFFUSER - SEE MECHANICAL DRAWINGS
- ELECTRIC CEILING HEATER - SEE MECHANICAL DRAWINGS
- CEILING HEIGHT
- SMOKE DETECTOR

GENERAL NOTES:

- COORDINATE MOUNTING REQUIREMENTS / ROUGH OPENING REQUIREMENTS OF ALL FIXTURES WITH MANUFACTURER AS REQUIRED.

01 / AE203

BUILDING 3 - PROPOSED RCP

1/8" = 1'-0"

0 8 16 24 FT

CERTIFICATION :

GEORGE A. BENNETT, JR. No. 1100 REGISTERED ARCHITECT

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.02.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
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TEL: (401) 431-1922
www.bbaltd.com

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 3
PROPOSED REFLECTED
CEILING PLAN

BBA JOB NO.: 1645

DRAWN BY: OR

CHECKED BY: GAB

DATE ISSUED: 03.02.2018

SCALE: AS NOTED

SHEET NO.:

AE203

ABBREVIATIONS

GENERAL ABBREVIATIONS:

AAV	AUTOMATIC AIR VENT	L	LENGTH
ADD'L	ADDITIONAL	LAT	LEAVING AIR TEMPERATURE
AFF	ABOVE FINISHED FLOOR	LB	POUND
AMS	AIR FLOW MEASURING STATION	LF	LINEAR FEET
ALT	ALTITUDE OR ALTERNATE	LD	LINEAR DIFFUSER
AMP	AMPERE	LRA	LOCKED ROTOR AMPS
AP	ACCESS PANEL	LVD	LOUVERED DOOR
APD	AIR PRESSURE DROP	LVG	LEAVING
ARCH	ARCHITECT	LWT	LEAVING WATER TEMPERATURE
ATC	AUTOMATIC TEMP. CONTROL		
ATM	ATMOSPHERE	MAX	MAXIMUM
AVG	AVERAGE	MBH	THOUSAND BTH
		MCA	MINIMUM CIRCUIT AMPS
BDD	BACKDRAFT DAMPER	MD	MOTOR OPERATED DAMPER
BG	BLAST GATE DAMPER	MECH	MECHANICAL
BHP	BRAKE HORSEPOWER	MEZZ	MEZZANINE
BI	BACKWARDS INCLINED	MFR	MANUFACTURER
BLDG	BUILDING	MIN	MINIMUM
BMS	BUILDING MANAGEMENT SYSTEM	MUA	MAKE-UP AIR
BOD	BOTTOM OF DUCT		
BOP	BOTTOM OF PIPE	N/A	NOT APPLICABLE
BSMT	BASEMENT	NC	NORMALLY CLOSED
BTU	BRITISH THERMAL UNIT	NC	NOISE CRITERIA
BTH	BTU PER HOUR	NIC	NOT IN CONTRACT
		NO	NORMALLY OPEN
CA	COMPRESSED AIR	No.	NUMBER
CDW	CONDENSER WATER	NOM	NOMINAL
CENT	CENTRIFUGAL	NTS	NOT TO SCALE
CF	CUBIC FEET		
CFM	CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
CL	CENTERLINE	OD	OUTSIDE DIAMETER
C.L.	COLUMN LINE	ODP	OPEN DRIP PROOF
CND	CONDENSATE	OED	OPEN END DUCT
CLG	CEILING OR COOLING	OV	OUTLET VELOCITY
C.O.	CLEAN-OUT		
CO	CARBON MONOXIDE	PD	PRESSURE DROP
CO2	CARBON DIOXIDE	PH	PHASE
COL	COLUMN	PHC	PREHEAT COIL
CONN	CONNECTION	PBG	PLUMBING
CONTR	CONTRACTOR	POS	PROVIDED BY OTHER SECTION
CV	CONSTANT VOLUME	PSI	POUNDS PER SQUARE INCH
		PSIA	PSI ABSOLUTE
DB	DRY BULB TEMPERATURE	PSID	PSI DIFFERENTIAL
		PSIG	PSI GAUGE
DEG	DEGREE DIRECT	PVC	POLYVINYL CHLORIDE
DDC	DIGITAL CONTROL	PRV	PRESSURE REDUCING VALVE
DIA	DIAMETER		
DIFF	DIFFUSER	QTY	QUANTITY
DIM	DIMENSION		
DN	DOWN	R	RADIUS
DP	DIFFERENTIAL PRESSURE	RA	RETURN AIR
DWDI	DOUBLE WIDTH DOUBLE INLET	REG	REGISTER
DX	DIRECT EXPANSION	RET	RETURN
		REQD	REQUIRED
EA	EACH OR EXHAUST AIR	RH	RELATIVE HUMIDITY
EAT	ENTERING AIR TEMPERATURE	RLA	RUNNING LOAD AMPS
ECH	ELECTRIC CABINET HEATER	RLL	REFRIGERANT LIQUID LINE
EFF	EFFICIENCY	RM	ROOM
ELEC	ELECTRICAL	RPM	REVOLUTIONS PER MINUTE
ELEV	ELEVATION	RSL	REFRIGERANT SUCTION LINE
EMER	EMERGENCY		
EMS	ENERGY MANAGEMENT SYSTEM	SA	SUPPLY AIR
ENT	ENTER	SCH	SCHEDULE
ESP	EXTERNAL STATIC PRESSURE	SD	SMOKE DETECTOR
EWT	ENTERING WATER TEMPERATURE	SEN	SENSIBLE
EXH	EXHAUST	SHC	SENSIBLE HEAT CAPACITY
EXIST.	EXISTING	SP	STATIC PRESSURE
		SPECS	SPECIFICATIONS
F	FAHRENHEIT OR FAN	SQ	SQUARE
FA	FREE AREA	SF	SQUARE FEET
FD	FIRE DAMPER (ACCESS DOOR)	SS	STAINLESS STEEL
FLA	FULL LOAD AMPS	STL	STEEL
FLEX	FLEXIBLE	SUP	SUPPLY
FPM	FEET PER MINUTE	SWSI	SINGLE WITH SINGLE INLET
FPS	FEET PER SECOND		
FRP	FIBERGLASS REINFORCED PLASTIC	T	TEMPERATURE
FS	FLOW SWITCH	TEL	TELEPHONE
FT	FEET	TEFC	TOT. ENCLOSED FAN COOLED
FTR	FINNED TUBE RADIATION	TEMP	TEMPERATURE
		TSTAT	THERMOSTAT
G	GAS	TOD	TOP OF DUCT
GAL	GALLONS	TON	12,000 BTH
GALV	GALVANIZED	TOP	TOP OF PIPE
GC	GENERAL CONTRACTOR	TOT	TOTAL
GPH	GALLONS PER HOUR	TSP	TOTAL STATIC PRESSURE
GPM	GALLONS PER MINUTE	TYP	TYPICAL
GWB	GYPSUM WALL BOARD		
		V	VENT
HB	HOSE BIBB	VB	VACUUM BREAKER
HC	HEATING COIL	VD	VOLUME DAMPER
HEX	HEAT EXCHANGER	V	VOLTS (ELECTRICAL)
HGT	HEIGHT	VEL	VELOCITY
HP	HORSEPOWER		
HR	HOUR	W	WIDTH OR WATT
HTG	HEATING	W/	WITH
HW	HOT WATER	WB	WET BULB TEMPERATURE
HZ	HERTZ	WC	WATER COLUMN
		WG	WATER GAUGE
ID	INSIDE DIAMETER	WMS	WIRE MESH SCREEN
IN	INCHES	W/O	WITHOUT
		WPD	WATER PRESSURE DROP
KW	KILOWATT	WTD	WATER TEMPERATURE DIFF.

CONTROLS ABBREVIATIONS:

ACD	AUTOMATIC CONTROL DAMPER	LSPS	LOW STATIC PRESSURE SWITCH
ACV	AUTOMATIC CONTROL VALVE	LS	LEVEL SENSOR
AMS	AIR FLOW MEASURING STATION		
ALM	ALARM	MD	MOTORIZED DAMPER
ATC	AUTOMATIC TEMPERATURE CONTROL		
ATS	AIR TEMPERATURE SENSOR	NC	NORMALLY CLOSED (POWER LOSS)
		NO	NORMALLY OPEN (POWER LOSS)
BD	BACKDRAFT DAMPER		
BV	BYPASS VALVE	OAH	OUTSIDE AIR HUMIDITY SENSOR
		OAT	OUTSIDE AIR TEMP. SENSOR
CO2	CARBON DIOXIDE SENSOR		
CO	CARBON MONOXIDE SENSOR	RH	RELATIVE HUMIDITY
CT	CURRENT TRANSFORMER		
CV	CONTROL VALVE	S	SWITCH
		SP	STATIC PRESSURE SENSOR
DDC	DIRECT DIGITAL CONTROL	SD	SMOKE DETECTOR
DPS	DIFFERENTIAL PRESSURE SWITCH	SP	STATIC PRESSURE SENSOR
DPT	DIFFERENTIAL PRESSURE SENSOR	SPD	SPEED CONTROL
DPV	DIFF. PRESSURE BYPASS VALVE	S/S	START/STOP
DSD	DUCT MOUNTED SMOKE DETECTOR		
DWDI	DOUBLE WIDTH DOUBLE INLET	T	THERMOSTAT
		TS	TEMPERATURE SENSOR
ES	END SWITCH		
		WTS	WATER TEMPERATURE SENSOR
FM	FLOW METER/TRANSMITTER		
FZ	FREEZESTAT		
H	HUMIDISTAT		
HEPA	HIGH EFF. PARTICULATE AIR FILTER		
HGB	HOT GAS BYPASS		
HHL	HIGH HUMIDITY LIMIT SENSOR		
HOA	HANDS-OFF AUTOMATIC SWITCH		
HS	HUMIDITY SENSOR		
HZ	HERTZ		

EQUIPMENT ABBREVIATIONS:

AC	AIR CONDITIONING UNIT	GMS	GLYCOL MAKE-UP SYSTEM
ACU	AC CONDENSING UNIT	GUH	GAS FIRED UNIT HEATER
AHU	AIR HANDLING UNIT		
AS	AIR SEPARATOR	H	HUMIDIFIER
		HP	HEAT PUMP
B	BOILER	HPU	HP CONDENSING UNIT
BB	BASE BOARD	HV	HEATING & VENTILATING UNIT
BC	BRANCH CONTROLLER	HWC	HOT WATER COIL
BP	BOILER PUMP		
BT	BUFFER TANK	LV	LOUVER
CAC	CRITICAL COOLING AC UNIT	KEF	KITCHEN EXHAUST FAN
CC	COOLING COIL		
CCU	CC CONDENSING UNIT	MAU	MAKE-UP AIR UNIT
CH	CHILLER	MCC	MOTOR CONTROL CENTER
CP	CIRCULATOR PUMP		
CT	COOLING TOWER	P	PUMP
CUH	CABINET UNIT HEATER	PTAC	PACKAGED TERMINAL AC UNIT
CWC	CHILLED WATER COIL		
		R	RETURN GRILLE
DC	DRY COOLER	RHP	RADIANT HEATING PANEL
DEF	DISHWASHER EXHAUST FAN	RTU	ROOF TOP UNIT
E	EXHAUST GRILLE	S	SUPPLY DIFFUSER
EBB	ELECTRIC BASE BOARD	SA	SOUND ATTENUATOR
ECH	ELECTRIC CABINET HEATER	SAC	SPLIT AC UNIT
ECH	ELECTRIC CEILING HEATER	SHP	SPLIT HEAT PUMP
EF	EXHAUST FAN	SF	SUPPLY FAN
ERV	ENERGY RECOVERY VENTILATOR		
ET	EXPANSION TANK	T	TRANSFER GRILLE
EUH	ELECTRIC UNIT HEATER		
		UH	UNIT HEATER
F	FURNACE	UV	UNIT VENTILATOR
FC	FAN COIL UNIT		
FPB	FAN POWERED VAV	VAV	VARIABLE AIR VOLUME BOX
FT	FINTUBE	VFD	VARIABLE FREQUENCY DRIVE
		WSHP	WATER SOURCE HEAT PUMP

GENERAL CONSTRUCTION NOTES:

1. ALL WORK IS TO BE PERFORMED IN STRICT COMPLIANCE WITH LOCAL CODES AND ALL OTHER REGULATIONS GOVERNING WORK OF THIS NATURE.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK, MATERIALS, AND LABOR TO SATISFY A COMPLETE WORKING SYSTEM WHETHER SPECIFIED OR IMPLIED.
3. THIS CONTRACTOR, PRIOR TO SUBMITTING HIS BID, SHALL VISIT THE PROJECT SITE TO FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS. REQUESTS FOR COMPENSATION FOR EXTRA WORK, WHICH WOULD HAVE BEEN EVIDENT BY COMPLIANCE WITH THE PREVIOUS STATEMENT, WILL NOT BE CONSIDERED. THE CONTRACTOR SHALL CONDUCT A THOROUGH FIELD INVESTIGATION TO VERIFY WORK SHOWN ON THE DRAWINGS. THE DRAWINGS REFLECT THE BEST AVAILABLE INFORMATION FROM EXISTING PLANS AND SITE INVESTIGATIONS.
4. THE MECHANICAL PLANS ARE INTENDED TO BE DIAGRAMMATIC AND ARE BASED ON ONE MANUFACTURER'S EQUIPMENT. THEY ARE NOT INTENDED TO SHOW THE EXACT ROUTING OF SYSTEMS OR LOCATION OF COMPONENTS. THE EXACT LOCATIONS, DIMENSIONS AND ALL OTHER DETAILS OF EQUIPMENT ARE THE RESPONSIBILITY OF THIS CONTRACTOR. THIS CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS OF THE EQUIPMENT PROPOSED TO ENSURE THAT THE EQUIPMENT WILL FIT IN THE AVAILABLE SPACE. PROVIDE ALL DUCT AND PIPE TRANSITIONS REQUIRED FOR CONNECTION TO EQUIPMENT.
5. THIS CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLVE.
6. ALL WORK SHALL BE PERFORMED IN A CLEAN AND WORKMANLIKE MANNER. CARE SHALL BE EXERCISED TO MINIMIZE ANY INCONVENIENCE OR DISTURBANCE TO OTHER AREAS OF THE BUILDING WHICH ARE TO REMAIN IN OPERATION. ISOLATE WORK AREAS BY MEANS OF TEMPORARY PARTITIONS AND/OR TARPS TO KEEP DUST AND DEBRIS WITHIN THE CONSTRUCTION AREA.
7. CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
8. ALL OPENINGS IN WALLS SHALL BE KEPT PROPERLY SEALED AT ALL TIMES, EXCEPT WHEN BEING WORKED ON TO PRECLUDE THE POSSIBILITY OF FLOODING DUE TO STORM OR OTHER CAUSES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. OWNER ASSUMES NO RESPONSIBILITY FOR PROTECTION OF PROPERTIES AGAINST FIRE, THEFT, AND ENVIRONMENTAL CONDITIONS.
10. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES PRIOR TO FABRICATION, PURCHASE AND/OR INSTALLATION OF ALL WORK. ALL OFFSETS IN PIPING AND DUCTS TO AVOID OBSTRUCTIONS SHALL BE PROVIDED AT NO COST TO THE OWNER.
11. CONTRACTOR SHALL REFER TO THE COMPLETE SET OF CONTRACT DOCUMENTS INCLUDING SPECIFICATIONS AND OTHER TRADES FOR A FULL UNDERSTANDING OF ALL WORK REQUIRED.
12. WHERE USED THE TERM "PROVIDE" SHALL MEAN "FURNISH AND INSTALL".
13. PROVIDE ALL REQUIRED RIGGING TO ACCOMMODATE THE REMOVAL & INSTALLATION OF ALL EQUIPMENT.
14. PROVIDE ACCESS PANELS FOR ALL CONCEALED DAMPERS, VALVES, AND EQUIPMENT.
15. ALL EQUIPMENT AND MATERIALS SHALL BE AS SPECIFIED OR "APPROVED EQUAL" BY THE ENGINEER OR ARCHITECT.
16. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF REGISTERS, DIFFUSERS, AND GRILLES.
17. CONTRACTOR SHALL SPRAY PAINT INSIDE OF DUCT BLACK, BEHIND ALL GRILLES AND REGISTERS.
18. ALL DUCTWORK AND PIPING SHALL BE INSTALLED AS INDICATED ON THE DRAWINGS IN A NEAT AND WORKMANLIKE MANNER AND BE SUPPORTED AS REQUIRED BY CODES. DUCTWORK AND PIPING SHALL BE SET UP AND DOWN AND OFFSET AS REQUIRED TO SUIT FIELD CONDITIONS. DIELECTRIC COUPLINGS SHALL BE USED WHERE DISSIMILAR METALS ARE JOINED.
19. IF A SECTION OF DUCT OR PIPE IS NOT LABELED FOR SIZE, THEN THE LARGER SIZE INDICATED ON THE DRAWINGS SHALL PREVAIL. SIZE OF DUCT RUN-OUTS TO DIFFUSERS SHALL EQUAL DIFFUSER NECK SIZE UNLESS OTHERWISE NOTED.
20. PROVIDE ALL NECESSARY TEMPORARY OR PERMANENT CAPS OR PLUGS FOR PIPING. DO NOT LEAVE PIPING OPEN ENDED.
21. PROVIDE CONDENSATE PUMPS THROUGHOUT CONDENSATE DRAINAGE SYSTEM AS REQUIRED TO PROPERLY REMOVE CONDENSATE. PROVIDE A PER PUMP LINE-ITEM ALLOWANCE.
22. REFRIGERANT PIPE SIZING SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. LENGTH OF PIPE, ELEVATION CHANGE AND EQUIPMENT ORIENTATION SHALL BE TAKEN INTO ACCOUNT.
23. SUCCESSFULLY PRESSURE TEST ALL REROUTED PIPING SYSTEMS. TEST SHALL BE PERFORMED AT TWICE SYSTEM OPERATING PRESSURES. REPAIR AND RETEST AS REQUIRED UNTIL SYSTEMS PROVE TIGHT.
24. ALL ROOF MOUNTED EQUIPMENT SHALL BE INSTALLED A MINIMUM OF 10' FROM THE ROOF EDGE. EQUIPMENT INSTALLED CLOSER THAN 10' SHALL REQUIRE THE INSTALLATION OF GUARD RAILS.
25. ALL CONCEALED ELECTRICAL CONNECTIONS SHALL BE HARD WIRED. PLUGS SHALL NOT BE USED AS A DISCONNECTING MEANS IN CONCEALED LOCATIONS.
26. CONTRACTOR SHALL PROVIDE ALL TEMPERATURE CONTROLS INCLUDING WIRING, TUBING, AND THERMOSTATS (WITH LOCKING COVERS) AND ALL MISCELLANEOUS APPURTENANCES TO MEET THE INTENT OF THESE DOCUMENTS. THERMOSTATS SHALL BE INSTALLED 48" AFF.
27. DUCT SMOKE DETECTORS SHALL BE FURNISHED BY ELECTRICAL CONTRACTOR, INSTALLED IN THE DUCTWORK BY MECHANICAL CONTRACTOR AND WIRED BY THE ELECTRICAL CONTRACTOR.
28. ALL FRESH AIR INTAKES & DIRECT VENTS SHALL TERMINATE AT LEAST 10' HORIZONTALLY FROM ANY GAS METERS.
29. THE CONTRACTOR SHALL MAKE THE OWNER AWARE OF ALL "UPSTREAM" ENERGY REBATES AND THE CONTRACTOR SHALL PROVIDE THE OWNER ALL NECESSARY INFORMATION AND DOCUMENTATION NECESSARY FOR ENERGY REBATE APPLICATIONS.

LEGEND

	EXISTING TO REMAIN
	EXISTING TO BE REMOVED OR RELOCATED
	NEW WORK
	RETURN/EXHAUST AIR DEVICE
	SUPPLY AIR DEVICE
	VOLUME DAMPER
FD	FIRE DAMPER
FSD	FIRE / SMOKE DAMPER
T	THERMOSTAT
DSD	DUCT SMOKE SENSOR
12x6 / 12x6	NEW DUCTWORK WIDTH X DEPTH OF DUCT
12x6	EXISTING DUCTWORK
	SQUARE ELBOW W/ DOUBLE RADIUS TURNING VANES (TYP. ALL 90° ELBOWS DOWNSTREAM OF FANS)
CU	AIR-COOLED CONDENSING UNIT
AHU	AIR HANDLING UNIT
M	MOTOR OPERATED DAMPER (24V BY ATC CONTRACTOR)
S.A.	SUPPLY AIR
R.A.	RETURN AIR
E.A.	EXHAUST AIR
O.A.	OUTSIDE AIR
C&C	CUT & CAP
	POINT OF CONNECTION BETWEEN NEW AND EXISTING WORK.
HWS	HOT WATER SUPPLY PIPING
HWR	HOT WATER RETURN PIPING

GENERAL RENOVATION NOTES:

7. ALL SHUT DOWNS OF EXISTING SYSTEMS SHALL BE SCHEDULED AND APPROVED BY THE OWNER PRIOR TO COMMENCING WITH WORK.
2. NO DUCTWORK, PIPING, EQUIPMENT, ETC. SHALL BE REMOVED, DISCONNECTED, OR SHUT DOWN WITHOUT PRIOR REVIEW WITH THE OWNER AND/OR ENGINEER TO CONFIRM THAT AREAS TO REMAIN IN OPERATION WILL NOT BE AFFECTED. IF ANY AREAS NOT WITHIN THE SCOPE OF WORK ARE AFFECTED BY ANY SHUTDOWN, REMOVAL, OR DISCONNECTION, 1 WEEK NOTICE MUST BE GIVEN TO THE OWNER INDICATING WHICH AREAS WILL BE AFFECTED, WHEN THE PROPOSED SHUTDOWN WILL OCCUR, AND FOR HOW LONG A PERIOD.
3. USE OF THE OWNER'S ELEVATORS AND BUILDING CORRIDORS FOR HANDLING OF THE OWNER'S AND REMOVED EQUIPMENT AND MATERIALS SHALL BE AT THE DIRECTION OF THE OWNER AND SHALL BE COORDINATED WITH HIS OPERATIONS.
4. ALL ITEMS REMOVED SHALL BECOME PROPERTY OF THE OWNER AND SHALL BE DISPOSED OF AS PER OWNER'S INSTRUCTIONS, UNLESS INDICATED OTHERWISE. ALL ITEMS WHICH ARE NOT TO BE STORED ON SITE BY OWNERS SHALL BE REMOVED FROM THE BUILDING IMMEDIATELY.
5. DISCONNECT AND REMOVE ALL EXISTING EQUIPMENT, PIPING, DUCTWORK, FLUES, REGISTERS, SUPPORTS, HANGERS, AND ALL OTHER MECHANICAL COMPONENTS MADE OBSOLETE BY THIS PROJECT.
6. PRIOR TO RENOVATION, CONTRACTOR TO RECORD ALL SUPPLY & RETURN MAIN AIRFLOWS & SUBMIT A COPY TO THE ENGINEER. ALL READINGS SHALL BE PERFORMED BY A CERTIFIED NEBB CONTRACTOR. COMPARE NEW EQUIPMENT VALUES & ALERT DISCREPANCIES FOR ENGINEER FEEDBACK. AT THE END OF THE PROJECT EXISTING SYSTEMS SHALL BE BALANCED TO PRE-CONSTRUCTION VALUES OR ADJUSTED VALUES BASED ON PRE-CONSTRUCTION TESTING ENGINEERING FEEDBACK.
7. ALL NEW, RELOCATED, OR EXISTING EQUIPMENT AFFECTED BY THIS SCOPE OF WORK SHALL BE REBALANCED BEFORE BEING PLACED IN SERVICE.
8. PROVIDE ALL REQUIRED CUTTING AND PATCHING AS REQUIRED TO COMPLETE THE INSTALLATION OF NEW MECHANICAL SYSTEM. PATCH ALL SURFACES TO MATCH AND MAINTAIN ALL FIRE RATINGS.
9. EXISTING ROOF CUTTING, FLASHING, SEALING, ETC. TO BE ACCOMPLISHED BY A ROOFING CONTRACTOR APPROVED BY THE EXISTING ROOF MANUFACTURER AND INSTALLED IN ACCORDANCE WITH ROOF MANUFACTURER'S RECOMMENDATIONS SO AS NOT TO VOID ROOF WARRANTY.
10. EXISTING MATERIALS THAT ARE REMOVED SHALL NOT BE REUSED IN NEW SYSTEMS, EXCEPT WHERE INDICATED AS SUCH ON THE DRAWINGS. ALL MATERIALS AND EQUIPMENT LISTED AS NEW MUST BE NEW.
11. THE FIRE PROOFING OF THE EXISTING STRUCTURE IS NOT TO BE REMOVED FOR THE INSTALLATION OF HANGERS, SUPPORTS AND DUCTWORK ETC. IF FIRE PROOFING IS DAMAGED, IT SHALL BE REPAIRED AT THE EXPENSE OF THE TRADE.
12. CONTRACTOR SHALL "USE US STEEL ONLY".
13. ALL DEMOLITION WORK SHALL BE COORDINATED WITH THE ABATEMENT CONTRACTOR.
14. ALL EXISTING DUCTWORK BEING RE-USED ON THIS PROJECT SHALL BE VACUUMED CLEAN PRIOR TO BEING PLACED BACK INTO OPERATION.

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

MECHANICAL LEGEND, NOTES AND ABBREVIATIONS

JOB NO.: 16096RS

DRAWN BY: MMD

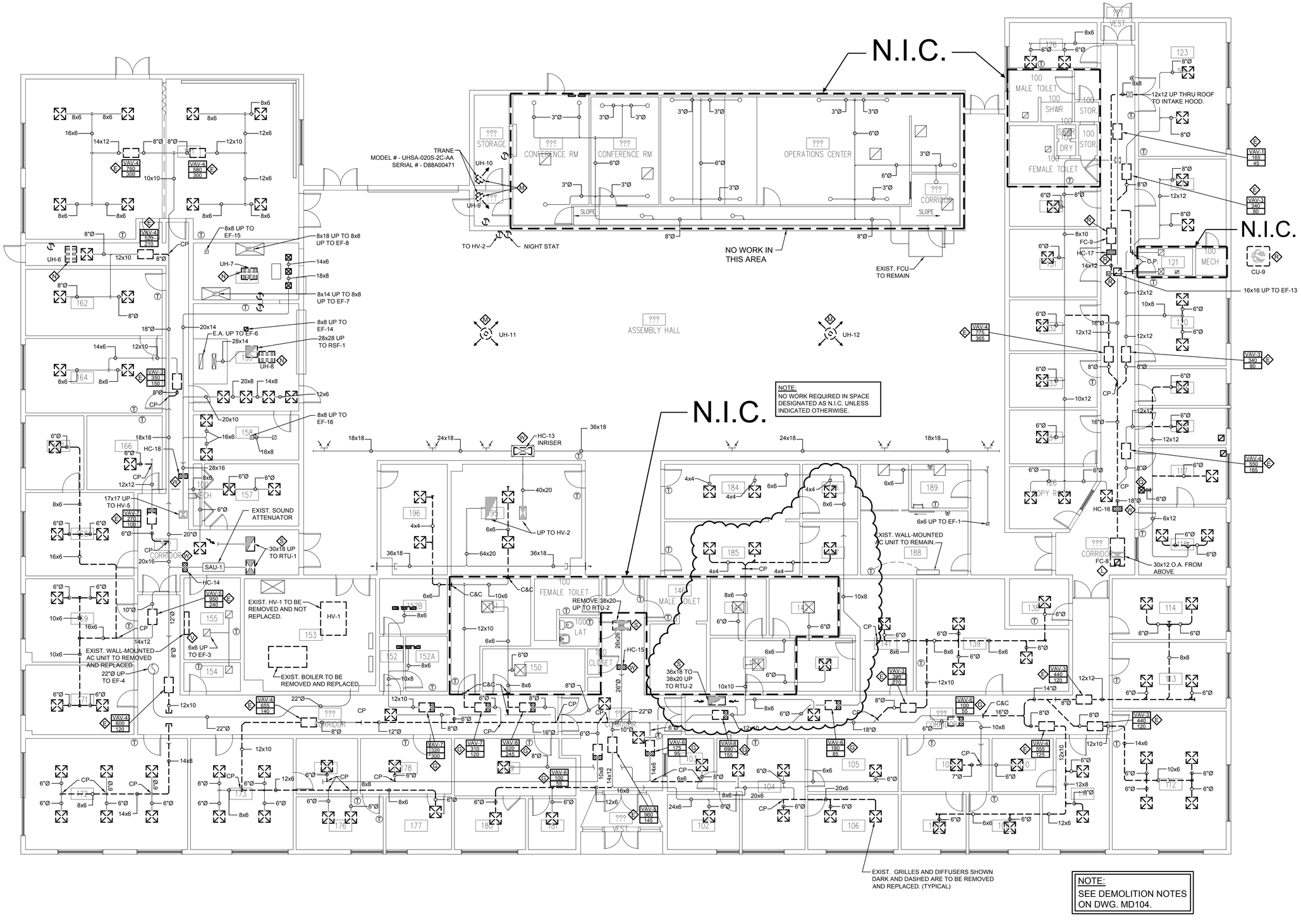
CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

M000



01
MD101

EXISTING MECHANICAL FLOOR PLAN BUILDING 1

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

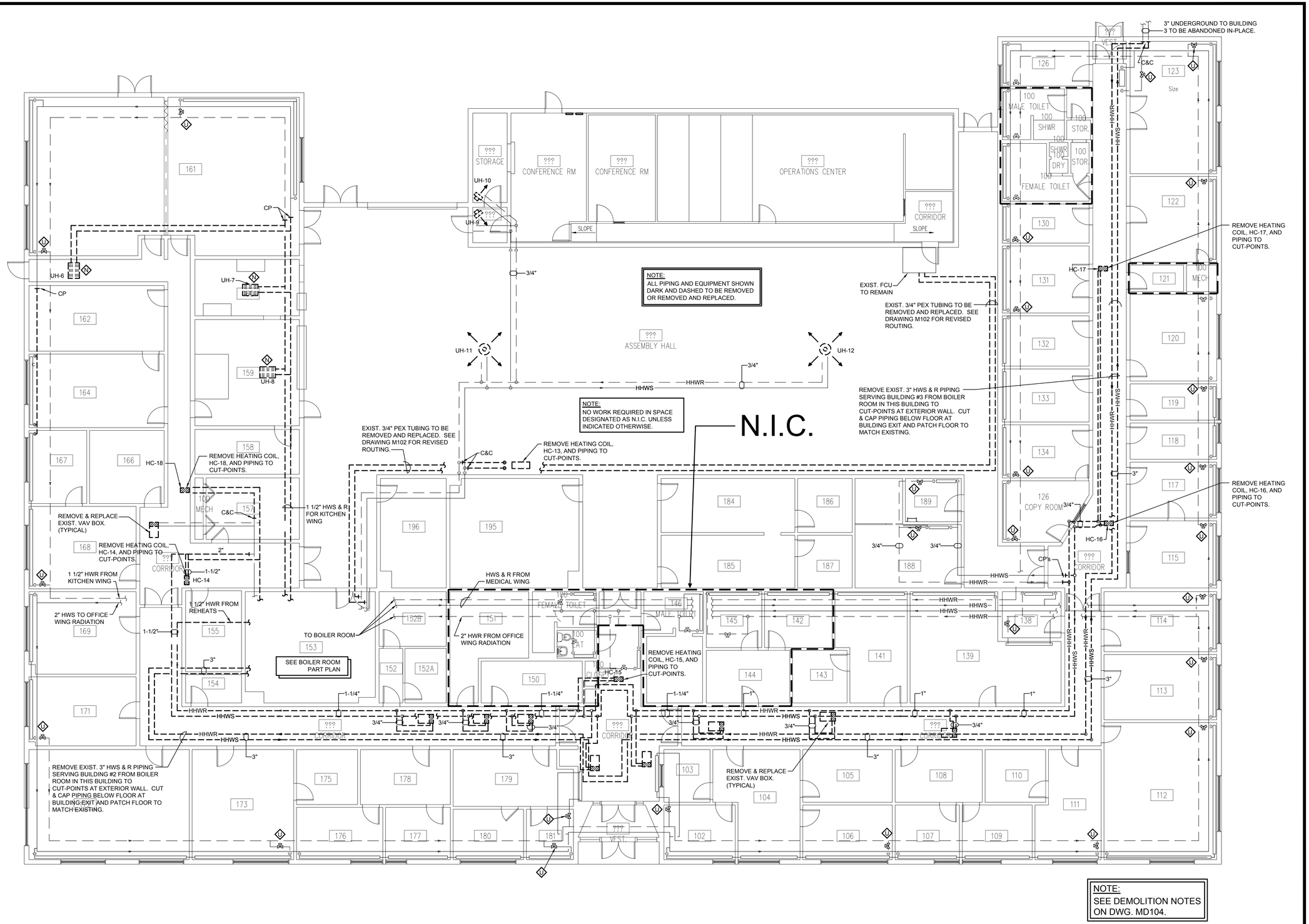
SHEET TITLE:

EXISTING MECHANICAL FLOOR PLAN BUILDING 1 DUCTWORK

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:

MD101



01 MD102

EXISTING MECHANICAL FLOOR PLAN BUILDING 1

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

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No. 7860
REGISTERED PROFESSIONAL ENGINEER MECHANICAL

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Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

EXISTING MECHANICAL FLOOR PLAN BUILDING 1 PIPING

JOB NO.: 16096RS

DRAWN BY: MMD

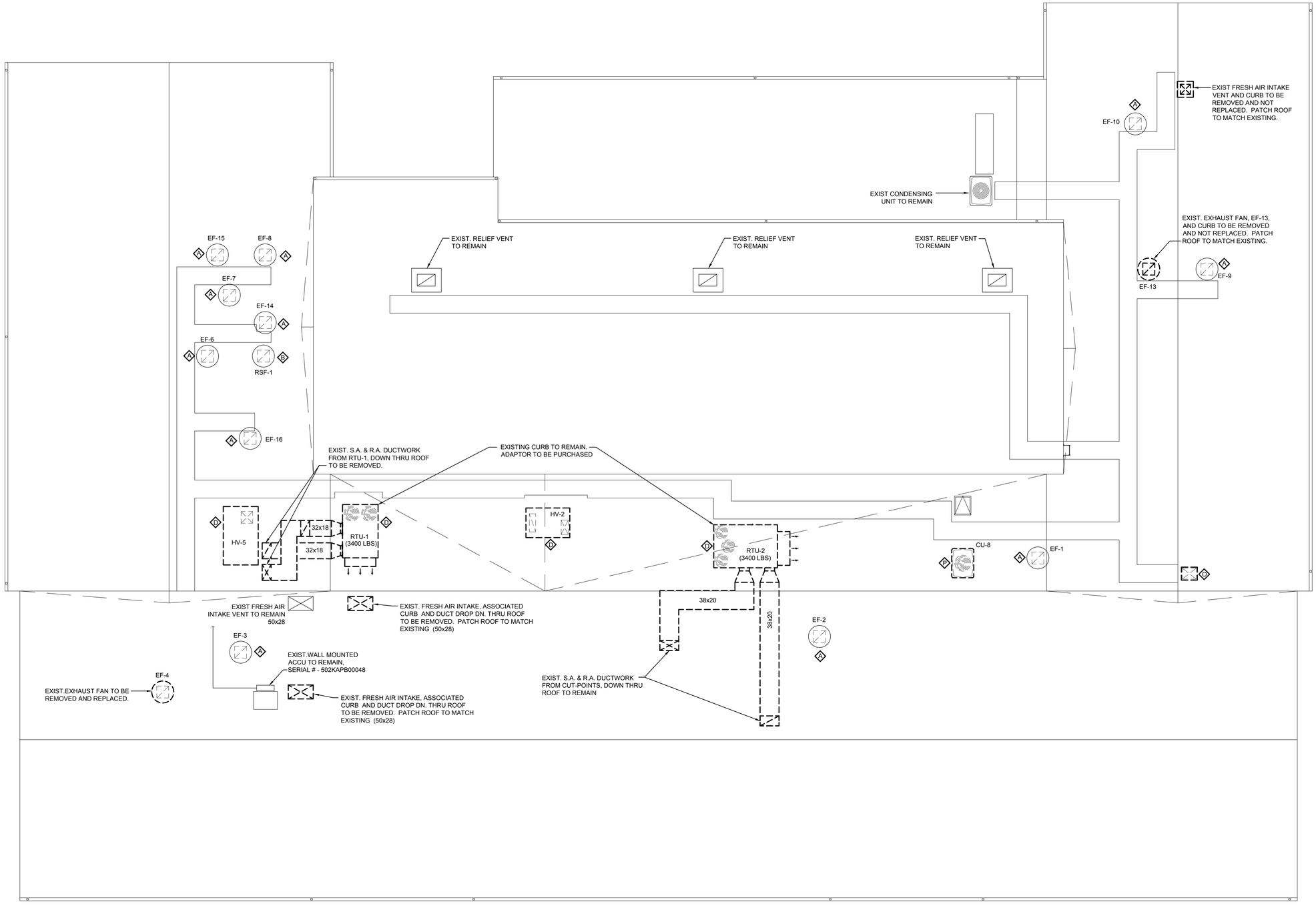
CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

MD102



NOTE:
SEE DEMOLITION NOTES ON DWG. MD104.

01
MD103

EXISTING MECHANICAL ROOF PLAN BUILDING 1

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

EXISTING MECHANICAL ROOF PLAN BUILDING 1

JOB NO.: 16096RS

DRAWN BY: MMD

CHECKED BY: RD

DATE ISSUED: 03.20.2018

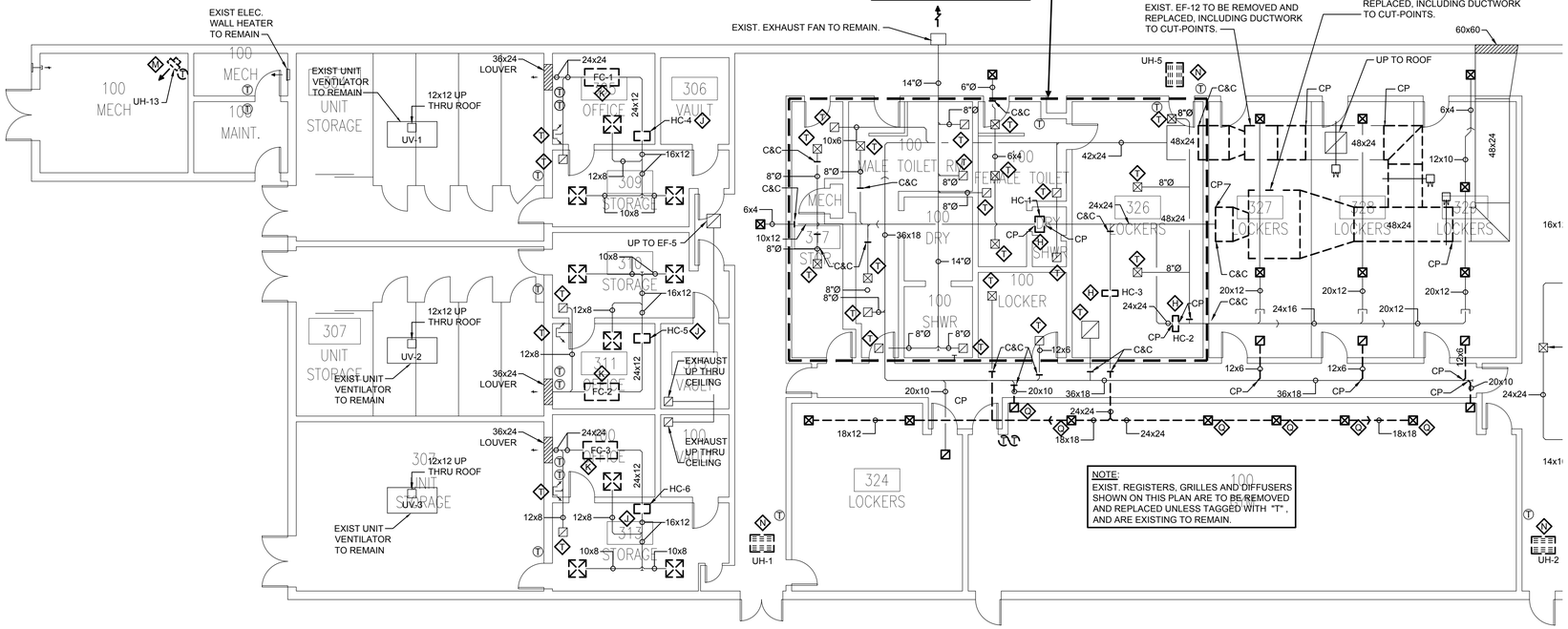
SCALE: AS NOTED

SHEET NO.:

MD103

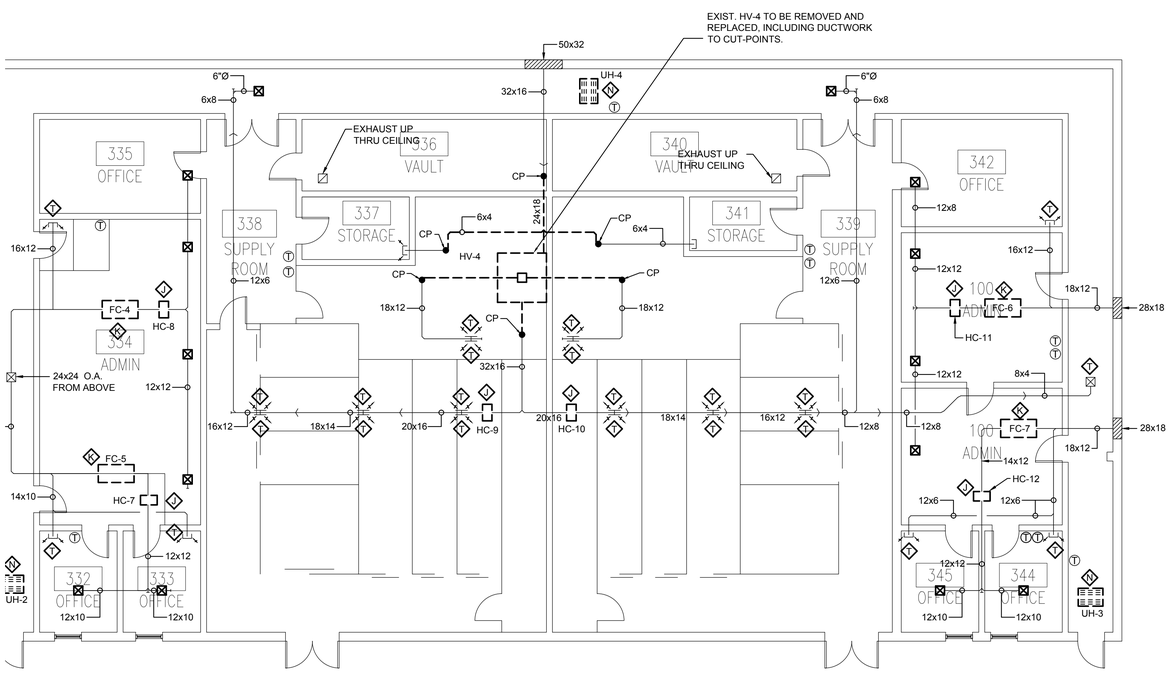
N.I.C.

NOTE:
NO WORK REQUIRED IN SPACE DESIGNATED AS N.I.C. UNLESS INDICATED OTHERWISE.



NOTE:
EXIST. REGISTERS, GRILLES AND DIFFUSERS SHOWN ON THIS PLAN ARE TO BE REMOVED AND REPLACED UNLESS TAGGED WITH "T", AND ARE EXISTING TO REMAIN.

NOTE:
ALL EXISTING REGISTERS, GRILLES AND DIFFUSERS SHOWN DARK TO BE REMOVED AND REPLACED.



DEMOLITION NOTES:

- A. EXISTING EXHAUST FAN TO REMAIN.
- B. EXISTING SUPPLY FAN TO REMAIN.
- C. EXISTING CONDENSING UNIT TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING AND REFRIGERANT PIPING. REFRIGERANT PIPING TO BE PURGED AND RE-USED.
- D. EXISTING PACKAGED ROOFTOP UNIT TO BE REMOVED AND REPLACED
- E. EXISTING VAV BOX TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, PIPING, WIRING & DUCTWORK.
- G. EXISTING VAV BOX TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING, DUCTWORK & HOT WATER PIPING.
- H. EXISTING HW HEATING COIL TO BE REMOVED, REPLACED AND RELOCATED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING, DUCTWORK AND HOT WATER PIPING. EXTEND SERVICES AS REQUIRED. FINAL LOCATIONS OF HC-1, HC-2 & HC-3 SHALL BE COORDINATED WITH THE WARWICK LATRINES MODERNIZATION CONTRACT DRAWINGS.
- J. EXISTING HW HEATING COIL TO BE REMOVED, REPLACED AND NOT RELOCATED. DISCONNECT AND REMOVE CONTROLS, WIRING, DUCTWORK & HOT WATER PIPING.
- K. EXISTING FAN COIL UNIT TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING, DUCTWORK & HOT WATER PIPING.
- L. EXISTING FAN COIL UNIT TO BE REMOVED AND NOT REPLACED. DISCONNECT AND REMOVE CONTROLS, WIRING, DUCTWORK & HOT WATER PIPING.
- M. EXISTING UNIT HEATER TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING & HOT WATER PIPING.
- N. EXISTING CABINET UNIT HEATER TO BE REMOVED AND REPLACED. DISCONNECT AND RE-CONNECT CONTROLS, WIRING & HOT WATER PIPING.
- O. EXIST. 26x32 FRESH AIR INTAKE VENT TO BE REMOVED. REUSE EXIST. ROOF OPENING.
- P. EXISTING CONDENSING UNIT TO BE REMOVED AND NOT REPLACED. DISCONNECT AND REMOVE CONTROLS, WIRING AND REFRIGERANT PIPING. PATCH ABANDONED ROOF PENETRATIONS.
- Q. REMOVE EXIST. REGISTER GRILLE OR DIFFUSER AND DUCTWORK BACK TO CUT POINT.
- R. REMOVE FC-9, HC-17, EF-13 ON ROOF, INTAKE HOOD ON ROOF, SYSTEM DUCTWORK, CONTROLS AND PIPING TO CUT-POINTS.
- S. EXISTING DUCT RISER TO BE REMOVED AND REPLACED.
- T. EXISTING REGISTER, GRILLE OR DIFFUSER SHALL REMAIN IN SERVICE.
- U. REMOVE AND REPLACE EXISTING CONTROL VALVE. VALVE SIZE TO MATCH EXISTING VALVE.
- U. REMOVE AND REPLACE EXISTING CONTROL VALVE. VALVE SIZE TO MATCH EXISTING VALVE.
- V. EXISTING AC UNIT AND ASSOCIATED CONDENSING UNIT TO BE REMOVED AND REPLACED

01 / MD104 EXISTING MECHANICAL FLOOR PLAN BUILDING 3

1/8" = 1'-0" 0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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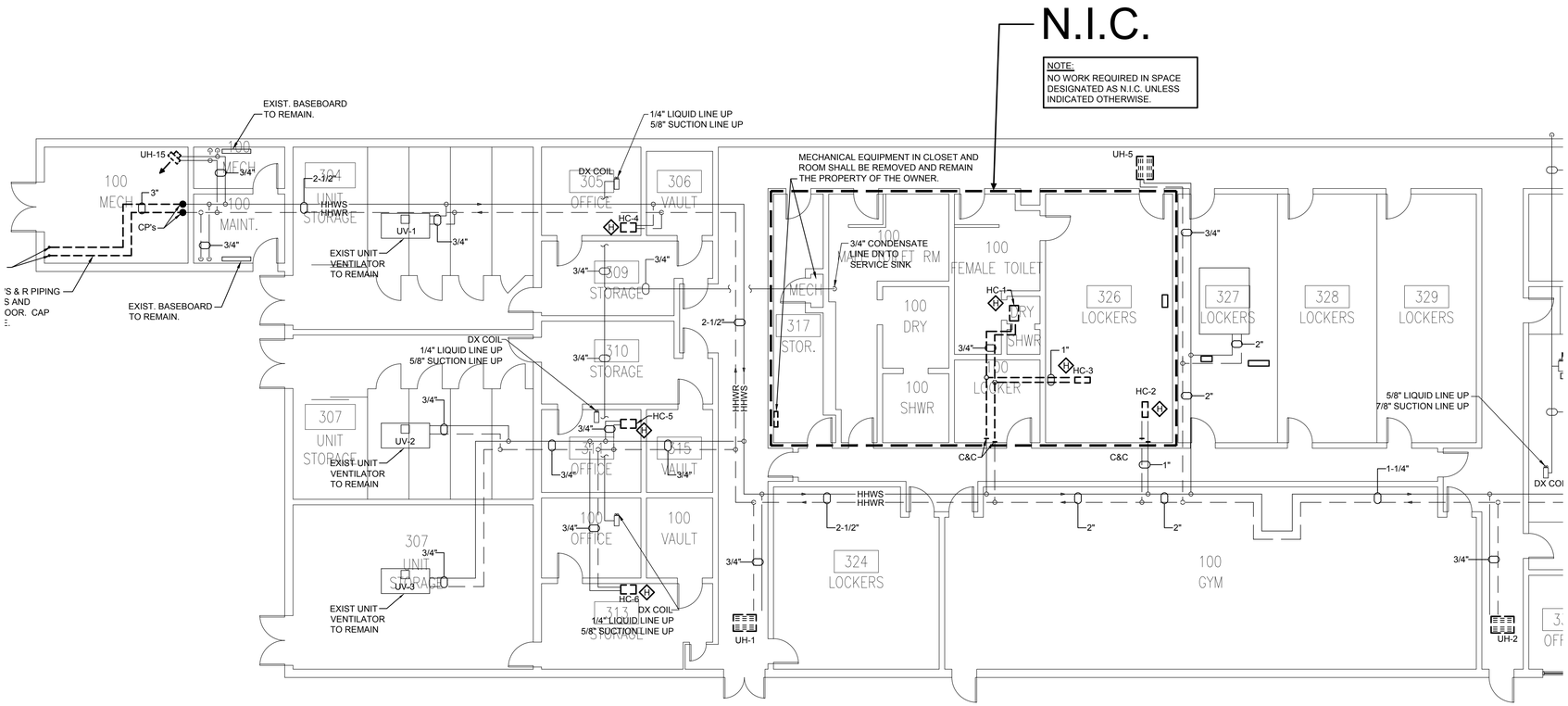
Tel (401) 765-7659 Fax (401) 765-2984

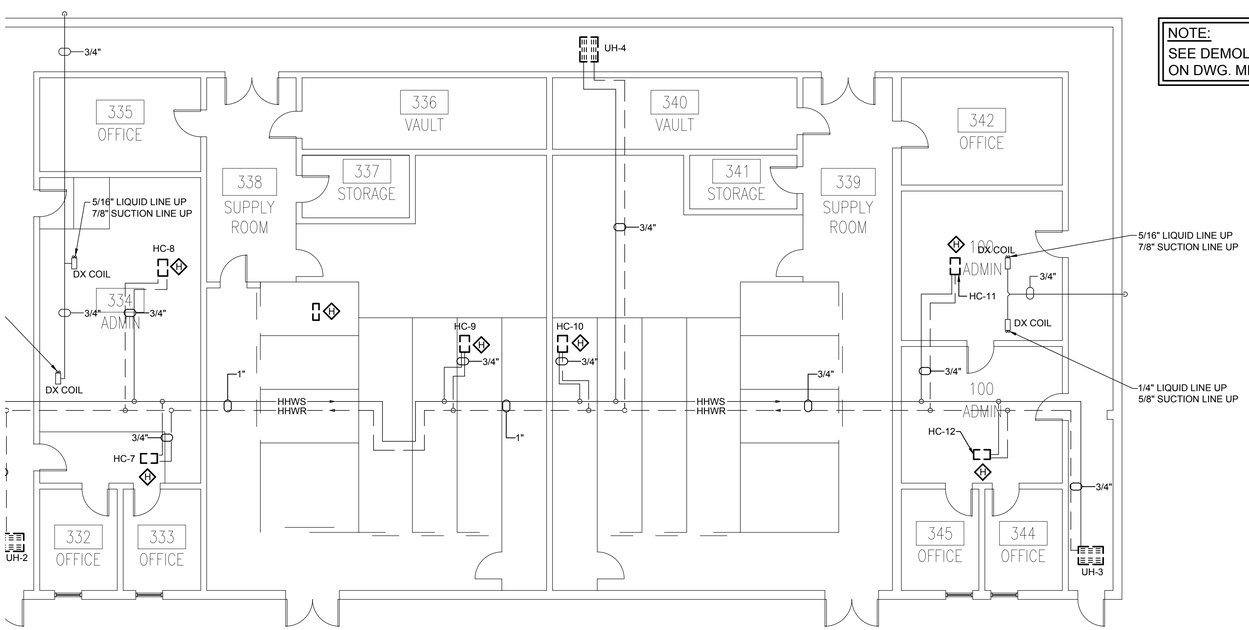
PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
EXISTING MECHANICAL FLOOR PLAN BUILDING 3 DUCTWORK

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
MD104





01
MD105

EXISTING MECHANICAL FLOOR PLAN BUILDING 3

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

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Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

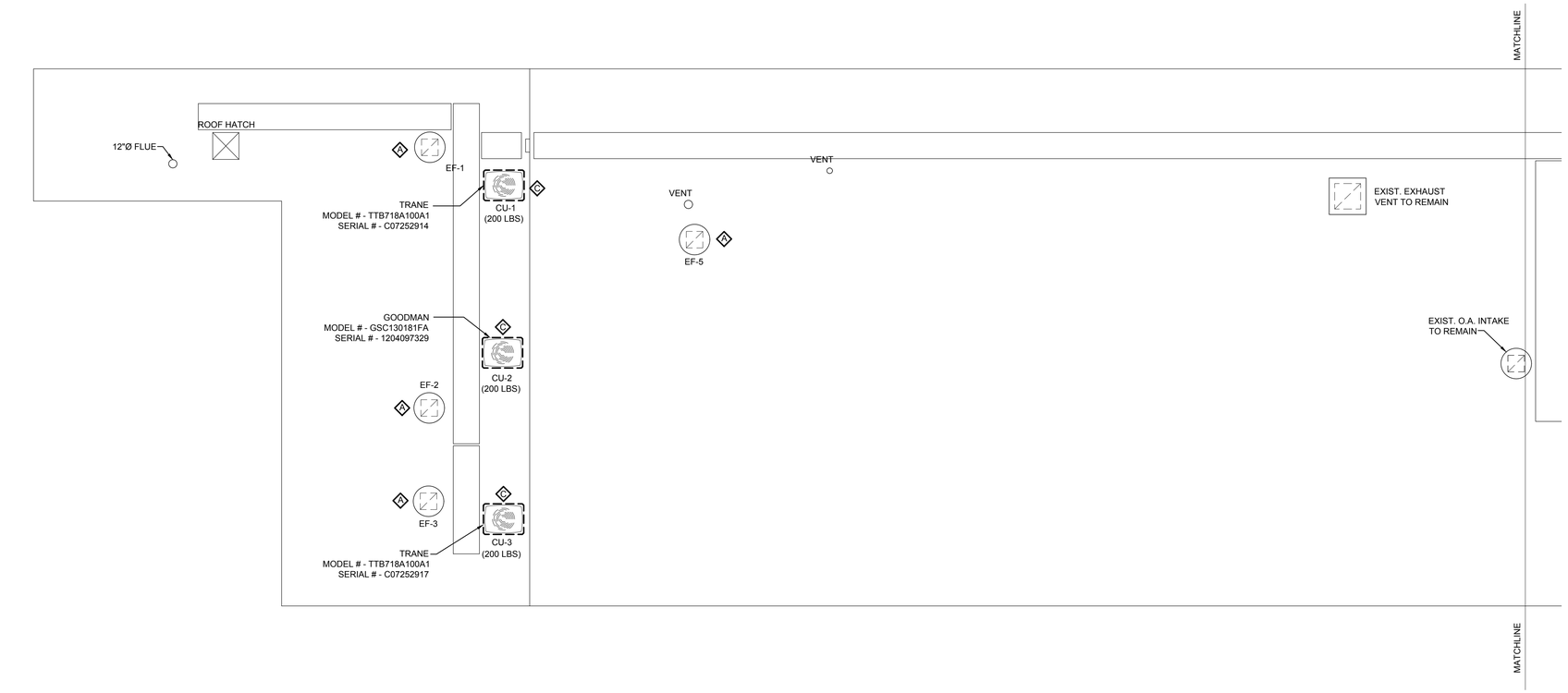
SHEET TITLE:

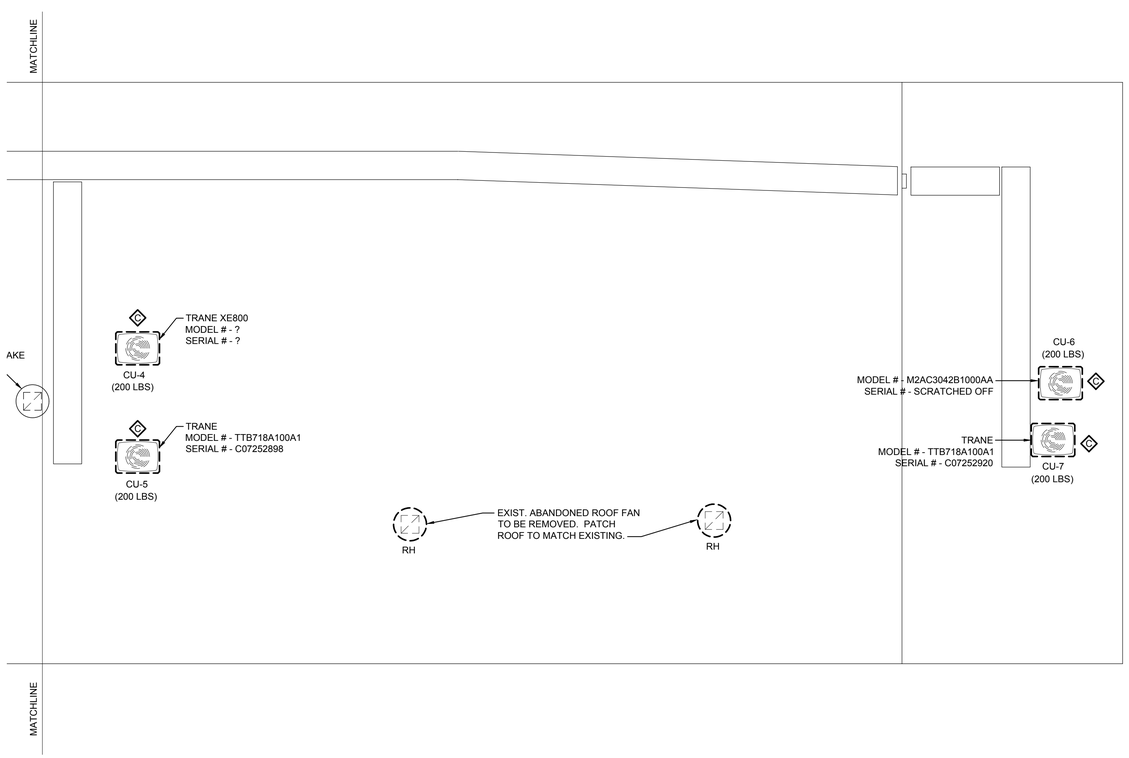
EXISTING MECHANICAL FLOOR PLAN BUILDING 3
PIPING

JOB NO.:	16096RS
DRAWN BY:	MMD
CHECKED BY:	RD
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

MD105





NOTE:
SEE DEMOLITION NOTES ON DWG. MD104.

01
MD106

MECHANICAL ROOF PLAN BUILDING 3

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

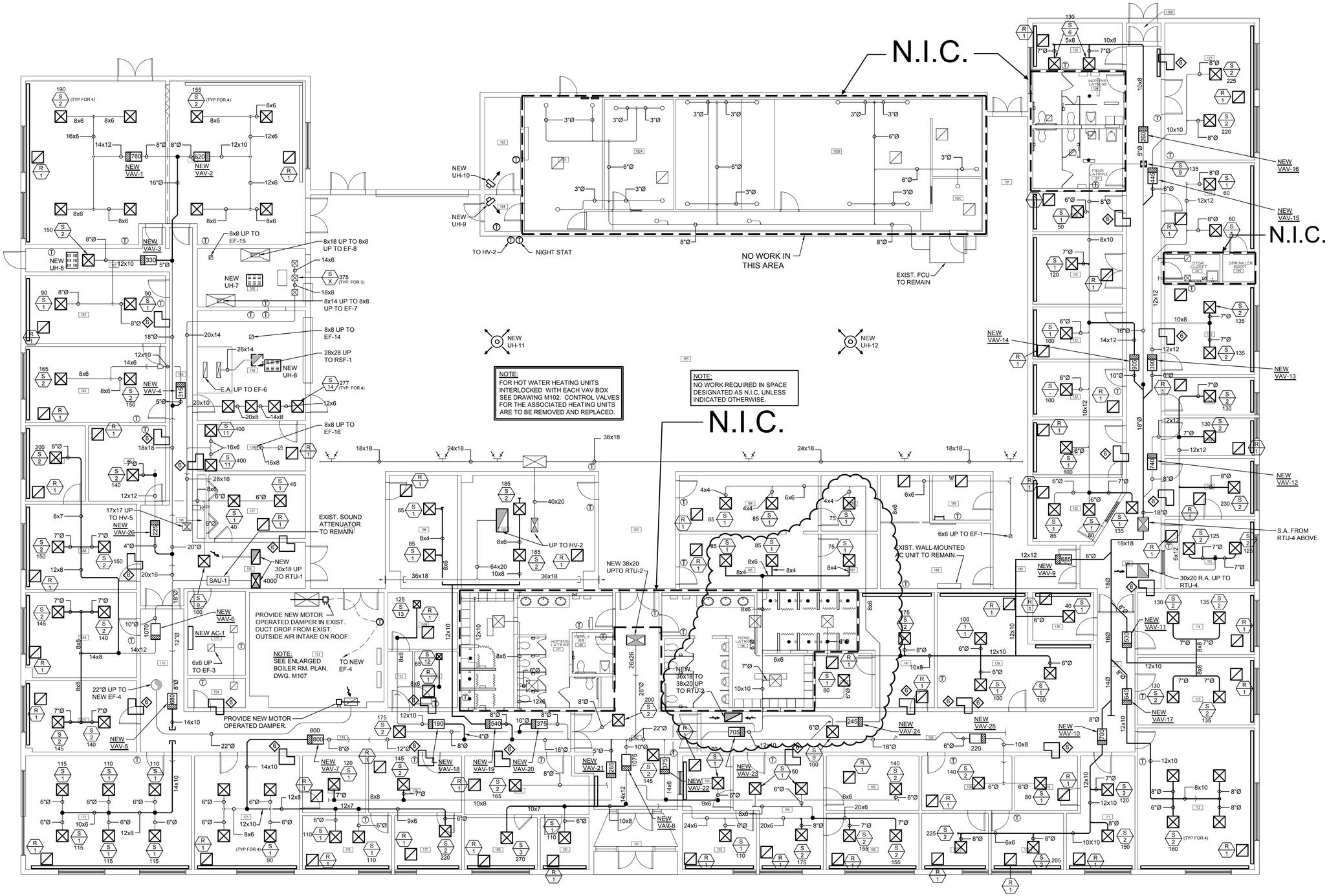
SHEET TITLE:

MECHANICAL ROOF PLAN
BUILDING 3

JOB NO.:	16096RS
DRAWN BY:	MMD
CHECKED BY:	RD
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

MD106



NEW WORK NOTES:
(SEE STRUCTURAL DETAILS ON DRAWING S101.)

1. EXISTING EXHAUST FAN TO REMAIN.
2. EXISTING SUPPLY FAN TO REMAIN.
3. NEW REPLACEMENT CONDENSING UNIT. FLASH AND PATCH AFFECTED AREA OF ROOF TO MATCH EXISTING.
4. NEW REPLACEMENT PACKAGED ROOFTOP UNIT. REMOVE EXIST. CURB, PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
5. NEW PACKAGED ROOFTOP UNIT. (NOT A REPLACEMENT) PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
6. NEW 16x16 TRANSFER AIR DUCT WITH 90° ELBOW AND ACOUSTICAL LINING. CUT OPENING IN WALL AS REQUIRED.
7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01
M101

MECHANICAL FLOOR PLAN BUILDING 1

1/8" = 1'-0"
0 12 24 FT

CERTIFICATION :

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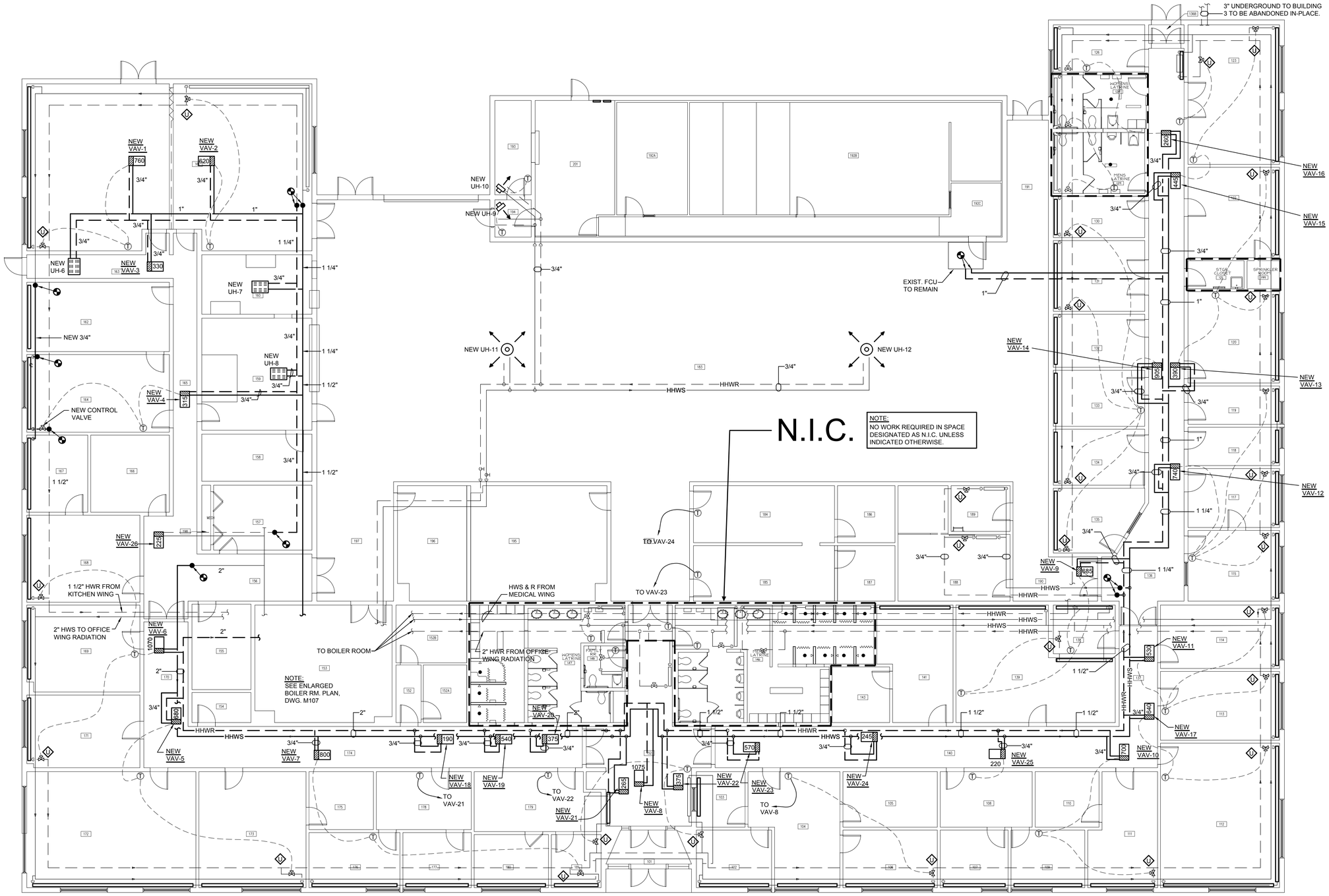
PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
MECHANICAL FLOOR PLAN
BUILDING 1
DUCTWORK

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M101



NEW WORK NOTES:
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7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01
M102

MECHANICAL FLOOR PLAN BUILDING 1

1/8" = 1'-0"
0 12 24 FT

CERTIFICATION :

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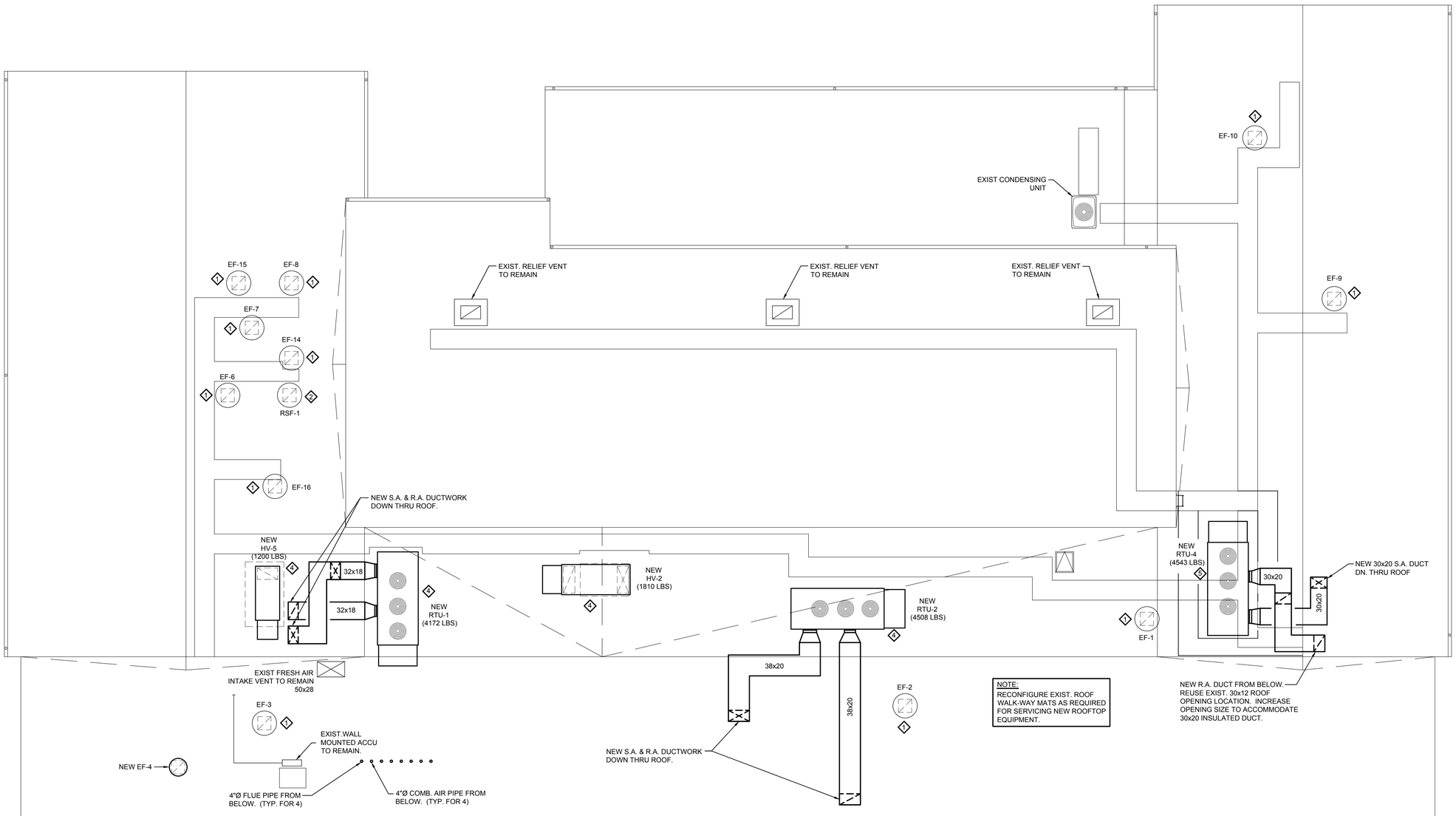
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
MECHANICAL FLOOR PLAN
BUILDING 1
PIPING

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M102



NOTE:
RECONFIGURE EXIST. ROOF WALK-WAY MATS AS REQUIRED FOR SERVICING NEW ROOFTOP EQUIPMENT.

NEW WORK NOTES:

(SEE STRUCTURAL DETAILS ON DRAWING S101.)

1. EXISTING EXHAUST FAN TO REMAIN.
2. EXISTING SUPPLY FAN TO REMAIN.
3. NEW REPLACEMENT CONDENSING UNIT. FLASH AND PATCH AFFECTED AREA OF ROOF TO MATCH EXISTING.
4. NEW REPLACEMENT PACKAGED ROOFTOP UNIT. REMOVE EXIST. CURB, PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
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6. NEW 16x16 TRANSFER AIR DUCT WITH 90° ELBOW AND ACOUSTICAL LINING. CUT OPENING IN WALL AS REQUIRED.
7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01
M103

MECHANICAL ROOF PLAN BUILDING 1

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

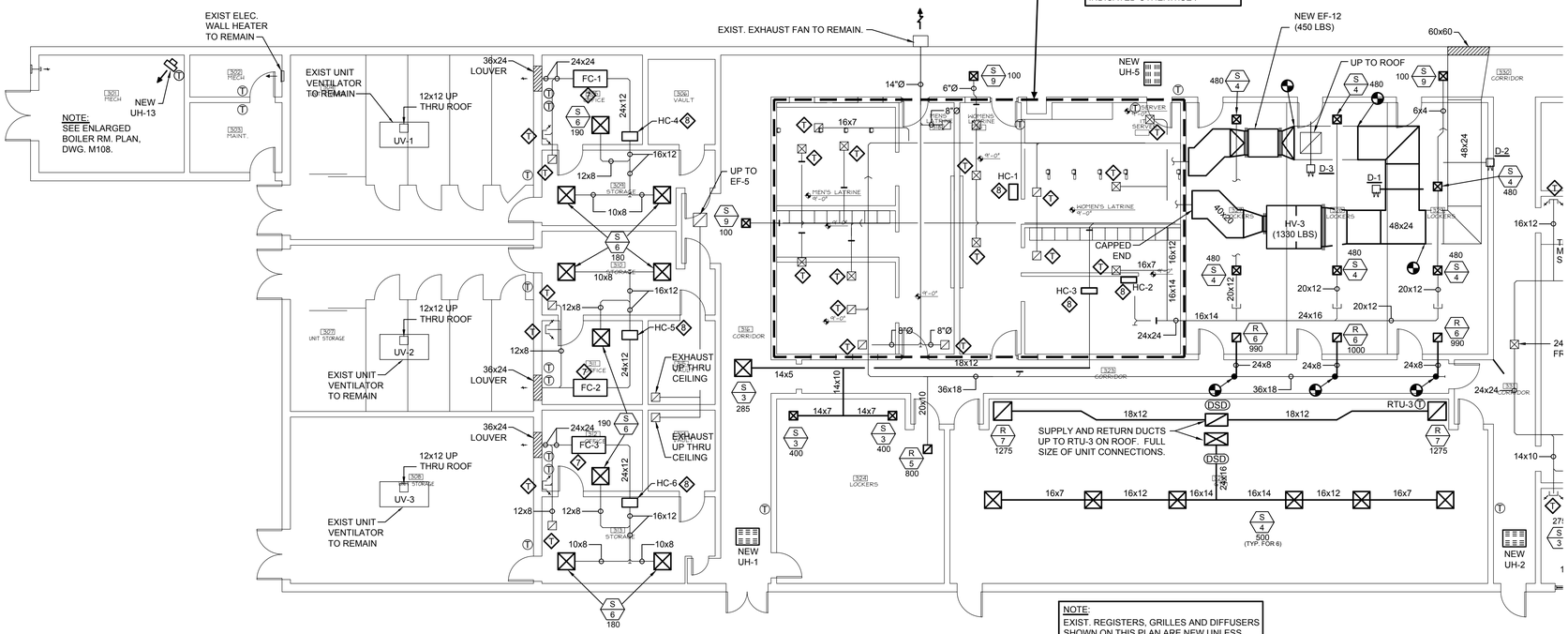
SHEET TITLE:

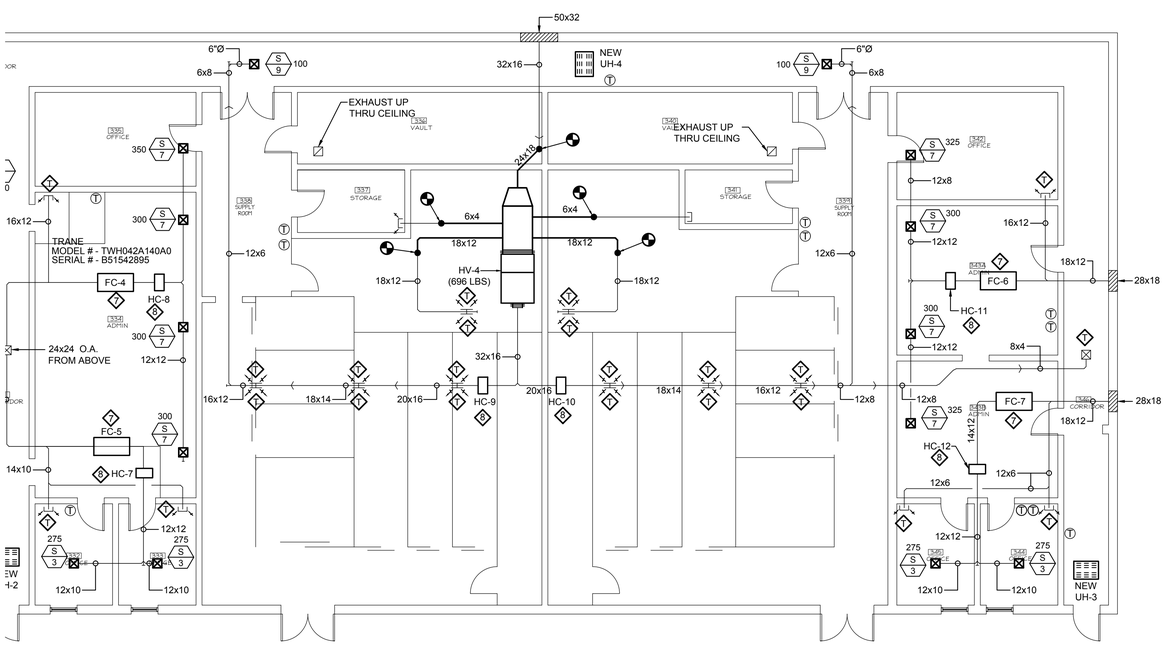
MECHANICAL ROOF PLAN
BUILDING 1

JOB NO.:	16096RS
DRAWN BY:	JMH
CHECKED BY:	RD
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

M103





NEW WORK NOTES:

(SEE STRUCTURAL DETAILS ON DRAWING S101.)

1. EXISTING EXHAUST FAN TO REMAIN.
2. EXISTING SUPPLY FAN TO REMAIN.
3. NEW REPLACEMENT CONDENSING UNIT. FLASH AND PATCH AFFECTED AREA OF ROOF TO MATCH EXISTING.
4. NEW REPLACEMENT PACKAGED ROOFTOP UNIT. REMOVE EXIST. CURB, PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
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6. NEW 16x16 TRANSFER AIR DUCT WITH 90° ELBOW AND ACOUSTICAL LINING. CUT OPENING IN WALL AS REQUIRED.
7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01 / M104

MECHANICAL FLOOR PLAN BUILDING 3

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
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MECHANICAL

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

MECHANICAL FLOOR PLAN
BUILDING 3
DUCTWORK

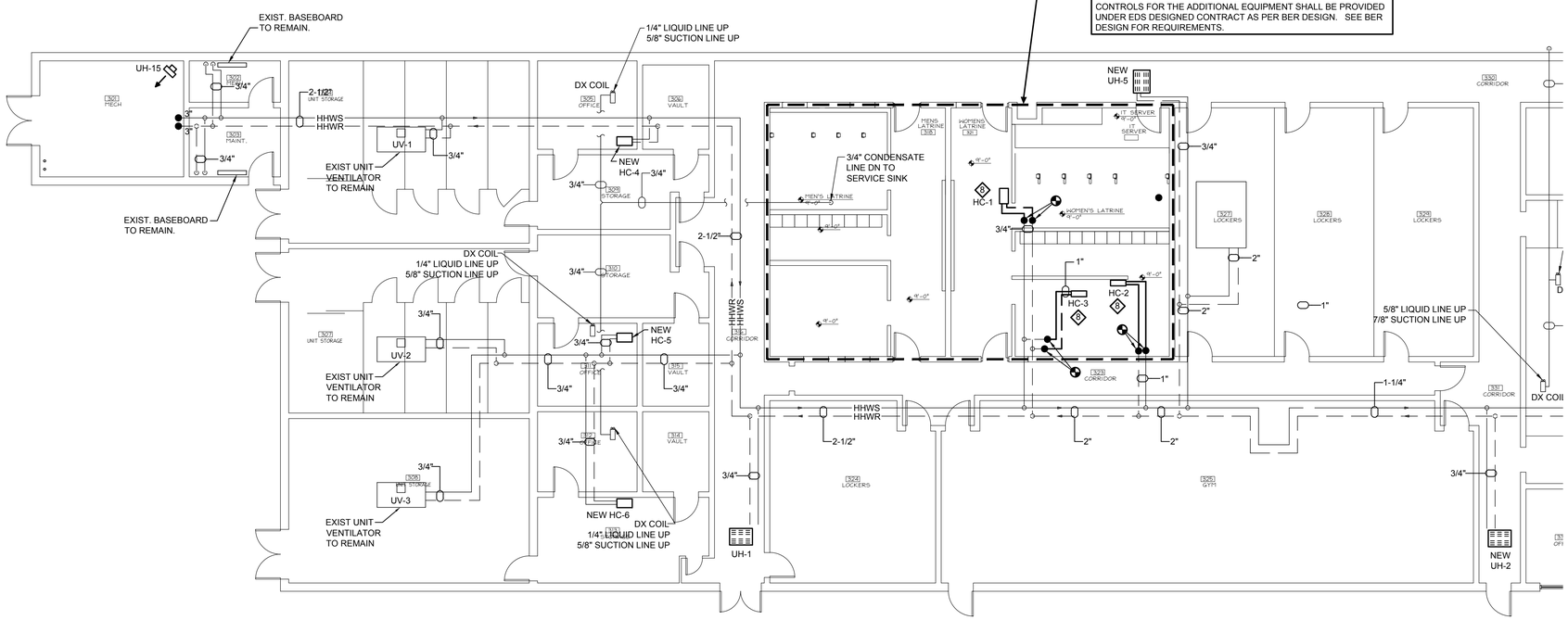
JOB NO.:	16096RS
DRAWN BY:	MMD
CHECKED BY:	RD
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

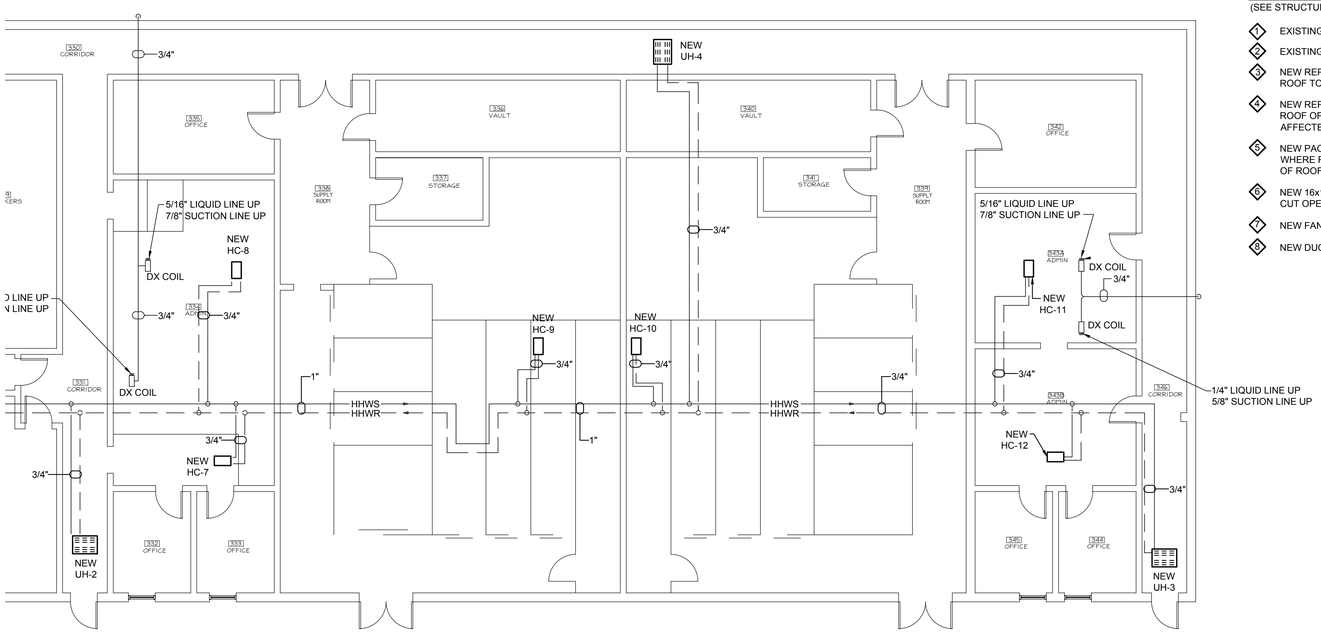
SHEET NO.:

M104

N.I.C.

NOTE:
NO WORK REQUIRED IN SPACE DESIGNATED AS N.I.C. UNLESS INDICATED OTHERWISE. PIPING AND CONTROLS FOR HC-1, HC-2 AND HC-3 SHALL BE PROVIDED UNDER THIS CONTRACT DESIGNED BY EDS. ADDITIONAL EQUIPMENT SHALL BE PROVIDED IN THE N.I.C. SPACE UNDER A SEPARATE CONTRACT DESIGNED BY BER. CONTROLS FOR THE ADDITIONAL EQUIPMENT SHALL BE PROVIDED UNDER EDS DESIGNED CONTRACT AS PER BER DESIGN. SEE BER DESIGN FOR REQUIREMENTS.





NEW WORK NOTES:
(SEE STRUCTURAL DETAILS ON DRAWING S101.)

1. EXISTING EXHAUST FAN TO REMAIN.
2. EXISTING SUPPLY FAN TO REMAIN.
3. NEW REPLACEMENT CONDENSING UNIT. FLASH AND PATCH AFFECTED AREA OF ROOF TO MATCH EXISTING.
4. NEW REPLACEMENT PACKAGED ROOFTOP UNIT. REMOVE EXIST. CURB, PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
5. NEW PACKAGED ROOFTOP UNIT. (NOT A REPLACEMENT) PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
6. NEW 16x16 TRANSFER AIR DUCT WITH 90° ELBOW AND ACOUSTICAL LINING. CUT OPENING IN WALL AS REQUIRED.
7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01 / M105 MECHANICAL FLOOR PLAN BUILDING 3

1/8" = 1'-0" 0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

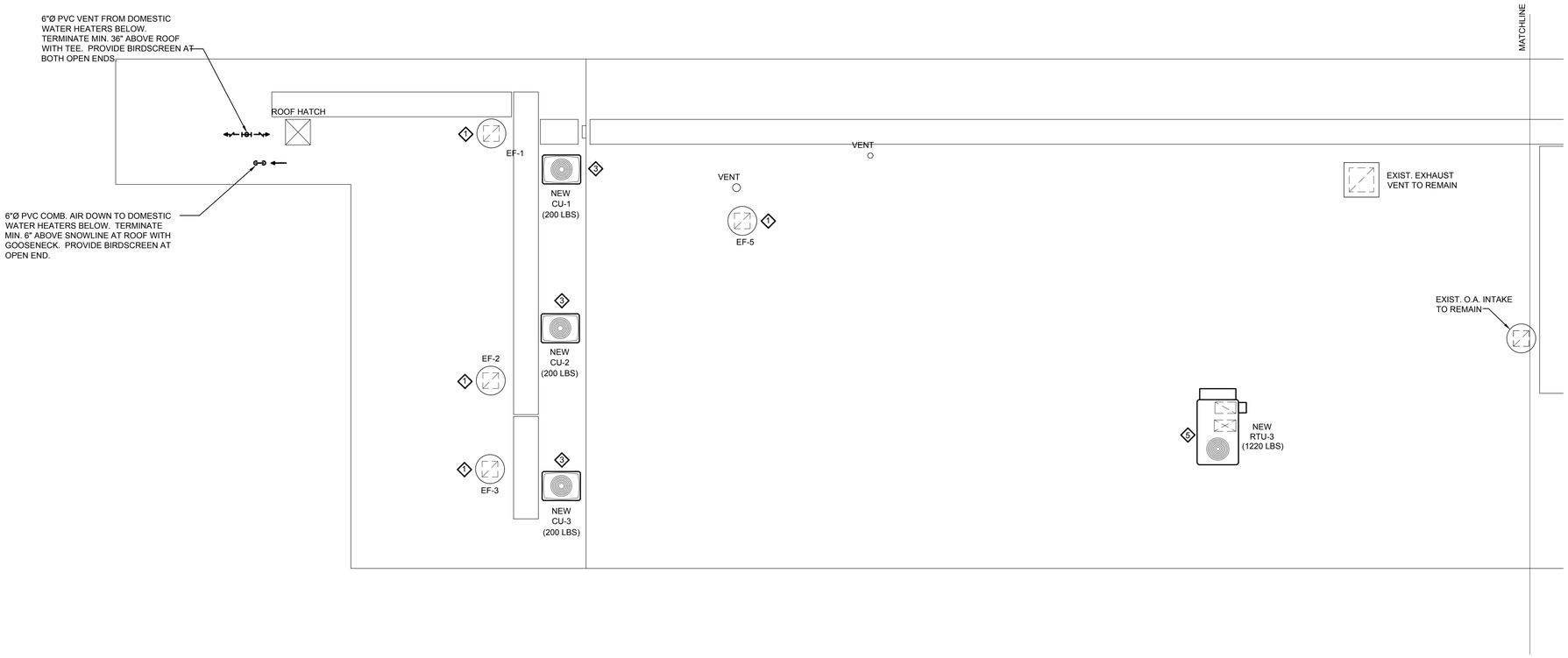
ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

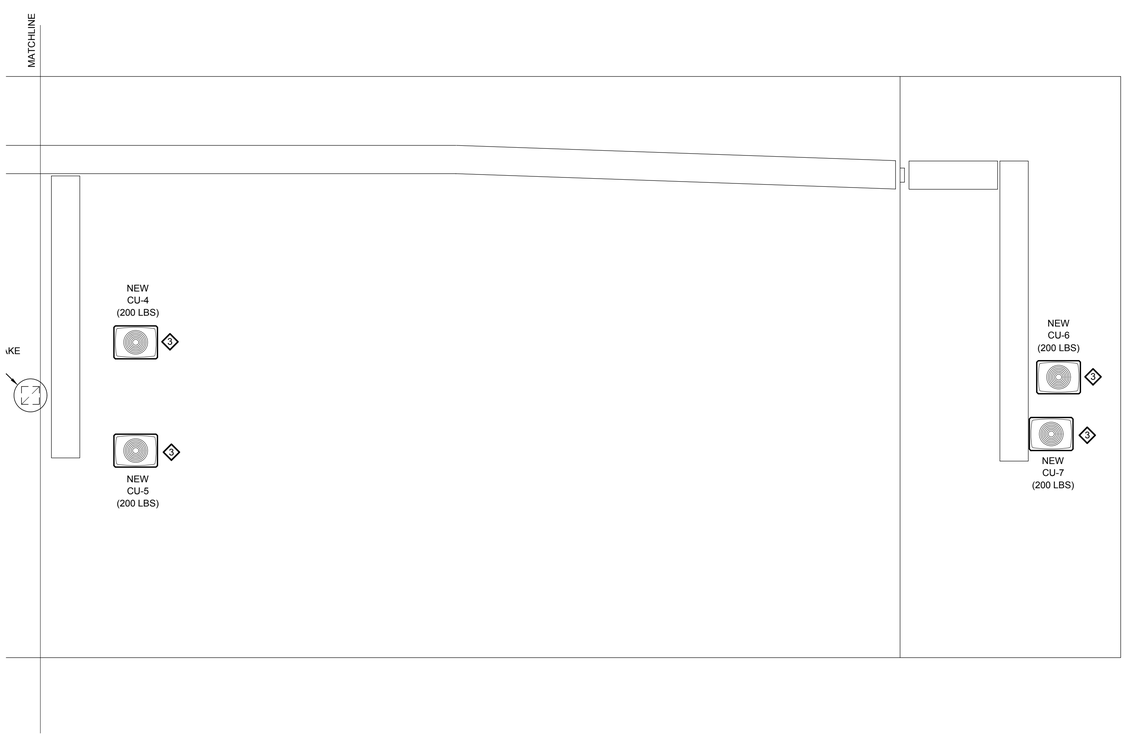
PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
MECHANICAL FLOOR PLAN
BUILDING 3
PIPING

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M105





NEW WORK NOTES:
(SEE STRUCTURAL DETAILS ON DRAWING S101.)

1. EXISTING EXHAUST FAN TO REMAIN.
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3. NEW REPLACEMENT CONDENSING UNIT. FLASH AND PATCH AFFECTED AREA OF ROOF TO MATCH EXISTING.
4. NEW REPLACEMENT PACKAGED ROOFTOP UNIT. REMOVE EXIST. CURB, PROVIDE NEW ROOF OPENINGS WHERE REQUIRED AND PROVIDE NEW ROOF CURB. FLASH AND PATCH AFFECTED AREAS OF ROOF TO MATCH EXISTING.
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7. NEW FAN COIL UNIT. SEE COIL PIPING DETAIL ON DRAWING M111.
8. NEW DUCT HEATING COIL. SEE COIL PIPING DETAIL ON DRAWING M111.

01
M106

MECHANICAL ROOF PLAN BUILDING 3

1/8" = 1'-0"
0 12 24 FT

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

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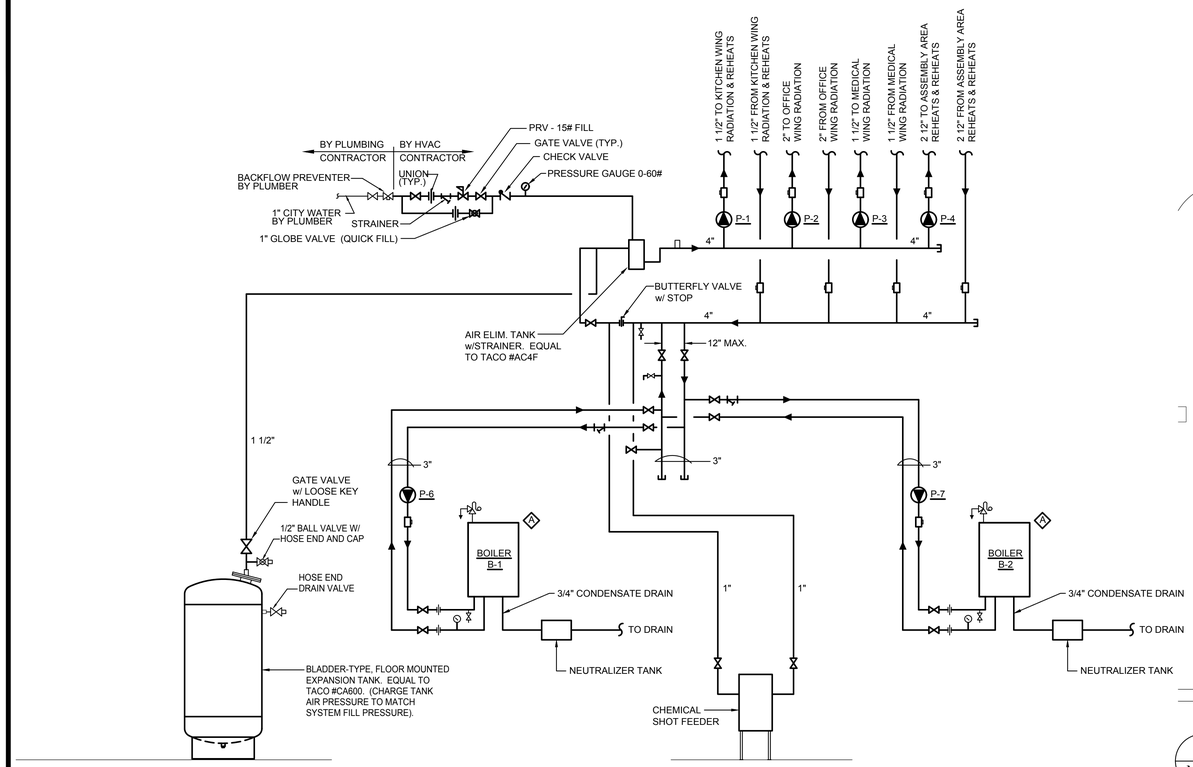
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
MECHANICAL ROOF PLAN
BUILDING 3

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

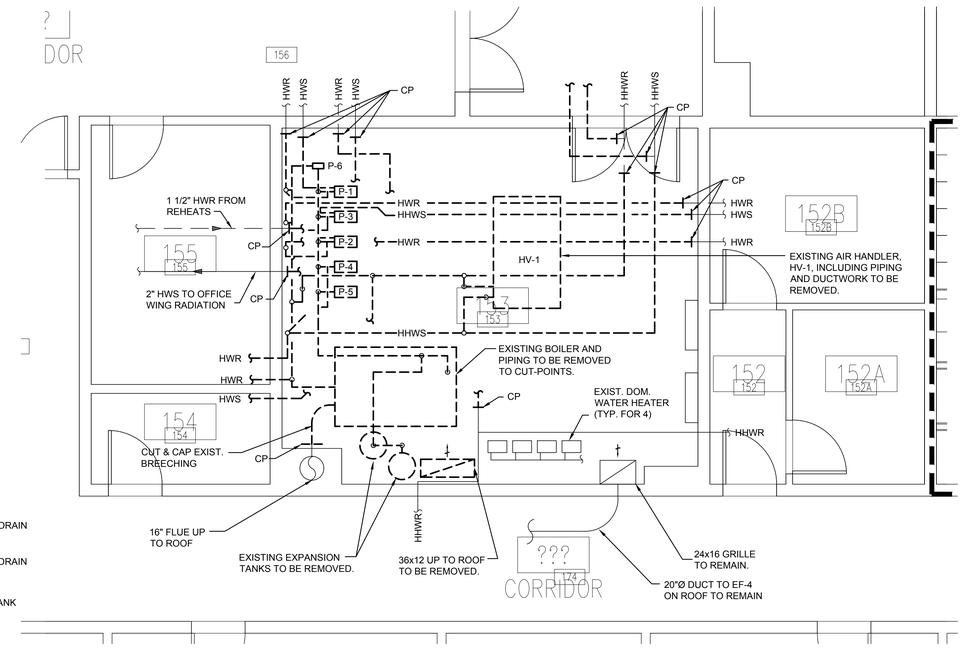
SHEET NO.:
M106



HEATING SYSTEM PIPING SCHEMATIC

NTS

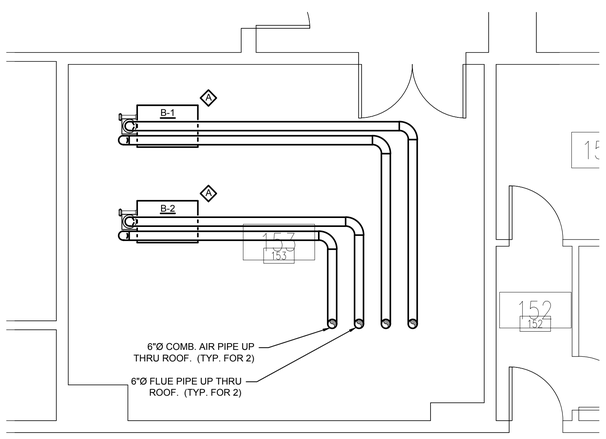
PROVIDE PAD MOUNT AND MAINTAIN PROPER CLEARANCES



MECHANICAL FLOOR PLAN BUILDING 1: EXIST. BOILER ROOM

01 / M107

1/4" = 1'-0" 0 6 12 FT



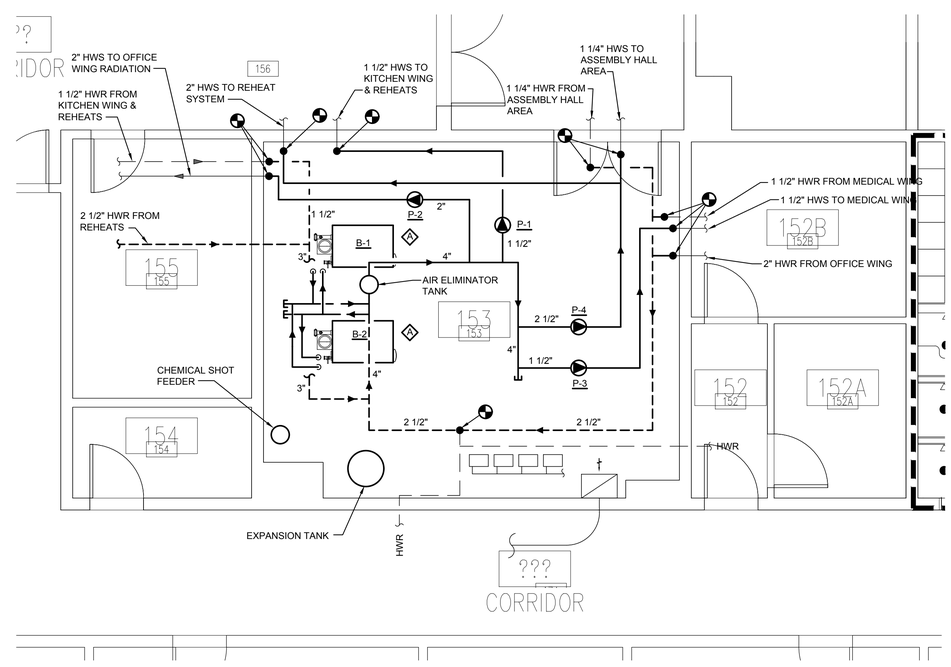
NOTES:

1. BOILER VENTS SHALL BE PROVIDED WITH VENT CAPS AND SHALL TERMINATE A MINIMUM OF 3'-0" ABOVE ROOF, 2'-0" MINIMUM HIGHER THAN ANY PART OF ROOF WITHIN 10'-0" AND MINIMUM 12" ABOVE ASSOCIATED AIR INLETS.
2. BOILER INTAKE GOOSENECKS SHALL BE FABRICATED WITH TWO 90° ELBOWS. FACE OF GOOSENECKS SHALL FACE ROOF AND SHALL TERMINATE A MINIMUM OF 2'-0" ABOVE ROOF.

BOILER FLUE AND COMBUSTION AIR PIPING

03 / M107

1/4" = 1'-0" 0 6 12 FT



MECHANICAL FLOOR PLAN BUILDING 1: REVISED BOILER ROOM

02 / M107

1/4" = 1'-0" 0 6 12 FT

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED PROFESSIONAL ENGINEER MECHANICAL

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141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

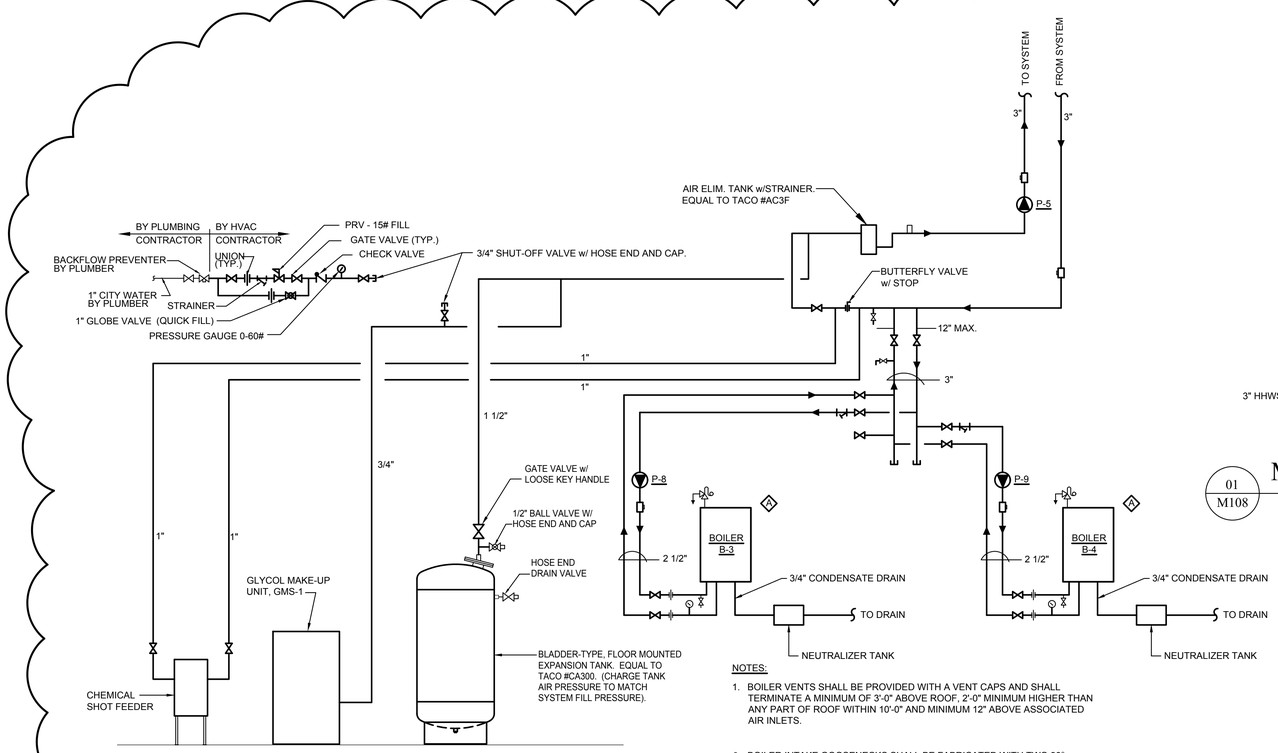
SHEET TITLE:

MECHANICAL FLOOR PLAN
BUILDING 1
BOILER ROOM PLANS

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:

M107



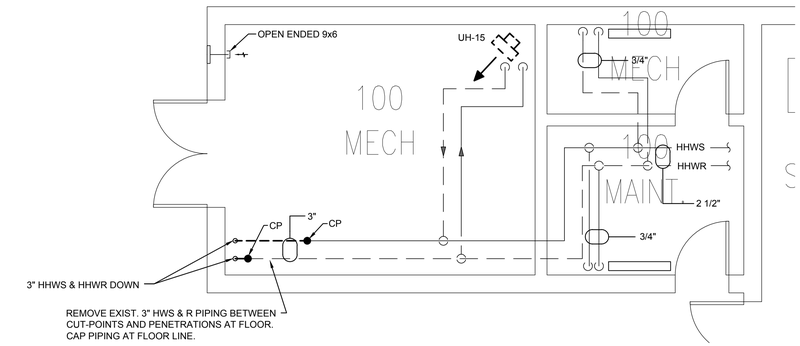
NOTES:

1. BOILER VENTS SHALL BE PROVIDED WITH A VENT CAPS AND SHALL TERMINATE A MINIMUM OF 3'-0" ABOVE ROOF, 2'-0" MINIMUM HIGHER THAN ANY PART OF ROOF WITHIN 10'-0" AND MINIMUM 12" ABOVE ASSOCIATED AIR INLETS.

2. BOILER INTAKE GOOSENECKS SHALL BE FABRICATED WITH TWO 90° ELBOWS. FACE OF GOOSENECKS SHALL FACE ROOF AND SHALL TERMINATE A MINIMUM OF 2'-0" ABOVE ROOF.

HEATING SYSTEM PIPING SCHEMATIC

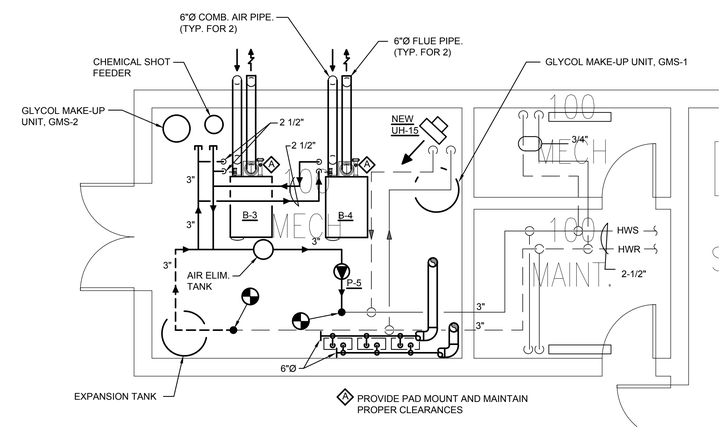
NTS



01
M108

MECHANICAL FLOOR PLAN BUILDING 3: EXIST. BOILER ROOM

1/8" = 1'-0" 0 12 24 FT



02
M108

MECHANICAL FLOOR PLAN BUILDING 3: REVISED BOILER ROOM

1/8" = 1'-0" 0 12 24 FT

BY OTHERS

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

MECHANICAL FLOOR PLAN
BUILDING 3
BOILER ROOM PLANS

JOB NO.: 16096RS

DRAWN BY: MMD

CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

M108

NOTES

1. THESE PLANS HAVE BEEN PREPARED USING THE SCHEDULED EQUIPMENT AS THE BASIS OF DESIGN. IF CONTRACTOR SUBSTITUTES LISTED "OR EQUAL", THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES TO THE DESIGN THAT ARE REQUIRED FOR THE EQUIPMENT SUBSTITUTION.
2. "OR EQUAL" SUBSTITUTIONS SHALL BE CONSIDERED AS FOLLOWS:
   - A. ROOFTOPS - CARRIER OR LENNOX
   - B. AIR TERMINAL BOXES - PRICE OR TITUS
   - C. DIFFUSERS, REGISTERS AND GRILLS - TITUS OR KRUEGER
   - D. SPLIT-SYSTEM A.C. EQUIPMENT - DAIKIN OR LG
   - E. CABINET AND UNIT HEATERS - TRANE OR AIRTHERM
   - F. AIR HANDLING UNITS - CARRIER OR LENNOX
   - G. CONDENSING UNITS - CARRIER OR LENNOX
   - H. PUMPS - TACO OR BELL & GOSSETT
   - I. GAS FIRED ROOFTOPS - REZNOR OR CARRIER
   - J. DUCT COILS - PRICE OR LENNOX
   - K. FAN COILS - CARRIER OR DAIKIN
   - L. FANS - PENNBARRY OR COOK
   - M. BOILERS - LOCHINVAR OR HTP
   - N. GLYCOL SYSTEMS - NEPTUNE OR BELL & GOSSETT
   - O. AUTOMATIC TEMPERATURE CONTROLS - JOHNSON OR SIEMENS

ROOFTOP UNIT SCHEDULE (BASED ON TRANE)

SYMBOL	LOCATION	MODEL	NOMINAL CAPACITY (TONS)	TOTAL CFM	O.A. CFM	ESP (IN)	EVAP. FAN BHP	COOLING DATA				HEATING DATA			ELECTRICAL DATA				APPROX. WEIGHT (LBS)	NOTES
								EDB °F	EWB °F	NET TOTAL MBH	NET SENSIBLE MBH	FUEL	INPUT MBH	OUTPUT MBH	EER	MCA	MOP	VOLTAGE		
RTU-1	BLDG. #1	OAGD180D3	15.0	4000	530	2.0	4.4	80.0	67.0	157.3	102.8	NG	200	160	7.2	94.3	110	208V/3Ø	4172	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19
RTU-2	BLDG. #1	OAGD210D3	17.5	4840	640	2.0	5.03	80.0	67.0	183.2	123.4	NG	200	160	8.2	116.1	125	208V/3Ø	4508	1,2,3,4,5,6,7,8,9,10,11,12,13, 14,15,16,17,18,19
RTU-3	BLDG. #3	YHC092F	7.5	3000	450	1.5	1.8	80.0	67.0	87.1	63.7	NG	200	160	12.6	41.9	50	208V/3Ø	1220	1,2,6,8,9,10,11,13,14,15,16,17,18,19
RTU-4	BLDG. #1	OAGD210D3	17.5	5300	535	2.0	5.67	80.0	67.0	183.9	127.4	NG	250	200	7.9	116.1	125	208V/3Ø	4543	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19

NOTES:
1. AIRFLOW CONFIGURATION: HORIZONTAL DISCHARGE / HORIZONTAL RETURN.
2. MODULATING HOT GAS REHEAT.
3. DIGITAL SCROLL PRIMARY CIRCUIT COMPRESSOR.
4. INDOOR BLOWER MOTOR: ECM w/ BACKWARD CURVED PLENUM FAN.
5. INDIRECT FIRED NATURAL GAS HEAT.
6. 439 STAINLESS STEEL FURNACE.
7. MULTI-ZONE VAV CONTROL w/ BACNET w/DISPLAY.
8. POWERED EXHAUST: ECM w/ BACKWARD CURVED PLENUM FAN & BAROMETRIC RELIEF DAMPER.
9. MODULATING OA/RA DAMPER w/ ECONOMIZER CONTROLLER.
10. MERV-13 FILTERS.
11. NON-FUSED DISCONNECT SWITCH.
12. AIR FLOW MONITORING: IFM PIEZO RING AND PE PIEZO RING.
13. CONDENSER HAILGUARD.
14. AUX MOD KNOCKDOWN CURB.
15. WARRANTY: 1-YEAR PARTS ONLY (MANUFACTURER WARRANTY)
16. WARRANTY: 5-YEAR DIGITAL/VARIABLE SPEED/STANDARD SCROLL COMPRESSOR / 25-YEAR HEAT EXCHANGER.
17. SUPPLY DISCHARGE AIR SENSOR.
18. 2 INCH DOUBLE WALL CONSTRUCTION.
19. STAINLESS STEEL DRIP PAN.

DIFFUSER, REGISTER & GRILLE SCHEDULE

SYMBOL	MANUFACTURER / MODEL	TYPE	THROW	CFM	THROAT SIZE	FACE SIZE	NOTES
S-1	PRICE / AMDA	CEILING	4W	1 - 120	6x6	24x24	1,2,3,4,5
S-2	PRICE / AMDA	CEILING	4W	121 - 250	9x9	24x24	1,2,3,4,5
S-3	PRICE / AMDA	CEILING	4W	251 - 450	12x12	24x24	1,2,3,4,5
S-4	PRICE / AMDA	CEILING	4W	451 - 750	15x15	24x24	1,2,3,4,5
S-5	PRICE / AMDA	CEILING	3W	1 - 120	6x6	24x24	1,2,3,4,5
S-6	PRICE / AMDA	CEILING	3W	121 - 250	9x9	24x24	1,2,3,4,5
S-7	PRICE / AMDA	CEILING	3W	251 - 450	12x12	24x24	1,2,3,4,5
S-8	PRICE / AMDA	CEILING	3W	451 - 750	15x15	24x24	1,2,3,4,5
S-9	PRICE / AMDA	CEILING	2W	100 - 135	6x6	24x24	1,2,3,4,5
S-10	PRICE / AMDA	CEILING	2W	225	9x9	15x15	1,2,3,4,6
S-11	PRICE / AMDA	CEILING	2WC	400	12x12	24x24	1,2,3,4,5
S-12	PRICE / AMDA	CEILING	3W	65	6x6	12x12	1,2,3,4,6
S-13	PRICE / AMDA	CEILING	3W	125	9x9	15x15	1,2,3,4,6
S-14	PRICE / AMDA	CEILING	1W	277	12x12	18x18	1,2,3,4,6
R-1	PRICE / 635DAL	CEILING	- - -	VARIES	22x22	24x24	1,2,3,5
R-2	PRICE / 635DAL	CEILING	- - -	150 - 225	10x10	12x12	1,2,3,6
R-3	PRICE / 635DAL	CEILING	- - -	285	12x12	14x14	1,2,3,6
R-4	PRICE / 635DAL	CEILING	- - -	550 - 740	16x16	18x18	1,2,3,6
R-5	PRICE / 635DAL	CEILING	- - -	800	18x18	24x24	1,2,3,5
R-6	PRICE / 635DAL	CEILING	- - -	990 - 1000	22x22	24x24	1,2,3,5
R-7	PRICE / 635DAL	CEILING	- - -	1275	22x46	24x48	1,2,3,5

NOTES:
1) ALUMINUM CONSTRUCTION, FACTORY PAINTED WHITE ENAMEL.
2) PROVIDE OPPOSED-BLADE DAMPERS ON ALL REGISTERS AND DIFFUSERS.
3) ALL UNITS: PROVIDE SQUARE TO ROUND TRANSITIONS AS NECESSARY.
4) PROVIDE AIR PATTERN ADJUSTMENT ON ALL CEILING DIFFUSERS.
5) PROVIDE AUXILIARY PANEL FOR MOUNTING IN T-BAR CEILING GRID SYSTEM.
6) SURFACE MOUNT.

* S = SUPPLY ** SIZE
* R = RETURN *** CFM
* E = EXHAUST
* T = TRANSFER
** X = EXISTING TO REMAIN

AIR TERMINAL BOX SCHEDULE (BASED ON TRANE)

TAG	ASSOCIATED RTU	MODEL	INLET SIZE "Ø	CFM			MAX INLET SP (INS. WG)	HEATING COIL DATA									ELECTRICAL DATA			NOTES
				MAX	MIN	HEAT		CAP MBH	EAT °F	LAT °F	FLOW (GPM)	WPD (ft w.g.)	APD (in. w.g.)	EWT °F	LWT °F	ROWS	HP	FLA	VOLTAGE	
VAV-1	RTU-1	VCWF08	8	760	190	300	0.75	13.0	55	95	1.1	2.6	0.24	180	156.5	1	N/A	N/A	N/A	1,2,3,5,7
VAV-2	RTU-1	VCWF08	8	620	155	250	0.75	10.9	55	95	0.7	1.1	0.17	180	147.8	1	N/A	N/A	N/A	1,2,3,5,7
VAV-3	RTU-1	VCWF05	5	330	85	175	0.75	7.6	55	95	0.5	0.5	0.09	180	150.4	1	N/A	N/A	N/A	1,2,3,5,7
VAV-4	RTU-1	VCWF05	5	315	80	175	0.75	7.6	55	95	0.5	0.5	0.09	180	150.4	1	N/A	N/A	N/A	1,2,3,5,7
VAV-5	RTU-1	VCWF08	8	680	170	270	0.75	11.7	55	95	0.8	1.5	0.2	180	151.4	1	N/A	N/A	N/A	1,2,3,5,7
VAV-6	RTU-1	VCWF10	10	1070	270	430	0.75	18.7	55	95	1.2	4.1	0.3	180	148.8	1	N/A	N/A	N/A	1,2,3,5,7
VAV-7	RTU-2	VCWF08	8	800	200	320	0.75	13.9	55	95	1.4	3.7	0.3	180	159.7	1	N/A	N/A	N/A	1,2,3,5,7
VAV-8	RTU-2	VCWF10	10	1075	270	430	0.75	18.7	55	95	1.2	4.1	0.3	180	148.8	1	N/A	N/A	N/A	1,2,3,5,7
VAV-9	RTU-4	VCWF08	8	685	170	270	0.75	11.7	55	95	0.8	1.5	0.2	180	151.4	1	N/A	N/A	N/A	1,2,3,5,7
VAV-10	RTU-2	VCWF08	8	700	175	280	0.75	12.2	55	95	0.9	1.8	0.2	180	153.2	1	N/A	N/A	N/A	1,2,3,5,7
VAV-11	RTU-4	VCWF08	8	530	130	210	0.75	9.4	55	96	0.5	0.7	0.1	180	142.6	1	N/A	N/A	N/A	1,2,3,5,7
VAV-12	RTU-4	VCWF08	8	740	185	300	0.75	13.0	55	95	1.1	2.6	0.2	180	156.5	1	N/A	N/A	N/A	1,2,3,5,7
VAV-13	RTU-4	VCWF06	6	390	100	160	0.75	7.3	55	97	0.5	0.5	0.1	180	150.9	1	N/A	N/A	N/A	1,2,3,5,7
VAV-14	RTU-4	VCWF10	10	905	225	360	0.75	15.6	55	95	0.8	1.9	0.2	180	139.3	1	N/A	N/A	N/A	1,2,3,5,7
VAV-15	RTU-4	VCWF06	6	445	110	180	0.75	7.8	55	95	0.6	0.6	0.2	180	151.5	1	N/A	N/A	N/A	1,2,3,5,7
VAV-16	RTU-4	VCWF05	5	260	65	175	0.75	7.6	55	95	0.5	0.5	0.1	180	150.4	1	N/A	N/A	N/A	1,2,3,5,7
VAV-17	RTU-4	VCWF08	8	640	160	260	0.75	11.3	55	95	0.7	1.3	0.2	180	149.6	1	N/A	N/A	N/A	1,2,3,5,7
VAV-18	RTU-2	VSWF04	4	190	50	190	0.75	8.9	55	109	0.5	0.1	0.02	180	144.5	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-19	RTU-2	VSWF08	8	540	135	215	0.75	9.7	55	102	0.5	0.1	0.01	180	141.3	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-20	RTU-2	VSWF06	6	375	95	190	0.75	9.2	55	107	0.5	0.2	0.01	180	143.4	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-21	RTU-2	VSWF05	5	265	70	190	0.75	9.0	55	108	0.5	0.1	0.02	180	144.0	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-22	RTU-2	VSWF06	6	375	95	190	0.75	9.2	55	107	0.5	0.2	0.01	180	143.4	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-23	RTU-2	VSWF08	8	705	175	280	0.75	9.9	55	100	0.5	0.1	0.01	180	140.5	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-24	RTU-2	VSWF05	5	245	60	190	0.75	8.9	55	109	0.5	0.1	0.02	180	141.3	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-25	RTU-2	VSWF04	4	220	55	190	0.75	8.9	55	109	0.5	0.1	0.02	180	144.4	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8
VAV-26	RTU-1	VSWF04	4	225	60	190	0.75	8.9	55	109	0.5	0.1	0.02	180	144.3	1	0.125	1.6	115/1/60	1,2,3,4,5,6,7,8

NOTES:
1. AIRFLOW IS GIVEN IN CUBIC FEET PER MINUTE (CFM).
2. AIR PRESSURE DROP IS GIVEN IN INCHES WATER GAUGE (IN. W.G.); AND WATER PRESSURE DROP IS GIVEN IN FEET OF WATER GAUGE (FT. W.G.).
3. WATER COIL PERFORMANCE IS RATED AND CERTIFIED IN ACCORDANCE WITH THE LATEST ADDITION OF AHRI STANDARD 410.
4. ALL UNITS PROVIDED WITH ECM MOTORS.
5. ALL UNITS PROVIDED WITH FG50 1/2" FIBERGLASS INTERNAL INSULATION METING REQUIREMENTS OF NFPA90A AND UL 181.
6. PROVIDE 1" MERV III DISPOSABLE FILTERS ON RETURN AIR CONNECTIONS.
7. CONTROL COMPONENTS SHALL BE FURNISHED TO THE UNIT MANUFACTURER BY THE ATC CONTRACTOR AND MOUNTED ON THE UNITS AT THE FACTORY.
8. FAN POWERED WITH H.W. HEATING COIL.

SPLIT-SYSTEM A.C. EQUIPMENT SCHEDULE (BASED ON MITSUBISHI)

INDOOR UNIT								OUTDOOR UNIT						
SYMBOL	MODEL	CFM	MOUNTING LOCATION	ELECTRICAL DATA			NOTES	SYMBOL	MODEL	COOL. CAP. MBH	ELECTRICAL DATA			NOTES
				MCA	MFS	VOLTAGE					MCA	MFS	VOLTAGE	
AC-1	PUYA12HA4	-	WALL MT'D.	13	---	208/1/60	1, 2, 3, 4, 7, 8	CU-8	PUYA12NHA4	6.0	13	-	208/1/60	3, 4, 5, 6

NOTES:
1. PROVIDE WITH DISCONNECT SWITCH. 2. PROVIDE WITH AUTOMATIC FAN SPEED CONTROL AND WIRED PROGRAMMABLE THERMOSTAT.
3. REFER TO MANUFACTURER'S GUIDELINES FOR LINE SIZING AND ALL INSTALLATION INSTRUCTIONS.
4. FURNISH AND INSTALL ALL REQUIRED INTERLOCKING CONTROLS & PIPING FOR REQUIRED SEQUENCE OF OPERATIONS.
5. PROVIDE WITH STARTER & DISCONNECT. 6. SUITABLE FOR LOW AMBIENT OPERATION.
7. CONDENSATE PUMP AS SUPPLIED BY MITSUBISHI.
8. POWERED FROM OUTDOOR UNIT.

WATER TREATMENT

A. ALL HYDRONIC HVAC SYSTEMS SHALL BE PROVIDED WITH WATER TREATMENT CHEMICALS DURING INITIAL FILL OF THE SYSTEMS. CHEMICALS SHALL BE DESIGNATED FOR USE IN THE SPECIFIC SYSTEM TYPE AND BE PROVIDED IN CONCENTRATIONS AS RECOMMENDED BY THE CHEMICAL MANUFACTURER.
B. WHERE INDICATED ON THE DRAWINGS, PROVIDE PROPYLENE GLYCOL TO HYDRONIC SYSTEMS IN THE CONCENTRATIONS INDICATED. GLYCOL SHALL BE OF THE INHIBITED TYPE AND BE PROVIDED WITH ADDITIONAL WATER TREATMENT CHEMICALS TO PREVENT CORROSION.
C. HYDRONIC SYSTEMS SHALL BE PROVIDED WITH A CHEMICAL SHOT FEEDER FOR THE MAINTENANCE OF WATER TREATMENT CHEMICALS.
D. CONTRACTOR SHALL PROVIDE SUBMITTALS FOR REVIEW AND APPROVAL FOR ALL WATER TREATMENT CHEMICALS. CHEMICAL TREATMENT SHALL MEET BOILER MANUFACTURER'S REQUIREMENTS.

SYSTEM FLUID SCHEDULE

ID	SYSTEM	PLANT EQUIPMENT	FLUID		OPERATING TEMPERATURE (°F)	NOTES
			TYPE	CONCENTRATION		
HW	HEATING HOT WATER, BLDG. NO. 3	B-3 & B-4	WATER	40%	140 - 160	1,2,3

NOTES:
1. PERCENT CONCENTRATION LISTED IS BY VOLUME.
2. PROVIDE WATER TREATMENT CHEMICALS UPON SYSTEM FILL.
3. GLYCOL SHALL BE OF THE INHIBITED TYPE.

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
MECHANICAL SCHEDULES

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M109

CABINET AND UNIT HEATER SCHEDULE

(BASED ON STERLING)

SYMBOL	LOCATION	MODEL	CFM	MBH	EAT °F	EWT °F	LWT °F	GPM	MOTOR DATA		TYPE	NOTES
									HP	VOLTAGE		
UH-1	BLDG. #3	RC-03	330	27.3	60	180	137.5	1.5	1/15	115/1/60	CABINET, HORIZ. RECESSED	1, 2
UH-2	BLDG. #3	RC-03	330	27.3	60	180	137.5	1.5	1/15	115/1/60	CABINET, HORIZ. RECESSED	1, 2
UH-3	BLDG. #3	RC-03	330	27.3	60	180	137.5	1.5	1/15	115/1/60	CABINET, HORIZ. RECESSED	1, 2
UH-4	BLDG. #3	RC-03	335	18.2	60	180	137.5	1.0	1/15	115/1/60	CABINET, HORIZ. RECESSED	1, 2
UH-5	BLDG. #3	RC-03	335	18.2	60	180	137.5	1.0	1/15	115/1/60	CABINET, HORIZ. RECESSED	1, 2
UH-6	BLDG. #1	RC-03	330	27.3	60	180	137.5	1.0	1/15	115/1/60	CABINET, HORIZ. RECESSED	1
UH-7	BLDG. #1	RC-03	335	18.2	60	180	137.5	1.0	1/15	115/1/60	CABINET, HORIZ. RECESSED	1
UH-8	BLDG. #1	RC-03	335	18.2	60	180	137.5	1.0	1/15	115/1/60	CABINET, HORIZ. RECESSED	1
UH-9	BLDG. #1	HS-108A	210	5.2	60	180	150	0.8	9w	115/1/60	PROPELLER, HORIZONTAL	1
UH-10	BLDG. #1	HS-108A	210	5.2	60	180	150	0.8	9w	115/1/60	PROPELLER, HORIZONTAL	1
UH-11	BLDG. #1	HS-120	1600	60.4	60	180	150	3.5	1/20	115/1/60	PROPELLER, VERTICAL	1
UH-12	BLDG. #1	HS-120	1600	60.4	60	180	150	3.5	1/20	115/1/60	PROPELLER, VERTICAL	1
UH-13	BLDG. #3	HS-24	450	13.4	60	180	150	1.8	9w	115/1/60	PROPELLER, HORIZONTAL	1, 2

NOTES:
1. PROVIDE WITH UNIT MOUNTED THERMOSTAT.
2. SEMI-RECESSED WALL TYPE.
3. HORIZONTAL UNIT HEATER.
4. THE BUILT-IN THERMOSTATS SHALL CONTROL THE OPERATION OF THE FAN, WITH CONTINUOUS FLOW THRU THE UNIT COILS.
5. HEATING CAPACITY BASED ON 40% GLYCOL SOLUTION.

AIR HANDLING UNIT SCHEDULE

(BASED ON TRANE)

SYMBOL	MODEL	S.A. CFM	O.A. CFM	ESP (IN)	FAN RPM	COOLING DATA	HEATING DATA						ELECTRICAL DATA				APPROX. WEIGHT (LBS)	NOTES
							E.A.T. °F	L.A.T. °F	E.W.T. °F	L.W.T. °F	GPM	MBH	HP	MCA	MOCP	VOLTAGE		
HV-3	CLIMATE CHANGER SIZE 14	6,600	100%	1.75	1905	N/A	0	60°F	180	140	23.2	429	10	47.94	80	208/3/60	1385	1, 2
HV-4	CLIMATE CHANGER SIZE 4	2940	290	1.00	1286	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.7	15	208/3/60	696	1

NOTES:
1. PROVIDE WITH FILTER SECTION, MERV 13 FILTERS, DOUBLE-WALL 2" INSULATED PANELS AND BASE RAILS.
2. HEATING CAPACITY BASED ON 40% GLYCOL SOLUTION.

GLYCOL MAKE-UP UNIT SCHEDULE

(BASED ON JOHN WOOD CO.)

SYMBOL	SERVICE	MODEL	TANK VOLUME	PUMP DATA				WEIGHT (LBS)	NOTES
				No.	HP	RPM	VOLTAGE		
GMS-1	BLDG. #3	JW-P-53-100	100 GAL.	3	1/3	3450	120/1/06	250	1,2

NOTES:
1. UNIT SHALL BE CUSTOM FABRICATED BY THE JOHN WOOD CO.
2. PROVIDE WITH PUMP & LEVEL MONITORING AND ALARM CONTACTS FOR BMS.

CONDENSING UNIT SCHEDULE

(BASED ON TRANE)

SYMBOL	LOCATION	ASSOC. FAN COIL UNIT	CONDENSER MODEL	NOMINAL CAPACITY (TONS)	ELECTRICAL DATA			NOTES
					MCA	MOCP	VOLTAGE	
CU-1	BLDG. #3	FC-1	4TTR6018	1.5	12	20	208/1/60	2, 3, 4, 5, 6
CU-2	BLDG. #3	FC-2	4TTR6018	1.5	12	20	208/1/60	2, 3, 4, 5, 6
CU-3	BLDG. #3	FC-3	4TTR6018	1.5	12	20	208/1/60	2, 3, 4, 5, 6
CU-4	BLDG. #3	FC-4	4TTR6042	3.5	21	35	208/1/60	2, 3, 4, 5, 6
CU-5	BLDG. #3	FC-5	4TTR6018	1.5	12	20	208/1/60	2, 3, 4, 5, 6
CU-6	BLDG. #3	FC-6	4TTR6042	3.5	21	35	208/1/60	2, 3, 4, 5, 6
CU-7	BLDG. #3	FC-7	4TTR6018	1.5	12	20	208/1/60	2, 3, 4, 5, 6

NOTES:
1) UNIT SHALL BE MOUNTED AT GRADE ON CONCRETE PAD.
2) COMPLY WITH MANUFACTURER'S APPLICATION GUIDELINE FOR ACR LINE INSTALLATION AS REQUIRED.
3) ELECTRICAL DISCONNECT SHALL BE INSTALLED BY THE ELECTRICAL CONTRACTOR.
4) UNIT SHALL BE FURNISHED WITH LOW-AMBIENT KIT TO INCLUDE CRANKCASE HEATER, WINTER START KIT, AND ALL ASSOCIATED HARDWARE AND CONTROLS.
5) UNIT SHALL BE R410A 16 SEER.
6) UNIT SHALL BE MOUNTED ON ROOF ON PRE-FABRICATED EQUIPMENT SUPPORT SLEEPERS.

NOTES

1. THESE PLANS HAVE BEEN PREPARED USING THE SCHEDULED EQUIPMENT AS THE BASIS OF DESIGN. IF CONTRACTOR SUBSTITUTES LISTED "OR EQUAL", THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES TO THE DESIGN THAT ARE REQUIRED FOR THE EQUIPMENT SUBSTITUTION.
2. "OR EQUAL" SUBSTITUTIONS SHALL BE CONSIDERED AS FOLLOWS:
   - A. ROOFTOPS - CARRIER OR LENNOX
   - B. AIR TERMINAL BOXES - PRICE OR TITUS
   - C. DIFFUSERS, REGISTERS AND GRILLS - TITUS OR KRUEGER
   - D. SPLIT-SYSTEM A.C. EQUIPMENT - DAIKIN OR LG
   - E. CABINET AND UNIT HEATERS - TRANE OR AIRTHERM
   - F. AIR HANDLING UNITS - CARRIER OR LENNOX
   - G. CONDENSING UNITS - CARRIER OR LENNOX
   - H. PUMPS - TACO OR BELL & GOSSETT
   - I. GAS FIRED ROOFTOPS - REZNOR OR CARRIER
   - J. DUCT COILS - PRICE OR LENNOX
   - K. FAN COILS - CARRIER OR DAIKIN
   - L. FANS - PENNBARRY OR COOK
   - M. BOILERS - LOCHINVAR OR HTP
   - N. GLYCOL SYSTEMS - NEPTUNE OR BELL & GOSSETT
   - O. AUTOMATIC TEMPERATURE CONTROLS - JOHNSON OR SIEMENS

PUMP SCHEDULE

(BASED ON GRUNDFOS)

SYMBOL	SERVICE	MODEL	GPM	HEAD (FT)	MOTOR DATA		NOTES
					POWER INPUT	VOLTAGE	
P-1	BLDG. #1, KITCHEN WING RAD & REHEATS	MAGNA3 40-80F	18	20	16 - - 262W	208V/1Ø	1,2,3
P-2	BLDG. #1, OFFICE WING RAD	MAGNA3 40-120F	37	25	16 - - 422W	208V/1Ø	1,2,3
P-3	BLDG. #1, MEDICAL WING RAD	MAGNA3 40-120F	16	26	16 - - 422W	208V/1Ø	1,2,3
P-4	BLDG. #1, ASSEMBLY HALL AREA & REHEATS	TPE 40-240/2S	54	54	1.5 HP	208V/1Ø	1,2,3
P-5	BLDG. #3, HEATING SYSTEM	MAGNA3 65-150F	75	49	29 - -1301W	208V/1Ø	1,2,3,4
P-6	BLDG. #1, BOILER #1	MAGNA3 40-180F	75	20	16 - - 587W	208V/1Ø	1,2,3
P-7	BLDG. #1, BOILER #2	MAGNA3 40-180F	75	20	16 - - 587W	208V/1Ø	1,2,3
P-8	BLDG. #3, BOILER #3	MAGNA3 40-180F	50	20	16 - - 587W	208V/1Ø	1,2,3,4
P-9	BLDG. #3, BOILER #4	MAGNA3 40-180F	50	20	16 - - 587W	208V/1Ø	1,2,3,4

NOTES:
1. PROVIDE DISCONNECT SWITCH AND CONTROL PANEL.
2. PROVIDE WITH VFD w/ AUTOADAPT.
3. PROVIDE WITH BUILT-IN DIFFERENTIAL PRESSURE AND TEMPERATURE SENSOR AND VARIABLE SPEED DRIVE.
4. SELECTION BASED ON 40% GLYCOL.

GAS-FIRED ROOFTOP H&V UNIT SCHEDULE

(BASED ON TRANE)

SYMBOL	LOCATION	MODEL	TOTAL CFM	O.A. CFM	ESP (IN)	EVAP. FAN RPM	EVAP. FAN BHP	HEATING DATA					ELECTRICAL DATA		APPROX. WEIGHT (LBS)	NOTES
								FUEL	INPUT MBH	OUTPUT MBH	EDB °F	LDB °F	MOCP	VOLTAGE		
HV-2	BLDG. #1	GRBA70PDGF0	7000	1200	1.25	815	4.2	NG	400	320	68	110	60	208/3/60	1810	1
HV-5	BLDG. #1	GRBA20PDGF0	3035	100%	1.25	630	1.4	NG	300	240	0	70	30	208/3/60	1150	1

NOTE:
1. PROVIDE WITH MERV 13 FILTERS.

DUCT COIL SCHEDULE

(BASED ON TRANE)

SYMBOL	ASSOC. AIR HANDLER	TYPE	FINNED LENGTH	COIL HEIGHT	ROWS	FINS/FT	CFM	MBH	EAT °F	LAT °F	APD	EWT °F	LWT °F	GPM	WPD	NOTES
HC-1	HV-3	T	18"	15"	1	110	1325	32.1	55	77	0.16	180	133.8	1.5	2.0'	1, 2
HC-2	HV-3	5W	36"	24"	1	152	4450	106.2	55	77	0.27	180	136.0	5.2	0.54'	1, 2
HC-3	HV-3	TT	18"	12"	1	139	1085	25.9	55	77	0.19	180	142.8	1.5	0.7'	1, 2
HC-4	FC-1	ST	12"	9"	1	80	550	7.9	65	78	0.13	180	145.8	0.5	0.44	1, 2
HC-5	FC-2	ST	12"	9"	1	80	550	7.9	65	78	0.13	180	145.8	0.5	0.44	1, 2
HC-6	FC-3	ST	12"	9"	1	80	550	7.9	65	78	0.13	180	145.8	0.5	0.44	1, 2
HC-7	FC-5	ST	12"	9"	1	80	550	7.9	65	78	0.13	180	145.8	0.5	0.44	1, 2
HC-8	FC-4	TT	18"	18"	1	80	1250	7.0	65	75	0.08	180	119.5	0.5	0.42	1, 2
HC-9	HV-4	T	20"	15"	1	110	1520	32.7	67	87	0.17	180	135.9	1.6	2.36	1, 2
HC-10	HV-4	T	20"	15"	1	110	1520	32.7	67	87	0.17	180	135.9	1.6	2.36	1, 2
HC-11	FC-6	TT	18"	18"	1	--	1250	7.0	65	75	0.08	180	119.5	0.5	0.42	1, 2
HC-12	FC-7	ST	12"	9"	1	80	550	7.9	65	78	0.13	180	145.8	0.5	0.44	1, 2

NOTES:
1. PROVIDE COIL WITH TURBULATORS.
2. HEATING CAPACITY BASED ON 40% GLYCOL SOLUTION.

FAN COIL UNIT SCHEDULE

(BASED ON TRANE)

SYMBOL	LOCATION	ASSOC. COND. UNIT	MODEL	HP	CFM	ESP	COOLING DATA			ELECTRICAL DATA			NOTES
							TOTAL MBH	EDB °F	EWB °F	MCA	MOCP	VOLTAGE	
FC-1	BLDG. #3	CU-1	GAM5A0A18M11EA	0.33	550	0.36	18.0	80	67	4	15	208/1/60	1
FC-2	BLDG. #3	CU-2	GAM5A0A18M11EA	0.33	580	0.36	18.0	80	67	4	15	208/1/60	1
FC-3	BLDG. #3	CU-3	GAM5A0A18M11EA	0.33	580	0.36	18.0	80	67	4	15	208/1/60	1
FC-4	BLDG. #3	CU-4	GAM5A0C42M31SA	0.5	1250	0.53	42.0	80	67	5	15	208/1/60	1
FC-5	BLDG. #3	CU-5	GAM5A0A18M11EA	0.33	550	0.36	18.0	80	67	4	15	208/1/60	1
FC-6	BLDG. #3	CU-6	GAM5A0C42M31SA	0.5	1250	0.53	42.0	80	67	5	15	208/1/60	1
FC-7	BLDG. #3	CU-7	GAM5A0A18M11EA	0.33	550	0.36	18.0	80	67	4	15	208/1/60	1

NOTES:
1. PROVIDE VIBRATION ISOLATION HANGERS.

FAN SCHEDULE

SYMBOL	MFG'R. / MODEL	SERVICE	TYPE	DRIVE	CFM	ESP (IN)	FAN RPM	MOTOR DATA		APPROX. WEIGHT (LBS)	NOTES
								HP	VOLTAGE		
EF-12	GREENHECK / EQB-22-50	BUILDING #3	IN-LINE	BELT	6,600	2.0	1248	5	208/3/60	365	1, 2
EF-4	GREENHECK / GB80-6	BUILDING #1	ROOF	BELT	300	0.375	1050	1/6	120/1/60	50	3

NOTES:
1. INTERLOCKED TO OPERATE WITH NEW HV-3.
2. PROVIDE WITH NEMA PREMIUM EFFICIENCY MOTOR, MOTOR VFD, GALV. CONSTRUCTION, NEMA-1 TOGGLE SWITCH, MOTOR COVER, BELT GUARD AND DUCT COLLARS.
3. PROVIDE CURB CAP FOR MOUNTING NEW FAN ON EXISTING ROOF CURB.

BOILER SCHEDULE

(BASED ON P-K MACH)

SYMBOL	MODEL	LOCATION	FUEL	MAX MBH INPUT	MBH OUTPUT	THERMAL EFFICIENCY	ELECTRICAL DATA	NOTES
							VOLTAGE	
B-1,B-2	C1050	BLDG #1	NAT. GAS	1050	987	92.0	115/1/60	1 thru 10
B-3,B-4	C750	BLDG #3	NAT. GAS	750	712	92.0	115/1/60	1 thru 10

NOTES:
1. HIGH-EFFICIENCY, CONDENSING BOILERS.
2. COMPLETE WITH MFG AUTOMATIC CONTROLS, INCLUDING LEAD/LAG CONTROL AND OUTDOOR AIR SENSOR. BOILER CONTROLS SHALL BE INTEGRATED WITH SYSTEM CONTROLS.
3. DIRECT VENT SEALED COMBUSTION.
4. ASME PRESSURE RELIEF VALVE (30 PSI)
5. FURNISH WITH CONDENSATE PUMP RECEPTACLE, OUTDOOR RESET, OUTDOOR SENSOR, HI/LOW LIMIT CONTROLS, RELIEF VALVE AND CSD-1 CONTROLS TO MEET ALL STATE AND LOCAL CODES. PROVIDE FACTORY START-UP AND BALANCING. ALL BREECHING AND INTAKE PIPING AS PER MFGS INSTALLATION INSTRUCTIONS.
6. FURNISH WITH CONDENSATE PUMP. BOILER CONDENSATE SHALL BE COLLECTED AND DISCHARGED TO AN INDIRECT DRAIN CONNECTION WITHIN BOILER ROOM.
7. FURNISH WITH MANUAL RESET LOW-WATER CUT-OFF.
8. FURNISH WITH CONDENSATE NEUTRALIZER.
10. PROVIDE WITH 80 PSIG 3/4"x1" SHIPPED LOOSE FOR FIELD INSTALLATION.
11. CONTRACTOR TO INSTALL PAD MOUNT.

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

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541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
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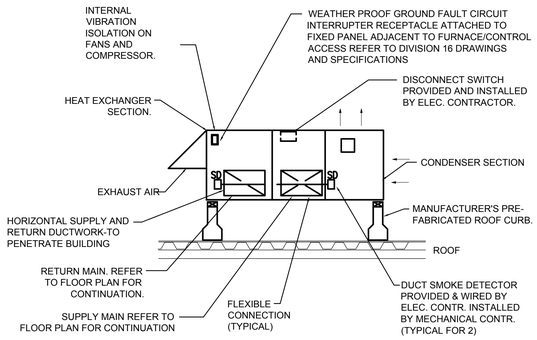
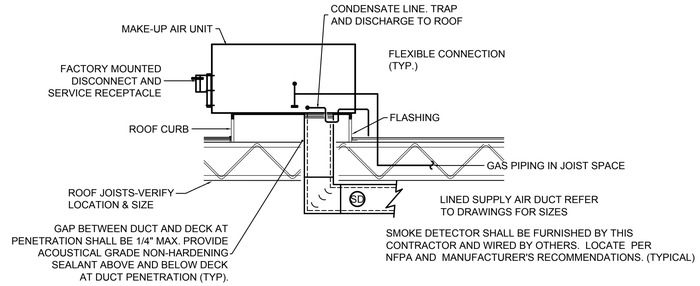
JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M110



ROOFTOP UNIT DETAIL, RTU-1, 3, & 4

NTS



NOTES:

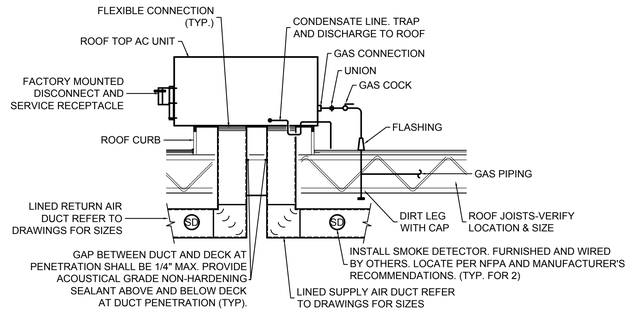
1. INSTALLATION TO BE PER APPROVED ROOFING SYSTEM MANUFACTURER'S REQUIREMENTS.

2. INSTALLATION SHALL BE COORDINATED WITH STRUCTURAL ENGINEER AND ARCHITECT.

3. UNIT SHALL BE SET UPON THE FACTORY ROOF CURB WITH GASKET. STAINLESS STEEL FASTENERS SHALL BE INSTALLED THROUGH THE ROOFTOP UNIT CURB RAIL INTO THE FACTORY ROOF CURB NAILING STRIP AT 12" INTERVALS. ALTERNATIVELY, FACTORY RESTRAINT BRACKETS OR DIRECT BOLTING MAY BE EMPLOYED.

ROOFTOP UNIT DETAIL - HV-5

NTS



NOTES:

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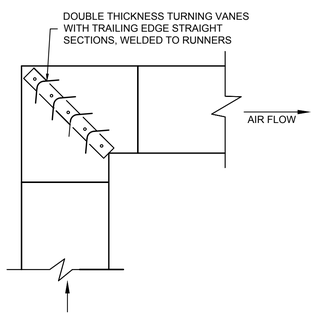
2. INSTALLATION SHALL BE COORDINATED WITH STRUCTURAL ENGINEER AND ARCHITECT.

3. UNIT SHALL BE SET UPON THE FACTORY ROOF CURB WITH GASKET. STAINLESS STEEL FASTENERS SHALL BE INSTALLED THROUGH THE ROOFTOP UNIT CURB RAIL INTO THE FACTORY ROOF CURB NAILING STRIP AT 12" INTERVALS. ALTERNATIVELY, FACTORY RESTRAINT BRACKETS OR DIRECT BOLTING MAY BE EMPLOYED.

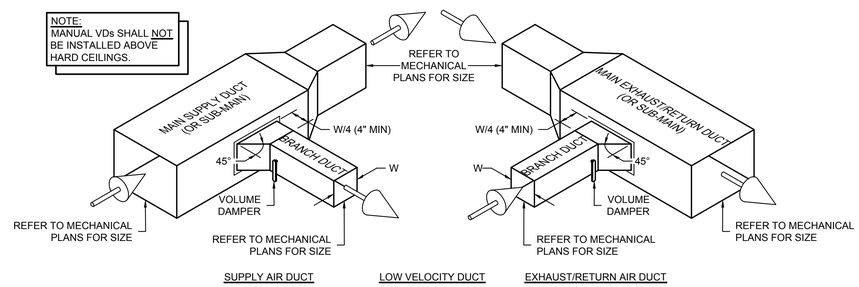
ROOFTOP UNIT DETAIL - HV-2, RTU-3

NTS



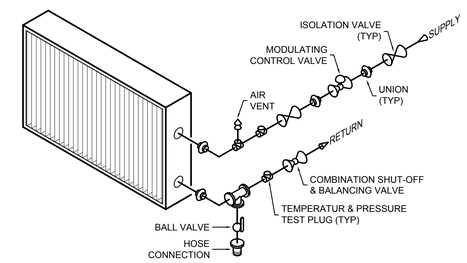
TYPICAL SQUARE ELBOW

NTS



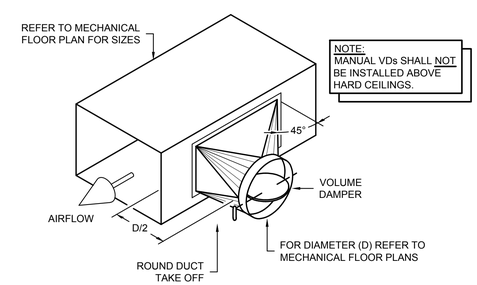
BRANCH DUCT CONNECTIONS

NTS



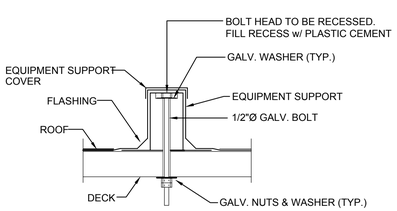
COIL PIPING DETAIL

NO SCALE



ROUND DUCT TAKE OFF DETAIL

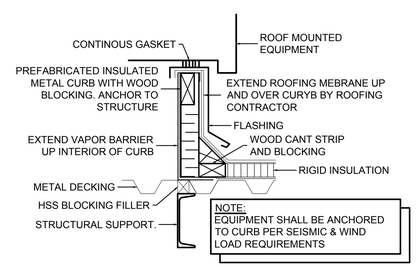
NTS



NOTE:
SLEEPER INSTALLATION TO BE PER APPROVED ROOFING SYSTEM MANUFACTURER'S REQUIREMENTS.

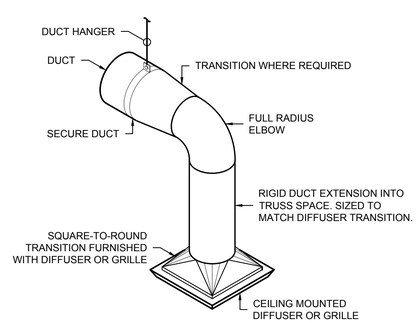
EQUIPMENT SUPPPORT DETAIL

NO SCALE



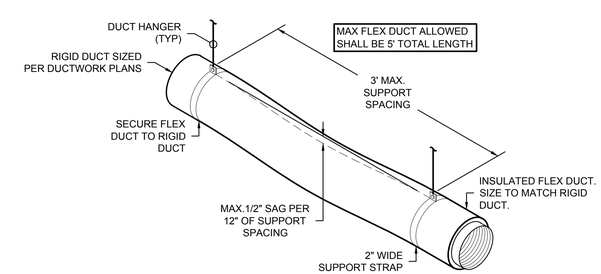
ROOF CURB INSTALLATION DETAIL

NTS



DIFFUSER CONNECTION DETAIL

NTS



FLEX DUCT SUPPORT DETAIL

NTS

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

MECHANICAL DETAILS

JOB NO.: 16096RS

DRAWN BY: MMD

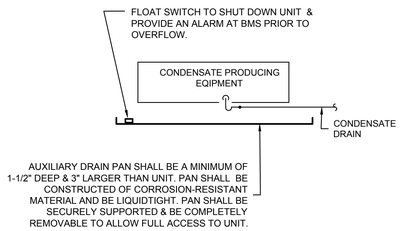
CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

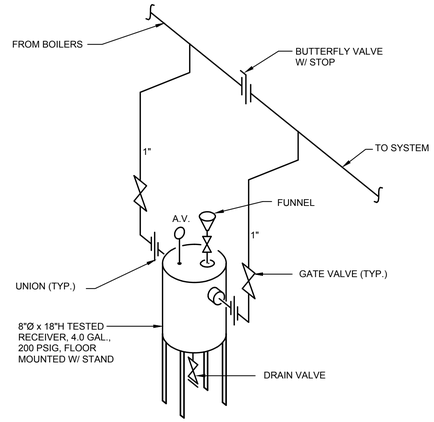
M111



NOTE: CONTRACTOR MAY PROVIDE SECONDARY DRAIN SWITCH TO SHUT DOWN UNIT & PROVIDE AN ALARM PRIOR TO OVERFLOW IN LIEU OF DRAIN PAN & FLOAT SWITCH IF ACCEPTABLE BY LOCAL INSPECTOR.

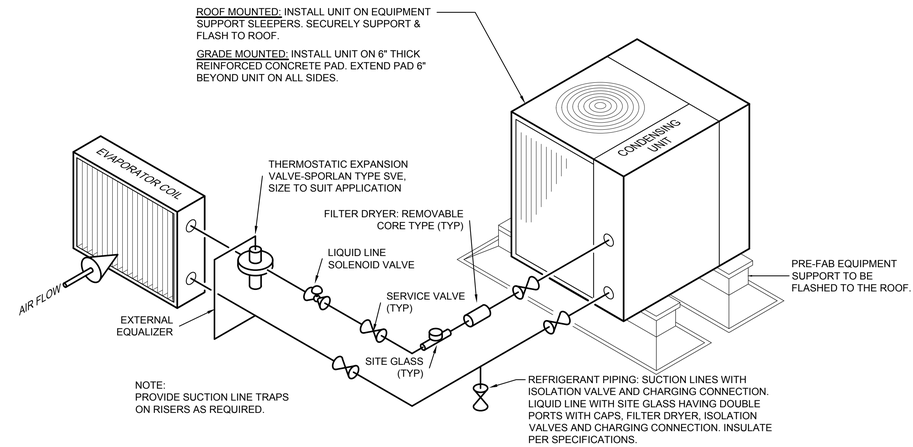
TYPICAL DRAIN PAN WITH FLOAT SWITCH DETAIL

NTS



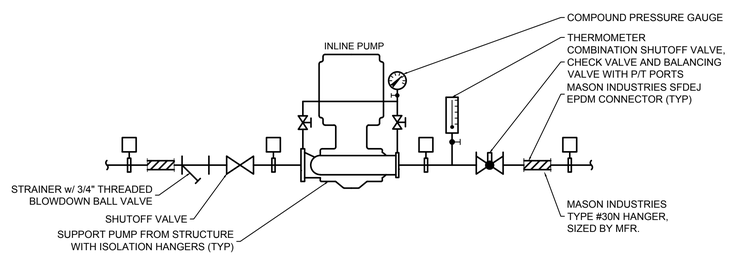
CHEMICAL SHOT FEEDER DETAIL

NTS



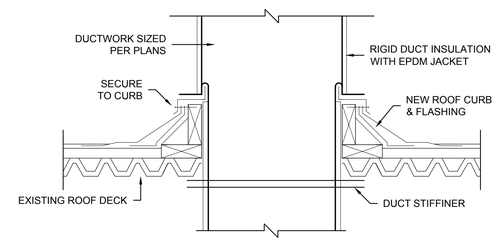
REFRIGERANT PIPING DIAGRAM

NO SCALE



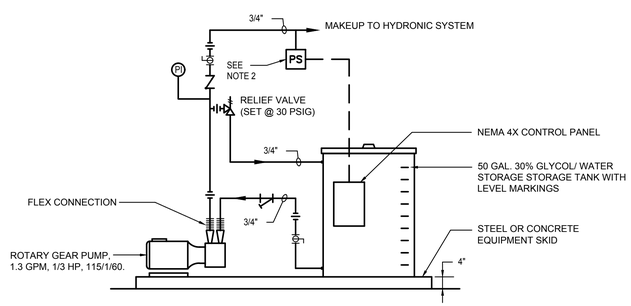
INLINE PUMP DETAIL

NTS



TYPICAL DUCT THRU ROOF PENETRATION DETAIL

SCALE: NONE

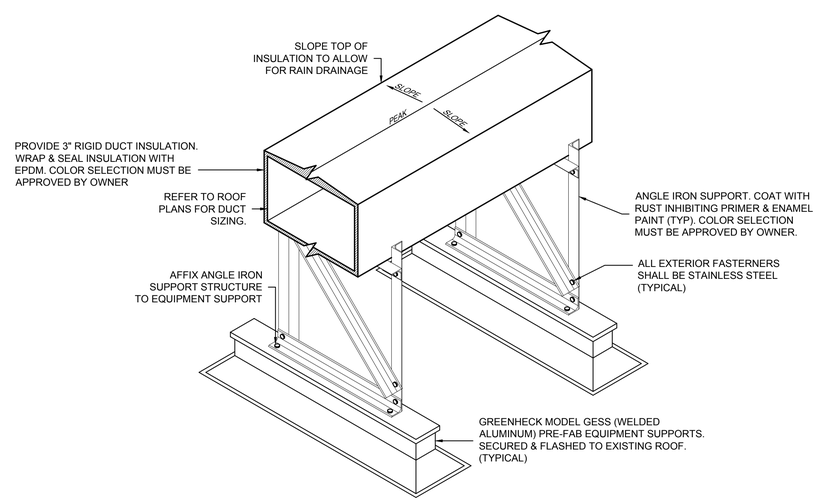


NOTES:

1. FURNISH & INSTALL PACKAGE GLYCOL FEED SYSTEM AS MANUFACTURED BY JOHN WOOD CO., MODEL JW-P-53-100 OR APPROVED EQUAL.
2. SET PRESSURE SWITCH TO OPERATE PUMP WHEN LINE PRESSURE DROPS 2 PSI BELOW SET PRESSURE (COLD SYSTEM).

GLYCOL FEED SYSTEM DETAIL

NTS



NEW EXTERIOR DUCTWORK DETAIL

SCALE: NONE

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED PROFESSIONAL ENGINEER MECHANICAL

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SHEET TITLE:

MECHANICAL DETAILS

JOB NO.: 16096RS

DRAWN BY: MMD

CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

M112

SECTION 15500 - MECHANICAL

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY OF WORK

A. Provide complete functional Heating, Ventilating and Air Conditioning system as shown on Mechanical Construction Documents.

1.3 REFERENCE STANDARDS

A. NFPA Standards

B. ANSI Standards

C. ASME Standards

D. ASTM Standards

E. AWWA Standards

F. ASHRAE Standards

G. SMACNA Standards

H. OSHA Standards

I. NEBB Standards

J. Local Codes and Ordinances

K. Owner's Insurance Company Requirements

L. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the contract documents shall take precedence.

M. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.

1.4 CONTRACT DRAWINGS & SPECIFICATIONS

A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work.

B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.

1.5 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.

1.6 SHOP DRAWINGS AND PRODUCT DATA

A. SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication, or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry, and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor propose to furnish.

B. Submit in accordance with Division 1.

C. It is the intent of the these specifications that all equipment, materials and workmanship used on this project be in complete conformance with all local, state and national codes, ordinances and standards.

D. Substitutions shall be equivalent to specified equipment in all aspects of quality and performance and shall conform to the intent stated above. It is the contractor's responsibility to submit only those items that meet these requirements. Should any non-conforming items be installed, they shall be replaced by the contractor at no additional cost to the owner.

E. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.

F. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, it shall be provided. Contractor to assume cost and entire responsibility thereof.

1.7 INSPECTION AND TESTS

A. During the progress of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction.

B. At completion of the work, Contractor shall submit to the Owner's representative in writing a statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the specification; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test.

C. A final inspection of the installation to determine compliance with the drawing and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. This Contractor shall provide the services of the project foreman for inspection purposes. The foreman shall remove and reinstall access panels, ceiling tiles, etc., as required to facilitate any inspections required by the Owner's representative.

D. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The component parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and the Contractor shall correct tests promptly, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.

1.8 ELECTRICAL EQUIPMENT

A. Electrical components of mechanical equipment and systems, such as motors, factory mounted motor starters, disconnects, and control equipment shall be provided under the related Section of Division 15.

B. Temperature control equipment, including thermostats, zone valves, relays, aquastats, etc. shall be provided under related sections of Division 15. Temperature control wiring not specifically shown on electrical drawings shall be provided under related Section of Division 15.

C. Upon completion of temperature control system wiring, the responsibility of the control system will fall under Division 15

D. All electrical equipment installed in concealed spaces shall be provided with a hard-wired electrical connection. Plug-type disconnects shall not be allowed in concealed spaces. Equipment provided with plug-in cords shall not have their cords modified.

1.9 OPENINGS IN EXTERIOR WALLS OR ROOF

A. Openings in exterior walls or roof shall be kept properly plugged and caulked at all times, except when being worked on to preclude the possibility of flooding due to storm or other causes. After completion of work, openings shall be permanently sealed and caulked in a manner approved by the Architect.

1.10 GUARANTEE

A. Except as otherwise specified, all work, materials and equipment shall be guaranteed against defects resulting from the use of inferior materials, equipment, or workmanship for one year from the date of final completion of the contract, or from full acceptance by the Owner, whichever is earlier.

B. If, within any guarantee period, repairs or changes to guaranteed work are required as a result of the use of defective materials or equipment, inferior workmanship or work that is not in accordance with the terms of the contract, and upon receipt of notice from the Owner, the following shall be done without expense to the Owner.

C. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects therein.

D. Repair all damage to the building or site/equipment or contents thereof which is the result of the use of defective materials or equipment or inferior workmanship, or of work not in accordance with the terms of the contract.

E. Make good any work or materials, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.

F. In fulfilling the requirements of the contract or of any guarantee embraced in or required thereby, any work guaranteed under another contract is disturbed, restore such disturbed work to original condition and guarantee such restored work to the same extent as it was guaranteed under such other contract.

G. If upon failure to proceed promptly after notice to comply with the terms of the guarantee, the Owner may have the defects corrected and Contractor and his surety shall be liable for all expenses incurred.

H. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities, which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.

1.11 CLEANING OF SYSTEM

A. Thoroughly clean piping, ducts, fixtures and equipment of all foreign substances inside and out before placing in operation. All air handling equipment shall be provided with "construction filters" for use during construction. Once construction is substantially complete and prior to final testing adjusting and balancing, furnish and install new filters for each piece of equipment.

B. If any foreign matter should stop any part of a system after being placed in operation, clean and reconnect system.

C. Remove all covers of interior floor drains and cleanouts, clean of all dirt, concrete traces, etc., then lightly grease and reinstall.

D. Existing HVAC systems which are being tied into or otherwise modified shall be thoroughly cleaned and refurbished prior to being placed back in service.

1. Duct Systems shall be cleaned of all foreign contaminants, dust and debris.
2. Hydronic Systems shall be fully flushed, cleaned, refilled and treated.
3. During contractor shall bring to the attention of the owner and engineer any perceived deficiencies in existing systems including but not limited to:
   a) Code deficiencies
   b) Inoperable equipment
   c) Leaking ductwork and/or piping
   d) Missing or deteriorating insulation
   e) Excessive noise

1.12 TEMPORARY OPENINGS

A. Coordinate construction and provide temporary openings in the building as required for the admission of equipment furnished under this Division.

1.13 DEFINITIONS

A. "Piping" includes, in addition to pipe, all fittings, valves, hangers, and other accessories relating to such piping.

B. "Concealed" means hidden from sight in trenches, chases, furred spaces, shafts, hung ceilings, embedded in construction or in crawl spaces.

C. "Exposed" means not installed underground or "concealed" as defined above.

D. "Provide" means furnish and install complete and ready to operate.

1.14 EQUIPMENT DEVIATIONS

A. Where proposals to use an item of equipment other than that specified which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Architect at the Contractor's expense.

B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

1.15 ELECTRICAL ROOM REQUIREMENTS

A. Do not install any piping, ductwork or equipment in or through electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms, unless piping or ductwork of equipment is intended to serve these rooms. Additionally, no ductwork or piping will be installed above electric panels. If the Contractor violates this requirement, he shall remove and/or relocate all items as required at his expense and to the satisfaction of the Architect.

1.16 COOPERATION WITH OTHER TRADES

A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Coordination drawings shall be initiated by this contractor. It this contractor's responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section 15500 of the Specifications. These drawings shall be prepared at not less than 1/4 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 15300, 15400 and 16000, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After each Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, and appropriate revisions made, each trade shall sign each drawing, indicating acceptance of the installation. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.

C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

1.17 PROJECT RECORD DOCUMENTS:

A. Each Contractor shall record clearly, neatly, accurately, and promptly as work progresses the following data:

1. Changes made resulting from change orders or instructions issued by the Architect.
2. Changes in routing made to avoid conflict with other trades or structural conditions.
3. Final location of equipment and panels if different than contract documents.

B. Upon completion of the project submit to the Architect a set of electronic media noting "as built" conditions indicating all variations and deviations of his work from contract documents.

1.18 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price.

B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders, indexed, containing the following:

1. Complete shop drawings of all material and equipment of this section.
2. Operation descriptions of all systems.
3. Names, addresses and telephone numbers of all suppliers of system components.
4. Preventative maintenance instructions for all systems.
5. Spare parts list of all system components.
6. Copies of all valve charts.

1.19 PROTECTION

A. Protect all work and material from damage by work and workmen, and accept liability for all damage thus caused.

B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

C. All openings in stored & installed ductwork shall be covered & sealed when not in use to prevent contamination from dust & debris.

1.20 SCAFFOLDING, RIGGING AND HOISTING

A. Provide scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of material, equipment and apparatus furnished under this division. Remove same from premises upon completion of work.

1.21 MATERIALS AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.

B. Furnish the services of an experienced foreman who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welder, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate, and test each system.

1.22 QUIET OPERATION AND VIBRATION

A. Work shall operate under all conditions of load without any objectionable sound or vibration. In case of moving machinery, sound, or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable shall be corrected in an approved manner at no expense to the Owner. Vibration control shall be means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.

1.23 ACCESSIBILITY

A. Assure and be responsible for the adequacy of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work. Cooperate with all other trades whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.

B. Locate all equipment, which must be serviced, operated, adjusted or maintained fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, filters, dampers, starters, coils, fire dampers, smoke dampers and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility, and the engineer shall approve any change.

C. Provide access panels for installation in concrete block walls or gypsum wallboard ceilings and partitions in locations, which require access for service to the items located behind the permanent gypsum wallboard or concrete block finish.

D. Access panels shall be installed where required to gain access to valves, dampers, controls, etc. Panels shall be flush, insulated, contain continuous steel hinge and screwdriver operated latch. Panels shall be rated equal to the assembly that they are being installed in panels shall be UL listed.

E. Access panels located in fire rated partitions shall be fire panels. The frame and panel assembly of these fire panels shall be manufactured under the Factory Inspection Service of the Underwriters' Laboratories, Inc., and shall bear a label reading: "Frame and Fire Panel Assembly, Rating 2 hours. (B) Temperature Rise 30 Minutes, 250° F. Maximum." Rated panels shall be equipped with automatic closing mechanism and be self-latching.

F. Panels shall be provided with screwdriver operated flush cam locks.

G. Panel size shall be 12 inches x 12 inches except furnish a larger size if required to service a particular item. The exact location and size of each access panel shall be reviewed with, and approved by, the Engineer.

1.24 CUTTING AND PATCHING

A. Provide all cutting and patching necessary to install the work specified in this division. Patching shall match adjacent surfaces.

B. At floor slabs & wall openings to be cored drilled or cut, contractor shall find and mark on both faces all reinforcing, rebar, conduits, utilities, etc.. by means of x-ray, pach-ometer or prof-ometer. Submit sketch showing locations of all findings and proposed cuts or cores for review.

C. No structural members shall be cut without the approval of the Structural Engineer, and all such cutting shall be accomplished in a manner directed by the Structural Engineer.

1.25 GROUNDING

A. All components of mechanical piping systems shall be properly grounded to building ground. Where ground path is interrupted by non-conductive materials, appropriate bonding or grounding to building ground shall be provided.

1.26 WATERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Architect before work is started. Furnish all necessary sleeves required.

1.27 DEMOLITION

A. Prior to submitting bid, visit site and identify existing conditions and difficulties that will affect work of this section. Demolition work will require careful site examination prior to bidding. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers.

B. Prior to commencing demolition, contractor shall identify with owner any equipment to be returned to the owner after demolition. All other debris shall be disposed of by this contractor in accordance with all applicable regulations. Any shutdowns required for demolition shall be coordinated with building owner to avoid impact to operations.

C. During demolition, any equipment found to be abandoned shall be demolished. Existing unused connections to existing ducts or piping shall be capped accordingly.

D. Under demolition, the following is, in brief, the extent of the work to be performed by the mechanical contractor under this contract.

1. The mechanical contractor shall be responsible for the disconnection and removal of the existing mechanical equipment, ductwork, piping, valves, etc.,in designated areas. Cut & cap piping and ductwork back to mains. Patch all roof and wall penetrations to match existing.
2. This contractor shall protect work against injury or damage; and carefully store material and equipment to be relocated. Open ends of work shall be closed with temporary covers or plugs during storage and construction to prevent entry of obstructing material.
3. All existing HVAC components, including but not limited to ductwork, piping, equipment, controls & accessories, shall be removed from the area of renovation.
4. Coordinate all demolition with other trades to ensure all relevant portions of the system including associated electrical and plumbing components are removed.
5. Refer to drawing plans and notes for additional information.

1.28 REBATES

A. The contractor shall make the owner aware of all applicable "upstream" energy rebates available for this project.

B. The contractor shall provide the owner all necessary information and documentation for completion and submission of energy rebate applications.

PART 2: PRODUCTS

2.1 IDENTIFICATION, MARKING AND TAGGING

A. Systems and equipment to be identified and marked and valves tagged include, but are not limited to the Heating, Air Conditioning & Ventilating systems.

B. Submit samples of marking and tagging devices and wording, lettering and numbering scheme for each system.

C. Equipment Identification:

1. Manufacturer's nameplates or trademark shall be permanently affixed to all equipment and materials furnished under this division. Manufacturer's nameplates shall include all pertinent data relative to the piece of equipment including model number, serial number, and operating characteristics as applicable.
2. Separate Equipment Identification Markers shall identify each item of equipment with a permanently attached marker indicating designation and/or number corresponding to design documents.
3. Markers shall be of rigid black Bakelite or phenolic construction with white engraved or incised letters.
4. Lettering on equipment markers shall be of adequate size to be legible from floor levels. In all cases marker lettering shall no be less than 1 inch high.

D. Piping System Identification:

1. Piping Systems shall be identified as indicated herein or as required by applicable codes and/or officials having jurisdiction.
2. Pipe Markers shall be color coded according to " Designations to Colors" - ASME A13.1-2007.
3. All piping and equipment shall be identified by pipe markings, which shall be provided by this Contractor. Markers shall be applied every 20 ft. Markings shall indicate pipe content, system, operating pressure & temperature, and direction of flow. The markers shall be as manufactured by Seton Name Plate Corp. or equal
4. Pipe Markers shall be of the pressure sensitive type as manufactured by the Seton Nameplate Corp. (F10-Code)
5. Valve Identification: Provide laminated plastic nameplates on all valves installed under Division 15, except stop valves in supplies to fixtures. Tags shall be constructed of 0.125 inches thick melamine plastic conforming to Fed. Spec. L-P-387. Surface shall be matte finish. Accurately align lettering and engrave into white core. Nameplates shall be to 2 inches round or hexagonal. Lettering shall be minimum of 0.375 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame one chart and schedule for each system under glass and place where directed in mechanical room. Furnish four copies of each chart and schedule. Each inscription shall identify its function. Attach nameplates with "S" hooks and chain to each valve. Valve nameplates shall be numbered and "keyed".

2.2 SLEEVES, INSERTS AND ESCUTCHEONS

A. Provide sleeves for all work passing through floor, wall, and ceiling construction. Locate and provide sleeves and inserts before the floor, wall or ceiling is constructed. If this contractor does not comply with the above, he shall bear all costs incurred for cutting and patching required for the installation of sleeves and inserts. Holes required for sleeves in existing walls and floors, or to conform to the above shall be saw cut or core drilled. This Contractor shall provide all drilling required for the installation of hangers.

B. Pipe sleeves through outside walls shall be Schedule 80 black steel pipe with 150 lb. black steel slip-on welded flanges welded at the center of the outside. Extend sleeves 1/2 inch beyond each side of the wall. Pack the space between sleeve and pipe with oakum to within 2 inches of each face of the wall. Pack the remaining space and make watertight with an approved waterproof compound.

C. Pipe sleeves through concrete floors or interior masonry walls shall be Schedule 40 black steel pipe, set flush with finished wall or ceiling surfaces, but extending 2 inches above finished floors. Plastic, PVC, or light metal sleeves shall not be installed.

D. Provide individual or strip type inserts pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4-inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods to 1/2 inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooded ends to allow fastening to reinforcing rods.

E. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the pipe and the insulation. Check floor and wall construction finishes to determine proper length of sleeves for various locations.

F. Provide 22 gauge galvanized steel duct sleeves through interior walls, floors and ceilings set flush with finished surfaces.

G. Pack the space between sleeves and structure, and sleeves and pipes or ducts passing through fire rated interior walls, floors, and ceilings with an approved fire and smoke proof packing material. Fire-stopping material shall maintain its dimensions and integrity while preventing the passage of flame, smoke, and gases under conditions of installation and user when exposed to the ASTM E119 time-temperature curve for a time period equivalent to the rating of the assembly penetrated. Cotton waste shall not ignite when placed in contact with the non-fire side during the test. Fire-stopping material shall be non-combustible as defined by ASTM E136; and in addition, for insulation materials, melt point shall be a minimum of 1700 degrees F. for 1-hour protection and 1850 degrees F. for 2-hour protection.

H. Fasten sleeves securely in floors, walls, etc. so that they will not become displaced when concrete is poured or when construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.

I. In all areas where ducts are exposed and pass through floors, the hole shall be surrounded by a 4-inch high by 3-inch wide concrete curb, or otherwise protected as determined by the Engineer.

J. Escutcheon plates shall be provided for all exposed un-insulated pipes passing through walls, floors, and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe. Where plates are provided for pipes passing through sleeves, which extend above the floor surface, provide deep recessed plates to conceal pipe sleeves.

2.3 SUPPORTS & ATTACHMENTS

A. Provide all necessary supports and bases required for all equipment, piping and for all other equipment furnished under this contract. Submit shop drawings to the Architect for approval before purchase, fabrication or construction of same.

B. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are not strong enough shall be replaced as directed.

C. Vibration Isolation: All mechanical equipment, piping and ductwork shall be mounted on vibration isolators/inertia bases to prevent the transmission of vibration and mechanically transmitted sound to the building structure.

1. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

2.4 SEISMIC RESTRAINTS

A. It is the intent of this seismic specification to keep all mechanical building system components in place during a seismic event.

B. All mechanical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.

C. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer's review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.

D. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

2.5 ELECTRIC MOTORS/STARTERS

A. Electric motors and starters shall conform to requirements of the AIEE, NEMA, UL, and NEC and shall be suitable for load duty, voltage, phase, frequency, service and location required. Provide inverter duty rated motors for use with variable frequency drives. Provide shaft grounding rings for all VFD controlled motors.

B. All motors shall be rated at 85% power factor at full rated load. Motors less than 85% power factor shall be corrected to 90% power factor at the factory. All motors shall be rated high efficiency.

C. Starters shall be Cerus International or equal.

1. Enclosed Non-Combination Starter
   a) Motor Starter shall be enclosed in a Type 1 or Type 4 UL rated enclosure.
   b) Motor Starter shall be rated for NEMA class B motors for AC-3 switching and AC-4 switching.
   c) Controls and annunciation shall include Hand- OFF- Auto keypad. LED indication shall include Hand, Off, Auto, Run and Overload. Overload reset shall be available.
   d) Control inputs shall include: Auto Wet input, Auto Dry input, Permissive Auto input, Damper Status Input and Override Input. Automatic control inputs shall be capable of accepting a transistorized input without the need for interposing relays. Wet control inputs shall accept AC or DC inputs from 10 to 138VACor DC.
   e) Damper control shall be built into the starter to provide 24VAC or 120VAC damper control and monitoring.
   f) Override input shall disable the starter from operating in either Hand or Auto mode.
   g) Protective Functions
      (i) Electronic Overload shall provide phase failure and phase loss protection, stall, and class 1 - 30 selectable overload protection. Phase failure protection shall initiate when phase loss is greater than 70% for 3 seconds or phase unbalance is greater than 50% for more than 5 seconds.
      (ii) Cycling fault protection shall be integral to the starter. Cycling fault shall be enabled whenever the starter is cycled more than 1000 times in a one hour period. This feature shall be selectable to be disabled. Cycling fault shall cause overload LED to blink rapidly.
2. Enclosed Combination Starter
   a) Enclosed combination starter shall include all of the above descriptions in addition to either a motor circuit protector with lock-out mechanism, a UL 508 breaker, or a fused disconnect with lock-out mechanism.
   b) The Motor Circuit protector shall be a UL listed 508 manual motor starter with magnetic trip elements only. The breaker and shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides an interrupting rating for the breaker and contactor combination.
   c) Fused disconnect shall be UL 98 suitable for service entrance protection.
   d) UL 508 breaker shall include thermal and magnetic trip mechanisms.

D. Disconnects provided by this contractor will be installed by Division 16, with the exception of factory mounted disconnects.

E. Motors smaller than 1/2 HP shall be capacitor-start or split phase type, single phase, 60-hertz alternating current for voltage required. Motors 1/2 HP and larger shall be squirrel-cage induction three phase 60 hertz alternating current for voltage required, unless specifically noted otherwise.

F. Where available, starters and disconnects shall be factory mounted by the unit manufacturer.

2.6 USE OF INSTALLATION

A. The Owners shall have the privilege of using any part of the installation when sufficiently complete, but such use thereof, or partial or final payment shall not be considered as an acceptance of such work in lieu of a written certificate from the Engineer.

2.7 DUCTWORK

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, supports and sealing for operating pressures indicated.

B. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90.

1. Sealant: As recommended by manufacturer specifically for sealing joints and seams in ductwork.
2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
3. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

C. Round Exposed Ductwork: Provide a complete double wall, spiral wound, round ductwork system as designed on the drawings with all necessary fittings, hangers, supports, turning vanes, and all other appurtenances for the installation of an operable system. All ductwork and fittings shall be galvanized sheet metal in accordance with ASTM-A527 specifications. Ductwork shall be of round spiral lockseam construction.

D. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

E. Flexible Ductwork: Duct shall be Flexmaster Type 4 Insulated Duct as manufactured by Buckley Associates or approved equal.

1. Flexible duct (insulated) shall be Underwriters Laboratory Listed (UL 181 Class I Connector) and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.
2. Duct fabric shall be of a smooth airtight polymer film mechanically locked to the outside helix. (Use of adhesives to lock to fabric in place is unacceptable.) The helix is constructed of corrosive resistant galvanized steel, formed and mechanically locked to the duct fabric on the outside to prevent tearing of the flexible duct.
3. Insulated flex shall have a fire retardant polyethylene outer jacket with a 1/2 lb. density, 1-1/2" thick fiberglass insulation blanket, factory wrapped.
4. The flexible duct shall be supported as required to prevent sagging. Flexible duct with excessive sagging will not be approved.
5. Flexible ductwork shall be rated at 6" positive pressure and 10" negative pressure for sizes up to 12". Negative pressure for 14" to 16" shall be 5". Negative pressure for 18" shall be 1".
6. Length of installed flexible duct shall not exceed 6'-0" in developed length.

F. Flexible Connections

1. Flexible connections shall be provided where a fan connects to a duct or casings to prevent transmission of vibration to ductwork.
2. Flexible connections shall fit tightly around ducts and fans and be securely bolted or clamped in place. Taping shall not be allowed.
3. Flexible duct connections shall be 6" long and made of straight, waterproof, flame retardant fabric having a flame spread rating of not over 25 and a smoke development rating of not over 50

G. Locker Room Ducts: Aluminum ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061- T6 or of equivalent strength. All joints and seams shall be sealed watertight with waterproof silicone duct sealant.

H. Existing Ductwork: Any existing ductwork within the area of work or connected to systems within the area of work shall be professionally cleaned by a experienced certified duct cleaning company. Contractor shall submit before/after photographs of each duct system cleaned.

I. Fire Dampers:

1. Provide fire dampers throughout air distribution system as required by applicable codes, standards and authorities. Provide access door for each fire damper of sufficient size to repair internal link. Fire dampers indicated on drawings may not fully represent the exact number required for this project. It is the Contractor's responsibility, at no additional cost to the Owner, to provide all required dampers.
2. Dampers shall be approved fusible-link self-closing spring loaded type, Buckley Model 150B or equal.
3. Dampers shall be dynamic type when serving a system that is not shut down during fire alarm activation.
4. Frame shall be fitted with angle iron stop and stainless steel spring latch, and shall be securely fastened to building construction.
5. Seal spaces between damper frames and walls and between damper frames and floor with approved fire-retardant material.
6. Use of dampers shall NOT reduce net free area of duct below that shown on drawings. Fire dampers shall be Type B with blades of dampers out of air stream.
7. Samples of fire dampers shall be submitted to and approved by local authorities having jurisdiction.
8. Dampers shall bear 1-1/2 hour UL-rating fire damper label and shall be constructed and installed as required by UL-555.
9. Fire dampers shall be Buckley, Ruskin, Nailor Industries or Prefco for use in the proper duct pressure classification.
10. Dampers shall be installed per SMACNA with breakaway connections and nose pieces on duct liner (see SMACNA HVAC Duct Construction Standards).
11. All dampers in ductwork served by equipment not subject to fan shut down upon fire alarm activation shall be dynamic type.

J. Volume Dampers:

1. Provide Young Regulator manual adjustable rectangular opposed blade dampers for duct heights less than 12" with factory-installed locking hand quadrants extended 2" for all dampers installed in externally insulated duct:

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

SPECIFICATIONS

JOB NO.: 16096RS

DRAWN BY: MMD

CHECKED BY: RD

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

M113

a) On each supply, return and general duct take-off.

b) At each take-off to register, grille or diffuser (not all are shown on drawing).

2. Dampers are manufactured approximately 5/16" smaller in width and 1/8" smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24" x 10"; actual size is approximately 23-11/16" x 9-7/8".
3. Damper frame shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of .050". Opposed damper blades shall be #6063 extruded aluminum with minimum thickness of .050" and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle bearings, and shall be driven by stainless steel connecting slide linkage controlled by 3/8" square steel control shaft.
4. Note: All required volume dampers may not be indicated on drawings but dampers shall be provided as necessary for systems balancing.
5. Dampers 12" and larger in height shall be opposed multi-blade equal to Greenheck, Nailor or Vent Products.
6. Where dampers are inaccessible, use Young Rectangular locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8" rod between ceiling regulator and damper shall be provided by Contractor.
7. Where dampers are to be located above hard ceilings Young Regulator Bowden Cable Control Dampers shall be utilized. Controllers (actuators) shall be of the concealed ceiling type. Controller type, finish & locations to be approved by architect prior to purchase & installation. The cable between the damper and controller shall be provided by the contractor.
8. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.
9. Brackets shall be galvanized metal, secured to ductwork with sheetmetal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2" handle extension for all dampers on externally insulated ductwork.
10. Note: All required volume dampers may not be indicated on Drawings but dampers shall be provided as necessary for system balancing.

2.8 DUCT INSULATION

A. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes.

B. Concealed supply & return ducts for heating, cooling and air intakes:

1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.
   a) Interior Concealed/Tempered: R-Value of 8.0 installed.
   b) Interior Ventilated/Untempered: R-Value of 12.0 installed.
2. Vapor Barrier Jacket:
   a) Kraft paper with glass fiber yarn and bonded to aluminized film.
      (i) Moisture vapor transmission: ASTM E96; 0.02 perms.
      (ii) Secure with pressure sensitive tape.
3. Vapor Barrier Tape:
   a) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

C. Exterior Ductwork

1. Material: Insulate with R-Value of 12.0 installed.
2. Jacket: Insulation jacket may be integral or field applied and shall be reflective, watertight and listed for this usage.
3. Install per latest installation instructions from the manufacturer.

D. All duct insulation & wrap shall be installed per the manufacturer's application instructions. Provide mechanical fasteners to the bottom of ducts as required by the manufacturer.

2.9 INTERIOR DUCT LINER

A. Polymer Foam insulation (EPFI) equal to IMCOA "IMCOSHEET" Engineered Polymer Foam Insulation, 1 inch thick, R = 4.0, closed cell. Insulation shall be installed as required by the insulation manufacturer. Insulation shall be in compliance with NFPA 90 and 90B. Flame spread shall be less than 25 and smoke density less than 50 per ASTM E-84, NFPA 255, UL 723 Class I and UL 181.

B. Duct lining shall be applied in the following locations:

1. 20' upstream and downstream from all air handling units exceeding 10 tons.
2. 10' upstream and downstream from all air handling unit of 10 tons or less.
3. 5' downstream from all other fan powered units including, but not limited to, fan powered VAV boxes.

C. Areas provided with interior duct lining shall also be provided with exterior duct insulation as indicated by these specifications.

2.10 PIPING

A. Hydronic Piping

1. Steel Pipe: ASTM A53, Schedule 40, black.
   a) Fittings: ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings or Victaulic ductile iron ASTM A536/395.
   b) Joints: Threaded, or AWS D1.1,welded or Victaulic grooved joints.
2. Copper Tubing: ASTM B88, Type L, hard drawn.
   a) Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
   b) Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
   c) Joints: Solder, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F or Victaulic grooved joints.

B. Equipment Drains and Overflows

1. Copper Tubing: ASTM B88, Type L, hard drawn.
   a) Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
   b) Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F (220 to 280 degrees C) or Victaulic grooved joints.
2. PVC Pipe: ASTM D1785, Schedule 40 and Schedule 80 for sizes 8 inch (200 mm) and larger or ASTM D2241, SDR 21 or 26.
   a) Fittings: ASTM D2466 or D2467, PVC.
   b) Joints: ASTM D2855, solvent weld.

C. Unions, Flanges and Couplings

1. Unions for Pipe 2 Inches (50 mm) and Under:
   a) Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
   b) Copper Pipe: Bronze, soldered joints.
2. Flanges for Pipe Over 2 Inches (50 mm):
   a) Ferrous Piping: 150 psig (1034 kPa) forged steel, slip-on.
   b) Copper Piping: Bronze.
   c) Gaskets: 1/16 inch (1.6 mm) thick preformed neoprene.
   d) Flexible: : Use in locations where vibration attenuation and stress relief are required. Style 177/77/W77.
   e) Gaskets: Grade EHP EPDM rated for -30F to 250F for 8" and smaller and Grade E EPDM rated for -30F to 230F for 10" and larger.
3. Provide di-electric fittings waterways wherever copper pipe meets steel pipe or other dissimilar metals.

D. Refrigerant Piping Copper Tubing: ASTM B280, Type ACR hard drawn.

1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.
3. Provide all valves and accessories required for complete installation.

E. Plenum Return Applications

1. Where piping is installed in a return air plenum piping shall be plenum rated.
2. PVC and/or PEX piping shall not be allowed in return air plenums.

2.11 VALVES

A. Valve Features

1. General Comply with ASME B31.9 for building services piping, and ASME
2. Valve Design; Valves shall have rising stem, or rising outside screw and yoke stems; except, non-rising stem valves may be used where headroom prevents full extension of rising stems.
3. Pressure and Temperature Ratings As scheduled and required to suit system pressures and temperatures.
4. Sizes unless otherwise indicated, provide valves of same size as upstream pipe size.
5. Operators Provide the following special operator features:
   a) Hand wheels fastened to valve stem, for valves other than quarter turn, by brass nut on a square-topped stem.
   b) Lever handles on quarter-turn valves 6 inch and smaller, except for plug valves. Provide one wrench for every 10-plug valves, and a one years supply of recommended lubricant or sealant.
6. Extended Stems where insulation is indicated or specified, provide extended stems arranged to receive insulation.
7. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
8. End Connections: As specified in the individual valves specifications.
9. Threads Comply with ANSI B2.1.
10. Flanges Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
11. Solder-Joints Comply with ANSI B16.18.
12. Caution: Where soldered end connections are used, use solders having a melting point below 840 degrees. F for gate, globe, and check valves; below 421 degrees. F for ball valves.

B. Gate Valves

1. Gate Valves - 2 Inch and Smaller MSS SP-80; Class 150, body and bonnet of ASTM B 62 cast bronze, threaded or solder ends, solid disc, gland packed, N.A. packing.
2. Gate Valves - 2-1/2 Inch and Larger MSS SP-70; Class 125 cast iron bodies conforming to ASTM A 126 (Body and Bonnet). Bronze trim, flanged ends, N.A. packing.

C. Ball Valves

1. Ball Valves - 1 Inch and Smaller Rated for 150 psi saturated steam pressure, 600 psi WOG pressure; 2-piece construction, bronze body conforming to ASTM B 62, standard (or regular) port, stainless steel ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Threaded ends for heating hot water and low-pressure steam.
2. Ball Valves - 1-1/4 Inch to 2 Inch Rated for 150 psi saturated steam pressure, 600 psi WOG pressure; 3-piece construction, bronze body conforming to ASTM B 62, conventional port, stainless steel ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Threaded ends for heating hot water and low-pressure steam.

D. Plug Valves

1. Plug Valves - 2 Inch and Smaller 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.
2. Plug Valves - 2-1/2 Inch and Larger MSS SP-78; 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends

E. Globe Valves

1. Globe Valves - 2 Inch and Smaller MSS SP-80; Class 150, body and union bonnet of ASTM B 62 bronze, gland packed, N.A. packing. Bronze trim, composition disc.
2. Globe Valves - 2-1/2 Inch and Larger MSS SP-85; Class 125 body, bronze trim, with body and bonnet conforming to ASTM A 126, Class B; cast iron, flanged ends, with N.A. packing.

F. Butterfly Valves

1. Butterfly Valves - 2 Inch and smaller MSS SP-67; 200 psi, cast bronze body, Viton seals, full port design, stainless steel trim, threaded or solder ends.
2. Butterfly Valves - 2-1/2 Inch and larger MSS SP-67; 200 CWP, conforming to ASTM A 126, Class B cast iron, EPDM cartridge liner, A1.Bronze disc, 416 s.s. Stem. Sizes up to 6 inches shall have lever operators with locks, and sizes 8 and above shall have gear operators with position indicator. Valves on dead end service or requiring additional body strength shall be lug-wafer type, drilled and tapped.

G. Check Valves

1. Swing Check Valves - 2 Inch and Smaller MSS SP-80; Class 150 or 200, cast bronze body and cap conforming to ASTM B 62, horizontal swing, with a Teflon disc, and having threaded ends. Valve shall be capable of being repaired while the valve remains in the line.
2. Swing Check Valves - 2-1/2 Inch and Larger MSS SP-71; Class 125, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, with a bronze disc or cast iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitted while the valve remains in the line.
3. Wafer Check Valves - (Non-Slam) Class 250, cast iron body, replaceable lapped bronze seat, lapped and balanced twin bronze flappers and stainless steel trim. Valve shall be designed to open and close at approximately one-foot differential pressure. Twin flappers shall be loaded with a stainless steel torsion spring to minimize flapper drag and assure even non-slam checking action.
4. Lift Check Valves - 2 Inch and Smaller Class 125, cast bronze body and cap conforming to ASTM B 62, horizontal, lift type valve, bronze disc and threaded ends. Valve shall be capable of being refitted and ground while the valve remains in the line.

H. Combination Balancing & Shutoff Valves:

1. 2" and Smaller Sizes: 300 psi, threaded or sweat ends, non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 786/787 or Engineer Approved Equal .
2. 2-1/2" and Larger Sizes: 300 psi, flanged or grooved ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM O-ring seals. 8, 12 or 16 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 788/789 or Engineer Approved Equal
3. Koil-Kit™ Components: Install Series 78U union port fitting and Series 78Ystrainer/ball valve combination to complete terminal hook-up at coil outlet

I. Balancing Valves

1. Balancing valves shall be provided on all piping mains and takeoffs as required to balance the system to the flows indicated on the drawings and in the equipment schedules.
2. Balancing valves shall be sized such that the specified flow through the valve generates an input to the flow measurement device that is within the range of accuracy of the device. Oversized valves that generate inputs that are below the range of the device and undersized valves that result in excessive pressure loss are not acceptable. Balancing valve submittals shall indicate size, flow and valve characteristics.

2.12 PIPING ACCESSORIES

A. Dielectric Unions: Unions comprising steel female pipe thread end and copper solder-joint end conforming to dimensional, strength and pressure requirements of Fed. Spec. WW-U-531, Class 1. Steel parts shall be galvanized or plated. Union shall have water-impervious insulation barrier capable of limiting galvanic current to 1% of the short-circuit current in a corresponding bimetallic joint. When dry, it shall also be able to withstand a 600-volt breakdown test.

1. Dielectric Waterways: Electroplated steel or ductile-iron nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig maximum working pressure at 230 deg F. Victaulic Style 47.

B. Strainers: Single basket type, with inlet and outlet on the same center line. Cast steel or fabricated steel body, mesh 300-series stainless- steel baskets. Open area of one basket shall be 2-1/2 times inlet or outlet piping area. Furnish on spare basket.

C. Sleeves: Provide where piping passes through masonry or concrete walls, floors, roofs and partitions. Sleeves shall be placed during construction. Sleeves in outside walls below and above grade, in floor, or in roof slabs, shall be standard weight zinc coated steel pipe. Sleeves in partitions shall be zinc coated sheet steel having a nominal weight of not less than 0.90 pound per square foot. Space between piping and the sleeve shall be not less than 0.25 inch. Sleeves shall be of sufficient length to pass through entire thickness of walls, partitions or slabs.

D. Expansion Joints:

1. Install Victaulic in-line expansion joints in grooved end steel piping systems that are installed in enclosures where pipe bends or loops cannot be applied.
2. 2" through 6" Sizes: Packless, gasketed, slip-type expansion joint with grooved end telescoping body for installation with rigid couplings, providing up to 3" axial end movement and designed for working pressures up to 350 psi. Victaulic Style 150 Mover.
3. ¾" and Larger Sizes: Combination of grooved end short nipples and flexible couplings joined in tandem to provide increased expansion. Joint movement and expansion capabilities determined by number of couplings/nipples used in the joint. Pressure rating dependent of size and style of flexible couplings used. Victaulic Style 155.

2.13 UNDERGROUND REFRIGERANT PIPING CONDUIT

A. The mechanical work required in conjunction with underground conduit shall include providing all conduits.

B. Conduits for underground banks shall be:

1. Trade diameter size as indicated.
2. Polyvinyl chloride Schedule 40 (approved for encased burial) duct.
3. Comply with NEMA TC 2; Schedule 40 PVC, or as indicated on plans. Fittings and Conduit Bodies shall comply with NEMA TC 3. Acceptable manufacturers are Carlon or approved equal.

C. Install conduit in such a manner as to provide a minimum cover of 30 inches after final grading except the cover may be reduced to a minimum of 18 inches to:

1. Tie into existing work.
2. Pass over other underground utilities.
3. Pass over underground obstructions.
4. Assist in the avoidance of low points.

D. Increase the minimum cover where required by field conditions.

E. Bends in conduit shall have minimum radius of 36".

F. Install conduit so that adjacent joints are staggered at least 6 inches from one another.

G. Offsets to accommodate field conditions shall be accomplished with two (2) bends of not more than ten (10) degrees each.

H. Plug both ends of all conduit stubs.

I. Backfill trenches as required and under provisions of Division 2. Interface installation of underground warning tape with backfilling specified in Division 2. Install warning tape 6 inches below finished surface.

J. Provide a continuous nylon warning tape above each full length of conduit 12 inches below grade.

K. After conduit has been installed and backfilled, clear each conduit of all obstructions and foreign matter by pulling a flexible mandrel (12" minimum length and a diameter 1/4" less than that of the conduit) and brush through it. In the event that obstructions are encountered in any conduit which will not permit the mandrel to pass, remove and replace the blocked section. Include in the mechanical work all excavation, backfilling, repair of concrete encasement and restoration of surface at grade involved in the conduit replacement.

2.14 PIPING INSTALLATION

A. Piping shall be inspected, tested and approved before being buried, covered or concealed. Horizontal piping shall be pitched with a minimum grade of one inch in 50 feet. Fittings shall be provided for changes in direction of piping, and for all connections. Fuel supply piping shall allow for ample tank movement and pipe expansion.

B. Install piping free from traps and drain toward tank.

C. Pipe Sleeves: Firmly pack space between the pipe or tubing, and sleeve with oakum and caulk on both ends of sleeve with elastic cement.

D. Unions, Flanges and Victaulic Couplings: Place unions, flanges or Victaulic couplings where necessary to permit easy disconnection of piping and apparatus. Each connection having a screw end valve shall have a union.

E. Valves: Install valves in positions accessible for operation and repair. Install check valve and an isolation valve on suction line of each fuel oil storage tank.

F. Field Testing: Upon completion and before final acceptance of the work, each system shall be tested as in service to demonstrate conformance with the contract requirements and in accordance with the requirements of ANSI B31.3 and NFPA 30.

G. Each new piping system will be hydrostatically tested at not less than 1.5 times the working pressure in accordance with ANSI B16.3, but in no case less than 200 psig and shall show no leakage or dials indicating not less than 1.5 times nor more than 2 times the test being placed in operation. Remove fuel quality monitor elements and water separator elements from filter separators before hydrostatic tests. Do not subject tank to pipe test pressures. Refer to tank manufacturers data for maximum test conditions.

H. Contractor shall provide one full tank load of fuel oil of the proper grade after successful testing.

I. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid or flexible, where required, grooved-end-pipe couplings. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. A Victaulic factory trained field representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

2.15 PIPING INSULATION

A. Insulation

1. Hydronic/Steam Piping: Preformed glass fiber meeting ASTM C547, "k" value of 0.24 @ 75°F with all service jacket (ASJ). Service temperature 0°F to +850°F, 25/50.
2. Low Temperature Fluid Applications: Provide insulation with integral wick material. Product shall include a factory applied integral vapor retarder extending under the evaporator area of the wick and covering not less than 98% of the circumference of the product. Exposed evaporator area shall be not less than 0.1 sq. ft./linear ft. of product.
3. Refrigerant Piping: Flexible closed cell insulation.

B. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes.

Fluid	Nominal Pipe Diameter	
	≤1.5"	>1.5
Hot Water	1 1/2"	2"
Cold Condensate, or Refrigerant	1 1/2"	1 1/2"

C. Condensate Piping

1. All condensate piping, regardless of temperature, shall be provided with insulation.
2. Condensate generated by cooling coils shall be considered Low Temperature Fluid.

D. Fittings: Factory precut insulation inserts, thickness to be same as adjacent. Enclose in premolded, PVC fitting covers.

1. Low Temperature Applications: Fittings and valves shall be wrapped continuously with wicking material prior to installing insulation to ensure a continuous path for removal of condensation.

E. Jackets:

1. Interior: Factory applied, all service jacket of white Kraft bonded to aluminum foil reinforced with fiberglass yarn and suitable for painting. Longitudinal and butt joints shall be made with factory applied pressure sensitive material.
2. Exterior/Exposed (Low Temperature): Field applied, 20 mil, PVC sheet material.
3. Exterior/Exposed (High Temperature): Field applied, Aluminum sheet material.
4. All jackets exposed to the weather shall be reflective, UV resistant and sealed watertight.

F. Preparation

1. Install materials after piping has been tested and approved.

G. Installation

1. Install materials in strict accordance with manufacturer's instructions.
2. Continue all insulation through penetrations.
3. In piping exposed to view, locate insulation and cover seams in least visible locations.
4. On piping that requires condensation control, (i.e. chilled or cold) insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
5. On piping not requiring condensation control (i.e. steam, condensate hot water) do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.

H. Supports:

1. All piping shall be supported in such a manner that the insulation is not compromised by the hanger or the effects of the hanger. In all cases, hanger spacing shall be such that the circumferential joint may be made outside the hanger. Cover the evaporating holes with contractor supplied Vapor/Wick Sealing Tape for the length of the metal saddle.
2. Piping systems 3" (75 mm) in diameter or less, insulated with fiberglass pipe insulation, may be supported by placing saddles of the proper length and spacing under the insulation as designated in Owens Corning Pub. 1-IN-14210.
3. For hot or cold piping systems larger than 3" (75 mm) in diameter, operating at temperatures less than +200F (93C) and insulated with fiberglass, inserts such as foam or high-density fiberglass with sufficient compressive strength shall be used to support the weight of the piping system.
4. On vertical runs, insulation support rings shall be used.

I. Accessories:

1. Insulation Bands: ¾ inch wide; 0.015 stainless steel
2. Metal Jacket Bands: ½ inch wide; 0.015 thick aluminum.
3. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
4. Finishing Cement: ASTM C449.
5. Fibrous Glass Cloth: Untreated; 8oz/sq. yd. Weight.
6. Adhesives: Compatible with insulation.
7. Wick material for wrapping valves and fittings
8. Closure Materials -Sealing Tape, and mastics.
9. Support Materials - Hanger straps, hanger rods, saddles, support high-density blocks, and support rings.
10. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of "Commercial & Industrial Insulation Standards."

2.16 FIRESTOPPING

A. Provide Firestopping systems for penetrations in fire-resistance-rated assemblies, including both membrane and through penetrations. This contractor shall thoroughly review architectural plans for assembly type and location and shall prepare bid accordingly.

B. Materials and systems shall be designed to meet the requirements of the intended application and shall be installed per manufacturer's guidelines.

C. Submittals: Provide for review Manufacturer's product literature and tested assembly for each type of fire protection material including product characteristics, typical uses, installation procedures, performance and limitation criteria.

2.17 SECONDARY DRAIN PANS

A. A secondary drain pan shall be provided under each piece of concealed (above ceilings, in closets, etc.) HVAC equipped which produces condensate.

B. The pan shall have a minimum depth of 1.5" and shall not be less than 3" larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion resistant material. Metallic pans shall have a minimum thickness of not less than 0.0276-inch galvanized sheet metal and non-metallic pans shall have a minimum thickness of not less than 0.0625 inch.

C. The secondary drain pan with a separate drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.

D. A secondary drain pan without a separate drain shall be equipped with water level detection device that will shut off the equipment served prior to overflow of the pan

PART 3: EXECUTION

3.1 OPERATING INSTRUCTIONS

A. Instruction to the Owner's Personnel - After completion of all work and all tests and at such times as designated by the Architect, provide the necessary skilled personnel to operate the entire installation until receipt of owners acceptance.

B. During the operating period, instruct the Owner's representative in the complete operation, adjustment, and maintenance of the entire installation.

C. Give at least forty-eight (48) hours advance notice to the Owner to coordinate scheduling of this instructional period.

D. Furnish to the Architect five (5) complete bound sets of typewritten or blueprinted instruction manuals for operating and maintaining all systems and equipment included in the contract. All instruction manuals shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.

E. The above-mentioned instructions shall include the maintenance schedule for the principal items of equipment furnished under this contract.

3.2 MANUFACTURER'S RECOMMENDATIONS:

A. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

3.3 TESTING, ADJUSTING, AND STARTING UP

A. Testing: All work must be proved satisfactory. The tests herein specified shall be applied in the presence of, and to the satisfaction of, the Architect before the work is covered, concealed or made inaccessible to testing, repair, correction or replacement. Accommodate the testing operation to the progress of the project as a whole. Correct all defects appearing under test and repeat the tests until all parts of the work have been successfully tested. Apply the specific tests herein described. Present all work for acceptance in clean condition, properly adjusted and in good working order; for instance, all machinery must be quiet, well balanced, and must be in place and reading accurately. All systems, equipment, controls, and devices in this work shall be tested in operation and must prove for their purposes in the judgment of the Architect or his authorized representative. All internal surfaces of all lines and equipment shall be blown or flushed clean. Where pressure tests are specified, the apparatus shall be clean before the tests are applied. Contractor shall provide adequate protection of piping and duct systems to prevent vandalism and/or accidental damage, blockage, etc., that will hinder or prevent proper operation of the finished systems.

1. Provide instruments, pumps, gauges, supplies, equipment, materials, and labor for testing and starting up. Dispose of test water and wastes after test, in a manner approved by all applicable codes.
2. Perform tests which may be required by authorities or agencies in addition to those herein specified.
3. Piping for hot water, chilled water, supply and return, drain, escape and relief valve discharge shall be tested with water and made tight under pressure of 150 pounds per square inch gauge maintained for one hour without pumping or as long as required to inspect all joints. Repair all leaks and retest. Piping shall be made tight without caulking. Apply pressure tests to piping only before connection of equipment. In no case shall piping, equipment or accessories be subjected to a pressure exceeding it's rating. Low-pressure elements shall be isolated or removed before tests are conducted.
4. Test valve bonnets for tightness. Test operate all valves at least once from closed-to-open-to-closed positions while valve is under pressure. Test all automatic valves for proper operation at the settings indicated. Test pressure relief valves at least three (3) times.
5. Test piping specialties for proper operation. Test air vent points to ensure that air has been vented.
6. Furnish certified shop test records for all pressure vessels. After installation, test at full operating pressures and temperatures maintained for one hour. Set and test all pressure control, relief and safety devices.
7. Repair or replace all defective work and repeat tests until the particular system and component parts thereof receive the approval of the Architect.
8. The duration of tests shall be as determined by authorities having jurisdiction, but in no case less than the time prescribed in each section of the specifications.
9. Test equipment and systems, which normally operate during seasons of the year during the appropriate season. Perform tests on individual equipment, systems and their controls. Whenever the equipment or system under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, function, and performance; the latter shall be operated simultaneously with the equipment of system being tested.

B. Adjusting, Balancing and Starting Up

1. Flush clean all systems prior to starting up the system. Any damages to the building or system components caused by failure to clean the systems properly shall be corrected to the satisfaction of the Architect or his authorized representative at no additional cost to the Owner.
2. In duct and piping systems, eliminate all noise and vibration and take all measures to secure proper circulation.
3. Run motor-driven equipment continuously for at least two hours in the presence of the Architect. Correct all defects of noise, vibration, alignment and balance. Replace all motors, which overheat or are noisy.
4. Balance systems completely for temperature, volume, and pressure per NEBB performance standards. Balancing subcontractor shall provide proof of certification by NEBB.
5. Air and water volumetric flow rates shall be within ten (10) percent of those specified. Air and water quantities and pressures shall be tested, balanced and recorded at all terminal devices. Volumetric flows and pressures shall be recorded on suitable forms and submitted for approval.
6. Provide any and all labor and equipment necessary to properly balance the installation including but not limited to dampers, valves, flow stations, test ports, sheaves, belts, etc.
7. All sequences of the system shall be checked and all temperature controls operated and commissioned as required to insure that all systems operate per Engineers intent.

3.4 SEQUENCE OF OPERATIONS

A. Sequence of Operations: This is a performance-based specification intended to convey the control intent of the various systems. The contractor shall provide detailed shop drawings including P&ID diagrams, equipment lists and finalized sequences for review by the Engineer prior to installation. Any questions concerning specific details shall be referred to the engineer for clarification.

B. System: It is the intent of this specification that a complete Building Management System (BMS) utilizing Direct Digital Control (DDC) be provided to control and monitor all HVAC systems within the facility. The basis of design for the BMS is Trane Co., or approved equal. Provide a single workstation for building maintenance personnel to interface with system sequences, setpoints and values. The controls for the Latrine systems (provided under separate contract) shall be integrated into this new EMS. The Garage control system (Bldg. No. 2) shall also be integrated into this new EMS.

C. Equipment and Wiring: This contractor shall provide all control equipment, and wiring (regardless of voltage) to accomplish the sequence of operations as detailed below.

D. Control and Monitoring: Sensors shall be provided throughout the HVAC systems (hydronic and air) as required to control and monitor their operation and verify performance at BMS. Provide sensors with remote mounted stats where indicated on the drawings. Where multiple space mounted sensors are required for a given unit they shall be located in the same general area.

E. Safety Controls: This contractor shall provide all safety controls required to protect the building and all controlled equipment from damage as well as those controls necessary to signal abnormal operation or malfunction of equipment. These shall include but not be limited to high limits, low limits, freezestats, flow switches, interlocks and relays.

F. Energy Efficiency: All controls and sequences shall be configured to provide maximum energy efficiency while maintaining occupant comfort.

G. Functional Performance Testing: The contractor shall perform complete and thorough Control Functional Performance Test (FPT) and Commissioning of the control systems. Upon completion of the FPT, a report shall be submitted to the engineer for review and comment. The FPT shall include testing of:

1. Safeties in every mode, i.e., in manual run mode as well as auto mode.
2. Signals to and from the fire alarm, security and entry systems.
3. Sequences of operation step by step in every mode and possible situation.
4. The operation of all control loops under actual operating conditions.
5. The interlocked operation of all equipment (i.e., the operation of starters in manual and off modes as well as auto mode, damper end switch interlock, etc.)
6. Where the BAS performs computations, the actual computation of any formulas and simulation of actual conditions to check the BAS computations.
7. Review of BAS programs for errors and omissions.
8. Hard copy graphs of trend logs of most, if not all, operational parameters.
9. Commissioning should test every conceivable life safety scenario and every conceivable operational scenario that the system will encounter and document this testing with printed graphs of trend logs.

H. Building Management System

1. System interface shall be web-based and accessible & adjustable from any web browser. System alarms and alerts shall be able to be programmed to be directed to a phone or email address.
2. System shall monitor all associated equipment & points in real-time.
3. System shall be capable of providing multiple occupancy schedules. Schedules shall be able to be programmed on a daily or monthly basis. Schedules shall allow for holidays. All schedules shall be able to be temporarily overridden at the request of the system operator though the web portal or at the space mounted user interface.
4. The following points shall be monitored by the BMS:
   a) Outside Air Temperature (DB/WB)
   b) Outside Air Relative Humidity
5. The BMS shall provide alerts for the following:
   a) Alarm/Trouble from any of the monitored systems
   b) Hot water supply temperature out of range
   c) Loss of motor function and/or flow (all monitored equipment)
6. Refer to sequence of operations for additional information & requirements. All required fan & flow monitoring of belt drive systems shall be directly detected. Motor CTs shall not be accepted on belt drive equipment.

I. Sequences of Operation

Sequence of Operation - ROOFTOP UNITS

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up / Pre-Cool, Occupied / Unoccupied and Heat / Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied Mode:

During occupied periods, the supply fan shall run continuously and the outside air damper shall open to maintain minimum ventilation requirements, where applicable. The unit controller shall control the supply fan speed to maintain the current duct static pressure setpoint (adj.).The DX

CERTIFICATION :

WILLIAM T. MAYER III
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
SPECIFICATIONS

JOB NO.: 16096RS
DRAWN BY: MMD
CHECKED BY: RD
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
M114

Unoccupied Mode:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the gas heat shall be enabled. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the gas heat shall be disabled.

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start, the outside air damper shall open if economizing is enabled and remain closed if economizing is disabled and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, the DX cooling shall be disabled and the outside air damper shall close.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode:

During optimal start, if the average space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the average space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the average space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling or economizer. The outside air damper shall remain closed, unless economizing. When the average space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

Occupied Bypass:

The BAS shall monitor the status of the “on” and “cancel” buttons of the space temperature sensors. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Cooling Mode:

The unit controller shall use the discharge air temperature sensor and discharge air temperature cooling setpoint to determine when to initiate requests for cooling. Discharge air setpoint shall be maintained by modulating the economizer or staging the DX cooling as required to maintain the discharge air setpoint.

Heating Mode:

During Unoccupied Heating or Morning Warm-Up Mode, the unit heat request will be communicated to the system VAVs prior to commencing heating operation to allow VAV units to open. The VFD shall be commanded to 100% and the heat will be staged on and off to satisfy the zone temperature setpoint.

Economizer:

The supply air sensor shall measure the dry bulb temperature of the air leaving the evaporator coil while economizing. When economizing is enabled and the unit is operating in the cooling mode, the economizer damper shall be modulated between its minimum position and 100% to maintain the discharge air temperature setpoint. The economizer damper shall modulate toward minimum position in the event the mixed air temperature falls below the low limit temperature setting. Compressors shall be delayed from operating until the economizer has opened to 100%.

Reference Enthalpy:

Outside air (OA) enthalpy shall compared with the reference enthalpy control setpoint. The economizer shall enable when OA enthalpy is 0.5 BTU/LB less than enthalpy control setpoint. The economizer shall disable when OA enthalpy is 0.5 BTU/LB greater than enthalpy control setpoint.

Supply Fan:

The supply fan shall be enabled while in the occupied mode and cycled on during the unoccupied mode. A differential pressure switch shall monitor the differential pressure across the fan. If the switch does not open within 40 seconds after a request for fan operation a fan failure alarm shall be annunciated at the BAS, the unit shall stop, requiring a manual reset.

Supply Duct Static Pressure Control (where applicable):

During the occupied mode the unit controller shall modulate the output to the VFD as required to maintain the duct static pressure setpoint of 1.5 inches of W.C. (adj.). If the duct static pressure falls below 1.3 inches of W.C. (adj.) the unit controller shall increase the output to the VFD to maintain setpoint. If the duct static pressure rises above 1.7 inches of W.C. (adj.) the unit controller shall decrease the output to the VFD to maintain setpoint. Upon a call for heating or cooling in the unoccupied mode the unit controller shall modulate the speed of the VFD to 100%.

If for any reason the supply air pressure exceeds the supply air pressure high limit, the supply fan shall shut down. The unit shall be allowed to restart three times after a 15 minute off period. If the overpressurization condition occurs on the fourth restart, the unit shall shut down and a manual reset diagnostic is displayed at the remote panel and/or the BAS system.

Building Pressure Control:

A differential pressure transducer shall actively monitor the difference in pressure between the building (indoors) and outdoors. If the building pressure increases above the differential pressure setpoint, the unit controller shall turn on the exhaust fan and modulate the exhaust fan damper to control building pressure to the differential pressure setpoint. If the building pressure decreases below the differential pressure setpoint, the controller shall deactivate the exhaust fan and close the exhaust damper.

Exhaust Fan Status:

A differential pressure switch shall monitor the differential pressure across the fan. If the switch is detected to be open for 40 consecutive seconds after a request for exhaust fan operation a fan failure alarm shall be annunciated at the BAS and the exhaust fan shall stop. A manual reset shall be required.

Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter when the fan is running. If the switch closes for 2 minutes after a request for fan operation a dirty filter alarm shall be annunciated at the BAS

Sequence of Operations - VAV BOXES

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied and Unoccupied commands. The BAS may also send a Heat/Cool mode, priority shutdown commands, space temperature and/or space temperature setpoint. If communication is lost with the BAS, the VAV controller shall operate using its local setpoints.

Occupancy Mode:

The occupancy mode shall be communicated or hardwired to the VAV via a binary input. Valid Occupancy modes for the VAV shall be:

Occupied:

Normal operating mode for occupied spaces or daytime operation. When the unit is in the occupied mode the VAV shall maintain the space temperature at the active occupied heating or cooling setpoint. Applicable ventilation and airflow setpoints shall be enforced. The occupied mode shall be the default mode of the VAV.

Unoccupied:

Normal operating mode for unoccupied spaces or nighttime operation. When the unit is in unoccupied mode the VAV controller shall maintain the space temperature at the stored unoccupied heating or cooling setpoint regardless of the presence of a hardwired or communicated setpoint. When the space temperature exceeds the active unoccupied setpoint the VAV shall modulate fully closed.

Occupied Bypass:

Mode used to temporarily place the unit into the occupied operation. Tenants shall be able to override the unoccupied mode from the space sensor. The override shall last for a maximum of 2 hours (adj.). The tenants shall be able to cancel the override from the space sensor at any time. During the override the unit shall operate in occupied mode.

Heat/Cool Mode:

The Heat/Cool mode shall be set by a communicated value or automatically by the VAV. In standalone or auto mode the VAV shall compare the primary air temperature with the configured auto changeover setpoint to determine if the air is "hot" or "cold". Heating mode shall command the VAV to heat only; it implies the primary air temperature is hot. Cooling mode shall command the VAV to cool only; it implies the primary air temperature is cold.

Heat/Cool Setpoint:

The space temperature setpoint shall be determined either by a local (e.g., thumbwheel) setpoint, the VAV default setpoint or a communicated value. The VAV shall use the locally stored default setpoints when neither a local setpoint nor communicated setpoint is present. If both a local setpoint and communicated setpoint exist, the VAV shall use the communicated value.

Cooling Mode:

When the unit is in cooling mode, the VAV controller shall maintain the space temperature at the active cooling setpoint by modulating the airflow between the active cooling minimum airflow setpoint to the maximum cooling airflow setpoint. Based on the VAV controller occupancy mode, the active cooling setpoint shall be one of the following:

Setpoint Default Value		
Occupied Cooling Setpoint	74.0 deg. F	
Unoccupied Cooling Setpoint	85.0 deg. F	
Occupied Standby Cooling Setpoint	78.0 deg. F	Occupied Min Cooling
Airflow Setpoint	See VAV Schedule	Occupied Max Cooling
Airflow Setpoint	See VAV Schedule	

The VAV shall use the measured space temperature and the active cooling setpoint to determine the requested cooling capacity of the unit. The outputs will be controlled based on the unit configuration and the requested cooling capacity.

Heating Mode:

When the unit is in heating mode, the VAV controller shall maintain the space temperature at the active heating setpoint by modulating the airflow between the active heating minimum airflow setpoint to the maximum heating airflow setpoint. Based on the VAV controller occupancy mode, the active heating setpoint shall be one of the following:

Setpoint Default Value		
Occupied Heating Setpoint	71.0 deg. F	
Unoccupied Heating Setpoint	60.0 deg. F	
Occupied Standby Heating Setpoint	67.0 deg. F	Occupied Min Heating
Airflow Setpoint	See VAV Schedule	Occupied Max Heating
Airflow	See VAV Setpoint Schedule	

The VAV controller shall use the measured space temperature and the active heating setpoint to determine the requested heating capacity of the unit. The outputs will be controlled based on the unit configuration and the requested heating capacity.

Reheat Control:

Reheat shall only be allowed when the primary air temperature is 5.0 deg. F below the configured reheat enable setpoint of 70.0 deg. F (adj.). The reheat shall be enabled when the space temperature drops below the active cooling setpoint and the airflow is at the minimum cooling airflow setpoint.

During reheat the VAV shall operate at its minimum heating airflow setpoint and energize the heat as follows:

Proportional Hot Water Reheat:

If the space temperature is below the heating setpoint the hot water reheat valve shall modulate as required to maintain the active heating setpoint.

Ventilation Control (Fixed):

When the unit is in unoccupied mode, the ventilation airflow setpoint shall be zero. When the unit is in occupied mode, the ventilation airflow setpoint shall equal the design outdoor airflow (see VAV schedule).

The current ventilation airflow setpoint shall be communicated to the BAS for control of the system outdoor-air intake.

Space Sensor Failure:

If there is a fault with the operation of the zone sensor an alarm shall be annunciated at the BAS. Space sensor failure shall cause the VAV to drive the damper to minimum air flow if the VAV is in the occupied mode, or drive it closed if the VAV is in the unoccupied mode. The series fan shall be enabled and the reheat will be disabled.

FAN POWERED VAV BOXES

Continuous Fan Control:

The VAV fan shall operate continuously in all occupied modes. During the unoccupied mode, the primary air valve shall modulate fully closed. The terminal fan and heat shall cycle as needed to maintain a reduced space temperature.

Sequence of Operations - HV-2 & 4

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied:

During occupied periods, the supply fan shall run continuously and the outside air damper shall open to maintain minimum ventilation requirements. The HV-2 gas heat and HV-4 hot water duct coils shall maintain the discharge air temperature setpoint. The discharge air temperature setpoint shall be dynamically reset based on the deviation of actual space temperature from the active space temperature setpoint.

Unoccupied:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the heat shall be enabled. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the heat shall be disabled.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode:

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm- up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide ventilation.

Occupied Bypass:

The BAS shall monitor the status of the “on” and “cancel” buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Heat Mode:

When the space temperature falls below the occupied heating setpoint the mode shall transition to heating. If the space temperature sensor fails an alarm shall be annunciated at the BAS. If the local and communicated setpoints fail the controller shall disable the supply fan and an alarm shall be annunciated at the BAS.

Mixed Air Low Limit:

The initial damper opening rate shall be limited to 2% per minute (adj.) until the damper has reached its minimum ventilation position. The outside air damper shall modulate to a position less than the minimum damper position if the mixed air temperature drops below 50.0 deg. F (adj.). If the mixed air temperature sensor fails an alarm shall be annunciated at the BAS and the outside air damper shall return to the minimum position.

Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter when the fan is running. If the switch closes during normal operation a dirty filter alarm shall be annunciated at the BAS.

Sequence of Operation - HV-5

Building Automation System Interface:

Control of HV-5 and associated exhaust fans, EF's-7, 8, 14 & 16, shall be accomplished through the Building Automation System (BAS). If any one of the four aforementioned fans is started through its local switch, the other three fans and HV-5 shall also operate. The BAS shall also send temperatures, setpoints and other applicable information to the controller. If a BAS is not present, or communication is lost with the BAS, the controller shall operate in the Occupied mode using its default setpoints.

HV-5 Operation:

When HV-5 is energized through the BAS, the supply fan shall run continuously and the outside air damper shall be fully open. The heat shall stage to maintain the discharge air temperature setpoint. If the discharge air temperature sensor fails the supply fan shall be disabled, the outside air damper shall close, and an alarm shall be annunciated at the BAS.

When HV-5 is not energized, the supply fan shall not run and the outside air damper shall be fully closed. The gas heating section shall be de-energized.

Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter when the fan is running. If the switch closes during normal operation a dirty filter alarm shall be annunciated at the BAS.

Sequence of Operation - HV-3

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller an Occupied or Unoccupied command. The BAS shall also send temperatures, setpoints and other applicable information to the controller. If a BAS is not present, or communication is lost with the BAS, the controller shall operate in the Occupied mode using its default setpoints.

Occupied:

During occupied periods, air handling unit, HV-3, and exhaust fan, EF-12, shall run continuously. Return air damper, D-1, shall be closed and outside air damper, D-2, and exhaust air damper, D-3, shall be fully open. The heat shall stage to maintain the discharge air temperature setpoint. If the discharge air temperature sensor fails the supply fan shall be disabled, the outside air damper shall close, and an alarm shall be annunciated at the BAS.

Unoccupied:

During unoccupied periods, the operation of air handling unit, HV-3, shall cycle on 100% return air to maintain a lower space temperature. Return air damper, D-1, shall be open and outside air damper, D-2, and exhaust air damper, D-3, shall be fully closed. The heat shall stage to maintain the discharge air temperature setpoint. If the discharge air temperature sensor fails the supply fan shall be disabled, the outside air damper shall close, and an alarm shall be annunciated at the BAS.

Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter when the fan is running. If the switch closes during normal operation a dirty filter alarm shall be annunciated at the BAS.

Sequence of Operations-SPLIT SYSTEMS

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Pre-Cool, Occupied / Unoccupied and Heat / Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied Cooling Mode:

During occupied periods, the supply fan shall run continuously and the outside air damper shall open to maintain minimum ventilation requirements. The DX cooling shall stage to maintain the occupied space temperature setpoint.

Occupied Heating Mode:

During occupied periods, the supply fan shall run continuously and the outside air damper shall open to maintain minimum ventilation requirements. The hot water heating coil shall modulate to maintain the occupied space temperature setpoint.

Unoccupied Cooling Mode:

When the space temperature is above the Unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled.

Unoccupied Heating Mode:

When the space temperature falls below the Unoccupied cooling setpoint of 60.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the heating coil control valve shall be enabled. When the space temperature rises above the unoccupied cooling setpoint of 60.0 deg. F minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the heating coil shall be disabled.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

Occupied Bypass:

The BAS shall monitor the status of the “on” and “cancel” buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Cooling Mode:

The unit controller shall use space temperature and space temperature setpoint to determine when to stage the cooling. When the space temperature rises above the setpoint, the unit controller shall stage the DX cooling as required to maintain the space temperature setpoint. When the space temperature falls below the setpoint the controller shall disable DX cooling.

Supply Fan:

The supply fan shall be enabled while in the occupied mode and cycled on during the unoccupied mode. A differential pressure switch shall monitor the differential pressure across the fan. If the switch does not open within 30 seconds (adj.) after a request for fan operation a fan failure alarm shall be annunciated at the BAS, the unit shall stop, requiring a manual reset.

Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall be annunciated at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Sequence of Operations - HOT WATER PLANT

General Description:

The hot water system consists of multiple boilers and associated pumps. The Building Automation System (BAS) controller shall provide stand-alone control or BAS workstation control of the supply heating water temperature setpoint (adj.) by controlling the boiler's enable/disable boiler signal.

Heating System Enable/Disable:

The heating system shall be enabled when the outside air temperature falls below 60.0 deg. F (adj.) or on a command for dehumidification. When enabled, the BAS controller shall start the lead hot water distribution pump, the lead boiler circulating pump, and enable the lead boiler. The boiler factory control shall operate the boiler to maintain its local supply setpoint.

Heating shall be disabled when the outdoor air temperature is above 65.0 deg. F (adj.) and there is no command for dehumidification. When heating is disabled, the hot water pumps and boilers shall be commanded to OFF.

Boiler Control:

The boiler lead/lag sequence shall be based on a weekly schedule. If the hot water distribution system supply temperature falls more than 25.0 deg. F (adj.) below setpoint for a period longer than 15 minutes (adj.), or if an active boiler signals a failure alarm, the BAS controller shall enable the lag boiler. In addition, the BAS controller shall send an alarm to the BAS workstation. When a boiler failure exists, lead/lag automation shall be disabled and the currently running boiler shall become the lead boiler.

Once the problem is corrected, the operator shall be able to clear the alarm failure from the BAS controller or BAS workstation. This shall re-enable the lead/lag sequence.

Once the lead boiler is enabled, the add sequence of additional boilers shall be disabled for a period of 30 minutes (adj.). Additional boilers are added if the hot water distribution system supply temperature falls 5.0 deg. F (adj.) below the hot water setpoint for a period of 10 minutes (adj.) or more.

The last boiler enabled shall be disabled when the hot water temperature rises 5.0 deg. F (adj.) above the hot water setpoint for a period of 10 minutes (adj.) or more. Additional boilers shall be disabled following the same subtraction sequence if the hot water temperature remains 5.0 deg. F (adj.) above the hot water setpoint for a period of 10 minutes (adj.) or more.

Domestic Water System:

The domestic water system shall be under control of the BAS system.

Hot Water Reset:

The hot water supply temperature setpoint shall be linearly reset from 120.0 deg. F (adj.) to 180.0 deg. F (adj.) as the outside air temperature falls from 60.0 deg. F (adj.) to 0.0 deg. F (adj.)

Hot Water Distribution Pump Start/Stop:

The BAS controller shall start a hot water pump through a contact closure of the pump's variable frequency drive (VFD) run-enable contacts.

Hot Water Distribution Pump Statuses:

The BAS controller shall detect hot water pump run statuses by a VFD current switch.

Hot Water Distribution Pump Failure:

If the lead start/stop relay is enabled and the current switch status is off for more than 30 seconds (adj.), the BAS controller shall annunciate a hot water pump failure alarm to the BAS workstation. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS controller or BAS workstation.

Hot Water Distribution Pump Speed:

The BAS controller shall monitor the hot water system differential pressure sensor. When the pump VFD is enabled, the BAS controller shall control the analog speed signal sent to the pump VFD to maintain a hot water differential pressure setpoint of 50.0 psig (adj.).

Pump Optimization:

The BAS shall continually monitor the hot water control valve position of all AHU's in the hot water system.

At hot water system startup, the hot water pressure setpoint is 100% of the maximum pressure setpoint. When all hot water valves are less than 85% open, the hot water differential pressure setpoint shall be lowered by 0.1 psig (adj.) of the current hot water differential pressure setpoint. This occurs every 5 minutes until at least one valve is more than 85% open, or if the setpoint is equal to the minimum hot water differential pressure setpoint, or if the pump VFD's are at a minimum speed setting (22 Hz).

When any hot water valve is more than 95% open, the hot water pressure setpoint shall increases by 0.1 psig (adj.) of the current hot water differential setpoint. This occurs every 5 minutes until no valve is more than 95% open, or if the hot water differential pressure setpoint has risen to the system's maximum setting, or if the pump VFD's are at the maximum setting (60 Hz).

Freeze Protection:

1. When the outdoor air temperature falls below 35.0 deg. F (adj.), the hot water distribution pump shall operate continuously to provide hot water circulation to all associated hot water coils. If the hot water supply temperature falls below 130.0 deg. F (adj.) during unoccupied periods, the boiler sequence shall be enabled to safeguard against low water temperature and boiler condensation.

J. COMMISSIONING

1. This contractor shall provide the commissioning deliverables to the engineer/owner. Deliverables shall include but not be limited to the following:
   a. Leakage test by this contractor.
   b. Start up and functional test reports by this contractor.
   c. Testing and balancing by an independent third party contractor.
   d. Verification report of the performance according to the sequence of operations by this contractor.

2. Copies of all records shall be provided to the engineer by this contractor including, but not limited to:
   a. Equipment manuals including the name of at least one service agency.
   b. Testing and balancing reports.
   c. Functional performance testing of the equipment, controls, economizers and lighting control systems.

3. All commissioning shall be performed as indicated here and elsewhere in the specifications and shall comply with provisions of the applicable energy conservation code.
   a. The mechanical contractor shall provide deliverables to the Engineer /Owner. Copies of all records shall be provided to the Engineer by this contractor including, but not limited to:
      Equipment manuals including the name of at least one service agency.
      Testing and Balancing reports.
      Functional performance testing of the equipment, controls, economizers and lighting control systems.
      All commissioning shall be performed as indicated here and elsewhere in the specifications and shall comply with Section C408 of the international Energy Conservation Code.

END OF SECTION

CERTIFICATION :

WILLIAM T. MAYER III
STATE OF RHODE ISLAND
No. 7860
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

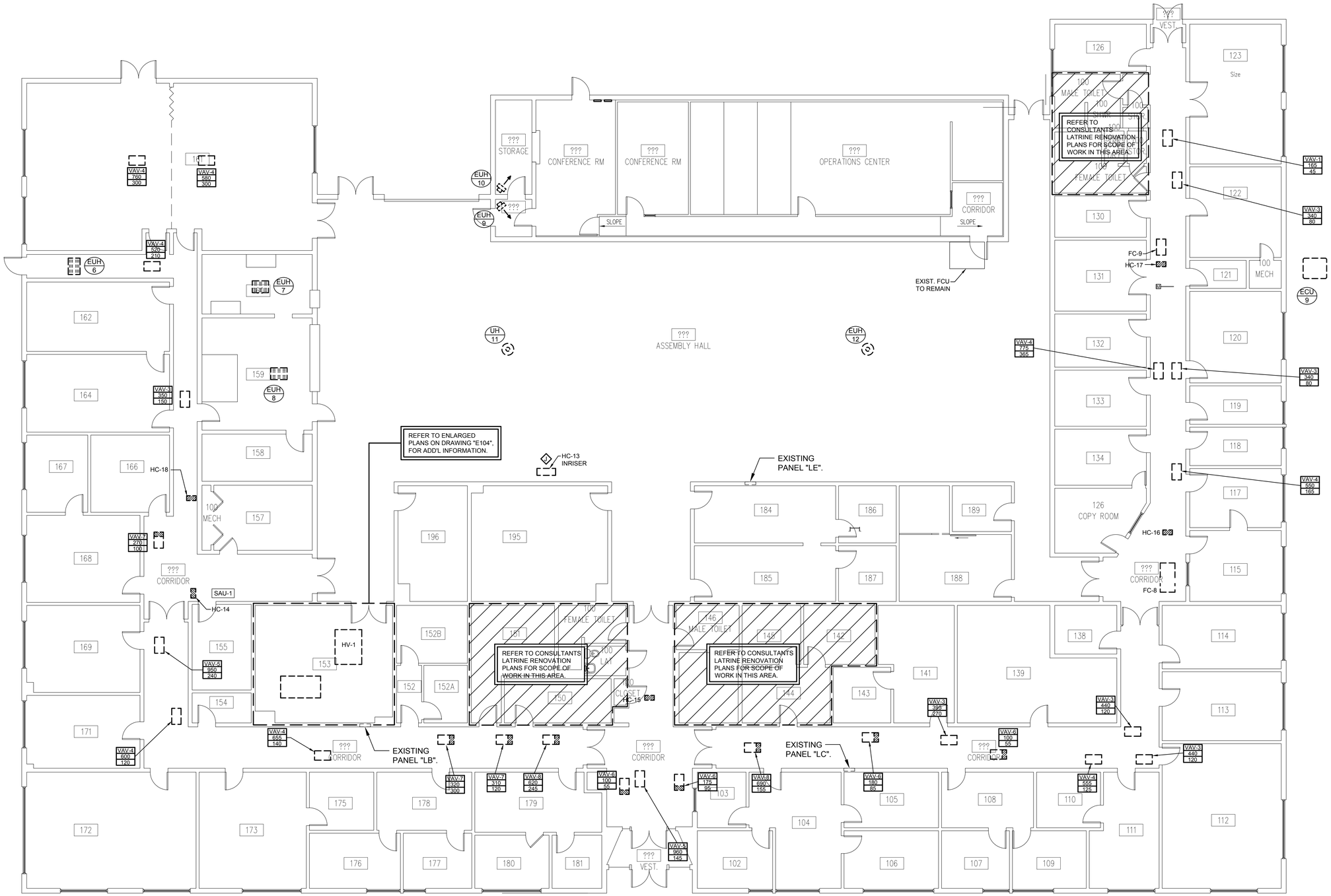
SHEET TITLE:

SPECIFICATIONS

JOB NO.:	16096RS
DRAWN BY:	MMD
CHECKED BY:	RD
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

M115



MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

TYPICAL NOTES

ALL FAN POWERED VAV BOX WIRING TO BE REMOVED FROM EXISTING UNIT & COILED FOR NEW FAN POWERED VAV BOXES.

01 / ED100

ELECTRICAL DEMOLITION - FLOOR PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

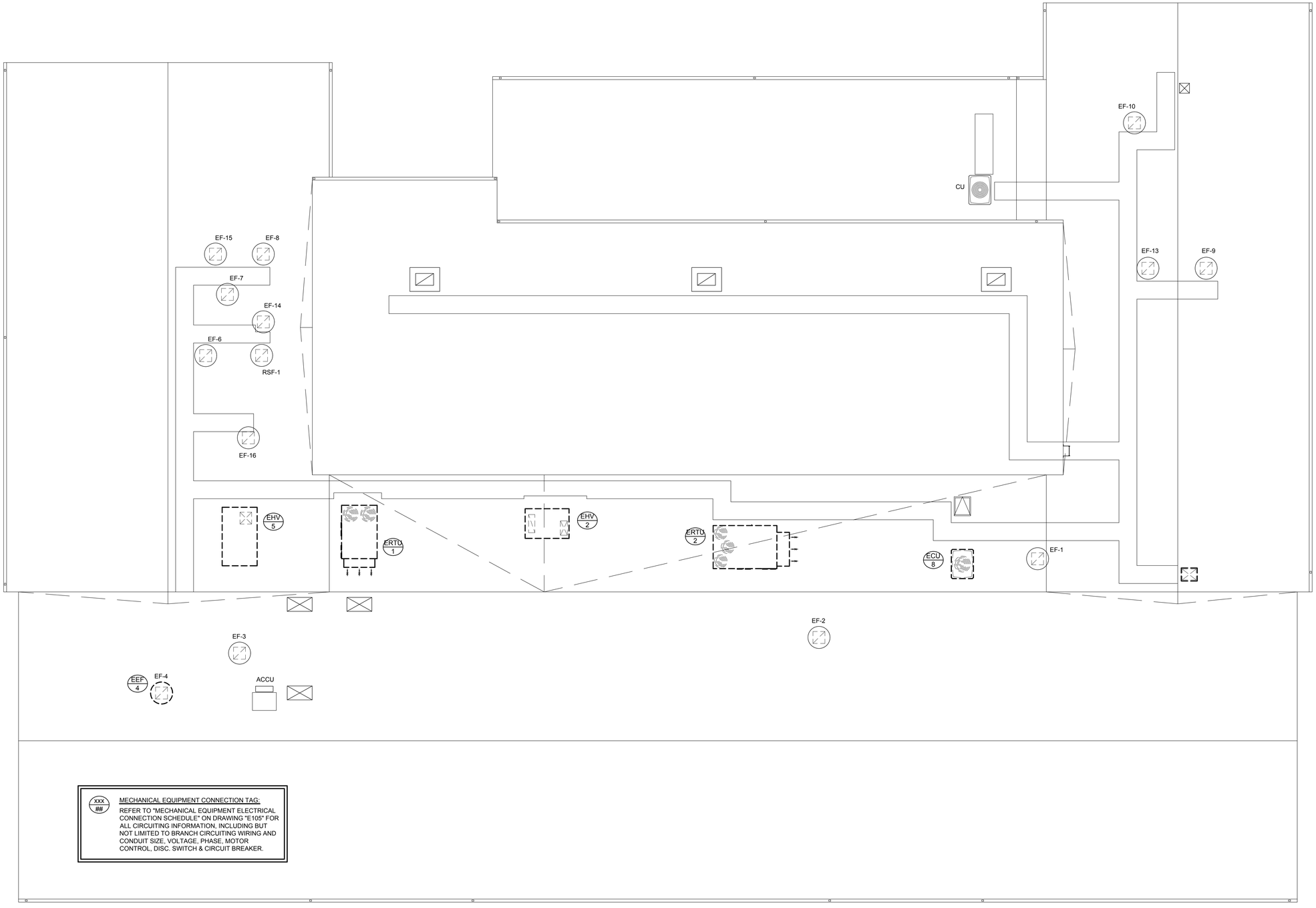
SHEET TITLE:

ELECTRICAL
DEMOLITION FLOOR PLAN
BUILDING 1

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

ED100



XXX ## MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

01 ED101

ELECTRICAL DEMOLITION - ROOF PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED
PROFESSIONAL ENGINEER
(ELECTRICAL)

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	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
DEMOLITION ROOF PLAN
BUILDING 1

JOB NO.: 16096RS

DRAWN BY: T.M.W.

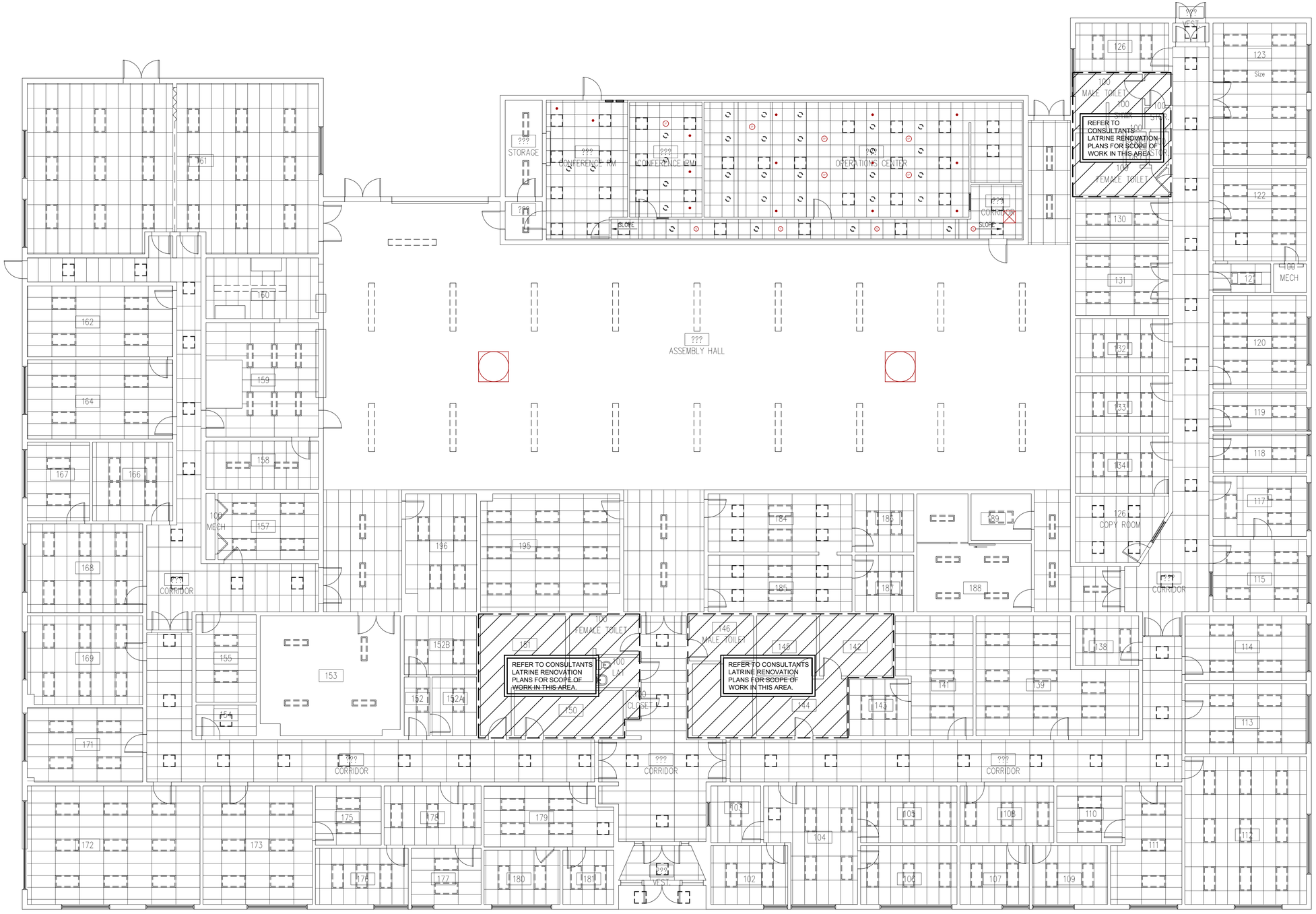
CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

ED101



LIGHTING NOTE:
CONTRACTOR SHALL REMOVE ALL EXISTING RECESSED LIGHTING FIXTURES FROM EXISTING CEILING GRIDS, EXISTING CIRCUITRY TO REMAIN FOR NEW LIGHTING LAYOUT, TO ACCOMMODATE DROP CEILING REPLACEMENTS. UPON COMPLETION OF NEW CEILING GRID INSTALLATIONS, THIS CONTRACTOR SHALL INSTALL NEW LIGHTING FIXTURES AS SHOWN ON REMAINING ELECTRICAL DRAWINGS. (TYPICAL)

01
ED102

ELECTRICAL DEMOLITION - LIGHTING PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED
PROFESSIONAL ENGINEER
(ELECTRICAL)

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ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
ELECTRICAL
DEMOLITION - LIGHTING PLAN
BUILDING 1

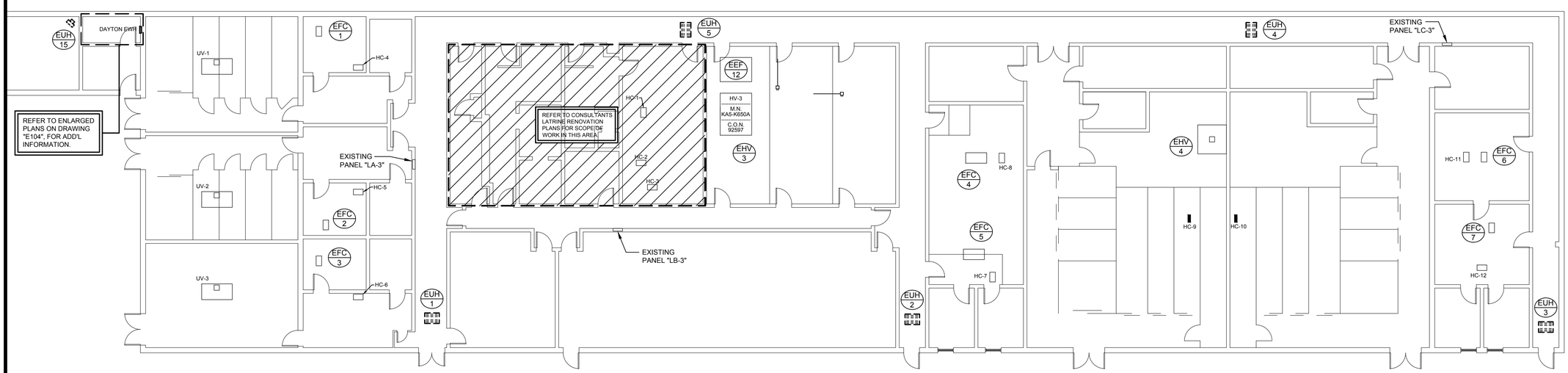
JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
ED102

01 ED102

ELECTRICAL DEMOLITION - ROOF PLAN - BUILDING 3

SCALE: 1" = 10'-0"



XXX / ##	MECHANICAL EQUIPMENT CONNECTION TAG: REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

02 ED102

ELECTRICAL DEMOLITION - FLOOR PLAN - BUILDING 3

SCALE: 1" = 10'-0"

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
DEMOLITION FLOOR PLAN
BUILDING 3

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

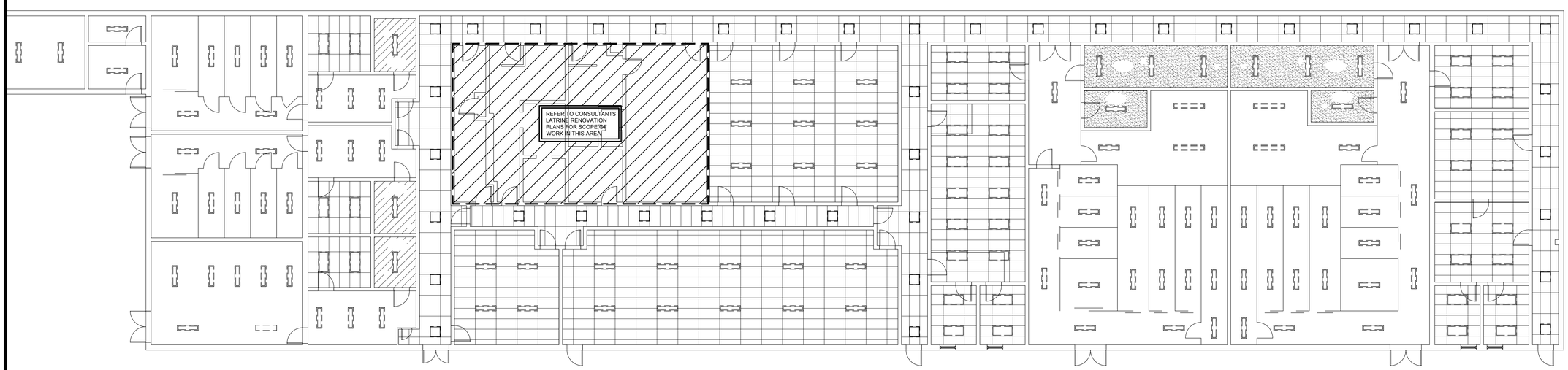
SHEET NO.:

ED103

01
ED102

ELECTRICAL DEMOLITION - ROOF PLAN - BUILDING 3

SCALE: 1" = 10'-0"



LIGHTING NOTE:

CONTRACTOR SHALL REMOVE ALL EXISTING RECESSED LIGHTING FIXTURES FROM EXISTING CEILING GRIDS, EXISTING CIRCUITRY TO REMAIN FOR NEW LIGHTING LAYOUT, TO ACCOMMODATE DROP CEILING REPLACEMENTS. UPON COMPLETION OF NEW CEILING GRID INSTALLATIONS, THIS CONTRACTOR SHALL INSTALL NEW LIGHTING FIXTURES AS SHOWN ON REMAINING ELECTRICAL DRAWINGS. (TYPICAL)

02
ED102

ELECTRICAL DEMOLITION - LIGHTING PLAN - BUILDING 3

SCALE: 1" = 10'-0"

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED
PROFESSIONAL ENGINEER
(ELECTRICAL)

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
DEMOLITION - LIGHTING PLAN
BUILDING 3

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

ED104

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION	MOUNTING
2	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER)	18" A.F.F.
	DUPLEX CONVENIENCE OUTLET, MOUNTED ABOVE COUNTER; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER)	42" A.F.F. (OR) 6" ABOVE COUNTER
	QUAD-RUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER)	18" A.F.F.
	QUAD-RUPLEX CONVENIENCE OUTLET, MOUNTED ABOVE COUNTER; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER)	42" A.F.F. (OR) 6" ABOVE COUNTER
WP 2	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE WITH GROUND FAULT PROTECTION. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER, "WP" INDICATES WEATHER PROOF WITH "WHILE-IN-USE COVER")	18" A.F.F.
WP 2	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE WITH GROUND FAULT PROTECTION. (SUBSCRIPT "2" INDICATES CIRCUIT NUMBER, "WP" INDICATES WEATHER PROOF WITH "WHILE-IN-USE" COVER)	46" A.F.F.
J	JUNCTION BOX; SIZE AS REQUIRED PER CODE.	
	MOTOR	
	PANELBOARD SURFACE MOUNTED; 208Y/120V, 3-PHASE, 4-WIRE. REFER TO "BRANCH CIRCUIT PANELBOARD SCHEDULES" ON PLANS FOR APPLICABLE INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.
	PANELBOARD SURFACE MOUNTED; 480Y/277V, 3-PHASE, 4-WIRE. REFER TO "BRANCH CIRCUIT PANELBOARD SCHEDULES" ON PLANS FOR APPLICABLE INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.
1,3 A	HOMERUN TO PANELBOARD (LOADCENTER); "A" INDICATES PANEL, "1,3" INDICATES CIRCUIT NUMBERS. REFER TO "TYPICAL CIRCUITING DETAIL" ON PLANS.	
60/50	FUSED DISCONNECT SWITCH, 60/50 INDICATES FRAME SIZE/FUSE SIZE IN THAT ORDER. STARTERS FOR HVAC EQUIPMENT BY MECHANICAL CONTRACTOR.	
	GROUND.	

COMMISSIONING NOTES

1. THIS CONTRACTOR SHALL PROVIDE THE DELIVERABLES TO THE ENGINEER/OWNER.
2. COPIES OF ALL RECORDS SHALL BE PROVIDED TO THE ENGINEER BY THIS CONTRACTOR INCLUDING, BUT NOT LIMITED TO A VERIFICATION REPORT OF THE LIGHTING AND ELECTRICAL SYSTEMS BY THIS CONTRACTOR, INCLUDING CERTIFICATION THAT ALL OCCUPANCY SENSORS HAVE BEEN PROPERLY LOCATED AND AIMED, ALL TIME SWITCH CONTROLS HAVE BEEN PROPERLY PROGRAMMED AND ALL DAYLIGHT RESPONSIVE CONTROLS HAVE BEEN PROPERLY LOCATED AND CALIBRATED.
3. ALL COMMISSIONING ACTIVITIES SHALL BE PERFORMED AS INDICATED HERE AND ELSEWHERE IN THE SPECIFICATIONS AND SHALL COMPLY WITH PROVISIONS OF THE APPLICABLE ENERGY CONSERVATION CODE.

ENERGY REBATE NOTES

1. THE CONTRACTOR SHALL MAKE THE OWNER AWARE OF ALL "UPSTREAM" ENERGY REBATES.
2. THE CONTRACTOR SHALL PROVIDE THE OWNER ALL NECESSARY INFORMATION AND DOCUMENTATION NECESSARY FOR ENERGY REBATE APPLICATIONS.

ABATEMENT NOTE

1. THE CONTRACTOR SHALL VERIFY ALL EQUIPMENT SCHEDULED TO BE DEMOLISHED WITH ABATEMENT CONTRACTOR PRIOR TO ANY WORK.

NOTES FOR ALUMINUM EQUIPMENT

1. THESE DRAWINGS ARE BASED ON THE USE OF COPPER IN CONDUCTORS, TRANSFORMER WINDINGS, SWITCHBOARDS, DISTRIBUTION PANELBOARDS, BRANCH CIRCUIT PANELBOARDS, LOAD CENTERS, DISCONNECT SWITCHES & CIRCUIT BREAKERS.
2. ALTHOUGH PERMITTED BY CODE, THIS OFFICE DOES NOT RECOMMEND THE USE OF ALUMINUM ELECTRICAL EQUIPMENT.
3. USE OF ALUMINUM CONDUCTORS, TRANSFORMERS WITH ALUMINUM WINDINGS AND SWITCHBOARDS, DISTRIBUTION PANELBOARDS, BRANCH CIRCUIT PANELBOARDS, LOAD CENTERS, DISCONNECT SWITCHES & CIRCUIT BREAKERS WITH ALUMINUM BUSS IS AT THE DISCRETION & DECISION OF THE OWNER.
4. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO DETERMINE ALL CONDUCTOR AND CONDUIT SIZES, PER NEC, SHOULD ALUMINUM BE USED.
5. IF ALUMINUM EQUIPMENT IS USED IN ANY OF THE ELECTRICAL COMPONENTS OF ITEM "3" ABOVE, THE FOLLOWING PROCEDURE SHALL BE FOLLOWED:
   a. INSTALLATION SHALL BE IN ACCORDANCE WITH IEEE STD. 241-1990, PARAGRAPH 8.7.2
   b. WHEN CUTTING CABLE, AVOID NICKING THE STRANDS.
   c. UNPLATED CONTACT SURFACES SHALL BE CLEANED WITH WIREBRUSH, STEEL WOOL, EMERY CLOTH OR SIMILAR ABRASIVE TOOL OR MATERIAL.
   d. PLATED SURFACES SHALL BE CLEANED WITH AN APPROVED SOLVENT.
   e. APPLY JOINT COMPOUND TO THE CONDUCTOR IF THE CONNECTOR DOES NOT ALREADY HAVE IT.
   f. USE ONLY CONNECTORS SPECIFICALLY TESTED AND APPROVED FOR USE ON ALUMINUM CONDUCTORS.
   g. REFER TO ANSI/UL486B-1982.
   h. ON MECHANICAL CONNECTORS, TIGHTEN THE CONNECTOR WITH A SCREWDRIVER OR WRENCH TO THE REQUIRED TORQUE. REMOVE EXCESS COMPOUND.
   i. ON COMPRESSION CONNECTORS, CRIMP THE CONNECTOR USING THE PROPER TOOL AND DIE. REMOVE EXCESS COMPOUND.
   j. ALWAYS USE JOINT COMPOUND THAT IS COMPATIBLE WITH THE INSULATION AND AS RECOMMENDED BY THE MANUFACTURER.
   k. WHEN MAKING AN ALUMINUM-TO-COPPER CONNECTION THAT IS EXPOSED TO MOISTURE, PLACE THE ALUMINUM CONDUCTOR ABOVE THE COPPER. IF THERE IS NO EXPOSURE TO MOISTURE, THE RELATIVE POSITION OF THE TWO METALS IS NOT IMPORTANT.
   i. WHEN USING INSULATED CONDUCTORS OUTDOORS, EXTEND THE CONDUCTOR INSULATION OR COVERING AS CLOSE TO THE CONNECTOR AS POSSIBLE TO MINIMIZE WEATHERING THE JOINT. OUTDOOR JOINTS SHALL BE COMPLETELY PROTECTED BY TAPE OR OTHER MEANS. WHEN OUTDOOR JOINTS ARE COVERED OR PROTECTED, THE PROTECTION SHALL COMPLETELY EXCLUDE MOISTURE.
6. WHEN ALUMINUM FEEDERS ARE INCLUDED AS VE ITEMS, IT IS RECOMMEND THAT ALUMINUM BE USED ONLY FOR DISTRIBUTION FEEDERS LARGER THAN 100 A PROVIDED THAT COMPRESSION ALICU PIN TERMINATIONS ARE UTILIZED. VOLTAGE DROP CALCULATIONS SHALL BE REVISED UTILIZING ALUMINUM CONDUCTORS. IT IS NOT RECOMMEND THAT ALUMINUM FEEDERS BE UTILIZED FOR ROTATING (MOTORS) OR VIBRATING TRANSFORMERS OR EQUIPMENT.

TYPICAL FIRE STOPPING NOTES

A. GENERAL: FIRE STOPPING SHALL BE PROVIDED BY THIS CONTRACTOR FOR ALL FLOOR, CEILING AND FIRE RATED WALL PENETRATIONS FOR CONDUIT, SLEEVES AND/OR CABLING AS REQUIRED BY JOB CONDITIONS.

B. THE CONTRACTOR SHALL PROVIDE A FIRE STOP SYSTEM IN ACCORDANCE WITH THE FOLLOWING:

1. THE SYSTEM SHALL CONSIST OF A WATERBASED SEALANT AND SUITABLE DAMMING MATERIALS (WHERE REQUIRED) AND BE INSTALLED PER MANUFACTURER'S REQUIREMENTS.
2. THE SEALANT SUPPLIED SHALL BE A TWO STAGED INTUMESCENT AND CAPABLE OF EXPANDING UP TO 8 TIMES ITS ORIGINAL VOLUME.
3. THE SEALANT SUPPLIED SHALL CONTAIN NO ASBESTOS, NO FIBERGLASS, AND NO SOLVENTS NOT CORROSIVE MINERAL SALTS OF ANY KIND.
4. THE SEALANT SHALL FORM A SURFACE CAPABLE OF BEING SANDED AND PAINTED TO MATCH SURROUNDING SURFACES AND SHALL BE IMPERVIOUS TO WATER WHEN DRY.
5. THE FIRE STOP SYSTEM SHALL BE TESTED TO THE TIME/TEMPERATURE REQUIREMENTS OF ASTM E119 AND SHALL BE UL1479 (ASTM E814) AND CLASSIFIED FOR UP TO 3 HOURS.
6. THE FIRE STOP SEALANT SHALL BE SPECSEAL SEALANT AS MANUFACTURED BY SPECIFIED TECHNOLOGIES, INC. OR APPROVED EQUAL.
7. SPECIAL CARE SHALL BE TAKEN WITH ELECTRICAL SYSTEMS NOT TO COMPROMISE ANY OF THE BUILDING FIRE PARTITIONS, FLOORS, WALLS OR MEMBRANES. PROVIDE ALL FIRESTOPPING REQUIRED TO COMPLY WITH THE BUILDING CODE, THE ELECTRICAL CODE AND THE UL LISTING OF EACH ASSEMBLY. COORDINATE LOCATIONS AND TYPES OF MEMBRANES WITH ARCHITECT.

SEISMIC RESTRAINT NOTE

A. GENERAL: IT IS THE INTENT OF THIS SEISMIC SPECIFICATION TO KEEP ALL ELECTRIAL BUILDING SYSTEM COMPONENTS IN PLACE DURING A SEISMIC EVENT. ALL ELECTRICAL SYSTEMS MUST BE INSTALLED IN STRICT ACCORDANCE WITH SEISMIC CODES, COMPONENT MANUFACTURER'S AND BUILDING CONSTRUCTION STANDARDS. WHENEVER A CONFLICT OCCURS BETWEEN THE MANUFACTURER'S OR CONSTRUCTION STANDARDS, THE MOST STRINGENT SHALL APPLY.

B. THIS CONTRACTOR SHALL ENGAGE A PROFESSIONAL STRUCTURAL ENGINEER REGISTERED IN THE JURISDICTION OF THIS PROJECT TO REVIEW THE ENTIRE INSTALLATION TO DETERMINE ALL SEISMIC RESTRAINT REQUIREMENTS AND METHODS. CONTRACTOR SHALL SUBMIT A REPORT OUTLINING THE STRUCTURAL ENGINEER'S REVIEW AS WELL AS SEISMIC RESTRAINT SHOP DRAWINGS AND SUPPORTING CALCULATIONS PREPARED BY THE PROFESSIONAL STRUCTURAL ENGINEER FOR REVIEW BY THE ARCHITECT.

C. SEISMIC RESTRAINTS SHALL BE DESIGNED IN ACCORDANCE WITH SEISMIC FORCE LEVELS AS DETAILED IN THE APPLICABLE BUILDING CODE.

1. ALL EQUIPMENT, CONDUIT AND PULL BOXES SHALL BE ADEQUATELY RESTRAINED TO RESIST SEISMIC FORCES. RESTRAINT DEVICES SHALL BE DESIGNED AND SELECTED TO MEET SEISMIC REQUIREMENTS AS DEFINED IN THE LATEST ISSUE OF THE BOCA NATIONAL BUILDING CODE IN ACCORDANCE WITH THE APPLICABLE SEISMIC ZONE.
2. ANCHOR BOLT CALCULATORS, SIGNED AND STAMPED BY A REGISTERED PROFESSIONAL ENGINEER, SHALL BE SUBMITTED SHOWING ADEQUACY OF THE BOLT SIZING AND TYPE. STAMPED CALCULATIONS SHALL ALSO BE FURNISHED FOR ANCHORS ON RESTRAINT DEVICES, CABLES, ISOLATORS AND RIGIDLY MOUNTED EQUIPMENT.

GENERAL ELECTRICAL SPECIFICATIONS

1. FURNISH LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR THE PROPER AND COMPLETE INSTALLATION OF ALL ELECTRIC WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED. REFER TO THE TENANT'S LEASE INFORMATION FOR SPECIFIC REQUIREMENTS. THE TENANT'S LEASE INFORMATION SHALL SUPERCEDE THIS SPECIFICATIONS WHERE A CONFLICT OCCURS BETWEEN THE TWO.
2. ALL ITEMS NOT SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE ELECTRICAL INSTALLATION, SHALL BE FURNISHED AND INSTALLED AS PART OF THIS PROJECT.
3. ALL ELECTRICAL INSTALLATIONS AND GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE LOCAL, STATE AND NATIONAL CODES.
4. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS.
5. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KIND AND IN FULL ACCORDANCE WITH THE MOST MODERN ELECTRICAL CONSTRUCTION STANDARDS. ALL MATERIAL SHALL BE NEW, UNLESS OTHERWISE NOTED AND FREE OF ANY DEFECTS.
6. THE ELECTRICAL CONTRACTOR SHALL CLEAN AT THE END OF EACH DAY ALL AREAS WORKED IN. EMPTY BOXES, RUBBISH, AND OTHER CONSTRUCTION MATERIALS OF NO USE SHALL BE REMOVED FROM THE BUILDING.
7. ALL WORK SEQUENCES SHALL BE COORDINATED WITH THE ARCHITECT AND SHALL BE COORDINATION WITH OTHER BUILDING TRADES AND ARCHITECTS BUILDING SCHEDULES.
8. ALL BRANCH CIRCUITS RATED AT 120 VOLTS, 20 AMPERES EXCEEDING 75 FEET SHALL BE MINIMUM #10 AWG.
9. ALL EQUIPMENT AND INSTALLATION OF ELECTRICAL EQUIPMENT SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE.
10. FURNISH AND INSTALL TEMPORARY POWER AS REQUIRED TO OPERATE TOOLS AND LIGHTING. PROVIDE PANELS AND LIGHTING FIXTURES FOR CONSTRUCTION AS NEEDED.
11. THE ELECTRICAL CONTRACTOR (E.C.) SHALL INSPECT THE SITE, PRIOR TO SUBMITTING HIS BID, AND SHALL INVESTIGATE ALL CONDITIONS UNDER WHICH THIS WORK SHALL BE PREFORMED. FAILURE TO INSPECT EXISTING CONDITIONS OR TO FULLY UNDERSTAND THE WORK WHICH REQUIRED SHALL NOT EXCUSE THE E.C. FROM HIS OBLIGATIONS TO SUPPLY AND INSTALL THE WORK IN ACCORDANCE WITH THE SPECIFICATIONS AND THE DRAWINGS AND UNDER ALL SITE CONDITIONS AS THEY EXIST.
12. THE PLANS DEPICT THE LOCATION OF ALL FIXTURE AND EQUIPMENT AND ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK, LAYOUT AND QUALITY OF WORKMANSHIP. THEY ARE NOT INTENDED FOR THE PURPOSE OF EXECUTION OF THE WORK, BUT THE CONTRACTOR SHALL UNDERSTAND THAT SUCH DETAILS ARE PART OF THE WORK.
13. THE ELECTRICAL CONTRACTOR SHALL CAREFULLY VERIFY ALL MEASUREMENTS AT THE SITE AND DETERMINE THE EXACT LOCATION OF ALL CHASES AND OPENINGS REQUIRED BY THIS WORK AND SHALL PROVIDE ALL SLEEVES, INSERTS, AND HANGERS REQUIRED.
14. BRANCH CIRCUITS ADDED TO ANY EXISTING PANELBOARDS SHALL ALSO INCLUDE THE CIRCUIT BREAKER DIRECTORY TO BE UPDATED. IF NO DIRECTORY EXISTS THAN ONE SHALL BE PROVIDED INDICATING THE NEW CIRCUITS ADDED.
15. WIRE AND CABLE FOR BRANCH CIRCUITS SHALL BE TYPE THWN/THHN, INSULATED FOR 600VOLTS, RATED AT 75°C MINIMUM AND UL LISTED FOR BUILDING WIRE USE. WIRE SIZE SHALL BE A MINUMUM OF #12 AWG SOLID. ALL CONDUCTORS SHALL BE COPPER. ALL WIRING SHALL BE CONCEALED AND INSTALLED IN RACEWAY. RACEWAYS SHALL BE E.M.T. WITH STEEL SET SCREW FITTINGS. METAL-CLAD CABLE TYPE MC CABLE MAY BE USED IN AREAS WHERE APPROVED BY THE LOCAL WIRING INSPECTOR.
16. FIRE ALARM SYSTEM WIRING SHALL BE CONCEALED AND INSTALLED IN RACEWAY. RACEWAYS SHALL BE E.M.T. WITH STEEL SET SCREW FITTINGS WITH INSULATED THROAT. FIRE ALARM METAL-CLAD CABLE TYPE MC CABLE MAY BE USED IN AREAS WHERE APPROVED BY THE LOCAL WIRING INSPECTOR. THE MINIMUM WIRE SIZE FOR FIRE ALARM WIRING SHALL BE #14 AWG. ALL SPLICES SHALL BE MADE ON SCREW TYPE TERMINAL STRIPS. WIRE NUTS SHALL NOT BE USED. T-TAPPING OF FIRE ALARM WIRING SHALL NOT BE ALLOWED.
17. RED PAINTED TERMINAL CABINETS AND BOXES WITH LOCKABLE COVERS SHALL BE PROVIDED AT ALL JUNCTION POINTS FOR FIRE ALARM SYSTEM WIRING.
18. ADDITIONAL JUNCTION BOXES BEYOND THOSE SHOWN ON THE DRAWINGS SHALL BE PROVIDED AS NECESSARY FOR ALL ELECTRICAL INSTALLATIONS.
19. ALL CUTTING, PATCHING AND FIRESTOPPING FOR ELECTRICAL INSTALLATIONS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
20. PROVIDE CONDUIT SLEEVES FILLED WITH AN APPROVED FIRE RESISTANT MATERIAL WHERE FIRE RATED WALLS, FLOORS OR CEILINGS ARE PENETRATED. APPROVED WATERTIGHT CONDUIT SLEEVES SHALL BE PROVIDED WHERE WALLS ARE PENETRATED EITHER ENTERING OR LEAVING THE BUILDING.
21. RECEPTACLES, LIGHT FIXTURES, AND POWER ITEMS BRANCH CIRCUIT WIRING MAY NOT BE SHOWN BUT SHALL BE PROVIDED AS REQUIRED. MINIMUM WIRING SHALL BE 2#12 PLUS 1#12GROUND IN 3/4"C. NO MORE THAN THREE PHASES MAY BE COMBINED IN A SINGLE HOMERUN AND EACH PHASE SHALL BE PROVIDED WITH AN INDIVIDUAL NEUTRAL.
22. ALL CONDUITS SHALL CONTAIN A GREEN SAFETY GROUND WIRE. BOND ALL PANELS, CABINETS, ENCLOSURES, CONDUITS, ETC., AS REQUIRED PER CODE.
23. ALL SUPPORTS AND ANCHORS SHALL BE DESIGNED AND INSTALLED PER REQUIREMENTS FOR THE SEISMIC CLASSIFICATIONS AS OUTLINED IN THE APPLICABLE BUILDING CODE. SITE LOCATION AND PREVAILING ORIENTATION SHALL BE TAKEN INTO ACCOUNT IN THE DESIGN.

SUBMIT SIX (6) COPIES FOR REVIEW AND APPROVAL OF THE FOLLOWING SHOP DRAWINGS: LIGHTING FIXTURES, WIRING DEVICES, RACEWAY, POKE-THRU DEVICES AND BUILDING WIRE & CABLE.

ABBREVIATIONS

A	AMPERES	FLR	FLOOR	NTS	NOT TO SCALE
ADA	AMERICANS WITH DISABILITIES ACT	G.C.	GENERAL CONTRACTOR	"NL"	UNSWITCHED, "NITE-LIGHT"
AMPS	AMPERES	GFCI	GROUND FAULT CIRCUIT INTERUPTER.	P	POLE
AFF	ABOVE FINISHED FLOOR	G	GROUND	PNL	PANEL
A/C	AIR CONDITIONING	GND	GROUND	TBD	*"TO BE DETERMINED"*, BY OTHERS, IN FIELD.
AWG	AMERICAN WIRE GAGE	HVAC	HEATING, VENTILATING, & & AIR CONDITIONING	TYP	TYPICAL
BLDG.	BUILDING	JB	JUNCTION BOX	UL	UNDERWRITERS LABATORY
C	CONDUIT	KVA	KILOVOLT AMPERES	UON	UNLESS OTHERWISE NOTED
CLG	CEILING	KW	KILOWATT	V	VOLTS
DN	DOWN	LTG	LIGHTING	W	WATTS
DWG	DRAWING	MAX	MAXIMUM	WH	WATER HEATER
E.C.	ELECTRICAL CONTRACTOR	MECH	MECHANICAL	WP	WEATHER-PROOF
EPO	EMERGENCY POWER OFF	MIN	MINIMUM	℄	CENTERLINE
EQ	EQUAL	MTD	MOUNTED	F.A.	FIRE ALARM
ER	EXISTING TO BE REMOVED	NAC	F.A. NOTIFICATION APPLIANCE CIRCUIT EXPANDER PANEL	FACP	FIRE ALARM CONTROL PANEL
ERN	EXISTING TO REMAIN				
ERL	EXISTING TO BE RE-LOCATED				

CERTIFICATION :

RAYMOND W. DUSSEAULT III
SEAL OF RHODE ISLAND
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

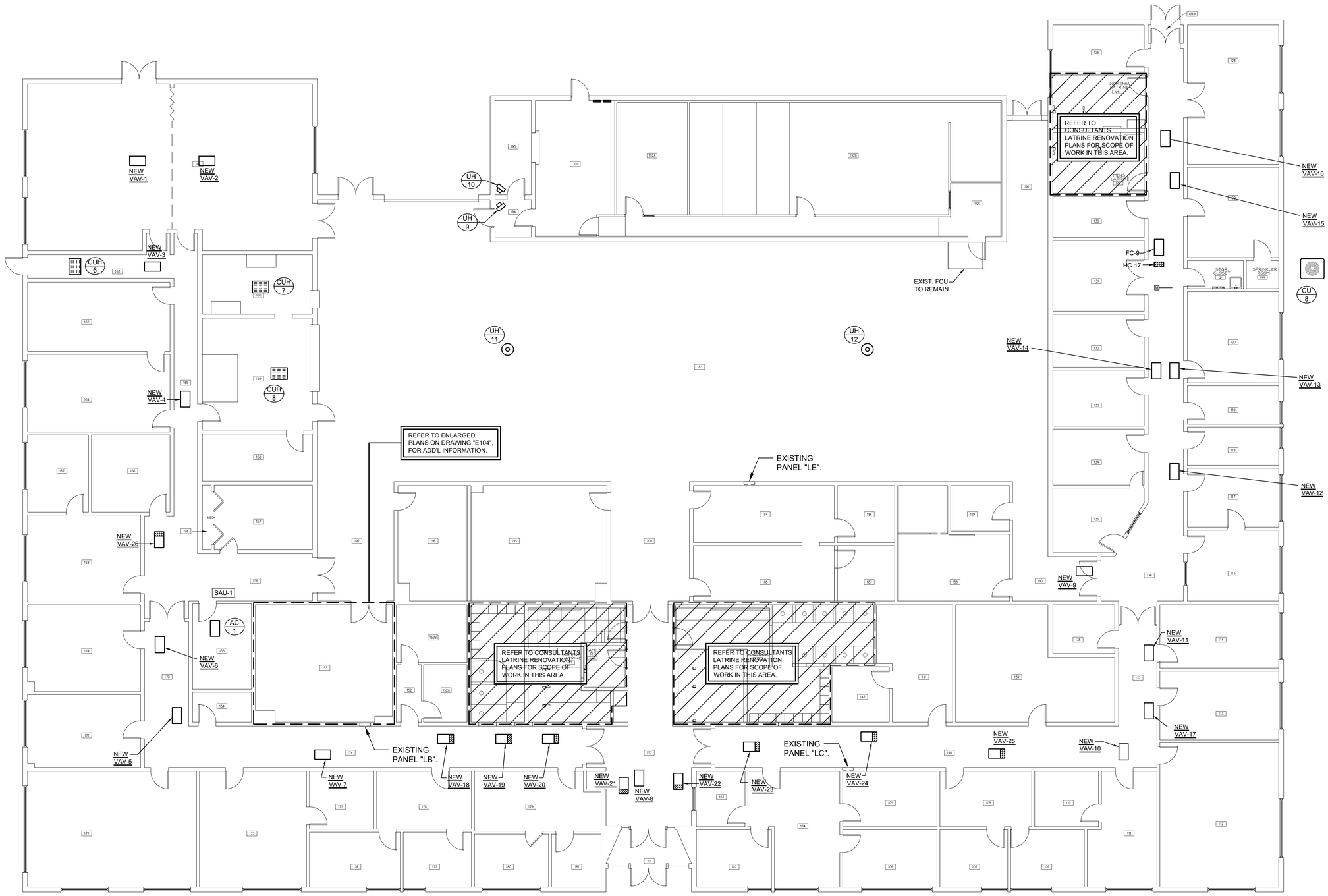
SHEET TITLE:

ELECTRICAL
LEGEND, DETAILS & NOTES

JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:

E100



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MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

TYPICAL NOTES

ALL NEW 120 VOLT FAN POWERED VAV BOXES SHALL BE TIED INTO DEMOLISHED FAN POWERED VAV BOX EXISTING CIRCUITRY. E.C. SHALL EXTEND WIRING AS REQUIRED. COORDINATE EXACT LOCATION WITH MECHANICAL DRAWINGS & MECHANICAL CONTRACTOR.

ALL LOW VOLTAGE VAV BOXES' ELECTRICAL WIRING SHALL BE PROVIDE & INSTALLED BY MECHANICAL CONTRACTOR.

01
E101

ELECTRICAL NEW WORK - FLOOR PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED
PROFESSIONAL ENGINEER
(ELECTRICAL)

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ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
NEW WORK FLOOR PLAN
BUILDING 1

JOB NO.: 16096RS

DRAWN BY: T.M.W.

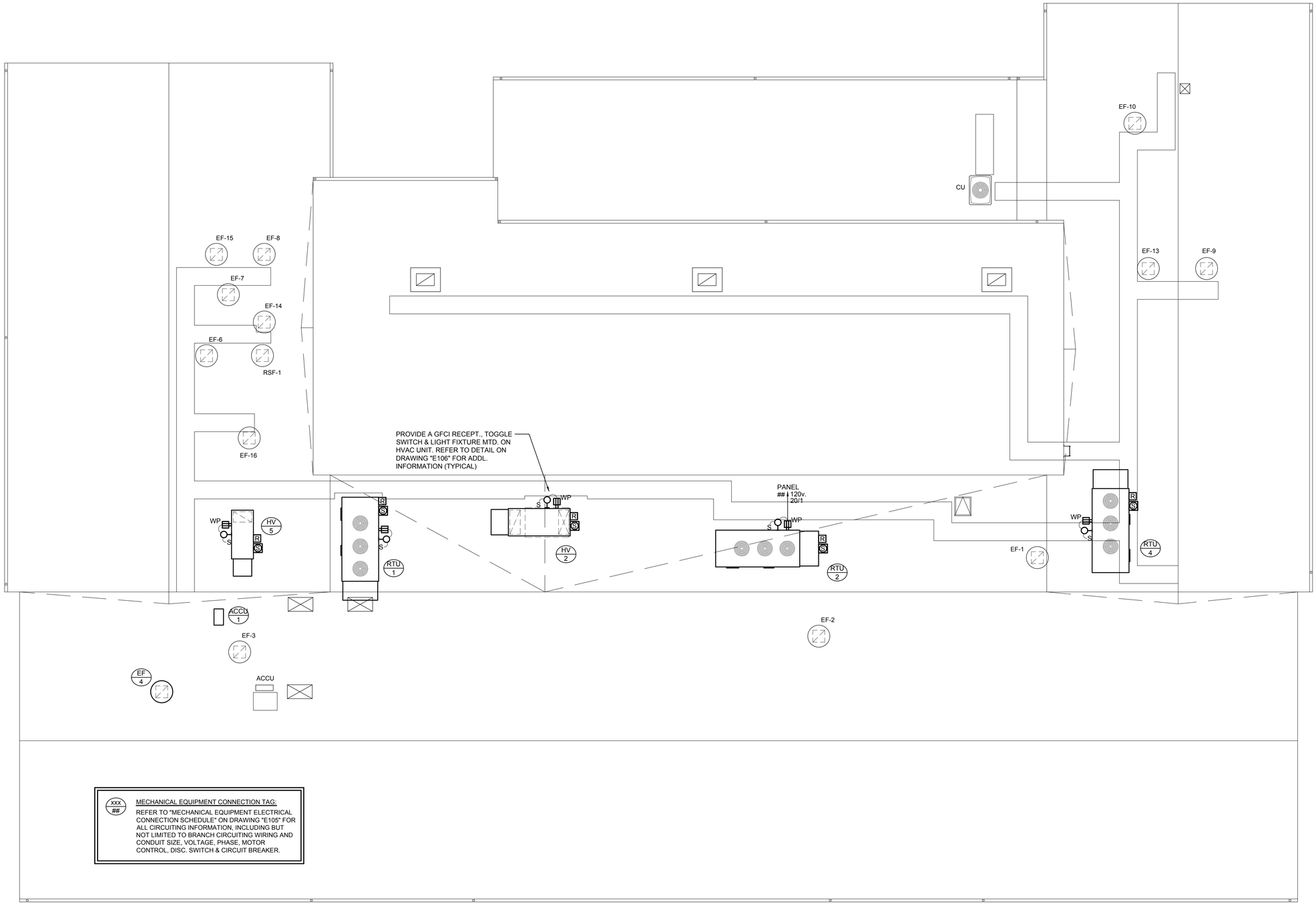
CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

E101



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MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

01 / E102

ELECTRICAL NEW WORK - ROOF PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III

STATE OF RHODE ISLAND

No. 7139

REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

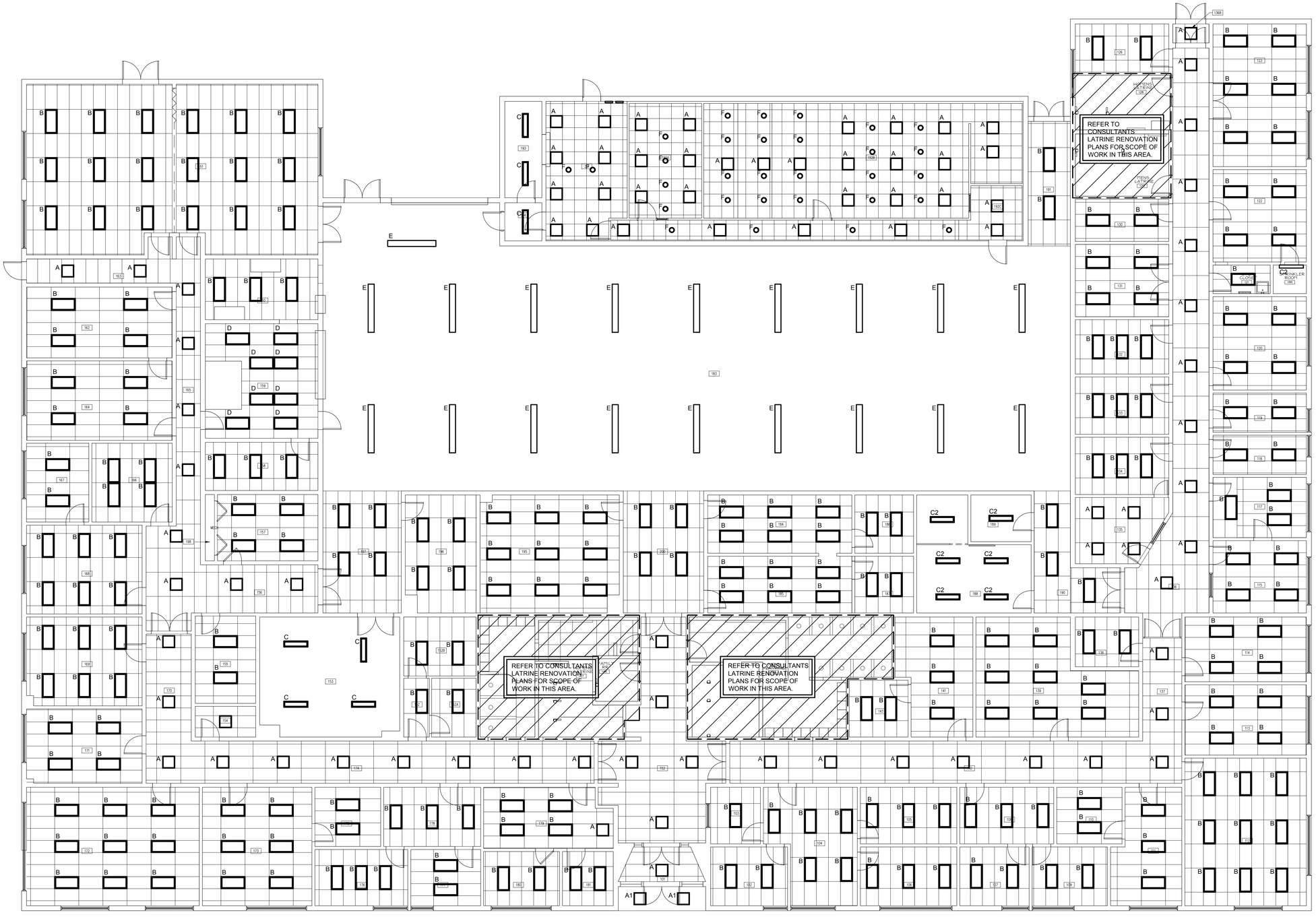
SHEET TITLE:

ELECTRICAL
NEW WORK ROOF PLAN
BUILDING 1

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

E102



LIGHTING NOTE:

CONTRACTOR SHALL PROVIDE & INSTALL NEW LIGHTING FIXTURES AS SHOWN ON THIS DRAWING. NEW FIXTURE SHALL BE INSTALLED IN NEW DROP CEILING ASSEMBLY OR SURFACE / PENDANT HUNG AS NOTED IN LIGHTING FIXTURE SCHEDULE. NEW FIXTURES SHALL BE TIED INTO EXISTING ROOMS / AREAS LIGHTING CIRCUITRY & SWITCHING. ANY NEW WIRING, CIRCUITRY & RACEWAYS SHALL MATCH EXISTING ELECTRICAL INSTALLATIONS. (TYPICAL)

01 / E103 ELECTRICAL NEW WORK - LIGHTING PLAN - BUILDING 1

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

CERTIFICATION :

RAYMOND W. DUSSEAULT III

No. 7139

REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
NEW WORK LIGHTING PLAN
BUILDING 1

JOB NO.: 16096RS

DRAWN BY: T.M.W.

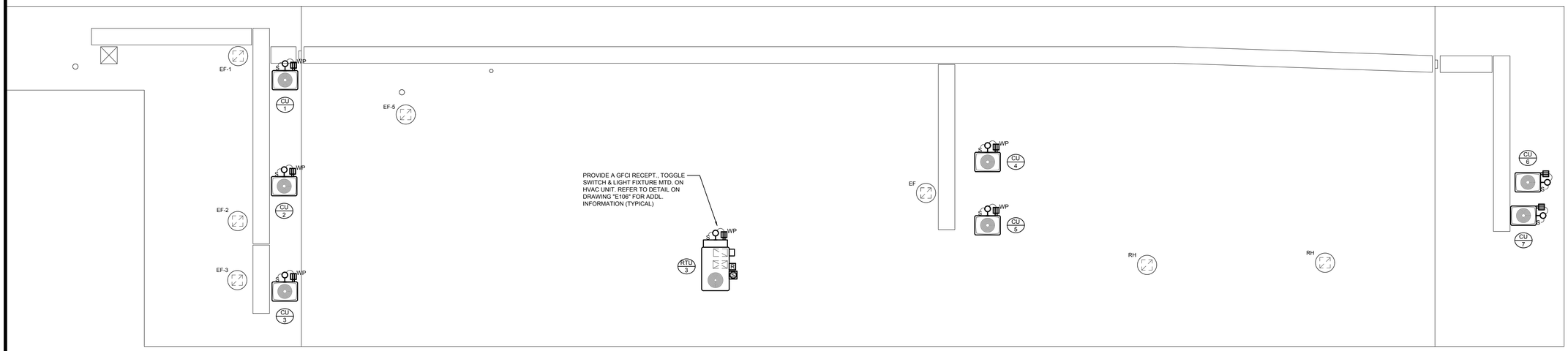
CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

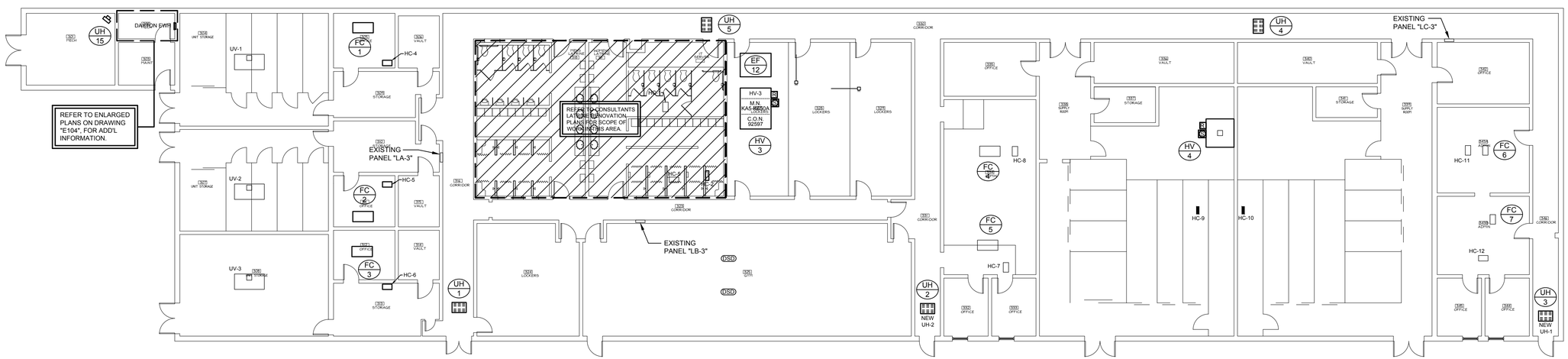
E103



01
E103

ELECTRICAL NEW WORK - ROOF PLAN - BUILDING 3

SCALE: 1" = 10'-0"



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MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

02
E103

ELECTRICAL NEW WORK - FLOOR PLAN - BUILDING 3

SCALE: 1" = 10'-0"

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED
PROFESSIONAL ENGINEER
(ELECTRICAL)

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141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

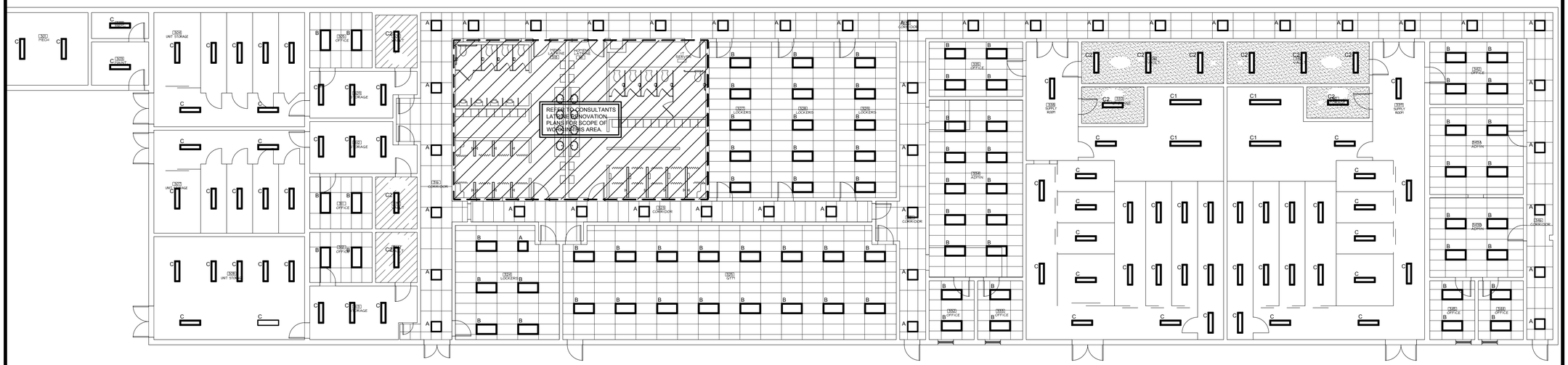
SHEET TITLE:

ELECTRICAL
NEW WORK FLOOR & ROOF PLAN
BUILDING 3

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

E104



02
E105

ELECTRICAL NEW WORK - LIGHTING PLAN - BUILDING 3

SCALE: 1" = 10'-0"

LIGHTING NOTE:

CONTRACTOR SHALL PROVIDE & INSTALL NEW LIGHTING FIXTURES AS SHOWN ON THIS DRAWING. NEW FIXTURE SHALL BE INSTALLED IN NEW DROP CEILING ASSEMBLY OR SURFACE / PENDANT HUNG AS NOTED IN LIGHTING FIXTURE SCHEDULE. NEW FIXTURES SHALL BE TIED INTO EXISTING ROOMS / AREAS LIGHTING CIRCUITRY & SWITCHING. ANY NEW WIRING, CIRCUITRY & RACEWAYS SHALL MATCH EXISTING ELECTRICAL INSTALLATIONS. (TYPICAL)

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOG No.	MOUNTING	LAMPING			VOLTAGE	DESCRIPTION / REMARKS
				TYPE	WATTAGE	QUANTITY		
A	LG	LGE-2X2SC-32-35-3200-TB	RECESSED	LED	-	1	120	2' X 2' RECESSED DIRECT / INDIRECT TROFFER WITH LED MODULE.
B	LG	LGE-2X4SC-40-35-4000-TB	RECESSED	LED	-	1	120	2' X 4' RECESSED DIRECT / INDIRECT TROFFER WITH LED MODULE.
C	VX LIGHTING	ESI-8'-VX-25W-LED-FSP-211	PENDANT	LED	-	1	120	4'-0" SUSPENDED STRIP WITH ACRYLIC LENSE AND LED MODULE.
C1	VX LIGHTING	ESI-8'-VX-25W-LED-FSP-211	PENDANT	LED	-	1	120	8'-0" SUSPENDED STRIP WITH ACRYLIC LENSE AND LED MODULE.
C2	VX LIGHTING	ESI-8'-VX-25W-LED-FSP-211	SURFACE	LED	-	1	120	4'-0" SURFACE MOUNTED STRIP WITH ACRYLIC LENSE AND LED MODULE.
D	LG	LGE-2X4SC-40-35-4000-TB	RECESSED	LED	-	1	120	2' X 4' RECESSED TROFFER SUITABLE FOR WET-LOCATION WITH TRIPLE GASKETING AND LED MODULE.
E	FLEX LIGHTING	ES40S-A1-23K-4MS-40-80-CL-LV-CRM-OCC20-CW-10V	SURFACE	LED	-	1	120	8'-0" SUSPENDED STRIP WITH WIRE GUARD AND LED MODULE.
F	GE LIGHTING	SIMPLICITY	RECESSED	LED	-	1	120	6" RECESSED DOWNLIGHT, (REPLACE EXISTING LAMPING WITH NEW LED LAMPING).

NOTES:
1. PROVIDE ACCESSORIES AND MOUNTING HARDWARE AS REQUIRED FOR ALL FIXTURES.
2. ALL FIXTURE/ACCESSORY COLORS NOT INDICATED ON DRAWING'S SHALL BE SELECTED BY ARCHITECT.
3. PROVIDE LAMPING FOR ALL FIXTURES UNLESS LAMPING IS INCLUDED WITH FIXTURE AS INDICATED IN SCHEDULE.
4. PROVIDE TYPICAL UNIT MOCK UP FOR LIGHT FIXTURE HANGING HEIGHTS AND EXPOSED ELECTRICAL CONDUIT LAYOUT TO BE REVIEWED BY ARCHITECT.
5. FIXTURE TO BE WIRED TO PHOTO CELL AND TIME CLOCK PROVIDED BY G.C.
6. ALL LIGHT FIXTURES WITH INCANDESCENT LAMPING SHALL BE PROVIDED W/ CFL/LED LAMP IN LIEU OF INCANDESCENT LAMP.
7. CBA = COLOR TO BE SELECTED BY ARCHITECT (THE ELECTRICAL CONTRACTOR SHALL VERIFY COLOR & FINISH WITH ARCHITECT PRIOR TO SUBMITTAL OF SHOP DRAWINGS.
8. CC = CUSTOM COLOR TO BE SELECTED BY ARCHITECT (THE ELECTRICAL CONTRACTOR SHALL VERIFY CUSTOM COLOR & FINISH WITH ARCHITECT PRIOR TO SUBMITTAL OF SHOP DRAWINGS.

CERTIFICATION :

RAYMOND W. DUSSEAULT III
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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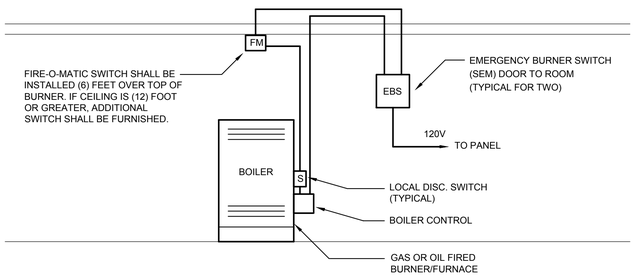
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
ELECTRICAL
NEW WORK LIGHTING PLAN
BUILDING 3

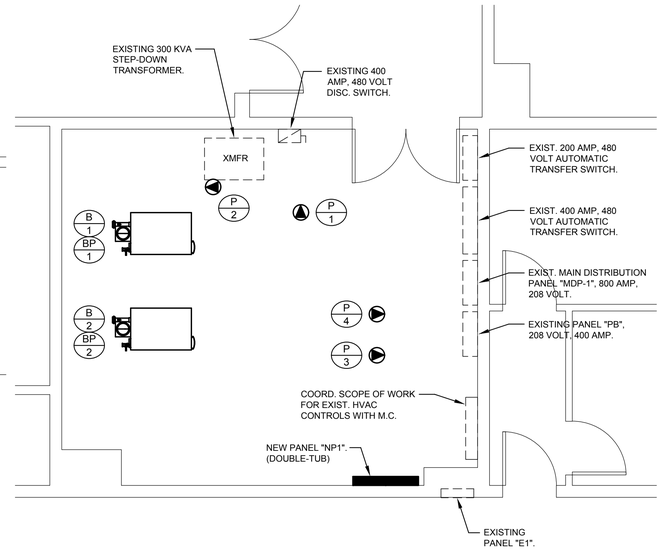
JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
E105



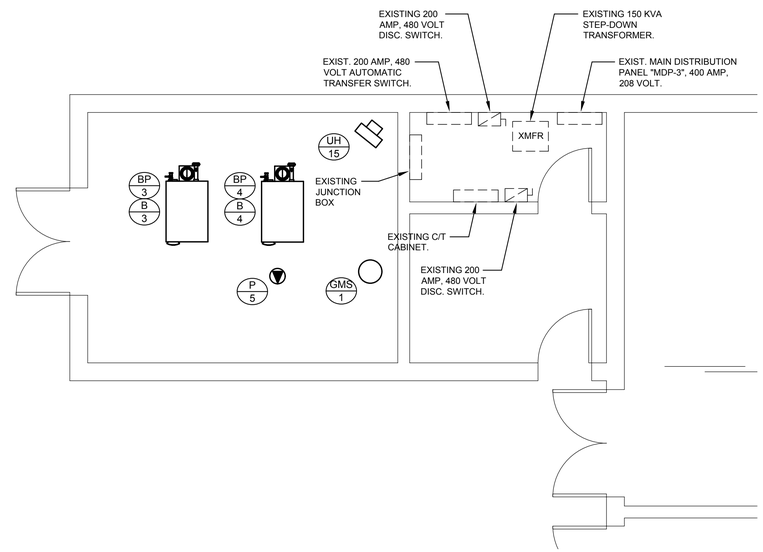
TYPICAL BOILER FIRE-O-MATIC SWITCH DETAIL

NOT TO SCALE



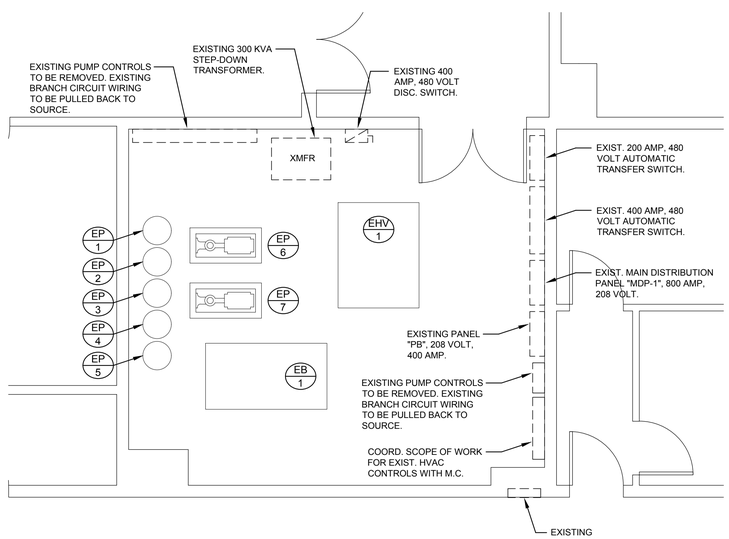
NEW WORK ELECTRIC / MECHANICAL ROOM PART PLAN - BUILDING 1

03 / E104 SCALE: 1/4" = 1'-0"



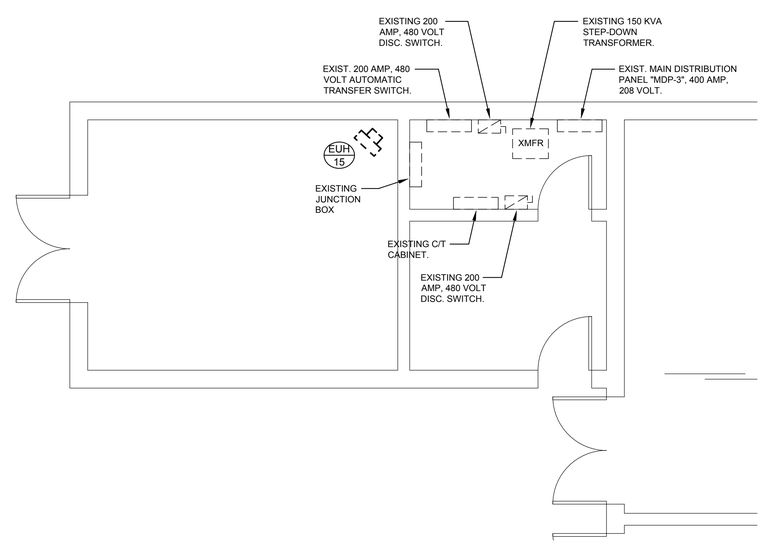
NEW WORK ELECTRIC / MECHANICAL ROOM PART PLAN - BUILDING 3

04 / E104 SCALE: 1/4" = 1'-0"



EXISTING ELECTRIC / MECHANICAL ROOM PART PLAN - BUILDING 1

01 / E104 SCALE: 1/4" = 1'-0"



EXISTING ELECTRIC / MECHANICAL ROOM PART PLAN - BUILDING 3

02 / E104 SCALE: 1/4" = 1'-0"

xxx / ##

MECHANICAL EQUIPMENT CONNECTION TAG:

REFER TO "MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE" ON DRAWING "E105" FOR ALL CIRCUITING INFORMATION, INCLUDING BUT NOT LIMITED TO BRANCH CIRCUITING WIRING AND CONDUIT SIZE, VOLTAGE, PHASE, MOTOR CONTROL, DISC. SWITCH & CIRCUIT BREAKER.

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
BUILDING 1 & 3 ELECTRIC ROOM PART PLANS

JOB NO.: 16096RS

DRAWN BY: T.M.W.

CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

E106

BUILDING 1 - MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE

XXX ## ITEM No.	DESCRPITION	LOCATION	EQUIPMENT CHARACTERISTICS VOLTS	PH	FREQ.	(KW) / HP	FLA	CIRCUIT	CIRCUIT BREAKER (HACR TYPE)	FEEDER & CONDUIT	DISCONNECT SWITCH SIZE	FUSE	POLES	NEMA	MANUAL MOTOR CONTROLLER	REMARKS
ERTU-1	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "MDP-1"	175A/3P	(EXISTING)	-	-	-	-	(EXISTING)	EXISTING MECHANICAL EQUIPMENT SCHEDULE TO BE REMOVED AND/OR REPLACED (BY OTHERS). E.C. SHALL REMOVE ALL EXISTING POWER WIRING FOR EQUIPMENT AND PULL BACK TO SOURCE (PANEL / BREAKER). ANY EXISTING WIRING FOUND TO MATCH THE ELECTRICAL CHARACTERISTICS OF THE REPLACEMENT EQUIPMENT INDICATED BELOW SHALL REMAIN AND BE RE-USED. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING WIRING, BREAKERS, DISCONNECT MEANS, ETC. COORDINATE TIME OF WORK WITH OTHER TRADES. (TYPICAL)
ERTU-2	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "MDP-1"	200A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
EHV-1	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "PB"	20A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
EHV-2	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "PB"	20A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
EHV-5	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "PB"	20A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-8	CONDENSING UNIT - "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "PB"	60A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-9	CONDENSING UNIT - "EXISTING"	(SEE PLANS)	208	3	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-6	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-7	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-8	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-9	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-10	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-11	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LE"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-11	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LE"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EB-1	BOILER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-1	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-2	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-3	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-4	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-5	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-6	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EP-7	BOILER "PUMP"	(SEE PLANS)	208	3	60	-	-	PNL. "PB"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EEF-4	EXHAUST FAN	(SEE PLANS)	120	1	60	-	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
RTU-1	ROOF TOP UNIT "NEW"	(ROOF)	208	3	60	-	94.3	PNL. "MDP-1"	110A/3P	3#1+1#8GND IN 1-1/4" CONDUIT	125	125	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	PROVIDE & INSTALL NEW WIRING AS INDICATED, UNLESS ANY EXISTING WIRING DETERMINED TO MATCH THE REQUIREMENTS OF THE REPLACEMENT EQUIPMENT INDICATED AT SUCH POINT EXISTING WIRING SHALL REMAIN AND BE RE-USED. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING WIRING, BREAKERS, DISCONNECT MEANS, ETC. COORDINATE TIME OF WORK WITH OTHER TRADES. (TYPICAL)
RTU-2	ROOF TOP UNIT "NEW"	(ROOF)	208	3	60	-	116.1	PNL. "MDP-1"	125A/3P	3#1/0+1#8GND IN 1-1/2" CONDUIT	125	125	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
RTU-4	ROOF TOP UNIT "NEW"	(ROOF)	208	3	60	-	116.1	PNL. "NP1"	125A/3P	3#1/0+1#8GND IN 1-1/2" CONDUIT	125	125	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
HV-2	HEATING UNIT "NEW"	(ROOF)	208	3	60	-	47.9	PNL. "PB"	60A/3P	3#4+1#10 GND IN 1" CONDUIT	60	60	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
HV-5	HEATING UNIT "NEW"	(ROOF)	208	3	60	-	8.7	PNL. "PB"	30A/3P	3#10+1#10 GND IN 3/4" CONDUIT	30	30	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CUH-6	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	1/15	-	??	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
CUH-7	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	1/15	-	??	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
CUH-8	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	1/15	-	??	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-9	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	9W	-	??	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-10	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	9W	-	??	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-11	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	1/20	-	PNL. "LE"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-12	UNIT HEATER "NEW"	(SEE PLANS)	-	1	60	1/20	-	PNL. "LE"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
B-1	BOILER	(SEE PLANS)	120	1	60	-	-	PNL. "NP1"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
B-2	BOILER	(SEE PLANS)	120	1	60	-	-	PNL. "NP1"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
BP-1	BOILER COND. PUMP	(SEE PLANS)	120	1	60	-	-	PNL. "NP1"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
BP-2	BOILER COND. PUMP	(SEE PLANS)	120	1	60	-	-	PNL. "NP1"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
P-1	PUMP	(SEE PLANS)	208	1	60	-	2.0	PNL. "NP1"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
P-2	PUMP	(SEE PLANS)	208	1	60	-	2.0	PNL. "NP1"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
P-3	PUMP	(SEE PLANS)	208	1	60	-	2.0	PNL. "NP1"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
P-4	PUMP	(SEE PLANS)	208	1	60	1.5	11.0	PNL. "NP1"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
EF-4	EXHAUST FAN	(SEE PLANS)	120	1	60	1/6	0.4	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
AC-1	SPLIT SYSTEM AIR CONDITIONER	(SEE PLANS)	208	1	60	-	1.0	LOCAL AREA PANEL. VERIFY EXACT CIRCUITS AVAILABLE.	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	INDOOR "AC" UNIT TO BE POWERED & CONTROLLED BY EXTERIOR MOUNTED CONDENSING UNIT. FIELD VERIFY EXACT WIRING WITH MANUFACTURER.
ACCU-1	SPLIT SYSTEM COND. UNIT	(SEE PLANS)	208	1	60	-	13.0			2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISCONNECT SWITCH WITH FUSING AS INDICATED.	

NOTES:

1. COORDINATE WITH HVAC CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS.
2. COORDINATE WITH PLUMBING CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL PLUMBING EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS.
3. ALL DISCONNECTING MEANS SHALL BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
4. ALL STARTERS, VFD'S ETC. SHALL BE SUPPLIED AND INSTALLED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL WIRE ALL HVAC EQUIPMENT.
5. ALL HVAC CONTROL WIRING SHALL BE PROVIDED BY OTHERS.

BUILDING 3 - MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE

XXX ## ITEM No.	DESCRPITION	LOCATION	EQUIPMENT CHARACTERISTICS VOLTS	PH	FREQ.	(KW) / HP	FLA	CIRCUIT	CIRCUIT BREAKER (HACR TYPE)	FEEDER & CONDUIT	DISCONNECT SWITCH SIZE	FUSE	POLES	NEMA	MANUAL MOTOR CONTROLLER	REMARKS
ECU-1	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LA-3"	40A/2P	(EXISTING)	-	-	-	-	(EXISTING)	EXISTING MECHANICAL EQUIPMENT SCHEDULE TO BE REMOVED AND/OR REPLACED (BY OTHERS). E.C. SHALL REMOVE ALL EXISTING POWER WIRING FOR EQUIPMENT AND PULL BACK TO SOURCE (PANEL / BREAKER). ANY EXISTING WIRING FOUND TO MATCH THE ELECTRICAL CHARACTERISTICS OF THE REPLACEMENT EQUIPMENT INDICATED BELOW SHALL REMAIN AND BE RE-USED. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING WIRING, BREAKERS, DISCONNECT MEANS, ETC. COORDINATE TIME OF WORK WITH OTHER TRADES. (TYPICAL)
ECU-2	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LA-3"	40A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-3	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LA-3"	40A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-4	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LB-3"	70A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-5	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LB-3"	50A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-6	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LC-3"	80A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
ECU-7	CONDENSING UNIT - "EXISTING"	(ROOF)	208	1	60	-	-	PNL. "LC-3"	20A/2P	(EXISTING)	-	-	-	-	(EXISTING)	
EHV-3	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "LB-3"	20A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
EHV-4	ROOF TOP UNIT "EXISTING"	(ROOF)	208	3	60	-	-	PNL. "LC-3"	20A/3P	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-1	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LA-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-2	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LB-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-3	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LC-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-4	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LC-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-5	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LB-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EUH-15	UNIT HEATER "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "MDP-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-1	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LA-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-2	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LA-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-3	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LA-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-4	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LB-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-5	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LB-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-6	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LC-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EFC-7	FAN COIL "EXISTING"	(SEE PLANS)	-	1	60	-	-	PNL. "LC-3"	??	(EXISTING)	-	-	-	-	(EXISTING)	
EEF-12	EXHAUST FAN	(SEE PLANS)	208	3	60	§	-	??	??	(EXISTING)	-	-	-	-	(EXISTING)	
CU-1	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	12.0	PNL. "LA-3"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	PROVIDE & INSTALL NEW WIRING AS INDICATED, UNLESS ANY EXISTING WIRING DETERMINED TO MATCH THE REQUIREMENTS OF THE REPLACEMENT EQUIPMENT INDICATED AT SUCH POINT EXISTING WIRING SHALL REMAIN AND BE RE-USED. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL EXISTING WIRING, BREAKERS, DISCONNECT MEANS, ETC. COORDINATE TIME OF WORK WITH OTHER TRADES. (TYPICAL)
CU-2	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	12.0	PNL. "LA-3"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CU-3	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	12.0	PNL. "LA-3"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CU-4	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	21.0	PNL. "LB-3"	35A/2P	2#8+1#10 GND IN 3/4" CONDUIT	60	35	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CU-5	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	12.0	PNL. "LB-3"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CU-6	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	21.0	PNL. "LC-3"	35A/2P	2#8+1#10 GND IN 3/4" CONDUIT	60	35	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
CU-7	CONDENSING UNIT - "NEW"	(ROOF)	208	1	60	-	12.0	PNL. "LC-3"	20A/2P	2#12+1#12 GND IN 3/4" CONDUIT	30	20	2	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
RTU-3	ROOF TOP UNIT "NEW"	(ROOF)	208	3	60	-	41.9	PNL. "MDP-3"	50A/3P	3#6+1#10 GND IN 3/4" CONDUIT	60	50	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
HV-3	HEATING UNIT "NEW"	(ROOF)	208	3	60	-	47.9	PNL. "LB-3"	60A/3P	3#4+1#10 GND IN 1" CONDUIT	60	60	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
HV-4	HEATING UNIT "NEW"	(ROOF)	208	3	60	-	8.7	PNL. "LC-3"	15A/3P	3#12+1#12 GND IN 3/4" CONDUIT	30	15	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
UH-1	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	1/15	-	PNL. "LA-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-2	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	1/15	-	PNL. "LB-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-3	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	1/15	-	PNL. "LC-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-4	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	1/15	-	PNL. "LC-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-5	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	1/15	-	PNL. "LB-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
UH-15	UNIT HEATER "NEW"	(SEE PLANS)	115	1	60	9W	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-1	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	4.0	PNL. "LA-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-2	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	4.0	PNL. "LA-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-3	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	4.0	PNL. "LA-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-4	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	5.0	PNL. "LB-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-5	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	4.0	PNL. "LB-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-6	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	5.0	PNL. "LC-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
FC-7	FAN COIL UNIT	(SEE PLANS)	208	1	60	-	4.0	PNL. "LC-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
EF-12	EXHAUST FAN	(SEE PLANS)	208	3	60	5	16.7	PNL. "MDP-3"	25A/3P	2#10+1#10 GND IN 3/4" CONDUIT	30	25	3	3R	PROVIDE "WP" DISC. SWITCH WITH FUSING AS INDICATED.	
B-3	BOILER	(SEE PLANS)	120	1	60	-	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
B-4	BOILER	(SEE PLANS)	120	1	60	-	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
BP-3	BOILER COND. PUMP	(SEE PLANS)	120	1	60	-	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
BP-4	BOILER COND. PUMP	(SEE PLANS)	120	1	60	-	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
P-5	PUMP	(SEE PLANS)	208	1	60	-	6.2	PNL. "MDP-3"	15A/2P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	
GMS-1	GLYCOL MAKE-UP SYSTEM	(SEE PLANS)	120	1	60	-	-	PNL. "MDP-3"	15A/1P	2#12+1#12 GND IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES	

NOTES:

1. COORDINATE WITH HVAC CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS.
2. COORDINATE WITH PLUMBING CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL PLUMBING EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS.
3. ALL DISCONNECTING MEANS SHALL BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
4. ALL STARTERS, VFD'S ETC. SHALL BE SUPPLIED AND INSTALLED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL WIRE ALL HVAC EQUIPMENT.
5. ALL HVAC CONTROL WIRING SHALL BE PROVIDED BY OTHERS.

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

ELECTRICAL
SCHEDULES & DETAILS

JOB NO.: 16096RS

DRAWN BY: T.M.W.

CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

E107

BUILDING 1 - BRANCH CIRCUIT PANELBOARD SCHEDULE

DESIGNATION	BUS AMPS	MAIN	LOCATION	VOLTAGE	PH	BREAKERS USED 1-POLE	BREAKERS USED 2-POLE	BREAKERS USED 3-POLE	BREAKERS SPARE 1-POLE	BREAKERS SPARE 2-POLE	BREAKERS SPARE 3-POLE	TOTAL POLES	MOUNTING	REMARKS
MDP-1	800A	MLO	(SEE PLANS)	208Y/120	3	REFER TO SCHEDULES ON ELECTRICAL DRAWING "E105" FOR BREAKER REQUIREMENTS OF NEW HVAC EQUIPMENT. NEW BREAKER'S SHALL MATCH EXISTING PANEL BOARD MANUF., SERIES, A.I.C. RATINGS, ETC.			-	-	-	42	SURFACE	EXISTING PANEL BOARD, PROVIDE NEW CIRCUIT BREAKER'S AS INDICATED FOR NEW HVAC EQUIPMENT. NEW BREAKER'S SHALL MATCH EXISTING PANEL BOARD MANUF., SERIES, A.I.C. RATINGS, ETC.
PB	300A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	SURFACE	
LB	50A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	
LC	90A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	
LE	125A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	
NP1	225A	225A	(SEE PLANS)	208Y/120	3	(4) 15A	(3) 15A, (1) 20A	(1) 125A - "RTU-4"	(5) 20A	-	-	42	SURFACE	NEW PANEL BOARD, NEW PANEL SHALL MATCH EXISTING PANEL BOARD MANUF., SERIES, A.I.C. RATINGS, ETC.

NOTES:

1. ALL PANELBOARDS SHALL BE PROVIDED WITH AN ENGRAVED NAMEPLATE ON THE DOOR INDICATING THE PANELBOARD DESIGNATION, VOLTAGE, RATING OF MCB OR MAIN LUGS AND SOURCE OF SUPPLY. ENGRAVED PLATE SHALL BE AS CALLED FOR IN THE SPECIFICATIONS.
2. ALL PANELBOARDS SHALL BE PROVIDED WITH A TYPED (HAND WRITTEN IS NOT ALLOWED) CIRCUIT DIRECTORY INDICATING THE LOAD FED BY EACH CIRCUIT BREAKER AND ITS LOCATION IN THE BUILDING.

BUILDING 3 - BRANCH CIRCUIT PANELBOARD SCHEDULE

DESIGNATION	BUS AMPS	MAIN	LOCATION	VOLTAGE	PH	BREAKERS USED 1-POLE	BREAKERS USED 2-POLE	BREAKERS USED 3-POLE	BREAKERS SPARE 1-POLE	BREAKERS SPARE 2-POLE	BREAKERS SPARE 3-POLE	TOTAL POLES	MOUNTING	REMARKS
MDP-3	400A	MLO	(SEE PLANS)	208Y/120	3	REFER TO SCHEDULES ON ELECTRICAL DRAWING "E105" FOR BREAKER REQUIREMENTS OF NEW HVAC EQUIPMENT. NEW BREAKER'S SHALL MATCH EXISTING PANEL BOARD MANUF., SERIES, A.I.C. RATINGS, ETC.			-	-	-	42	SURFACE	EXISTING PANEL BOARD, PROVIDE NEW CIRCUIT BREAKER'S AS INDICATED FOR NEW HVAC EQUIPMENT. NEW BREAKER'S SHALL MATCH EXISTING PANEL BOARD MANUF., SERIES, A.I.C. RATINGS, ETC.
LA-3	100A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	
LB-3	200A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	
LC-3	100A	MLO	(SEE PLANS)	208Y/120	3				-	-	-	42	RECESSED	

NOTES:

1. ALL PANELBOARDS SHALL BE PROVIDED WITH AN ENGRAVED NAMEPLATE ON THE DOOR INDICATING THE PANELBOARD DESIGNATION, VOLTAGE, RATING OF MCB OR MAIN LUGS AND SOURCE OF SUPPLY. ENGRAVED PLATE SHALL BE AS CALLED FOR IN THE SPECIFICATIONS.
2. ALL PANELBOARDS SHALL BE PROVIDED WITH A TYPED (HAND WRITTEN IS NOT ALLOWED) CIRCUIT DIRECTORY INDICATING THE LOAD FED BY EACH CIRCUIT BREAKER AND ITS LOCATION IN THE BUILDING.

MAIN: 225A/3P BUSSING: 225 AMP VOLTAGE: 208Y/120 PANEL: "NP1"

BASED ON 3-PHASE, 4-WIRE WIRING — TUB #1 (PROVIDE WITH FEED-THRU LUGS)

DESCRIPTION	LOAD (KVA) ØA	LOAD (KVA) ØB	LOAD (KVA) ØC	CKT. BRKR.	NO.	Ø	NO.	CKT. BRKR.	LOAD (KVA) ØA	LOAD (KVA) ØB	LOAD (KVA) ØC	DESCRIPTION
BOILER "B-1"	0.5			15/1	1	A	2	125/3	13.9			ROOF TOP UNIT, "RTU-4"
BOILER "B-2"		0.5		15/1	3	B	4			13.9		
BOILER "B-3"			0.5	15/1	5	C	6				13.9	
BOILER "B-4"	0.5			15/1	7	A	8	15/1	0.2			BOILER "B-1", CONDENSATE PUMP
PUMP "P-1"		0.2		15/2	9	B	10	15/1		0.2		BOILER "B-2", CONDENSATE PUMP
			0.2		11	C	12	15/1			0.2	BOILER "B-3", CONDENSATE PUMP
PUMP "P-2"	0.2			15/2	13	A	14	15/1	0.2			BOILER "B-4", CONDENSATE PUMP
		0.2			15	B	16	20/1		-		"SPARE"
PUMP "P-3"			0.2	15/2	17	C	18	20/1			-	"SPARE"
	0.2				19	A	20	20/1	-			"SPARE"
PUMP "P-4"		1.1		20/2	21	B	22	20/1		-		"SPARE"
			1.1		23	C	24	20/1			-	"SPARE"
					25	A	26					
					27	B	28					
					29	C	30					
					31	A	32					
					33	B	34					
					35	C	36					
					37	A	38					
					39	B	40					
					41	C	42					
	1.4	2.0	2.0	TOTAL / PHASE					14.3	14.1	14.1	

TOTAL (KVA) LOAD: 47.9

TOTAL (AMP) LOAD: 133.0

MAIN: M.L.O. BUSSING: 225 AMP VOLTAGE: 208Y/120 PANEL: "NP1"

BASED ON 3-PHASE, 4-WIRE WIRING — TUB #2

DESCRIPTION	LOAD (KVA) ØA	LOAD (KVA) ØB	LOAD (KVA) ØC	CKT. BRKR.	NO.	Ø	NO.	CKT. BRKR.	LOAD (KVA) ØA	LOAD (KVA) ØB	LOAD (KVA) ØC	DESCRIPTION
SPACE	-			-	43	A	44	-	-			SPACE
SPACE		-		-	45	B	46	-		-		SPACE
SPACE			-	-	47	C	48	-			-	SPACE
SPACE	-			-	49	A	50	-	-			SPACE
SPACE		-		-	51	B	52	-		-		SPACE
SPACE			-	-	53	C	54	-			-	SPACE
SPACE	-			-	55	A	56	-	-			SPACE
SPACE		-		-	57	B	58	-		-		SPACE
SPACE			-	-	59	C	60	-			-	SPACE
SPACE	-			-	61	A	62	-	-			SPACE
SPACE		-		-	63	B	64	-		-		SPACE
SPACE			-	-	65	C	66	-			-	SPACE
SPACE	-			-	67	A	68	-	-			SPACE
SPACE		-		-	69	B	70	-		-		SPACE
SPACE			-	-	71	C	72	-			-	SPACE
SPACE	-			-	73	A	74	-	-			SPACE
SPACE		-		-	75	B	76	-		-		SPACE
SPACE			-	-	77	C	78	-			-	SPACE
SPACE	-			-	79	A	80	-	-			SPACE
SPACE		-		-	81	B	82	-		-		SPACE
SPACE			-	-	83	C	84	-			-	SPACE
	-	-	-	TOTAL / PHASE					-	-	-	

TOTAL (KVA) LOAD: -

TOTAL (AMP) LOAD: -

LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE

CONDUCTOR AWG.	MAXIMUM CONDUCTOR LENGTH AT 120V	MAXIMUM CONDUCTOR LENGTH AT 277V	GROUND CONDUCTOR AWG.
#12	75'-0"	175'-0"	#12
#10	120'-0"	285'-0"	#10
#8	190'-0"	445'-0"	#10
#6	300'-0"	-	#10

LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES:

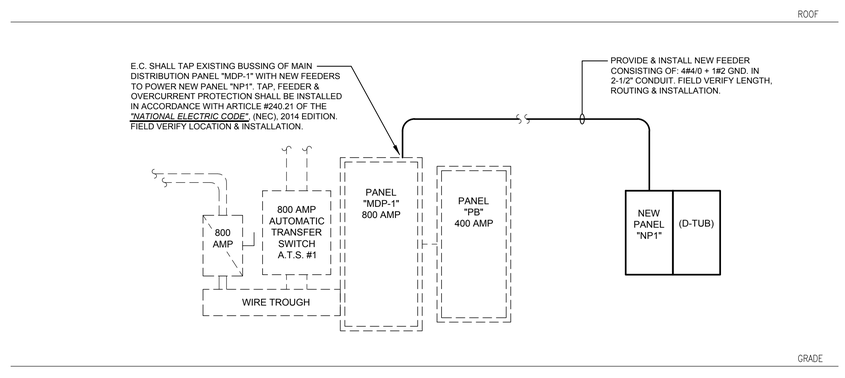
1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.
2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BASED FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP.
3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS REQUIRED.

RECEPTACLE BRANCH CIRCUIT WIRING SCHEDULE

CONDUCTOR AWG.	MAXIMUM CONDUCTOR LENGTH AT 120V	GROUND CONDUCTOR AWG.
#12	100'-0"	#12
#10	165'-0"	#10
#8	255'-0"	#10
#6	405'-0"	#10

RECEPTACLE BRANCH CIRCUIT WIRING SCHEDULE NOTES:

1. BASED ON 20A CIRCUIT LOADED TO 9A USING SINGLE PHASE, 2 WIRE CIRCUITS.
2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BASED FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP.
3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS REQUIRED.



"NEW WORK" POWER RISER DIAGRAM
BUILDING #1
NOT TO SCALE

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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	03.20.2018	ISSUED FOR CONSTRUCTION

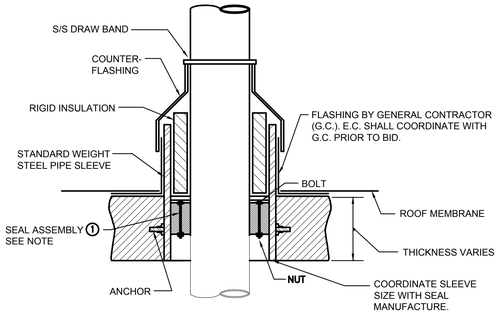
ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
ELECTRICAL SCHEDULES & DETAILS

JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

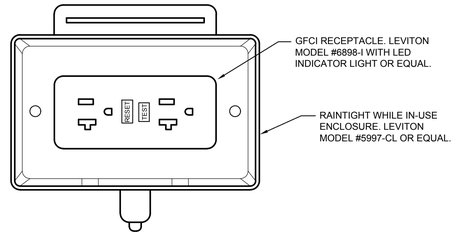
SHEET NO.:
E108



NOTE: 1 SEAL ASSEMBLY SHALL BE MODULAR MECHANICAL TYPE CONSISTING OF INTERLOCKING RUBBER LINK SHAPE TO CON-TENUOUSLY FILL IN THE ANNULAR SPACE BETWEEN PIPE OPENING. PRESSURE PLATES SHALL BE DELRIN PLASTIC. BOLTS AND NUTS SHALL BE 18.8 STAINLESS STEEL. SEALING ELEMENT SHALL BE EPDM RUBBER.

CONDUIT THRU ROOF DETAIL

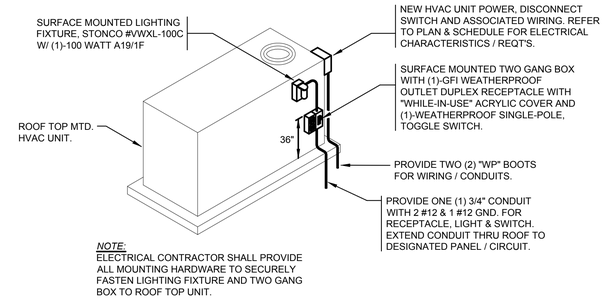
NOT TO SCALE



HORIZONTAL MOUNT

WEATHER-PROOF RECEPTACLE DETAIL

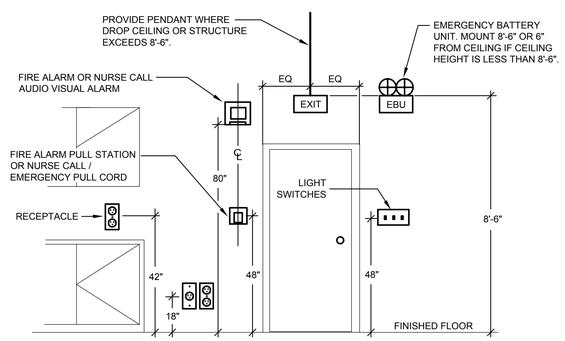
NOT TO SCALE



NOTE:
ELECTRICAL CONTRACTOR SHALL PROVIDE ALL MOUNTING HARDWARE TO SECURELY FASTEN LIGHTING FIXTURE AND TWO GANG BOX TO ROOF TOP UNIT.

TYPICAL MOUNTING INSTALLATION - ROOF TOP UNITS

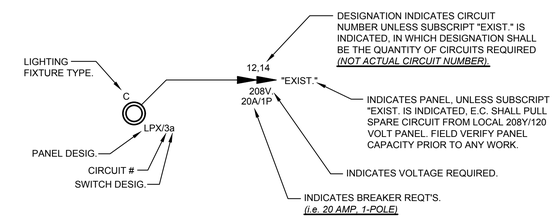
NOT TO SCALE



NOTE:
THIS DETAIL INDICATES CENTERLINE FOR FIRE ALARM/PULL STATION SWITCHES AND RECEPTACLES. HOWEVER THIS SAME CENTERLINE PRINCIPLE SHALL BE FOR ALL GROUP MTD. ELECTRICAL DEVICES. IF FIRE ALARM IS ON SAME SIDE OF DOOR AS SWITCHES, PULL STATION SHALL BE HORIZONTALLY SEPARATED BY A MINIMUM OF 18". THIS ELEVATION IS A GENERAL ARRANGEMENT OF OF DEVICES. ARCHITECT PLANS TAKE PRECEDENCE FOR EXACT LOCATIONS.

MOUNTING HEIGHT DETAIL

NOT TO SCALE



NOTES:

1. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN CONTRACT. INFORMATION AND COMPONENTS SHOWN ON RISER DIAGRAMS BUT NOT ON PLANS, AND VICE VERSA, SHALL APPLY OR SHALL BE PROVIDED AS THOUGH EXPRESSLY REQUIRED ON BOTH. IT IS NOT INTENDED THAT EVERY JUNCTION BOX, OFFSET, FITTING OR COMPONENT BE SPECIFIED OR SHOWN ON DRAWINGS; HOWEVER, CONTRACT DOCUMENTS REQUIRE PROVISION OF ALL COMPONENTS AND MATERIALS NECESSARY FOR COMPLETE AND OPERATIONAL ELECTRICAL INSTALLATION, WHETHER OR NOT INDICATED OR SPECIFIED.
2. BRANCH CIRCUIT WIRING MAY NOT BE GRAPHICALLY SHOWN ON DRAWINGS AND MAY BE SHOWN BY CIRCUIT NUMBERS BESIDE FIXTURES, DEVICES AND EQUIPMENT. PROVIDE COMPLETE WIRING SYSTEM WHETHER OR NOT SHOWN GRAPHICALLY. WIRING IS SHOWN BY CONDUIT RUNS ON DRAWINGS WHERE SPECIFIC ROUTING IS REQUIRED OR FOR OTHER SPECIAL REASONS. ONLY ROOMS WITH MULTIPLE SWITCHING HAVE "SWITCH CONTROL LETTERS" ASSIGNED. PROVIDE THHN CONDUCTORS IN AREAS WITH HIGH AMBIENT TEMPERATURES SUCH AS BOILER ROOMS, INCINERATOR ROOMS, MECHANICAL EQUIPMENT ROOMS ETC., FOR SIZES LARGER THAN NO. 10 AWG.

TYPICAL CIRCUITING DETAIL

NOT TO SCALE

CERTIFICATION :

RAYMOND W. DUSSEAULT III
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
ELECTRICAL DETAILS

JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
E109

FIRE ALARM NOTES

1. E.C. SHALL PROVIDE CIRCUIT BREAKER LOCK-ON DEVICES FOR FACP AND NAC POWER EXTENDER CIRCUITS.

2. E.C. SHALL FURNISH AND INSTALL REMOTE INDICATING LIGHTS/TEST SWITCHES FOR DUCT SMOKE DETECTORS AS WELL AS SMOKE DETECTOD LOCATED AT THE TOP OF THE ELEVATOR SHAFTS.

3. REFER TO FLOOR PLANS FOR EXACT NUMBER OF DEVICES & CANDELA RATINGS.

4. COLOR CODE PER NFPA, (LATEST EDITION).

5. ALL SPLICES SHALL BE MADE ON SCREW TYPE TERMINAL BLOCKS. NO WIRENUTS WILL BE ALLOWED.

6. RED PAINTED TERMINAL CABINETS & BOXES WITH LOCKABLE COVERS SHALL BE PROVIDED AT ALL JUNCTION POINTS.

7. AFC FIRE ALARM / CONTROL CABLE TYPE MC (UL LISTED) MAY BE USED ABOVE CEILINGS AND IN CONCEALED AREAS WHERE ACCEPTABLE TO THE LOCAL AUTHORITY HAVING JURISDICTION. OTHERWISE WIRING SHALL BE INSTALLED IN EMT CONDUIT. WIRING IN EXPOSED AREAS SHALL BE EMT, E.C. SHALL PROVIDE AN ALTERNATE TO PAINT PER ARCHITECTS DIRECTION.

8. THE CONTRACTOR AT COMPLETION OF THE FIRE ALARM SYSTEM SHALL TEST THE ENTIRE SYSTEM PER THE LOCAL FIRE DEPARTMENTS REQUIREMENTS. THE CONTRACTOR SHALL REPLACES OR FIX ANY PART OF THE SYSTEM NOT PROPERLY WORKING.

9. ALL WIRING SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. E.C. SHALL TAKE INTO ACCOUNT VOLTAGE DROP. (TYPICAL)

10. ALL FIRE ALARM SYSTEM COMPONENTS & MOUNTING HEIGHTS SHALL COMPLY WITH ADA REQUIREMENTS.

11. E.C. SHALL PROVIDE ANY AND ALL AUXILIARY EQUIPMENT IN ORDER TO PROVIDE A COMPLETE, PROPERLY FUNCTIONING SYSTEM. COORDINATE REQUIREMENTS WITH LOCAL MANUFACTURERS REP.

12. ALL FIRE ALARM STROBE SIGNAL DEVICES SHALL BE SYNCHRONIZED TYPE DEVICES AND COMPLY WITH ADA REQUIREMENTS.

13. NO T-TAPPING OF FIRE ALARM WIRING SHALL BE ALLOWED. (TYPICAL)

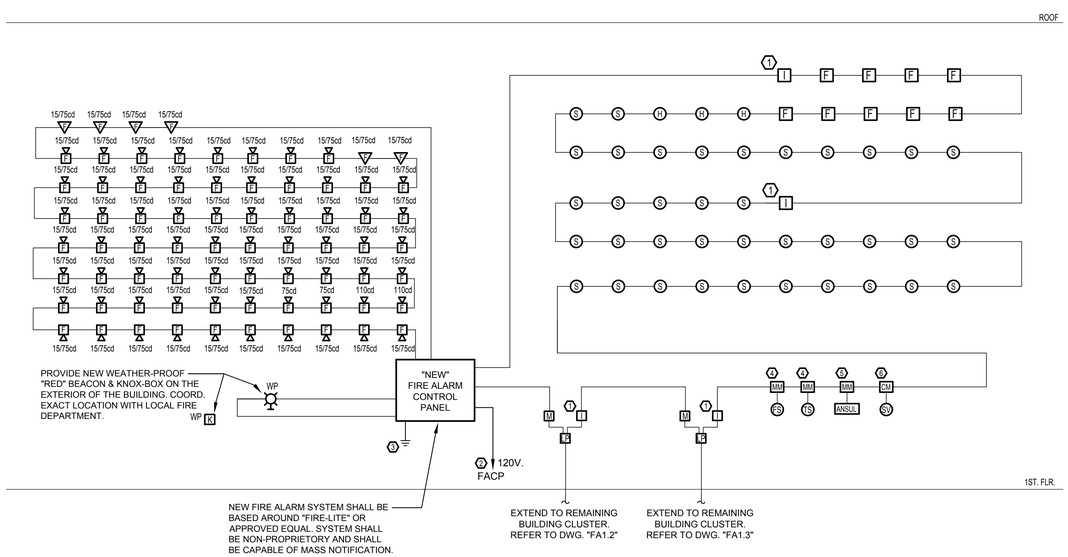
14. ALL FIRE ALARM WIRING & RACEWAY SHALL BE SUPPORTED BY THE BUILDING STRUCTURE AND SHALL NOT BE LOCATED AS TO BE DAMAGED BY BUILDING USE.

15. FIRE ALARM SYSTEM BATTERIES AND CHARGER SHALL BE PROVIDED FOR STAND-BY BATTERY POWER CAPACITY PER THE STATE'S FIRE LAWS (LATEST EDITION). E.C. SHALL SUBMIT BATTERY CALCULATIONS FOR THE MODIFIED SYSTEM DOCUMENTING CODE COMPLIANCE.

16. NEW NOTIFICATION APPLIANCE CIRCUIT EXPANDER PANELS SHALL BE PROVIDED WITH INTEGRAL BATTERY BACK-UP PER STATE'S FIRE LAWS (LATEST EDITION).

FIRE ALARM RISER NOTES

1. PROVIDE FIRE ALARM ISOLATION MODULE AT THE BEGINNING AND END OF EACH LOOP OF INITIATING DEVICES. ALSO PROVIDE FIRE ALARM ISOLATION MODULE AT A MAXIMUM OF EVERY 25 DEVICES ON LOOP.
2. PROVIDE 20 AMP CIRCUIT (2#12 + 1#12 GND. IN 3/4"C.) FROM SPARE BREAKER IN LOCAL 120/208V PANEL FOR EACH NEW NAC PANEL. PROVIDE BREAKER LOCK-ON DEVICE.
3. GROUND NEW NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL, PER LATEST EDITION OF NATIONAL ELECTRICAL CODE.
4. UPON ACTIVATION OF THE SPRINKLER SYSTEM FLOW SWITCHES, THE FIRE ALARM SYSTEM SHALL BE SET INTO ALARM VIA A MONITOR MODULE. FIELD VERIFY EXACT PROGRAMMING & WIRING REQT'S. WITH FIRE DEPARTMENT.
5. UPON ACTIVATION OF THE KITCHEN FIRE SUPPRESSION SYSTEM (ANSUL PANEL), THE FIRE ALARM SYSTEM SHALL BE SET INTO ALARM VIA A MONITOR MODULE. FIELD VERIFY EXACT WIRING REQT'S.
6. UPON ACTIVATION OF THE FIRE ALARM SYSTEM A CONTROL MODULE SHALL BE TIED INTO GAS SOLENOID VALVE TO SHUT-OFF GAS SUPPLY TO EQUIPMENT LOCATED BENEATH EXHAUST HOOD(S). FIELD VERIFY EXACT WIRING REQT'S.



BUILDING 1

FIRE ALARM LEGEND

FACP	FIRE ALARM SYSTEM MASS NOTIFICATION, CONTROL PANEL.
ANN	FIRE ALARM SYSTEM REMOTE ANNUNCIATOR PANEL.
M	(EXISTING) FIRE ALARM SYSTEM, MASTER-BOX.
WP K	FIRE ALARM SYSTEM, WEATHER-PROOF KNOX BOX.
WP	FIRE ALARM SYSTEM, WEATHER-PROOF "RED" BEACON, LOCATED AT ENTRANCE OF BUILDING MOUNTED DIRECTLY OVER "KNOX-BOX".
60cd F	FIRE ALARM SYSTEM, SPEAKER / STROBE DEVICE, SUB-SCRIPT INDICATES CANDELA RATING.
WP F	FIRE ALARM SYSTEM, WEATHER-PROOF SPEAKER / STROBE DEVICE, LOCATED ON THE EXTERIOR OF THE BUILDING AT THE ENTRANCE / LOCATION OF FACP.
15cd	FIRE ALARM SYSTEM STROBE. SUB-SCRIPT INDICATES CANDELA RATING.
F	FIRE ALARM SYSTEM MINI HORN. ALL STROBES SHALL BE SYNCHRONIZED AND COMPLY WITH ADA.
F	FIRE ALARM SYSTEM, PULL STATION, PROVIDE WITH STOPPER II PROTECTIVE COVER AND MOUNTED SO THAT THE OPERABLE PART OF THIS DEVICE IS 48" ABOVE FINISHED FLOOR.
S	FIRE ALARM SYSTEM, SMOKE DETECTOR.
S	FIRE ALARM SYSTEM, DUCT SMOKE DETECTOR LOCATED IN THE SUPPLY & RETURN DUCTWORK OF HVAC UNITS WITH 2000 CFM (OR) GREATER.
TS	FIRE ALARM SYSTEM, DUCT SMOKE DETECTOR REMOTE TEST SWITCH WITH INDICATOR LIGHT.
135°F R/R H	FIRE ALARM SYSTEM, RATE-OF-RISE TEMPERATURE HEAT DETECTOR, SUB-SCRIPT INDICATES TEMPERATURE RATING. (SUITABLE FOR 50'-0" "ON CENTER" MOUNTING)
190°F FT H	FIRE ALARM SYSTEM, FIXED TEMPERATURE HEAT DETECTOR, SUB-SCRIPT INDICATES TEMPERATURE RATING. (SUITABLE FOR 50'-0" "ON CENTER" MOUNTING)
FS	SPRINKLER SYSTEM FLOW SWITCH BY OTHERS. CONTRACTOR SHALL PROVIDE MONITOR MODULE TO TIE INTO FIRE ALARM SYSTEM. COORD. TIE-IN.
TS	SPRINKLER SYSTEM TAMPER SWITCH BY OTHERS. CONTRACTOR SHALL PROVIDE MONITOR MODULE TO TIE INTO FIRE ALARM SYSTEM. COORD. TIE-IN.
PS	SPRINKLER SYSTEM PRESSURE SWITCH BY OTHERS. CONTRACTOR SHALL PROVIDE MONITOR MODULE TO TIE INTO FIRE ALARM SYSTEM. COORD. TIE-IN.
MM	FIRE ALARM SYSTEM, MONITOR MODULE.
CM	FIRE ALARM SYSTEM, CONTROL MODULE.
R	FIRE ALARM SYSTEM, RELAY.

NOTES:

CONTRACTOR SHALL CONTACT AND COORDINATE WITH LOCAL MANUFACTURER'S REPRESENTATIVE, FOR ALL SPECIFIC INSTALLATION AND EQUIPMENT INFORMATION REQUIRED. (OR EQUAL) FIRE ALARM SYSTEM SHALL BE APPROVED DURING SUBMITTAL REVIEW.

REFER TO FLOOR PLANS FOR EXACT NUMBER OF FIRE ALARM DEVICES.

FIRE ALARM SYSTEM CONTROL PANEL & ASSOCIATED COMPONENTS SHALL BE NON-PROPRIETARY.

NOTES:

CONTRACTOR SHALL PROVIDE ADDITIONAL POWER SUPPLIES IN FIRE ALARM CONTROL PANEL AS REQUIRED AS WELL AS NEW NOTIFICATION EXTENDER PANELS (NAC), TO PROVIDE POWER FOR ALL NOTIFICATION DEVICES. COORDINATE REQUIRED EQUIPMENT WITH LOCAL MANUFACTURER'S REPRESENTATIVE. (TYPICAL)

CONTRACTOR SHALL ACQUIRE ACTUAL DEVICE COUNTS FROM FLOOR PLANS, NOT THIS RISER. THIS RISER DIAGRAM IS FOR WIRING INTENT PURPOSES ONLY.

EACH BUILDING'S FIRE ALARM SYSTEM SHALL BE WIRED DIRECTLY TO A ZONE IN THE EXISTING MASTER-BOX LOCATED IN BUILDING #1, WITHOUT ACTIVATING BUILDING'S #1, FIRE ALARM SYSTEM OR ASSOCIATED DEVICES.

TYPICAL FIRE STOPPING NOTES

A. GENERAL: FIRE STOPPING SHALL BE PROVIDED BY THIS CONTRACTOR FOR ALL FLOOR, CEILING AND FIRE RATED WALL PENETRATIONS FOR CONDUIT, SLEEVES AND/OR CABLING AS REQUIRED BY JOB CONDITIONS.

B. THE CONTRACTOR SHALL PROVIDE A FIRE STOP SYSTEM IN ACCORDANCE WITH THE FOLLOWING:

1. THE SYSTEM SHALL CONSIST OF A WATERBASED SEALANT AND SUITABLE DAMMING MATERIALS (WHERE REQUIRED) AND BE INSTALLED PER MANUFACTURER'S REQUIREMENTS.
2. THE SEALANT SUPPLIED SHALL BE A TWO STAGED INTUMESCENT AND CAPABLE OF EXPANDING UP TO 8 TIMES ITS ORIGINAL VOLUME.
3. THE SEALANT SUPPLIED SHALL CONTAIN NO ASBESTOS, NO FIBERGLASS, AND NO SOLVENTS NOT CORROSIVE MINERAL SALTS OF ANY KIND.
4. THE SEALANT SHALL FORM A SURFACE CAPABLE OF BEING SANDED AND PAINTED TO MATCH SURROUNDING SURFACES AND SHALL BE IMPERVIOUS TO WATER WHEN DRY.
5. THE FIRE STOP SYSTEM SHALL BE TESTED TO THE TIME/TEMPERATURE REQUIREMENTS OF ASTM E119 AND SHALL BE UL1479 (ASTM E814) AND CLASSIFIED FOR UP TO 3 HOURS.
6. THE FIRE STOP SEALANT SHALL BE SPECSEAL SEALANT AS MANUFACTURED BY SPECIFIED TECHNOLOGIES, INC. OR APPROVED EQUAL.
7. SPECIAL CARE SHALL BE TAKEN WITH ELECTRICAL SYSTEMS NOT TO COMPROMISE ANY OF THE BUILDING FIRE PARTITIONS, FLOORS, WALLS OR MEMBRANES. PROVIDE ALL FIRESTOPPING REQUIRED TO COMPLY WITH THE BUILDING CODE, THE ELECTRICAL CODE AND THE UL LISTING OF EACH ASSEMBLY. COORDINATE LOCATIONS AND TYPES OF MEMBRANES WITH ARCHITECT.

SEISMIC RESTRAINT NOTE

A. GENERAL: IT IS THE INTENT OF THIS SEISMIC SPECIFICATION TO KEEP ALL ELECTRIAL BUILDING SYSTEM COMPONENTS IN PLACE DURING A SEISMIC EVENT. ALL ELECTRICAL SYSTEMS MUST BE INSTALLED IN STRICT ACCORDANCE WITH SEISMIC CODES, COMPONENT MANUFACTURER'S AND BUILDING CONSTRUCTION STANDARDS. WHENEVER A CONFLICT OCCURS BETWEEN THE MANUFACTURER'S OR CONSTRUCTION STANDARDS, THE MOST STRINGENT SHALL APPLY.

B. THIS CONTRACTOR SHALL ENGAGE A PROFESSIONAL STRUCTURAL ENGINEER REGISTERED IN THE JURISDICTION OF THIS PROJECT TO REVIEW THE ENTIRE INSTALLATION TO DETERMINE ALL SEISMIC RESTRAINT REQUIREMENTS AND METHODS. CONTRACTOR SHALL SUBMIT A REPORT OUTLINING THE STRUCTURAL ENGINEER'S REVIEW AS WELL AS SEISMIC RESTRAINT SHOP DRAWINGS AND SUPPORTING CALCULATIONS PREPARED BY THE PROFESSIONAL STRUCTURAL ENGINEER FOR REVIEW BY THE ARCHITECT.

C. SEISMIC RESTRAINTS SHALL BE DESIGNED IN ACCORDANCE WITH SEISMIC FORCE LEVELS AS DETAILED IN THE APPLICABLE BUILDING CODE.

1. ALL EQUIPMENT, CONDUIT AND PULL BOXES SHALL BE ADEQUATELY RESTRAINED TO RESIST SEISMIC FORCES. RESTRAINT DEVICES SHALL BE DESIGNED AND SELECTED TO MEET SEISMIC REQUIREMENTS AS DEFINED IN THE LATEST ISSUE OF THE BOCA NATIONAL BUILDING CODE IN ACCORDANCE WITH THE APPLICABLE SEISMIC ZONE.
2. ANCHOR BOLT CALCULATORS, SIGNED AND STAMPED BY A REGISTERED PROFESSIONAL ENGINEER, SHALL BE SUBMITTED SHOWING ADEQUACY OF THE BOLT SIZING AND TYPE. STAMPED CALCULATIONS SHALL ALSO BE FURNISHED FOR ANCHORS ON RESTRAINT DEVICES, CABLES, ISOLATORS AND RIGIDLY MOUNTED EQUIPMENT.

TYPICAL ELECTRICAL NOTES

1. FURNISH LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR THE PROPER AND COMPLETE INSTALLATION OF ALL ELECTRIC WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED.
2. ALL ITEMS NOT SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE ELECTRICAL INSTALLATION, SHALL BE FURNISHED AND INSTALLED AS PART OF THIS PROJECT.
3. ALL ELECTRICAL INSTALLATIONS AND GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE LOCAL, STATE AND NATIONAL CODES.
4. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS.
5. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KIND AND IN FULL ACCORDANCE WITH THE MOST MODERN ELECTRICAL CONSTRUCTION STANDARDS. ALL MATERIAL SHALL BE NEW, UNLESS OTHERWISE NOTED AND FREE OF ANY DEFECTS.
6. THE ELECTRICAL CONTRACTOR SHALL CLEAN AT THE END OF EACH DAY ALL AREAS WORKED IN. EMPTY BOXES, RUBBISH, AND OTHER CONSTRUCTION MATERIALS OF NO USE SHALL BE REMOVED FROM THE BUILDING.
7. ALL WORK SEQUENCES SHALL BE COORDINATED WITH THE ARCHITECT AND SHALL BE COORDINATION WITH OTHER BUILDING TRADES AND ARCHITECTS BUILDING SCHEDULES.
8. ALL BRANCH CIRCUITS RATED AT 120 VOLTS, 20 AMPERES EXCEEDING 75 FEET SHALL BE MINIMUM #10 AWG.

COMMISSIONING NOTES

1. THIS CONTRACTOR SHALL PROVIDE THE DELIVERABLES TO THE ENGINEER/OWNER.
2. COPIES OF ALL RECORDS SHALL BE PROVIDED TO THE ENGINEER BY THIS CONTRACTOR INCLUDING, BUT NOT LIMITED TO A VERIFICATION REPORT OF THE LIGHTING AND ELECTRICAL SYSTEMS BY THIS CONTRACTOR, INCLUDING CERTIFICATION THAT ALL OCCUPANCY SENSORS HAVE BEEN PROPERLY LOCATED AND AIMMED, ALL TIME SWITCH CONTROLS HAVE BEEN PROPERLY PROGRAMMED AND ALL DAYLIGHT RESPONSIVE CONTROLS HAVE BEEN PROPERLY LOCATED AND CALIBRATED.
3. ALL COMMISSIONING ACTIVITIES SHALL BE PERFORMED AS INDICATED HERE AND ELSEWHERE IN THE SPECIFICATIONS AND SHALL COMPLY WITH PROVISIONS OF THE APPLICABLE ENERGY CONSERVATION CODE.

ENERGY REBATE NOTES

1. THE CONTRACTOR SHALL MAKE THE OWNER AWARE OF ALL "UPSTREAM" ENERGY REBATES.
2. THE CONTRACTOR SHALL PROVIDE THE OWNER ALL NECESSARY INFORMATION AND DOCUMENTATION NECESSARY FOR ENERGY REBATE APPLICATIONS.

ABATEMENT NOTE

1. THE CONTRACTOR SHALL VERIFY ALL EQUIPMENT SCHEDULED TO BE DEMOLISHED WITH ABATEMENT CONTRACTOR PRIOR TO ANY WORK.

CERTIFICATION :

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STATE OF RHODE ISLAND
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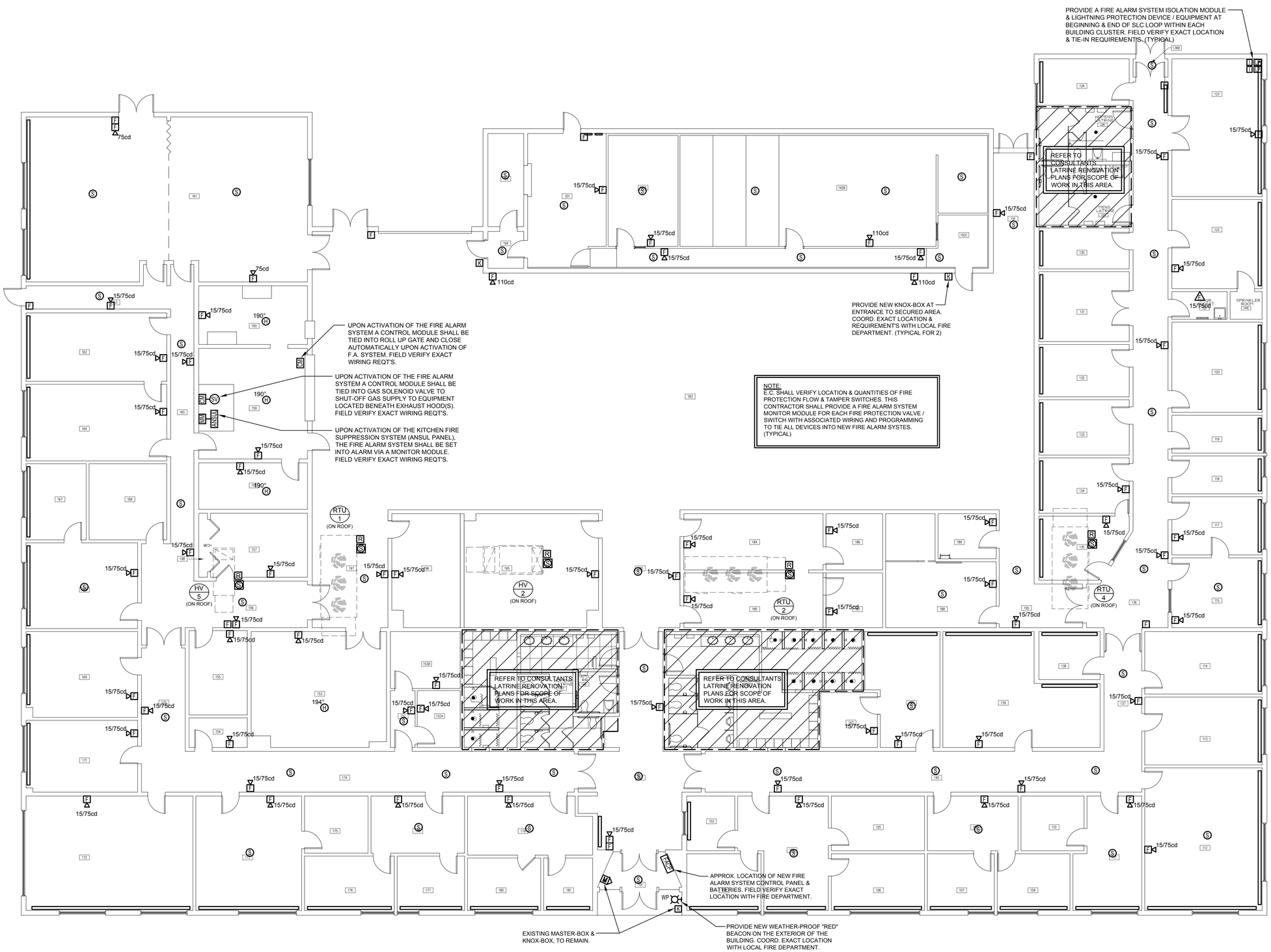
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
LIFE SAFETY LEGENDS AND NOTES

JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
FA000



BUILDING 1 LIFE SAFETY PLAN

01 / FA100

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

CERTIFICATION :

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WARWICK, RI

SHEET TITLE:

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JOB NO.: 16096RS

DRAWN BY: T.M.W.

CHECKED BY: R.W.D.

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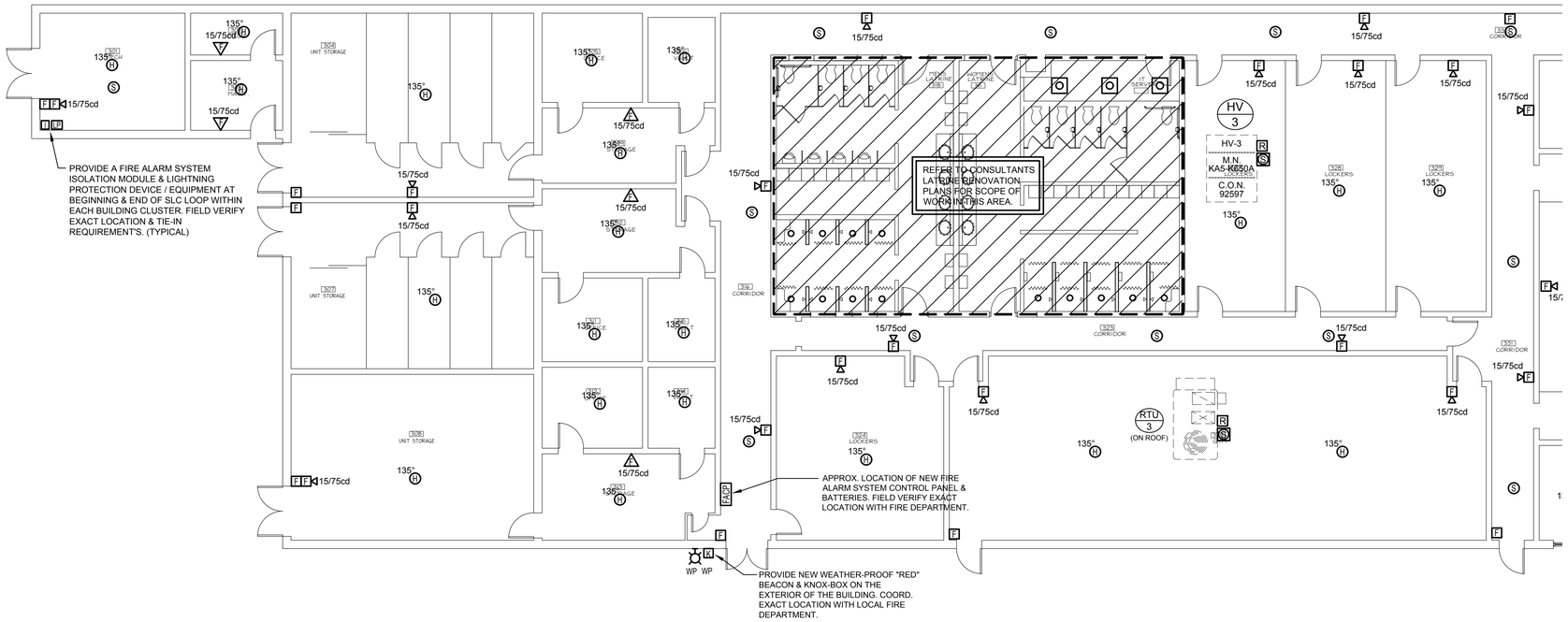
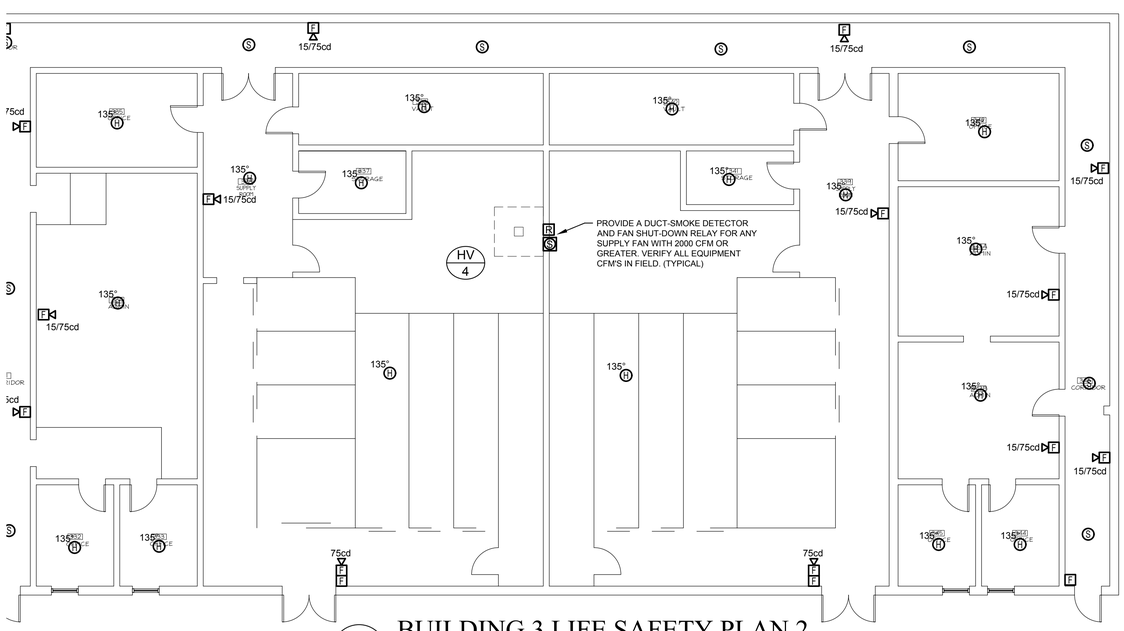


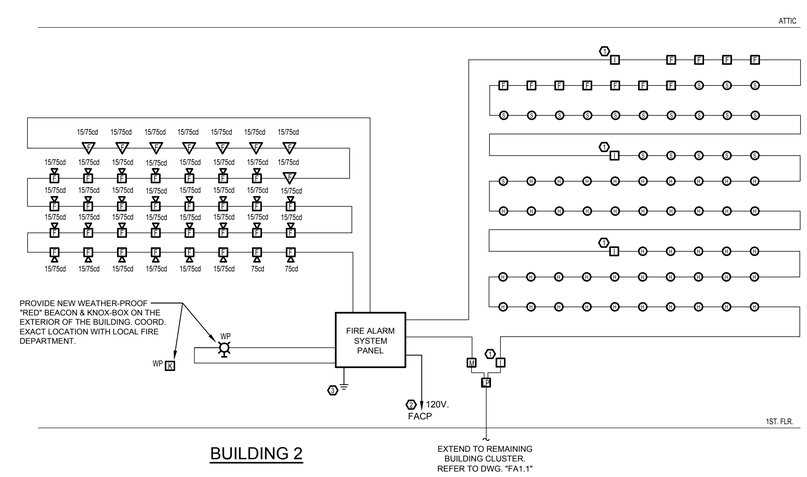
02 FA101 BUILDING 3 LIFE SAFETY PLAN 1

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



01 FA101 BUILDING 3 LIFE SAFETY PLAN 2

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



BUILDING 2

EACH BUILDING'S FIRE ALARM SYSTEM SHALL BE WIRED DIRECTLY TO A ZONE IN THE EXISTING MASTER-BOX LOCATED IN BUILDING #1, WITHOUT ACTIVATING BUILDING'S #1, FIRE ALARM SYSTEM OR ASSOCIATED DEVICES.

CONTRACTOR SHALL CONFIRM EXACT AMOUNTS OF FIRE ALARM DEVICES WITH LIFE SAFETY DRAWINGS.

CERTIFICATION :

RAYMOND W. DUSSEAULT III
STATE OF RHODE ISLAND
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

BUILDING 3 LIFE SAFETY PLAN

JOB NO.: 16096RS

DRAWN BY: T.M.W.

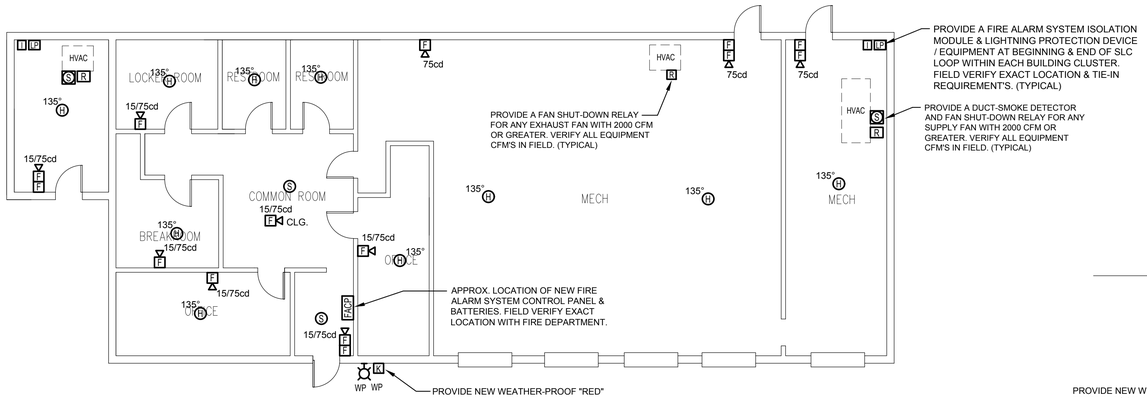
CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

FA101



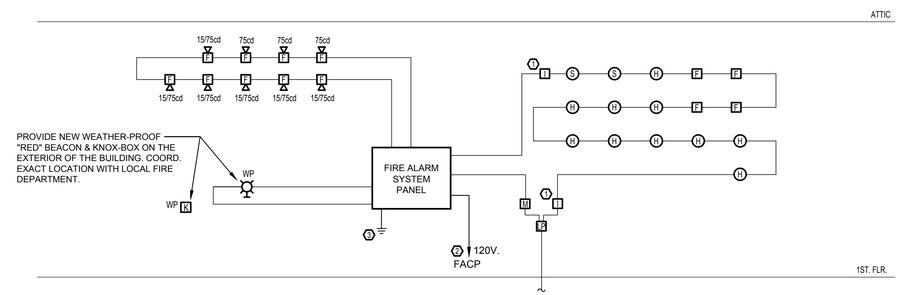
NOTE:
ALL WIRING, RACEWAYS & DEVICES SPECIFIED & SHOWN IN GARAGE / REPAIR AREAS SHALL BE CLASS I, DIV. 2 AS SPECIFIED IN ARTICLES #500.5(B)(2) AS WELL AS ARTICLE #501 OF THE *"NATIONAL ELECTRIC CODE"*, (NEC), S014 EDITION.

01 / FA102

BUILDING 2 LIFE SAFETY PLAN

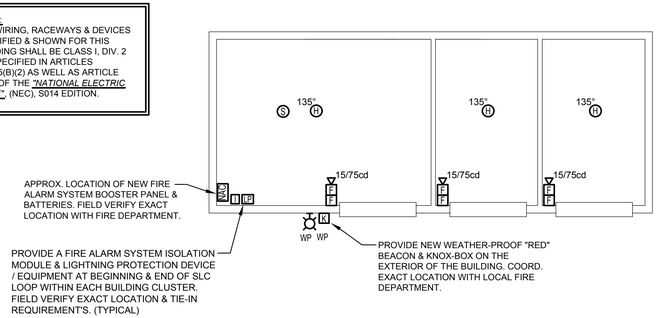
SCALE: 1/8" = 1'-0"

EACH BUILDING'S FIRE ALARM SYSTEM SHALL BE WIRED DIRECTLY TO A ZONE IN THE EXISTING MASTER-BOX LOCATED IN BUILDING #1, WITHOUT ACTIVATING BUILDING'S #1, FIRE ALARM SYSTEM OR ASSOCIATED DEVICES.



BUILDING 3

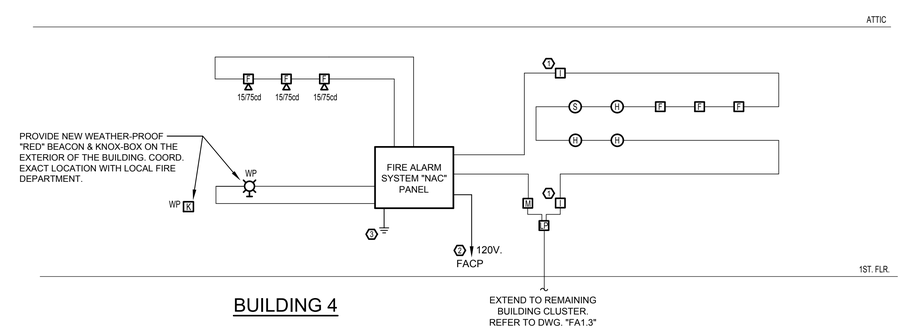
NOTE:
ALL WIRING, RACEWAYS & DEVICES SPECIFIED & SHOWN FOR THIS BUILDING SHALL BE CLASS I, DIV. 2 AS SPECIFIED IN ARTICLES #500.5(B)(2) AS WELL AS ARTICLE #501 OF THE *"NATIONAL ELECTRIC CODE"*, (NEC), S014 EDITION.



02 / FA102

BUILDING 4 LIFE SAFETY PLAN

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



BUILDING 4

EACH BUILDING'S FIRE ALARM SYSTEM SHALL BE WIRED DIRECTLY TO A ZONE IN THE EXISTING MASTER-BOX LOCATED IN BUILDING #1, WITHOUT ACTIVATING BUILDING'S #1, FIRE ALARM SYSTEM OR ASSOCIATED DEVICES.

CERTIFICATION :

RAYMOND W. DUSSEAULT III
No. 7139
REGISTERED PROFESSIONAL ENGINEER (ELECTRICAL)

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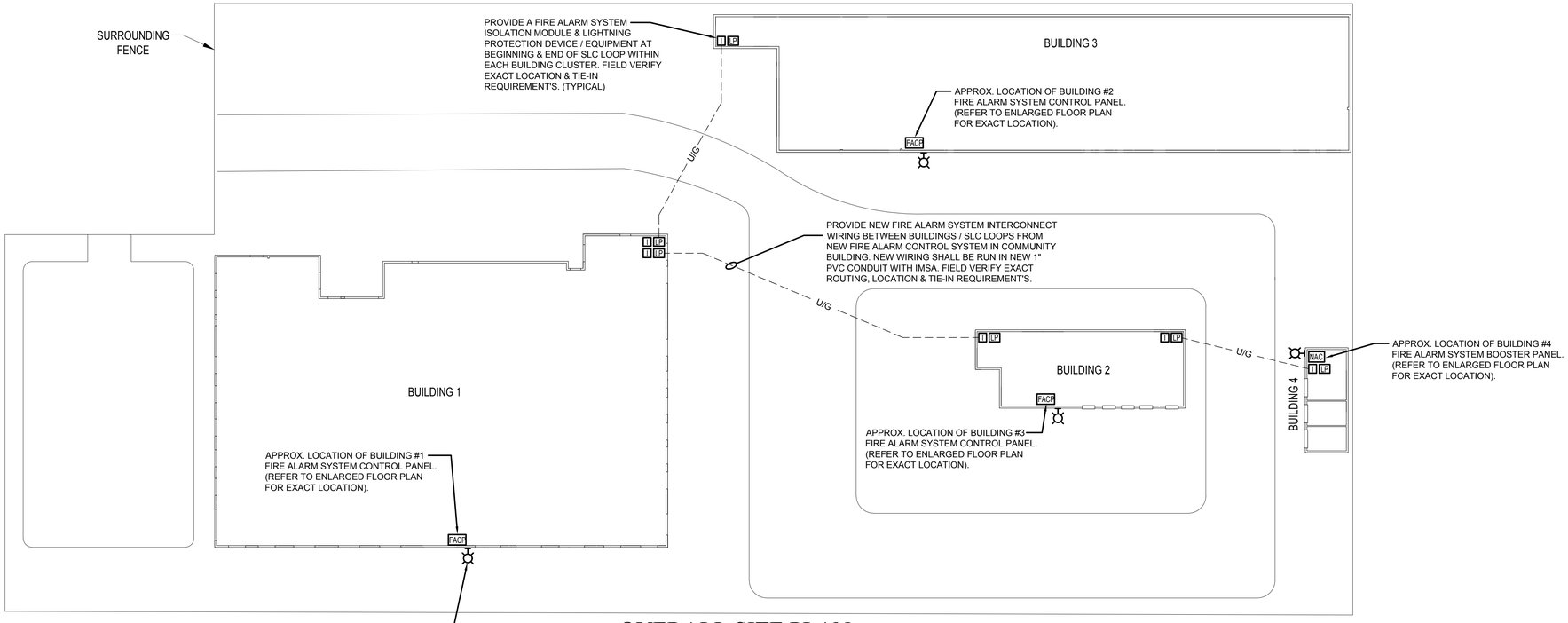
ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
BUILDING 2 & 4
LIFE SAFETY PLANS

JOB NO.: 16096RS
DRAWN BY: T.M.W.
CHECKED BY: R.W.D.
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
FA102



01 FA103 OVERALL SITE PLAN

SCALE: 1" = 30'-0"

ELECTRICAL SPECIFICATIONS

1. FURNISH LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR THE PROPER AND COMPLETE INSTALLATION OF ALL ELECTRIC WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED. REFER TO ANY SPECIFICATIONS, STANDARDS AND/OR DETAILS REQUIRED BY THE MPTN, SUCH REQUIREMENTS SHALL SUPERCEDE THIS SPECIFICATION WHERE A CONFLICT OCCURS BETWEEN THE TWO.

2. ALL ITEMS NOT SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE ELECTRICAL INSTALLATION, SHALL BE FURNISHED AND INSTALLED AS PART OF THIS PROJECT.

3. ALL ELECTRICAL INSTALLATIONS AND GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE MPTN, STATE AND NATIONAL CODES.

4. OBTAIN AND PAY FOR ALL INSPECTIONS, TESTS AND/OR PERMITS.

5. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KIND AND IN FULL ACCORDANCE WITH THE MOST MODERN ELECTRICAL CONSTRUCTION STANDARDS. ALL MATERIAL SHALL BE NEW, UNLESS OTHERWISE NOTED AND FREE OF ANY DEFECTS.

6. THE ELECTRICAL CONTRACTOR SHALL CLEAN AT THE END OF EACH DAY ALL AREAS WORKED IN. EMPTY BOXES, RUBBISH, AND OTHER CONSTRUCTION MATERIALS OF NO USE SHALL BE REMOVED FROM THE BUILDING.

7. ALL WORK SEQUENCES SHALL BE COORDINATED WITH THE ARCHITECT AND SHALL BE COORDINATION WITH OTHER BUILDING TRADES AND ARCHITECTS BUILDING SCHEDULES.

8. ALL BRANCH CIRCUITS RATED AT 120 VOLTS, 20 AMPERES EXCEEDING 75 FEET SHALL BE MINIMUM #10 AWG.

9. ALL EQUIPMENT AND INSTALLATION OF ELECTRICAL EQUIPMENT SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE.

10. FURNISH AND INSTALL TEMPORARY POWER AS REQUIRED TO OPERATE TOOLS AND LIGHTING FOR ALL TRADES. PROVIDE CONDUIT, CONDUCTORS, WIRING DEVICES, AND LIGHTING FIXTURES FOR CONSTRUCTION AS NEEDED.

11. THE ELECTRICAL CONTRACTOR (E.C.) SHALL INSPECT THE SITE, PRIOR TO SUBMITTING HIS BID, AND SHALL INVESTIGATE ALL CONDITIONS UNDER WHICH THIS WORK SHALL BE PREFORMED. FAILURE TO INSPECT EXISTING CONDITIONS OR TO FULLY UNDERSTAND THE WORK WHICH REQUIRED SHALL NOT EXCUSE THE E.C. FROM HIS OBLIGATIONS TO SUPPLY AND INSTALL THE WORK IN ACCORDANCE WITH THE SPECIFICATIONS AND THE DRAWINGS AND UNDER ALL SITE CONDITIONS AS THEY EXIST.

12. THE PLANS DEPICT THE LOCATION OF ALL FIXTURE AND EQUIPMENT AND ARE INTENDED TO INDICATE THE GENERAL SCOPE OF WORK, LAYOUT AND QUALITY OF WORKMANSHIP. THEY ARE NOT INTENDED FOR THE PURPOSE OF EXECUTION OF THE WORK, BUT THE CONTRACTOR SHALL UNDERSTAND THAT SUCH DETAILS ARE PART OF THE WORK.

13. THE ELECTRICAL CONTRACTOR SHALL CAREFULLY VERIFY ALL MEASUREMENTS AT THE SITE AND DETERMINE THE EXACT LOCATION OF ALL CHASES AND OPENINGS REQUIRED BY THIS WORK AND SHALL PROVIDE ALL SLEEVES, INSERTS, AND HANGERS REQUIRED.

14. BRANCH CIRCUITS ADDED TO ANY EXISTING PANELBOARDS SHALL ALSO INCLUDE THE CIRCUIT BREAKER DIRECTORY TO BE UPDATED. IF NO DIRECTORY EXISTS THAN ONE SHALL BE PROVIDED INDICATING THE NEW CIRCUITS ADDED.

15. WIRE AND CABLE FOR BRANCH CIRCUITS SHALL BE TYPE THWN/THHN, INSULATED FOR 600VOLTS, RATED AT 75°C MINIMUM AND UL LISTED FOR BUILDING WIRE USE. WIRE SIZE SHALL BE A MINUMUM OF #12 AWG SOLID. ALL CONDUCTORS SHALL BE COPPER. ALL WIRING SHALL BE CONCEALED AND INSTALLED IN RACEWAY. RACEWAYS SHALL BE E.M.T. WITH STEEL SET SCREW FITTINGS. METAL-CLAD CABLE TYPE MC CABLE MAY BE USED IN AREAS WHERE APPROVED BY THE LOCAL WIRING INSPECTOR.

16. LIGHTING FIXTURES SHALL BE SUPPORTED INDEPENDENTLY FROM THE STRUCTURE OF THE BUILDING. THE CEILING SHALL NOT BE THE SOLE SUPPORT FOR THE LIGHTING FIXTURES. ALL LIGHTING FIXTURES SHALL BE PROVIDED WITH LAMPS INSTALLED. ALL BALLASTS SHALL BE HIGH POWER FACTOR, CLASS "A" SOUND RATED WITH FUSING OR THERMAL PROTECTION. NEW LAMPS SHALL HAVE THE SAME COLOR TEMPERATURE AS EXISTING LAMPS WITHIN THE SAME AREA.

17. OUTLET BOXES SHALL BE GALVANIZED STEEL, OF THE TYPE REQUIRED FOR THE PARTICULAR APPLICATION, AND SIZED TO ACCOMODATE THE NUMBER OF CONDUCTORS TO BE INSTALLED PER CODE.

18. SWITCHES SHALL BE EQUAL TO HUBBELL #1221 FOR 20-AMP / 1-POLE AND #1223 FOR 20-AMP / 3-POLE. RECEPTACLES SHALL BE EQUAL TO HUBBELL #5352 AND #GF5352 FOR GFCI TYPE. ALL DEVICES SHALL BE PROVIDED WITH MATCHING FACE PLATES. COLORS OF DEVICES AND PLATES SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO ORDERING ANY MATERIAL.

19. ADDITIONAL JUNCTION BOXES BEYOND THOSE SHOWN ON THE DRAWINGS SHALL BE PROVIDED AS NECESSARY FOR ALL ELECTRICAL INSTALLATIONS.

20. ALL CUTTING, PATCHING AND FIRESTOPPING FOR ELECTRICAL INSTALLATIONS SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

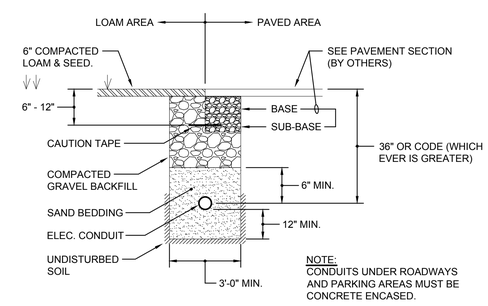
21. PROVIDE CONDUIT SLEEVES FILLED WITH AN APPROVED FIRE RESISTANT MATERIAL WHERE FIRE RATED WALLS, FLOORS OR CEILINGS ARE PENETRATED. APPROVED WATERTIGHT CONDUIT SLEEVES SHALL BE PROVIDED WHERE WALLS ARE PENETRATED EITHER ENTERING OR LEAVING THE BUILDING.

22. RECEPTACLES, LIGHT FIXTURES, AND POWER ITEMS BRANCH CIRCUIT WIRING MAY NOT BE SHOWN BUT SHALL BE PROVIDED AS REQUIRED. MINIMUM WIRING SHALL BE 2#12 PLUS 1#12GROUND IN 3/4"C. NO MORE THAN THREE PHASES MAY BE COMBINED IN A SINGLE HOMERUN AND EACH PHASE SHALL BE PROVIDED WITH AN INDIVIDUAL NEUTRAL.

23. ALL CONDUITS SHALL CONTAIN A GREEN SAFETY GROUND WIRE. BOND ALL PANELS, CABINETS, ENCLOSURES, CONDUITS, ETC., AS REQUIRED PER CODE.

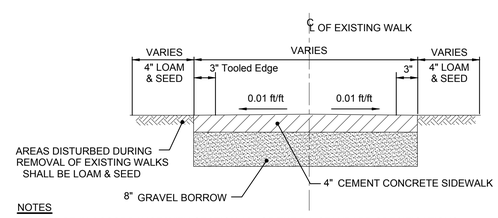
24. ALL SUPPORTS AND ANCHORS SHALL BE DESIGNED AND INSTALLED PER REQUIREMENTS FOR THE SEISMIC CLASSIFICATIONS AS OUTLINED IN THE APPLICABLE BUILDING CODE. SITE LOCATION AND PREVAILING ORIENTATION SHALL BE TAKEN INTO ACCOUNT IN THE DESIGN.

25. SUBMIT SIX (6) COPIES FOR REVIEW AND APPROVAL OF THE FOLLOWING SHOP DRAWINGS: LIGHTING FIXTURES, WIRING DEVICES, RACEWAY, AND BUILDING WIRE & CABLE.



CONDUIT TRENCH DETAIL

NOT TO SCALE



NOTES

1. SHALL BE IN ACCORDANCE WITH SECTION 905 OF THE R.I. STANDARD SPECIFICATIONS.
2. 4x4x4/4 W.W.F. TO BE USED WITH CONC. WALK
3. CONCRETE WALK SHALL BE BROOM FINISHED EXCEPT FOR TOOLED EDGES

CONCRETE SIDEWALK

NOT TO SCALE

CERTIFICATION :

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STATE OF RHODE ISLAND
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Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

SITE PLAN

JOB NO.: 16096RS

DRAWN BY: T.M.W.

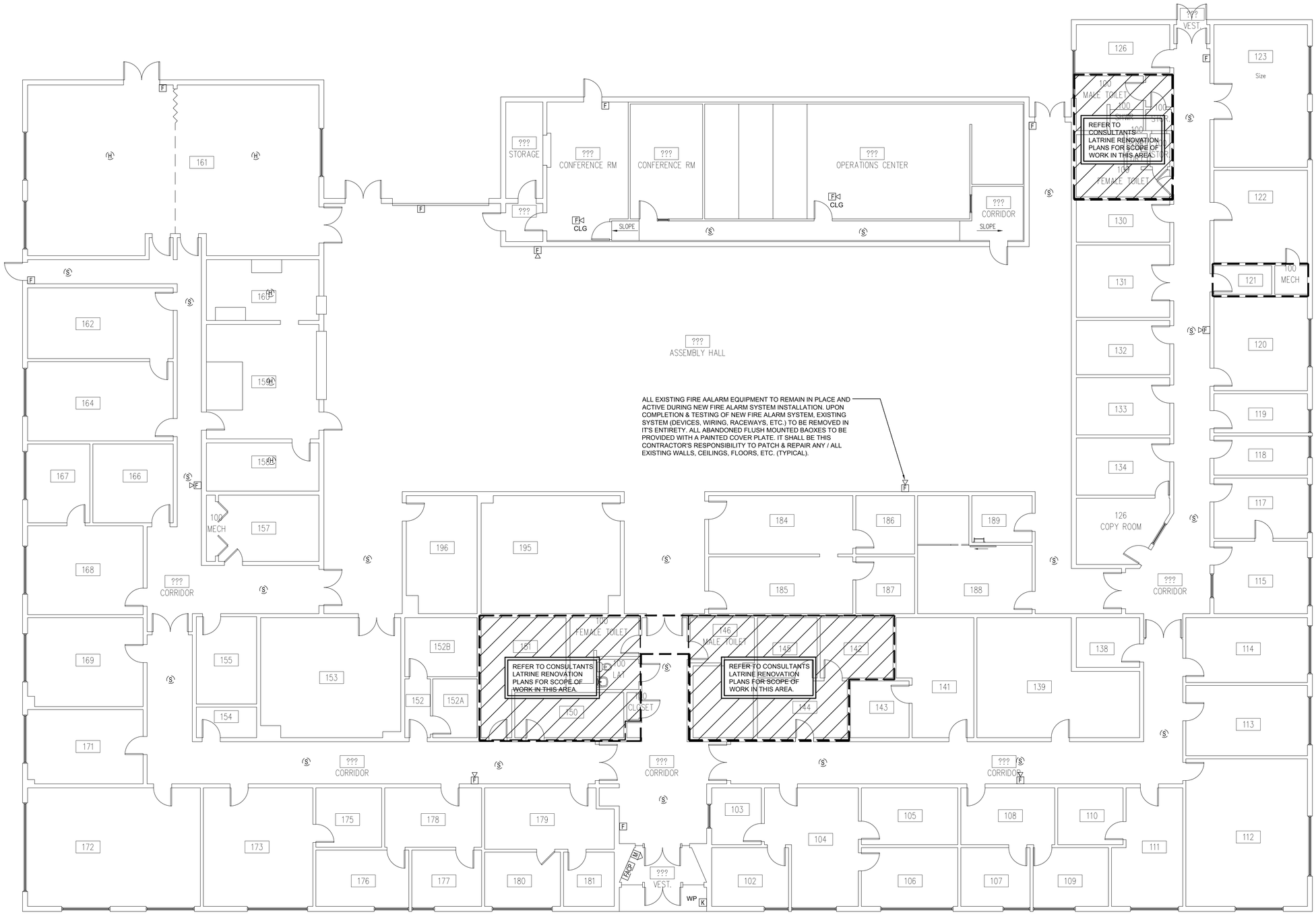
CHECKED BY: R.W.D.

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

FA103



1 FA104 BUILDING 1 DEMO LIFE SAFETY PLAN

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

CERTIFICATION :

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PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

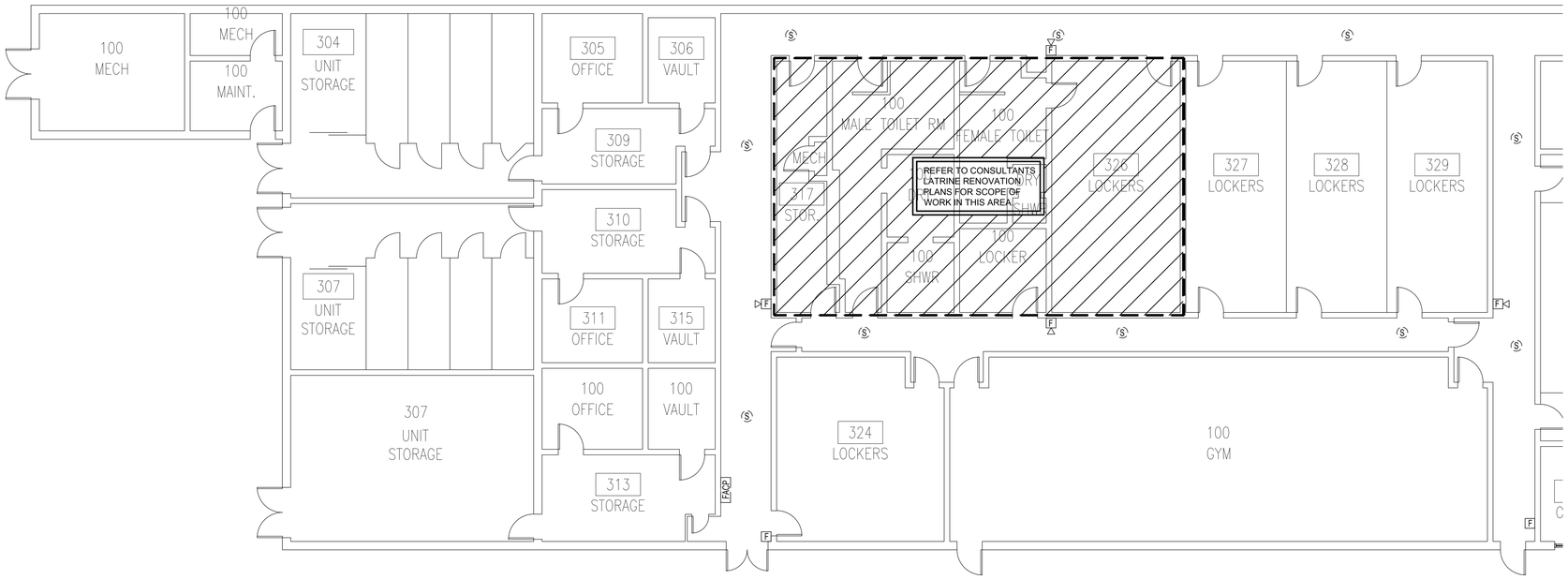
SHEET TITLE:

BUILDING 1 LIFE SAFETY DEMO PLAN

JOB NO.:	16096RS
DRAWN BY:	T.M.W.
CHECKED BY:	R.W.D.
DATE ISSUED:	03.20.2018
SCALE:	AS NOTED

SHEET NO.:

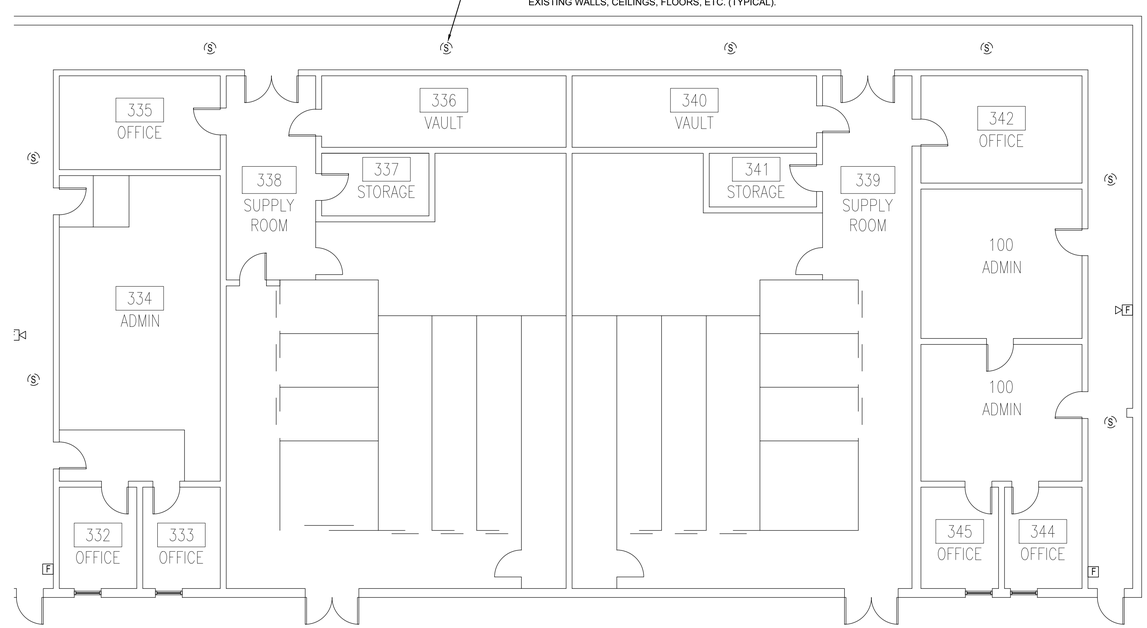
FAD100



1 FA105 BUILDING 3 LIFE SAFETY DEMO PART PLAN 1

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

ALL EXISTING FIRE AALARM EQUIPMENT TO REMAIN IN PLACE AND ACTIVE DURING NEW FIRE ALARM SYSTEM INSTALLATION. UPON COMPLETION & TESTING OF NEW FIRE ALARM SYSTEM, EXISTING SYSTEM (DEVICES, WIRING, RACEWAYS, ETC.) TO BE REMOVED IN IT'S ENTIRETY. ALL ABANDONED FLUSH MOUNTED BAOXES TO BE PROVIDED WITH A PAINTED COVER PLATE. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO PATCH & REPAIR ANY / ALL EXISTING WALLS, CEILINGS, FLOORS, ETC. (TYPICAL).



2 FA105 BUILDING 3 LIFE SAFETY DEMO PART PLAN 2

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

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WARWICK, RI

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DRAWN BY: T.M.W.

CHECKED BY: R.W.D.

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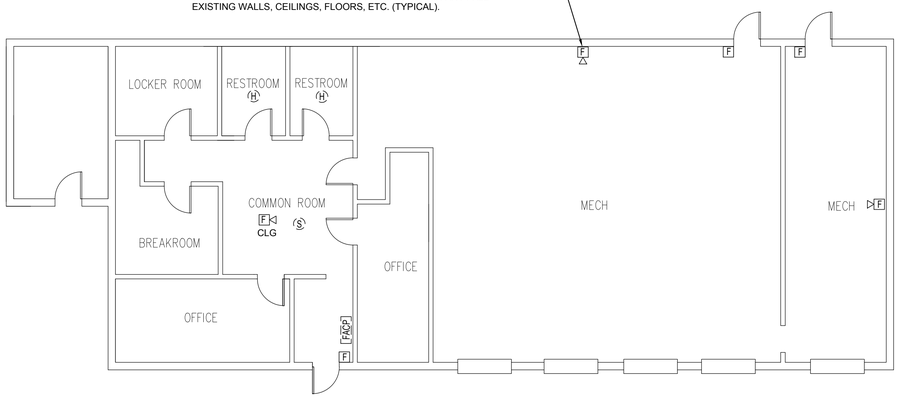
SCALE: AS NOTED

SHEET NO.:

FAD101

ALL EXISTING FIRE AALARM EQUIPMENT TO REMAIN IN PLACE AND ACTIVE DURING NEW FIRE ALARM SYSTEM INSTALLATION. UPON COMPLETION & TESTING OF NEW FIRE ALARM SYSTEM, EXISTING SYSTEM (DEVICES, WIRING, RACEWAYS, ETC.) TO BE REMOVED IN IT'S ENTIRETY. ALL ABANDONED FLUSH MOUNTED BAOXES TO BE PROVIDED WITH A PAINTED COVER PLATE. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO PATCH & REPAIR ANY / ALL EXISTING WALLS, CEILINGS, FLOORS, ETC. (TYPICAL).



1 / FA106 BUILDING 2 LIFE SAFETY DEMO PLAN

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

TYPICAL DEMOLITION NOTES

1. THE ELECTRICAL CONTRACTOR SHALL REVIEW ALL OF THE ARCHITECTS AND OTHER TRADES DRAWINGS TO VERIFY ALL AREAS OF RENOVATION AND TO GET A COMPLETE UNDERSTANDING OF THE DEMOLITION WORK REQUIRED BY THIS PROJECT.

2. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. RENOVATION WORK WILL REQUIRE CAREFUL SITE EXAMINATION PRIOR TO BIDDING. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUED BY AN EXPERIENCED OBSERVER.

3. COORDINATE ALL WORK WITH THE BUILDING OWNER 10 DAYS PRIOR TO DISRUPTION TO ANY POWER.

4. DISCONNECT AND REMOVE ALL FIXTURES, WIRING DEVICES, CONDUIT AND FITTINGS, WIRING & CABLE, FIRE ALARM DEVICES/COMPONENTS , HANGERS, SUPPORTS, WIREWAYS, AND ALL OTHER ELECTRICAL COMPONENTS MADE OBSOLETE BY THIS PROJECT.

5. REFER TO ALL CONSTRUCTION DOCUMENTS TO GAIN A COMPLETE UNDERSTANDING OF THE DEMOLITION WORK REQUIRED.

6. ALL HVAC UNITS SCHEDULED TO BE REMOVED OR RE-LOCATED SHALL BE DONE SO BY THE HVAC CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL DISCONNECT AND MAKE-SAFE FOR REMOVAL.

7. TEMPORARY WALL OPENINGS AND/OR MODIFICATIONS REQUIRED FOR REMOVAL/INSTALLATION OF EQUIPMENT SHALL BE PROVIDED AS NEEDED AND COORDINATED WITH THE GENERAL CONTRACTOR.

8. CUT, REMOVE AND LEGALLY DISPOSE OF SELECTED ELECTRICAL EQUIPMENT, COMPONENTS AND MATERIALS AS INDICATED, INCLUDING, BUT NOT LIMITED TO, REMOVAL OF ELECTRICAL ITEMS INDICATED TO BE REMOVED AND ITEMS MADE OBSOLETE BY THE WORK. THE OWNER RESERVES THE OPTION OF SALVAGE RIGHTS TO DEMOLISHED MATERIAL AND REMOVED EQUIPMENT. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE TO OBTAIN A LIST OF MATERIALS AND REMOVED EQUIPMENT TO BE TURNED OVER TO THE OWNER. ALL OTHER MATERIAL AND REMOVED EQUIPMENT NOT BEING SALVAGED BY THE OWNER SHALL BE DISPOSED OF BY THE CONTRACTOR.

9. PROTECT THE STRUCTURE, FURNISHINGS, FINISHES, AND ADJACENT MATERIALS NOT INDICATED OR SCHEDULED TO BE REMOVED. PROTECT THE ELECTRICAL WORK AND THE WORK OF OTHERS IN A MANNER BEST SUITED TO THE PARTICULAR CASE. CORRECT ANY DAMAGE DONE TO ANY WORK AT NO ADDITIONAL COST.

10. PROVIDE AND MAINTAIN TEMPORARY PARTITIONS OR DUST BARRIERS ADEQUATE TO PREVENT THE SPREAD OF DUST AND DIRT TO ADJACENT AREAS.

11. MAINTAIN ACCESS TO EXISTING ELECTRICAL INSTALLATIONS WHICH REMAIN ACTIVE. MODIFY INSTALLATION OR PROVIDE ACCESS PANEL AS APPROPRIATE.

12. THESE DRAWINGS HAVE BEEN COMPILED FROM THE BEST AVAILABLE INFORMATION AND ARE NOT INTENDED TO LIMIT THE SCOPE OF THE WORK. THE ELECTRICAL CONTRACTOR MAY ENCOUNTER HIDDEN OR COVERED CONDITIONS, NOT INDICATED IN THESE DOCUMENTS, REQUIRING THE ELECTRICAL CONTRACTOR TO PROVIDE ADDITIONAL WORK FOR THE COMPLETION OF HIS OR HER CONTRACT. IT WILL BE ASSUMED THAT THE CONTRACTOR HAS INSPECTED THE SITE PRIOR TO BIDDING AND VERIFIED THE INFORMATION SUPPLIED HEREIN.

13. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. WHEN WORK MUST BE PERFORMED ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.

a. EXISTING FIRE ALARM SYSTEM: MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL THE MODIFIED/EXPANDED SYSTEM IS TESTED AND ACCEPTED BY THE FIRE DEPARTMENT. DISABLE SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. NOTIFY OWNER, ARCHITECT/ENGINEER AND LOCAL FIRE DEPARTMENT AT LEAST TEN DAYS BEFORE PARTIALLY OR COMPLETELY DISABLING SYSTEM. MINIMIZE OUTAGE DURATION. MAKE TEMPORARY CONNECTIONS TO MAINTAIN SERVICE IN AREAS ADJACENT TO WORK AREA AS REQUIRED OR PROVIDE A "FIRE-WATCH" SYSTEM COORDINATED WITH THE LOCAL FIRE DEPARTMENT.

14. PROTECT ALL EXISTING WALLS, FLOORS, CEILINGS, LIGHT FIXTURES, ETC. WHICH ARE TO REMAIN & TO PREVENT DAMAGE DURING ALL CONSTRUCTION PHASES

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BUILDING 2 LIFE SAFETY DEMO PLAN

JOB NO.: 16096RS

DRAWN BY: T.M.W.

CHECKED BY: R.W.D.

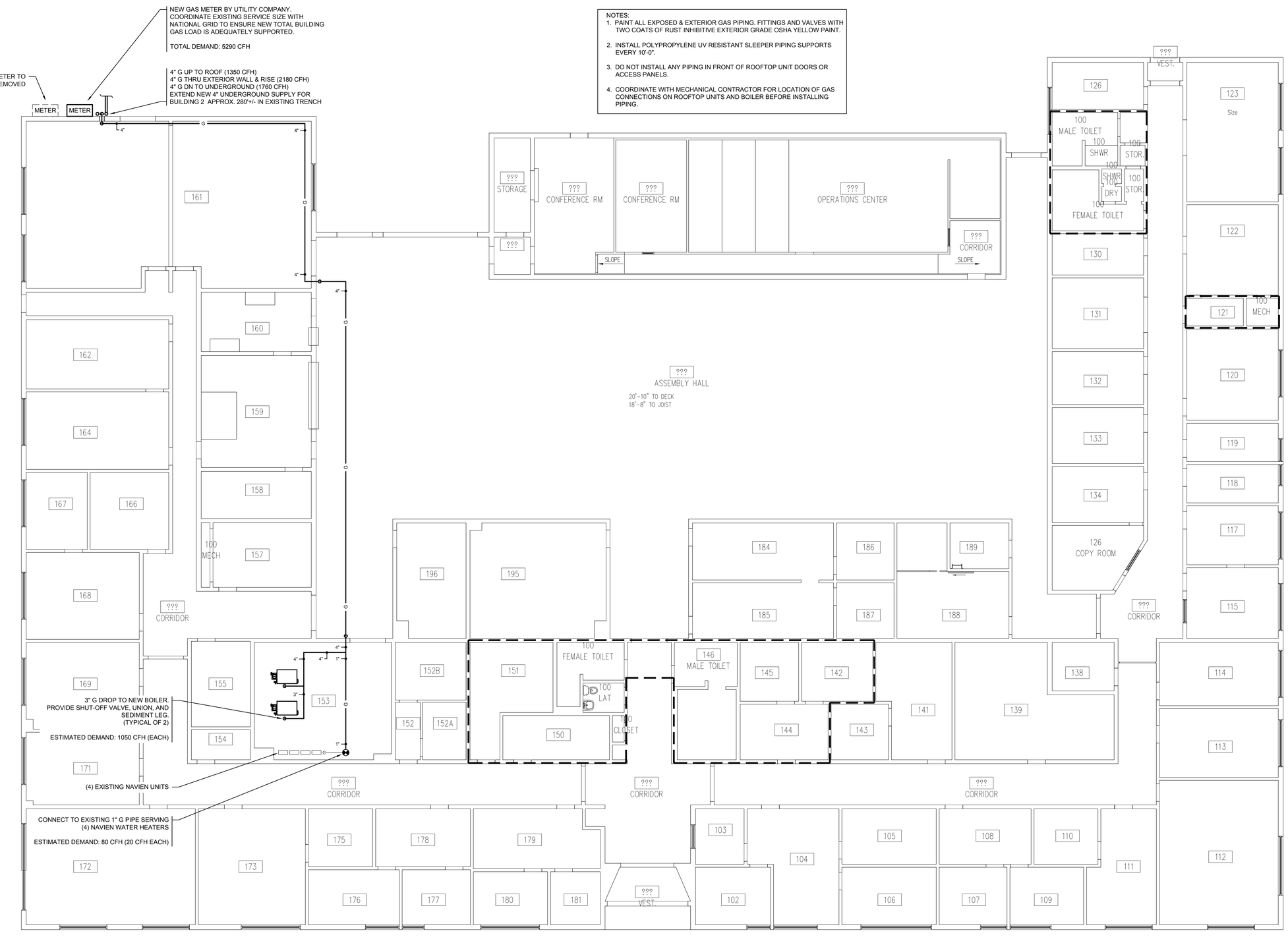
DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

FAD102

NOTES:
1. PAINT ALL EXPOSED & EXTERIOR GAS PIPING. FITTINGS AND VALVES WITH TWO COATS OF RUST INHIBITIVE EXTERIOR GRADE OSHA YELLOW PAINT.
2. INSTALL POLYPROPYLENE UV RESISTANT SLEEPER PIPING SUPPORTS EVERY 10'-0".
3. DO NOT INSTALL ANY PIPING IN FRONT OF ROOFTOP UNIT DOORS OR ACCESS PANELS.
4. COORDINATE WITH MECHANICAL CONTRACTOR FOR LOCATION OF GAS CONNECTIONS ON ROOFTOP UNITS AND BOILER BEFORE INSTALLING PIPING.



01 P101 Plumbing First Floor Gas Plan - Building 1

1/8" = 1'-0" 0 12 24 FT

CERTIFICATION :

GLEN G. MARKEY
No. 7349
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

THIS DRAWING IS A PART OF AN INTEGRATED SET OF CONSTRUCTION CONTRACT DOCUMENTS. REFER TO ALL DRAWINGS AND SPECIFICATIONS INCLUDING BUT NOT LIMITED TO "GENERAL CONDITIONS" "SUMMARY OF WORK",AND ANY APPLICABLE MANUFACTURERS TECHNICAL SPECIFICATIONS.

REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

THIS DRAWING IS NOT TO BE SCALED OR USED AS AN AS-BUILT.

REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:
PLUMBING FIRST FLOOR GAS PLAN - BUILDING 1

JOB NO.: 16096RS
DRAWN BY: JMS
CHECKED BY: GGM
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
P101

NOTES:
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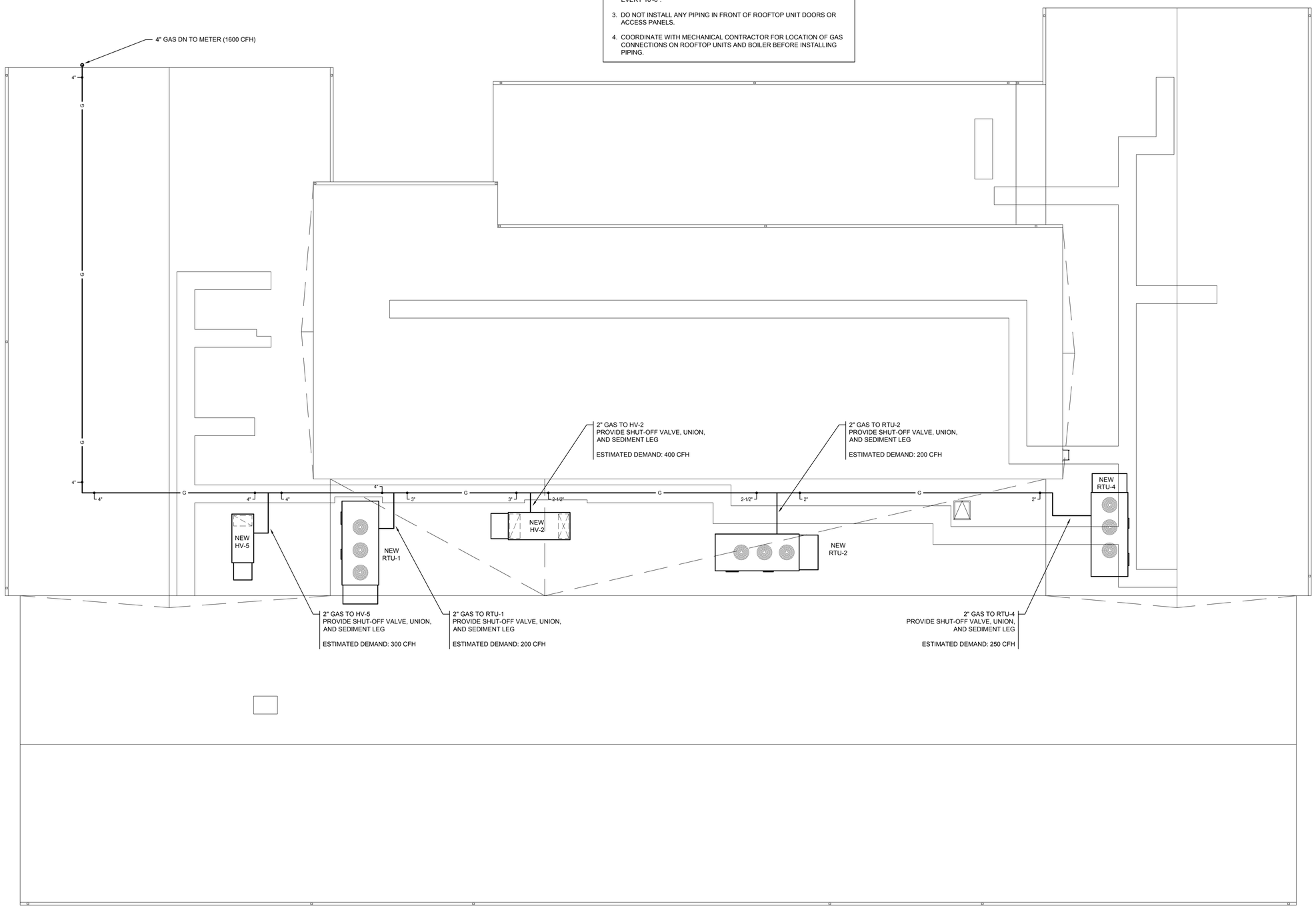

01
P102

Plumbing Roof Plan - Building 1

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

GLEN G. MARKEY
STATE OF RHODE ISLAND
No. 7349
REGISTERED
PROFESSIONAL ENGINEER
MECHANICAL

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REV. NO.	DATE	DESCRIPTION
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	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

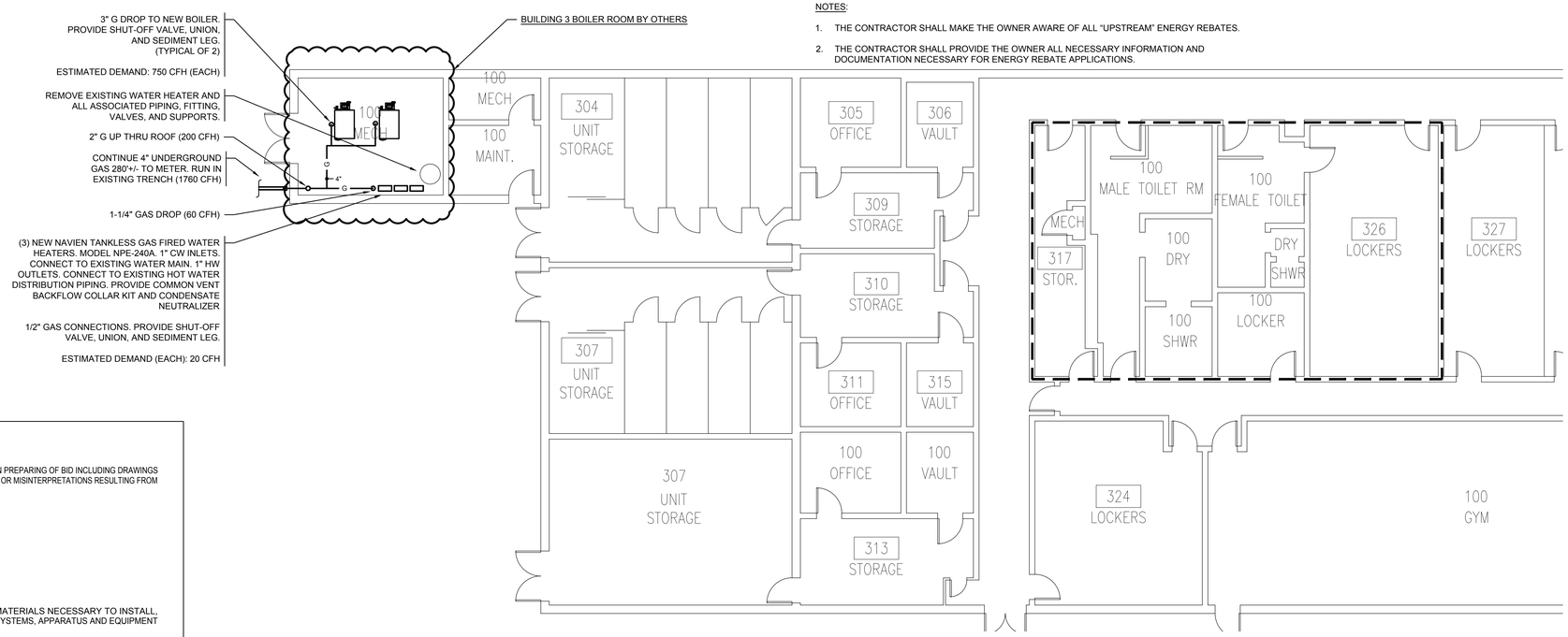
SHEET TITLE:
PLUMBING ROOF PLAN - BUILDING 1

JOB NO.: 16096RS
DRAWN BY: JMS
CHECKED BY: GGM
DATE ISSUED: 03.20.2018
SCALE: AS NOTED

SHEET NO.:
P102

NOTES:

1. THE CONTRACTOR SHALL MAKE THE OWNER AWARE OF ALL "UPSTREAM" ENERGY REBATES.
2. THE CONTRACTOR SHALL PROVIDE THE OWNER ALL NECESSARY INFORMATION AND DOCUMENTATION NECESSARY FOR ENERGY REBATE APPLICATIONS.



01
P103

Plumbing Gas Plan - Building 3

1/8" = 1'-0"

0 12 24 FT

PLUMBING GENERAL NOTES

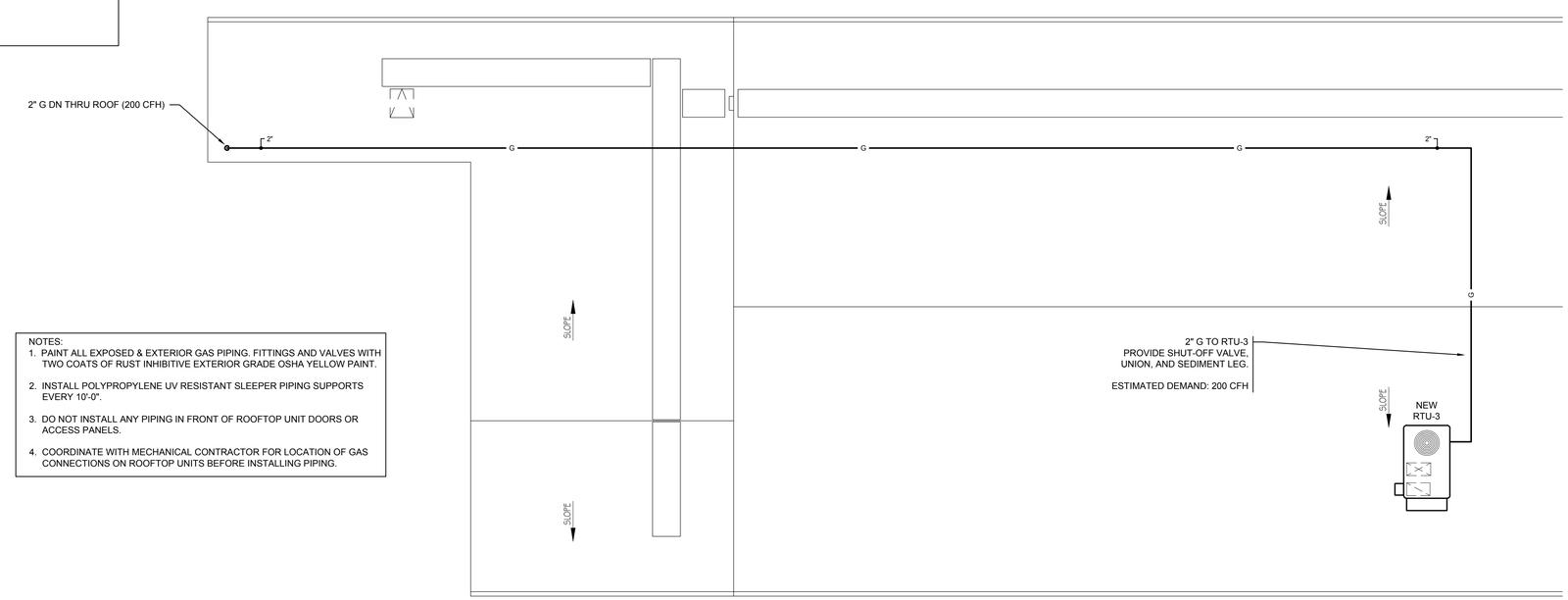
1. BIDDERS SHALL UTILIZE A COMPLETE SET OF PLUMBING BIDDING DOCUMENTS IN PREPARING OF BID INCLUDING DRAWINGS AND SPECIFICATIONS. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR ERRORS OR MISINTERPRETATIONS RESULTING FROM THE USE OF INCOMPLETE SETS OF PLUMBING BIDDING DOCUMENTS.

   THESE PLUMBING BIDDING DOCUMENTS SHALL INCLUDE:

   SPECIFICATION
   22 00 00 PLUMBING SPECIFICATION

   DRAWINGS
   P101 PLUMBING FIRST FLOOR GAS PLAN - BUILDING 1
   P102 PLUMBING ROOF PLAN - BUILDING 1
   P103 PLUMBING PLANS - BUILDING 2

2. THE WORK COVERED CONSISTS OF FURNISHING ALL LABOR AND MATERIALS NECESSARY TO INSTALL, COMPLETE AND READY FOR CONTINUOUS OPERATION, THE PLUMBING SYSTEMS, APPARATUS AND EQUIPMENT FOR THIS PROJECT.
3. ALL EQUIPMENT AND MATERIALS FURNISHED UNDER THE PLUMBING SUB-CONTRACT, LABOR AND TESTING PERFORMED HEREIN SHALL BE IN COMPLETE ACCORDANCE WITH THE STATE BUILDING CODE, LOCAL FUEL GAS AND PLUMBING CODES, ALL LOCAL CODES AND REGULATIONS, NATIONAL FIRE PROTECTION ASSOCIATION, INSURANCE REGULATIONS AND REQUIREMENTS GOVERNING SUCH WORK.
4. ANY AND ALL PERMITS REQUIRED FOR INSTALLATION OF ANY MATERIAL SHALL BE OBTAINED AS PART OF THE WORK OF THE SPECIFICATION INCLUDING ALL FEES OR EXPENSES INCURRED.
5. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION OF ALL PLUMBING FIXTURES AND EQUIPMENT.
6. ALL LOCATIONS OF EXISTING PIPING AND EQUIPMENT INDICATED HAS BEEN OBTAINED FROM EXISTING CONDITIONS DURING SITE VISITS AND EXISTING PLANS. THIS CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PIPING, PIPE SIZES, POINTS OF CONNECTIONS TO EXISTING PIPING, FIXTURES AND EQUIPMENT PRIOR TO COMMENCEMENT OF WORK.
7. MISCELLANEOUS DISCREPANCIES OR OMISSIONS WHICH MIGHT APPEAR ON THE PLANS OR SPECIFICATIONS WILL NOT RELIEVE THE PLUMBING SUB-CONTRACTOR OF CODE COMPLIANCE.



NOTES:
1. PAINT ALL EXPOSED & EXTERIOR GAS PIPING. FITTINGS AND VALVES WITH TWO COATS OF RUST INHIBITIVE EXTERIOR GRADE OSHA YELLOW PAINT.
2. INSTALL POLYPROPYLENE UV RESISTANT SLEEPER PIPING SUPPORTS EVERY 10'-0".
3. DO NOT INSTALL ANY PIPING IN FRONT OF ROOFTOP UNIT DOORS OR ACCESS PANELS.
4. COORDINATE WITH MECHANICAL CONTRACTOR FOR LOCATION OF GAS CONNECTIONS ON ROOFTOP UNITS BEFORE INSTALLING PIPING.

02
P103

Plumbing Roof Plan - Building 3

1/8" = 1'-0"

0 12 24 FT

CERTIFICATION :

GLEN G. MARKEY
STATE OF RHODE ISLAND
No. 7349
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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REFER TO ALL DRAWINGS FOR COMPLETE SCOPE OF WORK.

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

PLUMBING GAS PLANS - BUILDING 3

JOB NO.: 16096RS

DRAWN BY: JMS

CHECKED BY: GGM

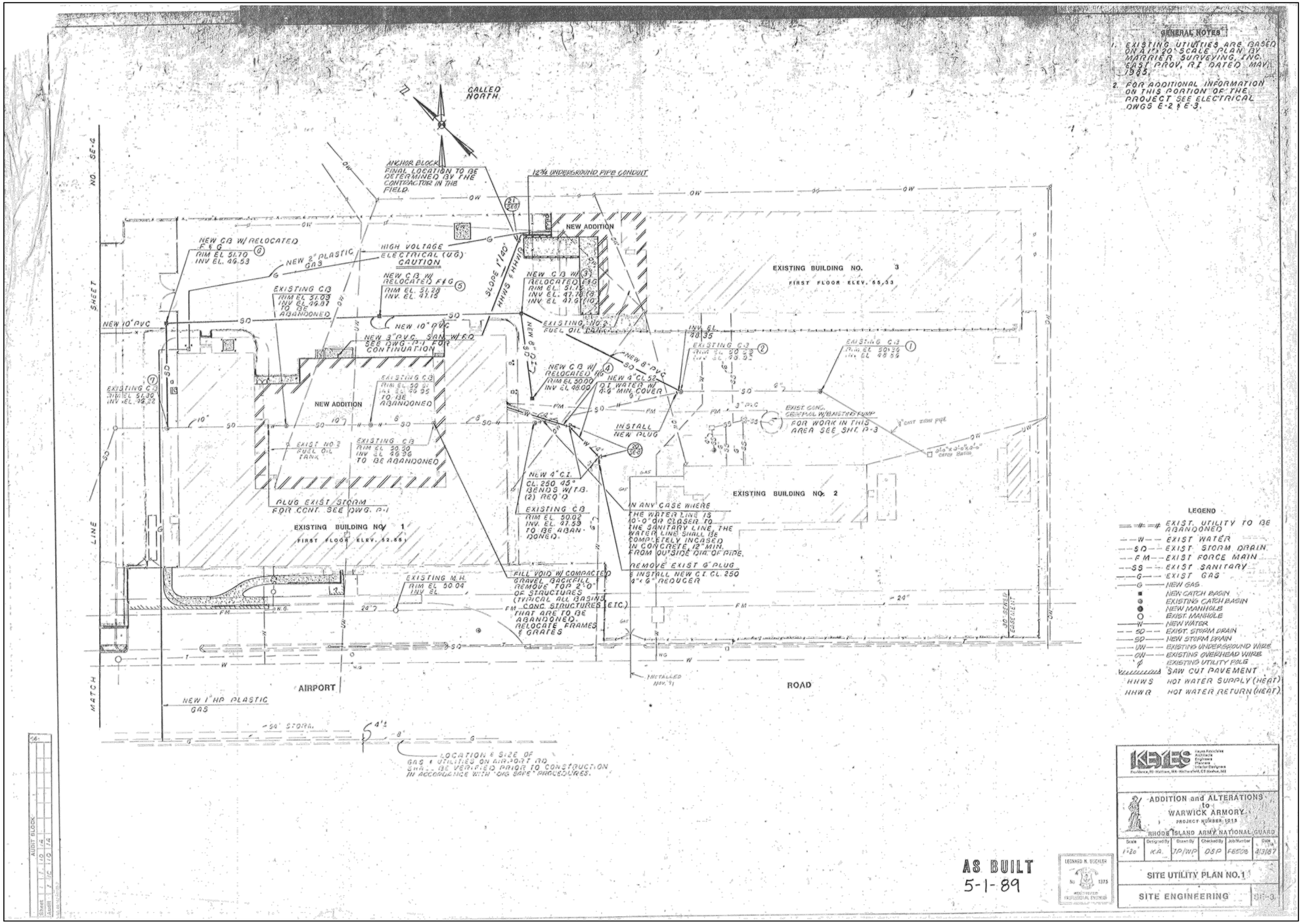
DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

P103

CONTRACTOR TO MAKE PROVISIONS FOR GROUND PENETRATING RADAR TO LOCATE THE EXACT LOCATION OF THE EXISTING UNDERGROUND GAS MAIN TO BUILDING 3.



CERTIFICATION :

GLEN G. MARKEY
No. 7349
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	03.20.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Statersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

PROJECT NAME:

WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

SHEET TITLE:

SITE UTILITY AS-BUILT
(FOR REFERENCE ONLY)

JOB NO.: 16096RS

DRAWN BY: JMS

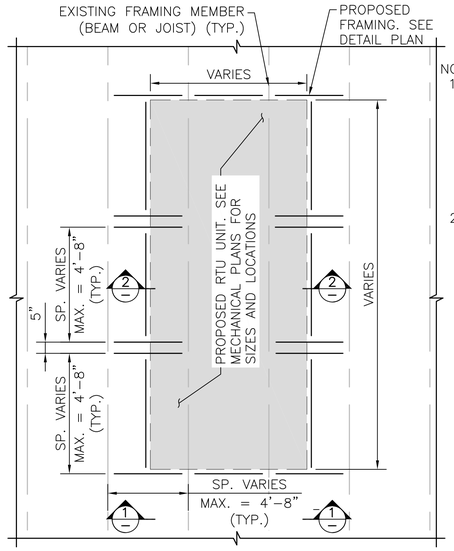
CHECKED BY: GGM

DATE ISSUED: 03.20.2018

SCALE: AS NOTED

SHEET NO.:

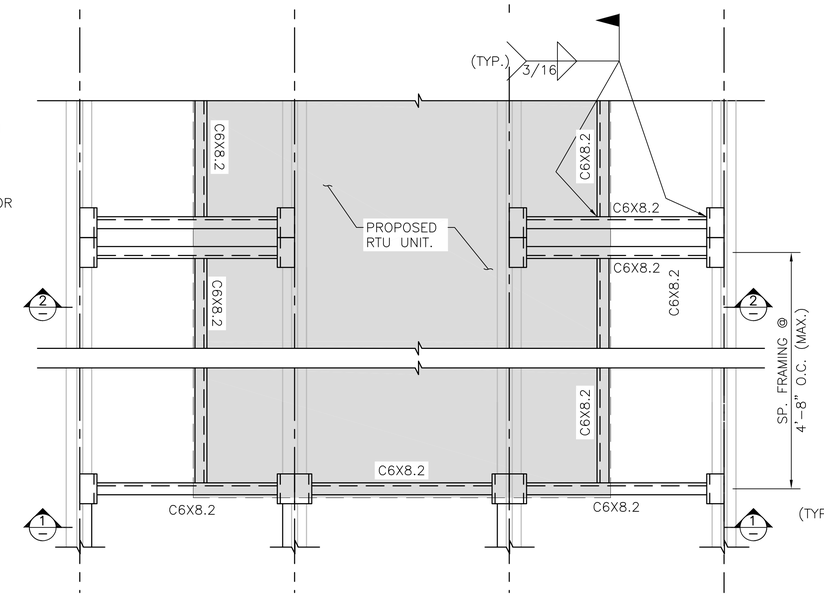
P201



NOTES:
1. RTU SIZES AND LOCATIONS VARY. CONTRACTOR TO PROVIDE FRAMING SIMILAR AS SHOWN ON THIS SHEET DIRECTLY UNDERNEATH CURBS AND USING THE LIMITS SHOWN ABOVE
2. DETAILS APPLICABLE FOR BUILDINGS 1 & 2

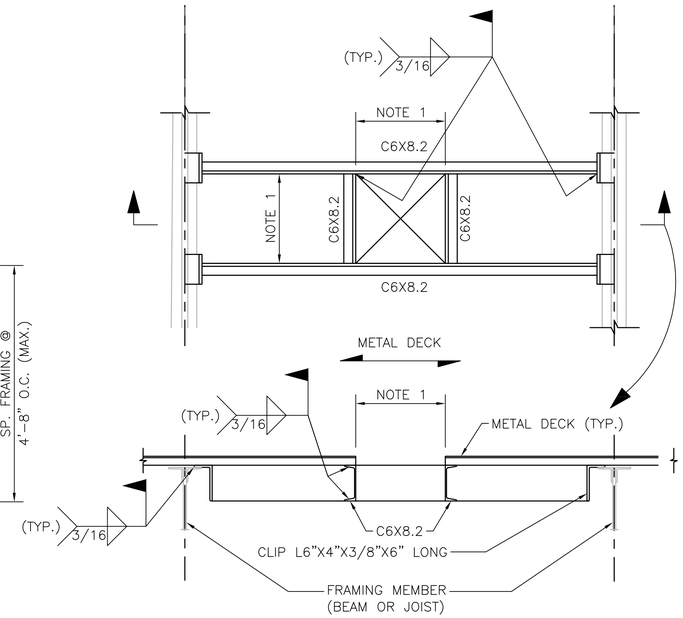
TYPICAL RTU CURB SUPPORTING FRAMING PARTIAL ROOF PLAN

NOT TO SCALE



1 TYPICAL RTU CURB SUPPORT DETAIL PLAN

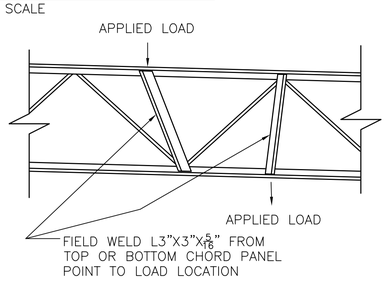
NOT TO SCALE



NOTE 1:
SEE MECHANICAL PLANS FOR LOCATION AND SIZE.

3 TYPICAL ROOF OPENING IN FRAMING

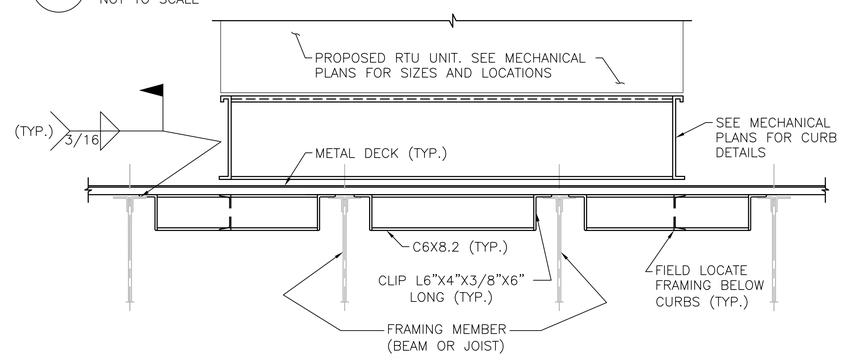
NOT TO SCALE



NOTE: TYPICAL FOR ALL JOISTS SUPPORTING ANY LOAD FROM TOP OR BOTTOM CHORD BETWEEN PANEL POINTS. VERIFY LOCATION AND NUMBER OF LOADS WITH MECHANICAL, ARCHITECTURAL, AND ELECTRICAL DRAWINGS.

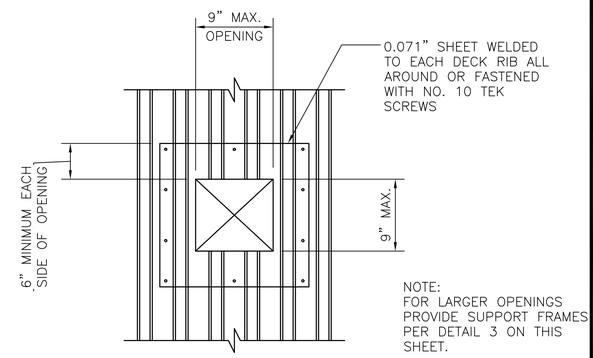
2 TYPICAL JOIST MODIFICATION AT CONCENTRATED LOAD DETAIL

NOT TO SCALE



1 SECTION

NOT TO SCALE

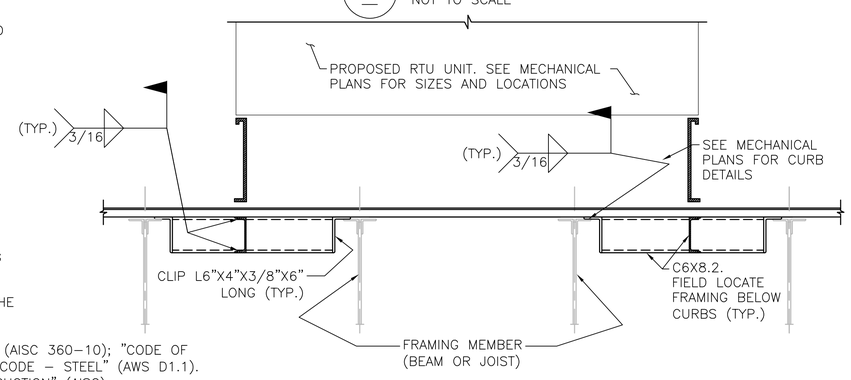


NOTE:
FOR LARGER OPENINGS PROVIDE SUPPORT FRAMES PER DETAIL 3 ON THIS SHEET.

NOTE:
NO REINFORCEMENT REQUIRED FOR HOLES 6" OR LESS LOCATED SO THAT ONLY ONE DECK RIB IS AFFECTED. HOLES AFFECTING MORE THAN ONE DECK RIB SHALL BE REINFORCED AS INDICATED ABOVE.

4 PLAN FOR OPENINGS IN ROOF DECK

NOT TO SCALE



2 SECTION

NOT TO SCALE

GENERAL NOTES:
1. STRUCTURAL DRAWINGS TO BE USED IN CONJUNCTION WITH ARCHITECTURAL, ELECTRICAL, AND MECHANICAL DRAWINGS AND PROJECT SPECIFICATIONS.
2. CODES AND STANDARDS:
   A. RHODE ISLAND STATE BUILDING CODE SBC-1-2013
   B. AISC 360-10 SPECIFICATION FOR STRUCUTRAL STEEL BUILDINGS.
   C. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCUTURES.
3. ALL SAFETY REGULATIONS TO BE FOLLOWED STRICTLY. METHODS OF CONSTRUCTION AND ERECTION OF STRUCTURAL MATERIALS IS CONTRACTOR'S RESPONSIBILITY.
4. UNLESS OTHERWISE NOTED, DETAILS SHOWN ON DRAWINGS ARE TO BE CONSIDERED TYPICAL FOR ALL SIMILAR CONDITIONS.
5. EXISTING DIMENSIONS AND CONDITIONS MUST BE VERIFIED OR DETERMINED IN THE FIELD BY THE CONTRACTOR. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE AFFECTED PORTION OF THE WORK.

MECHANICAL EQUIPMENT SUPPORTS:
1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR APPROVAL INDICATING LOCATION, FRAMING, AND SUPPORT DETAILS OF ALL EQUIPMENT, INCLUDING DIMENSIONS, DETAILS, AND OPERATING AND DESIGN LOADS. NO EQUIPMENT SHALL BE SET IN PLACE WITHOUT SUCH APPROVAL.

ROOF DECK
1. ALL OPENING ON EXISTING ROOF DECK WILL REQUIRE ADDITIONAL FRAMING AS SHOWN ON THE DRAWINGS.

STRUCTURAL STEEL
1. STRUCTURAL STEEL SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS" (AISC 360-10); "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS & BRIDGES" (AISC); AND "STRUCTURAL WELDING CODE - STEEL" (AWS D1.1).
2. STRUCTURAL STEEL SHALL BE DETAILED IN ACCORDANCE WITH "DETAILING FOR STEEL CONSTRUCTION" (AISC).
3. STRUCUTRAL STEEL SHALL CONFORM TO THE FOLLOWING:
   (A) ROLLED BEAM SHAPES ..... ASTM A992 GRADE 50 (Fy = 50 KSI)
   (B) ANGLES AND PLATES ..... ASTM A36 (Fy = 36 KSI)
4. WELDED CONNECTIONS SHALL BE MADE BY AWS CERTIFIED WELDERS USING FILLER METAL CONFORMING TO E70XX WITH LOW HYDROGEN
5. NO FIELD CUTTING OF STRUCTURAL STEEL OR FIELD CUTTING OF STRUCUTRAL STEEL OR FIELD MODIFICATIONS OF STRUCUTRAL STEEL SHALL BE DONE WITHOUT PRIOR WRITTEN APPROVAL BY ENGINEER FOR EACH SPECIFIC CASE.
6. ALL STEEL USED IN THIS PROJECT SHALL BE MANUFACTURED IN THE UNITED STATES. ALL MANUFACTURING PROCESSES OF THE STEEL MATERIAL IN A PROJECT (i.e. SMELTING, AND ANY SUBSEQUENT PROCESS WHICH ALTERS THE STEEL MATERIAL'S PHYSICAL FORM OR SHAPE OR CHANGES ITS CHEMICAL COMPOSITION) MUST OCCUR WITHIN THE UNITED STATES TO BE CONSIDERED OF DOMESTIC ORIGIN. THIS INCLUDES PROCESSES SUCH AS ROLLING, EXTRUDING, MACHINING, BENDING, GRINDING, DRILLING, AND THE APPLICATION OF COATINGS, INCLUDING IRON.

CERTIFICATION :

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REV. NO.	DATE	DESCRIPTION
	11.10.2017	ISSUED FOR BID DOCUMENTS
	02.28.2018	PROGRESS ONLY
	03.02.2018	ISSUED FOR CONSTRUCTION

ENGINEERING DESIGN SERVICES INCORPORATED
141 Industrial Highway Slatersville, RI 02876
Tel (401) 765-7659 Fax (401) 765-2984

Steere ENGINEERING INC

PROJECT NAME:
WARWICK ARMORY
541 AIRPORT ROAD
WARWICK, RI

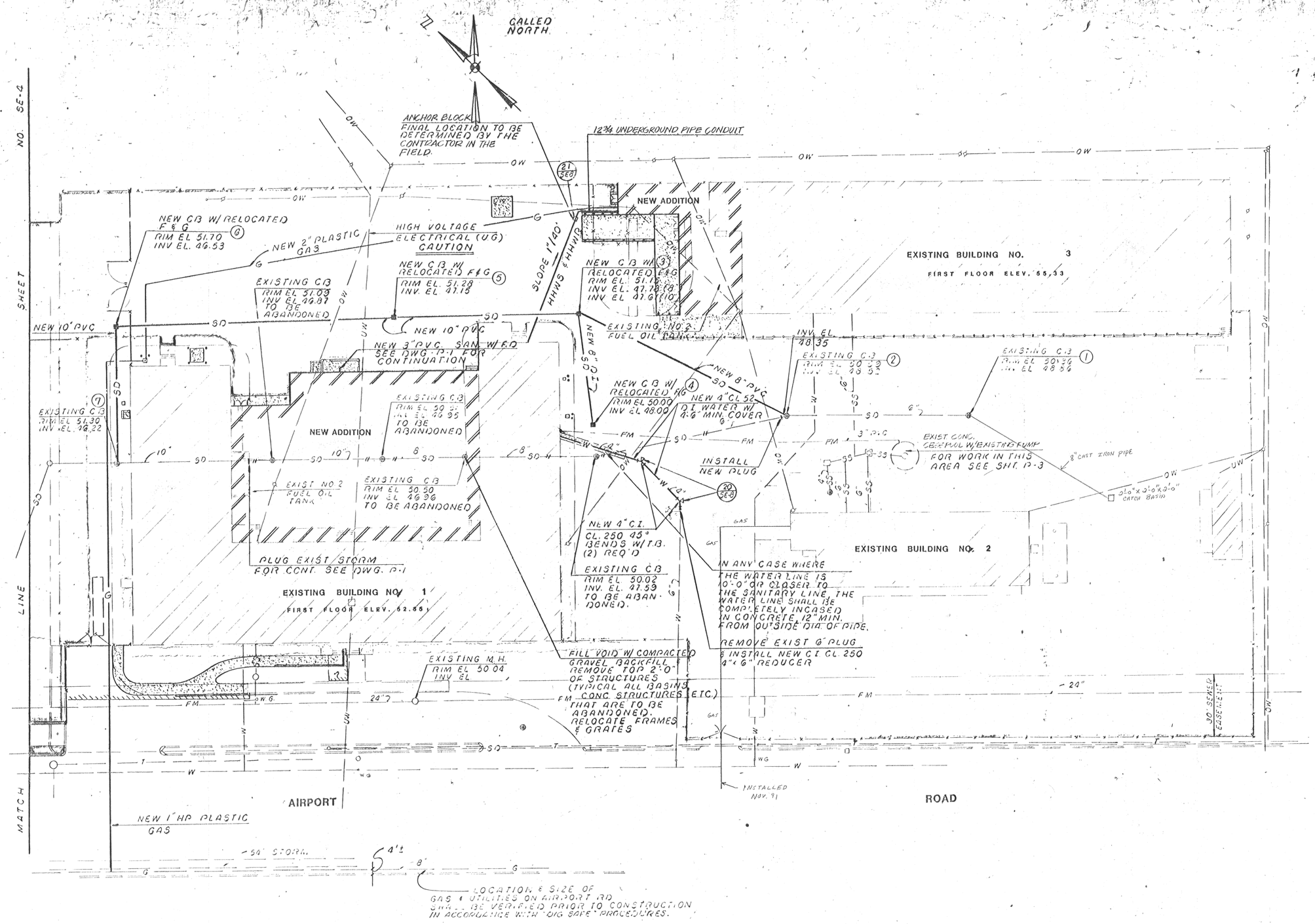
SHEET TITLE:
ROOF EQUIPMENT AND ROOF OPENING SUPPORT DETAILS

JOB NO.: 16096RS
DRAWN BY: TIP
CHECKED BY: BSN
DATE ISSUED: 03.02.2018
SCALE: AS NOTED

SHEET NO.:
S101

GENERAL NOTES

1. EXISTING UTILITIES ARE BASED ON A 1"=20' SCALE PLAN BY MARRIER SURVEYING, INC. EAST PROV, R.I. DATED MAY, 1985.
2. FOR ADDITIONAL INFORMATION ON THIS PORTION OF THE PROJECT SEE ELECTRICAL DWGS E-2 & E-3.



LEGEND

—#—#—	EXIST. UTILITY TO BE ABANDONED
—W—	EXIST WATER
—SD—	EXIST STORM DRAIN
—FM—	EXIST FORCE MAIN
—SS—	EXIST SANITARY
—G—	EXIST GAS
—G—	NEW GAS
■	NEW CATCH BASIN
⊗	EXISTING CATCH BASIN
●	NEW MANHOLE
○	EXIST. MANHOLE
—W—	NEW WATER
—SD—	EXIST. STORM DRAIN
—SD—	NEW STORM DRAIN
—UW—	EXISTING UNDERGROUND WIRE
—OW—	EXISTING OVERHEAD WIRE
φ	EXISTING UTILITY POLE
	SAW CUT PAVEMENT
HHWS	HOT WATER SUPPLY (HEAT)
HHWR	HOT WATER RETURN (HEAT)

KEYES Keyes Associates Architects Engineers Planners Interior Designers
Providence, RI · Waltham, MA · Wethersfield, CT · Nashua, NH

ADDITION and ALTERATIONS to WARWICK ARMORY
PROJECT NUMBER 1913
RHODE ISLAND ARMY NATIONAL GUARD

Scale	Designed By	Drawn By	Checked By	Job Number	Date
1"=20'	KA	JP/WP	DSP	F8508	4/13/87

SITE UTILITY PLAN NO. 1

SITE ENGINEERING — SE-3

LEONARD N. BUCKLER No. 1375 REGISTERED PROFESSIONAL ENGINEER

AS BUILT 5-1-89

AUDIT BLOCK				
Sheet	1	1/0	1/4	
Audit	1	1/0	1/0	1/4