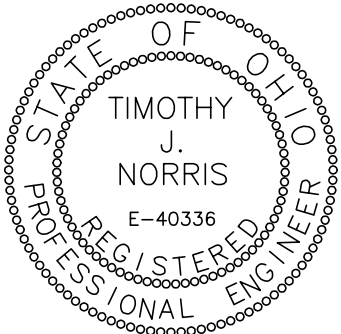


BASEMENT LIGHTING PLAN

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

PLAN NOTES:

- ① SWITCH SHALL CONTROL LIGHTING FIXTURE ABOVE. REFER TO 'FIRST FLOOR LIGHTING PLAN' ON DRAWING 'E2'.
- ② LIGHTING BRANCH CIRCUIT SHALL CONTINUE TO FIRST FLOOR. REFER TO 'FIRST FLOOR LIGHTING PLAN' ON DRAWING 'E2'.
- ③ EC SHALL PROVIDE POWER FROM LIGHTING BRANCH CIRCUIT FEEDING STAIRWELL AHEAD OF SWITCHING. REFER TO 'FIRST FLOOR LIGHTING PLAN' ON DRAWING 'E2'.



VILLAGE OF CRESTLINE

WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I
BASEMENT LIGHTING PLAN

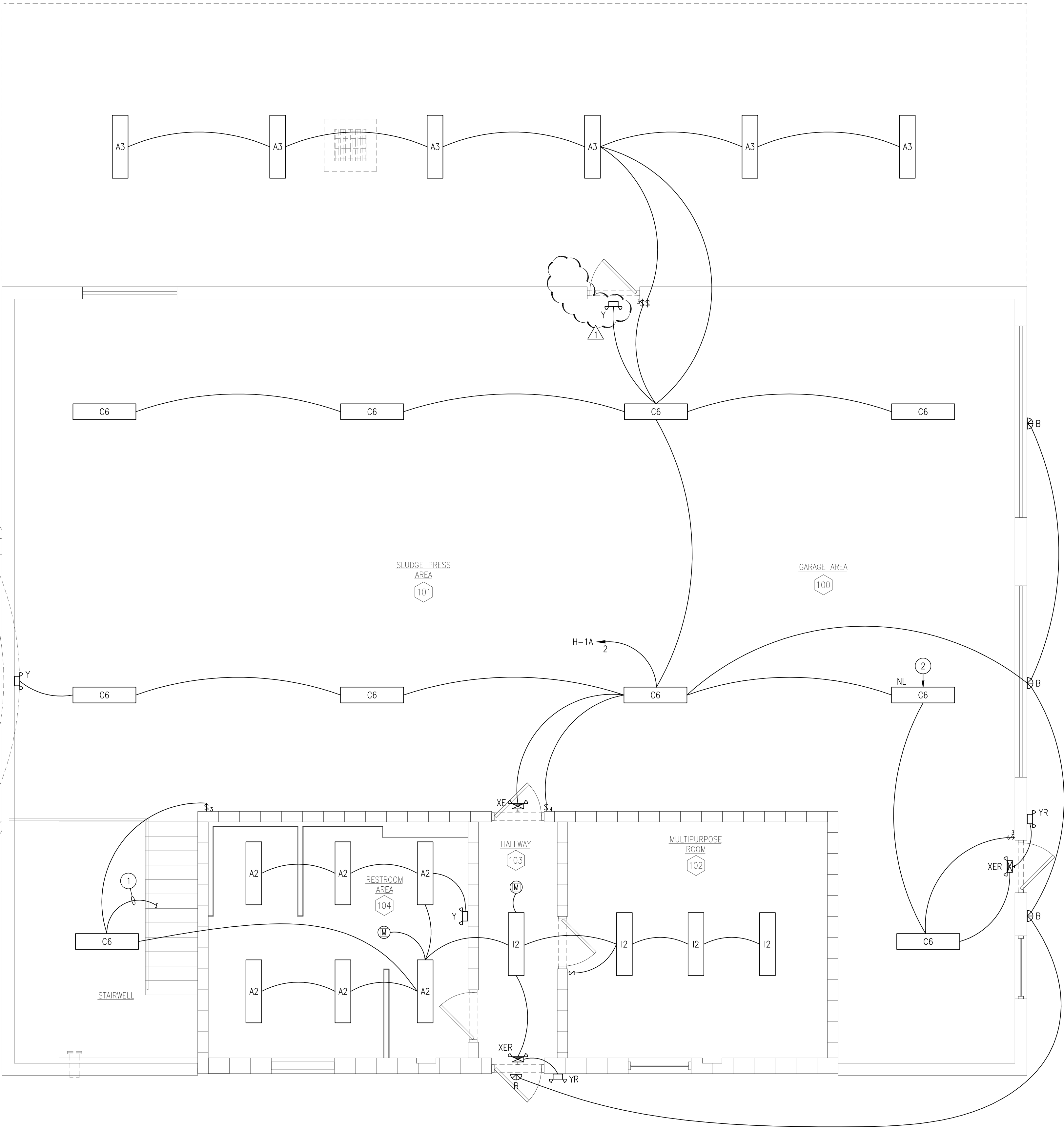
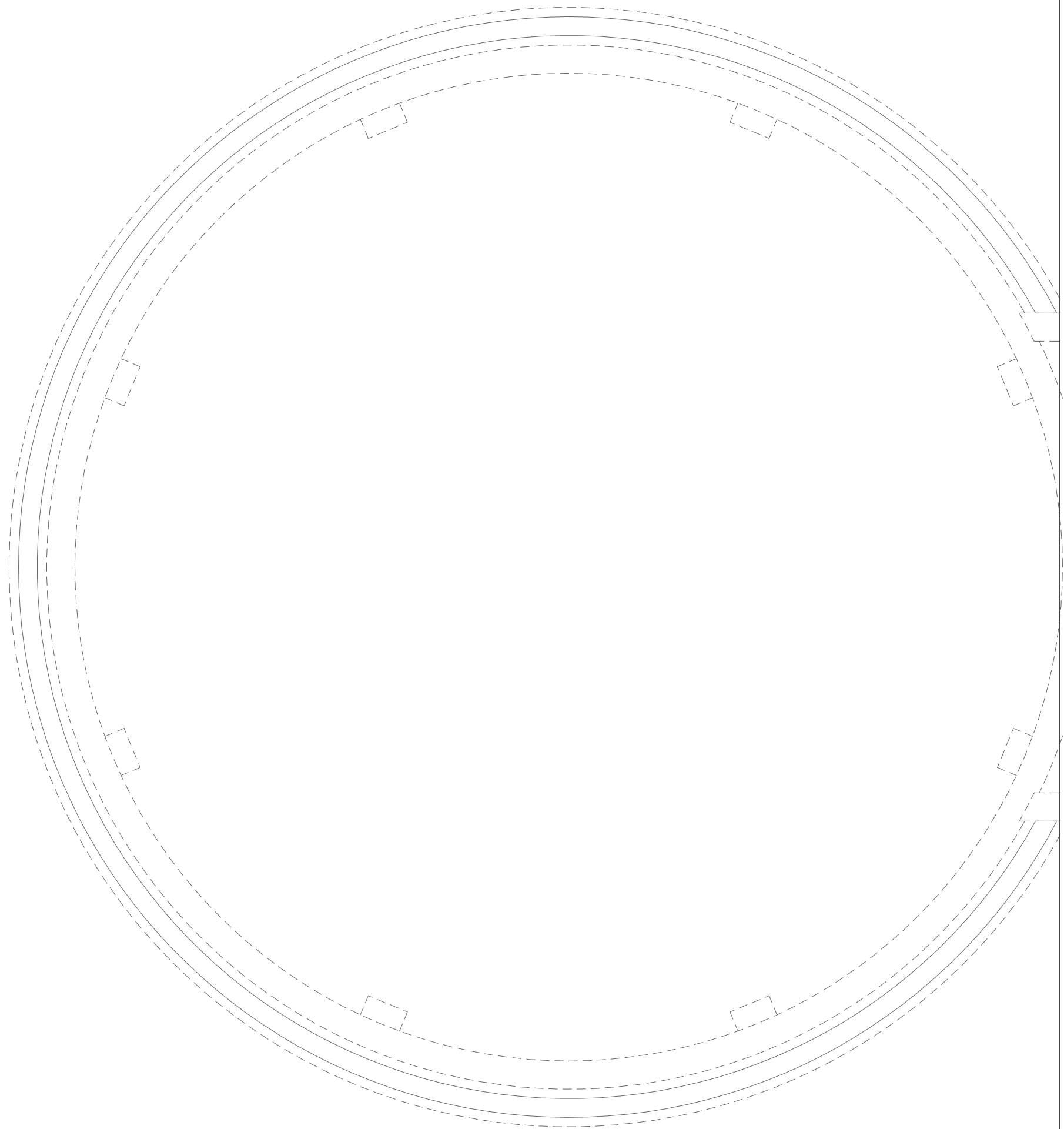


REV. NO.	DATE	CALCULATED
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ADDENDUM 3	04\30\14	CHECKED
		T.J.N.

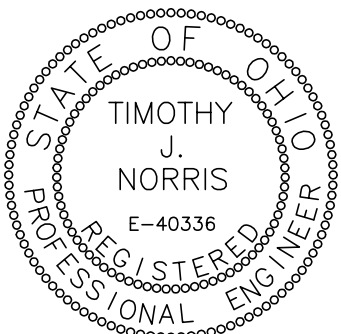
E1
X

PLAN NOTES:

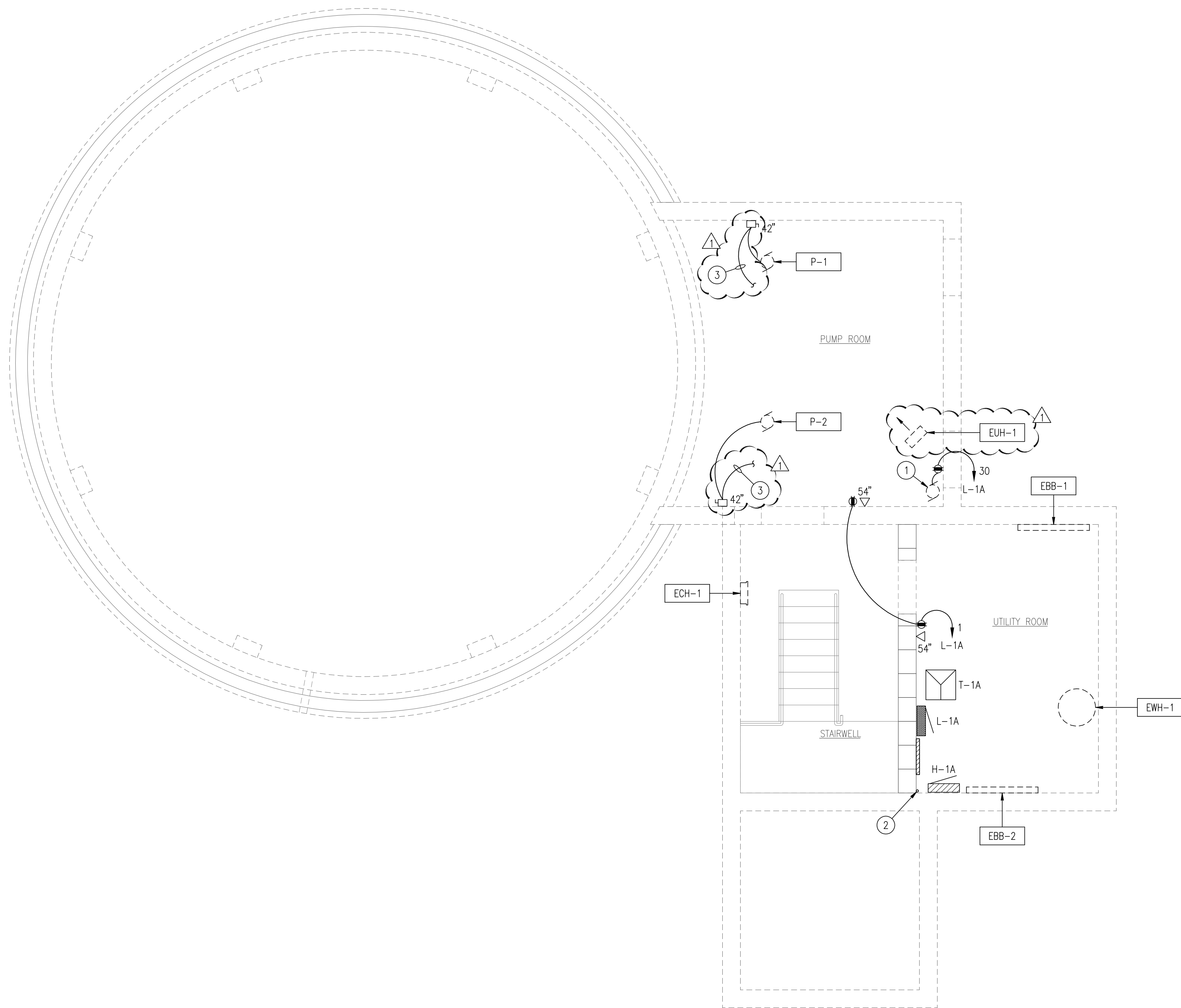
- 1 FUTURE SHALL RECEIVE POWER AND CONTROL FROM LIGHTING BRANCH CIRCUIT AND 3-WAY SWITCH IN BASEMENT, REFER TO "BASEMENT LIGHTING PLAN" ON DRAWING 'E1'.
- 2 FUTURE SHALL BE PROVIDED WITH INTEGRAL OCCUPANCY SENSOR (OPTION #MSE360LB) AND WIRED AHEAD OF LOCAL SWITCHING.



FIRST FLOOR LIGHTING PLAN
SCALE: 1/4" = 1'-0"



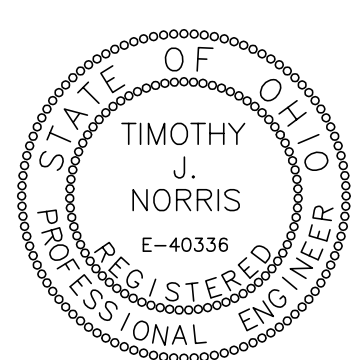
<div><div>E2</div><div>X</div></div>	VILLAGE OF CRESTLINE	WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I FIRST FLOOR LIGHTING PLAN	<div><div><div>JGJ</div><div>Consulting engineers</div></div><div><div>20000 Crestline Rd., Suite C</div><div>Crestline, Ohio 44829</div><div>Phone: 419.234.9999</div><div>Email: jg@jgjengineers.com</div><div>www.jgjengineers.com</div></div></div>	REV. NO.	DATE	CALCULATED	
				BID & PERMIT	04/10/14	S.P.K.	
				ADDENDUM 3	04/30/14	CHECKED	
						T.J.N.	



BASEMENT POWER & SYSTEMS PLAN
SCALE: 1/4" = 1'-0"

PLAN NOTES:

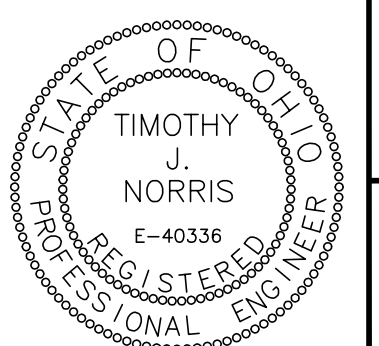
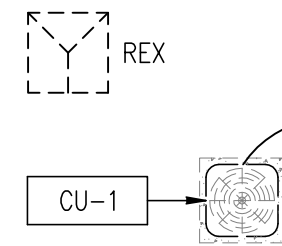
- ① EXISTING SUMP PUMP (120V, 1/2HP) - VERIFY SUMP PUMP PIT LOCATION IN FIELD.
- ② TELECOMMUNICATIONS SERVICE ENTRANCE CONDUIT. COORDINATE REQUIREMENTS WITH TELECOMMUNICATIONS SERVICE PROVIDER.
- ③ EC SHALL PROVIDE POWER AND CONTROL FROM SCREW PRESS CONTROL PANEL IN SLUDGE PRESS AREA. REFER TO PLAN NOTE #6 ON DRAWING 'E4'.

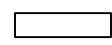
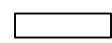

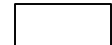
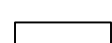






REV. NO.	DATE	CALCULATED	
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		T.J.N.	
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ADDENDUM 3 04\30\14			
WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I BASEMENT POWER & SYSTEMS PLAN			
VILLAGE OF CRESTLINE			
E3 X			

- ① SINGLE RECEPTACLE (NEMA 6-30R) AT 48" AFF FOR ELECTRIC DRYER (208V/1Ø, 4.5KW) – EC SHALL CONNECT TO CIRCUITS #24 & #26 IN PANEL "L-1A" WITH 2#10 & 1#10 GROUND IN ¾ CONDUIT AND 30/2 CIRCUIT BREAKER.
- ② EC SHALL PROVIDE RECEPTACLE AT 54" AFF FOR CNP PUMP (120V, 0.1KW) – EC SHALL CONNECT TO CIRCUIT #15 IN PANEL "L-1A". VERIFY LOCATION IN FIELD.
- ③ MOTOR OPERATED DAMPER (120V, 0.1KW) – EC SHALL PROVIDE POWER FROM BRANCH RECEPTACLE CIRCUIT AS SHOWN AND CONNECT CONTROL WIRING AS DIRECTED BY MC.
- ④ EC SHALL REFEED ANY EXISTING ELECTRICAL DEVICES REMAINING AFTER DEMOLITION. COORDINATE IN FIELD.
- ⑤ SCREW PRESS SOLENOID VALVE – EC SHALL PROVIDE 120V POWER FROM CIRCUIT #17 IN PANEL "L-1A". DEVICE SHALL BE CONTROLLED BY SCREW PRESS CONTROL PANEL. COORDINATE LOCATION IN FIELD.

- 1



LIGHTING FIXTURE SCHEDULE							TIMOTHY J. NORRIS & ASSOCIATES
FIXTURE TYPE	LAMP(S)	BALLAST(S)	FIXTURE WATTAGE	FIXTURE VOLTAGE	FIXTURE DESCRIPTION	CATALOG NUMBER	NOTES
A2 	(2) 32W T8	(1) E	60	277	FLUORESCENT, 4' LONG, SURFACE MOUNTED FIXTURE WITH HIGH IMPACT FIBERGLASS HOUSING, ACRYLIC DIFFUSER AND WET LOCATION LISTING.	LITHONIA DWM-232-MVOLT-GE810IS	③
A3 	(3) 32W T8	(1) E	90	277	FLUORESCENT, 4' LONG, SURFACE MOUNTED FIXTURE WITH NEMA 4X LISTING.	RIGALITE XP-265-4-3L-A	③
B 	39W LED	NA	40	277	LED, WET LOCATION LISTED, BUILDING MOUNTED FIXTURE WITH DIE-CAST ALUMINUM HOUSING, POLYESTER POWDER FINISH AND INTEGRAL PHOTOCCELL.	LITHONIA TWH-LED-10C-T3M-MVOLT-PE	
C6 	(6) 32W T8	(2) E	200	277	FLUORESCENT HIGH BAY FIXTURE WITH FORMED STEEL HOUSING, WIDE DISTRIBUTION AND BAKED WHITE ENAMEL FINISH.	LITHONIA IBZ-632-WD	⑤ ⑥
I2 	(2) 32W T8	(1) E	60	277	FLUORESCENT, 4' LONG INDUSTRIAL FIXTURE WITH DIE-FORMED COLD ROLLED STEEL HOUSING, REFLECTOR AND CHANNEL COVER AND HIGH-GLOSS, BAKED WHITE ENAMEL FINISH.	LITHONIA L232-MV	④
XE 	5W LED (2) 5W INC	NA	15	120	COMBINATION INCANDESCENT EMERGENCY LIGHTING UNIT/LED EXIT SIGN WITH FACES, ARROWS AND MOUNTING AS INDICATED ON DRAWINGS, 6" HIGH RED LETTERS, WHITE THERMOPLASTIC HOUSING, LEAD-CADMIUM BATTERY, BATTERY CHARGER, TEST SWITCH, INDICATOR LIGHT AND (2) ADJUSTABLE LAMP HEADS.	LITHONIA LHQM-S-W-3-R	① ② ③ ⑦
XER 	5W LED (2) 5W INC	NA	15	120	COMBINATION INCANDESCENT EMERGENCY LIGHTING UNIT/LED EXIT SIGN WITH FACES, ARROWS AND MOUNTING AS INDICATED ON DRAWINGS, 6" HIGH RED LETTERS, WHITE THERMOPLASTIC HOUSING, HIGH OUTPUT LEAD-CALCIUM BATTERY WITH REMOTE COMPACTICY, BATTERY CHARGER, TEST SWITCH, INDICATOR LIGHT AND (2) ADJUSTABLE LAMP HEADS.	LITHONIA LHQM-S-W-3-R-HO	① ② ③ ⑦
Y 	(2) 6W INC	NA	15	120	INCANDESCENT EMERGENCY LIGHTING UNIT WITH THERMOPLASTIC HOUSING, LEAD-CALCIUM BATTERY, BATTERY CHARGER, TEST SWITCH, INDICATOR LIGHT AND (2) ADJUSTABLE LAMP HEADS.	LITHONIA ELM2	① ② ③ ⑦
YR 	(2) 6W HAL	NA	15	120	HALOGEN INCANDESCENT REMOTE EMERGENCY LIGHTING UNIT WITH THERMOPLASTIC HOUSING AND (2) ADJUSTABLE LAMP HEADS.	LITHONIA ELA-W-T-NX-H0606	① ② ③ ⑦


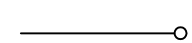
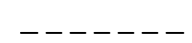






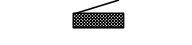

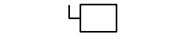






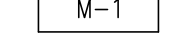

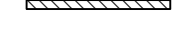
LIGHTING FIXTURE SCHEDULE NOTES:

- ① WALL MOUNTED EXIT SIGNS AND EMERGENCY LIGHTING UNITS SHALL BE MOUNTED ABOVE DOORS, CENTERED BETWEEN DOOR AND CEILING WHERE PRACTICAL, OR AT A SIMILAR HEIGHT IF NOT ABOVE DOORS, UON.
- ② FIXTURE SHALL BE WIRED AHEAD OF LOCAL SWITCHING.
- ③ VERIFY FINISH COLOR WITH ARCHITECT PRIOR TO PROCUREMENT.
- ④ EC SHALL MOUNT FIXTURE TO SURFACE OF CEILING.
- ⑤ FIXTURE SHALL BE HUNG NEAR CEILING. COORDINATE WITH OWNER.
- ⑥ FIXTURE SHALL PROVIDED WITH (1) 2-LAMP BALLAST & (1) 4-LAMP BALLAST.
- ⑦ EC SHALL AIM FIXTURES FOR OPTIMUM COVERAGE OF TASK AS DIRECTED IN FIELD BY ARCHITECT.

LIGHTING FIXTURE SCHEDULE KEY:

LAMP TYPE:
LED = LIGHT EMITTING DIODE
T8 = STANDARD LINEAR FLUORESCENT
HAL = HALOGEN INCANDESCENT
INC = INCANDESCENT

BALLAST TYPE:
E = ELECTRICAL
NA = NOT APPLICABLE

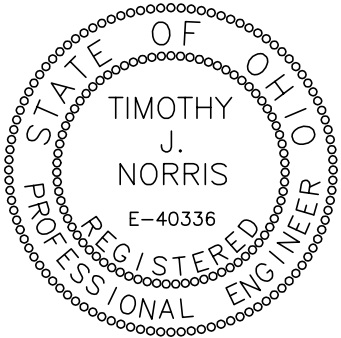
ELECTRICAL SYMBOL LEGEND	
SYMBOL	DESCRIPTION
	HOMERUN TO A 20 AMPERE, SINGLE POLE CIRCUIT BREAKER (PANEL 'A' CIRCUIT NUMBER '1'), UON. PROVIDE QUANTITY OF CONDUCTORS TO ACCOMMODATE CIRCUITING AND CONTROL INDICATED.
	CONDUIT TURNED UP
	CONDUIT INSTALLED BELOW GRADE OR BELOW FINISHED FLOOR
	SWITCH (20A, 120/277V, SINGLE POLE) AT 48" AFF, UON ('3' = THREE-WAY, '4' = FOUR-WAY, 'M' = MANUAL MOTOR CONTROLLER)
	LIGHTING CONTROL OCCUPANCY SENSOR – CEILING MOUNTED
	DUPLEX RECEPTACLE (20A, 125V) AT 18" AFF, UON
	DUPLEX RECEPTACLE (20A, 125V) GROUND FAULT CIRCUIT INTERRUPTER TYPE AT 18" AFF, UON, IF INDOOR, AND AT 24" AFG, UON, IF OUTDOOR ('WP' = WEATHERPROOF)
	SPECIAL PURPOSE SINGLE RECEPTACLE – NEMA CONFIGURATION AND HEIGHT AS INDICTED ON DRAWINGS.
	JUNCTION BOX – MOUNTING HEIGHT AND SIZE AS REQUIRED BY CODE OR AS NOTED ON DRAWINGS
	PANELBOARD (208Y/120V, 3Ø, 4 WIRE)
	PANELBOARD (480Y/277V, 3Ø, 4 WIRE)
	NON-FUSED DISCONNECT SWITCH – SIZE AS INDICATED
	COMBINATION MAGNETIC MOTOR STARTER/DISCONNECT SWITCH – FUSING AS INDICATED
	FUSED DISCONNECT SWITCH – SIZE AND FUSING AS INDICATED
	TRANSFORMER
	UTILITY POLE
	UTILITY POLE WITH STREET LIGHT
	SINGLE OR THREE PHASE MOTOR – SEE DRAWINGS FOR DESCRIPTION
	ELECTRICAL CONNECTION TO EQUIPMENT ITEM 'M-1' (LETTER DESIGNATION AS APPLICABLE) – REFER TO 'EQUIPMENT CONNECTION SCHEDULE' ON DRAWING 'E6'
	VOICE/DATA ROUGH-IN OUTLET BOX AT 18" AFF, UON
	TELECOMMUNICATIONS BACKBOARD

ELECTRICAL ABBREVIATIONS	
ABBREVIATION	DESCRIPTION
A	AMPERES
AF	AMP FUSED
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AS	AMP SWITCH
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AWG	AMERICAN WIRE GAUGE
C.	CONDUIT
C/B	CIRCUIT BREAKER
DWG.	DRAWING
EC	ELECTRICAL CONTRACTOR
EMT	ELECTRICAL METALLIC TUBING
ETR	EXISTING ELECTRICAL DEVICE TO REMAIN – MAINTAIN DURING DEMOLITION
EXT	EXTERIOR
FLA	FULL LOAD AMPS
G.	GROUND
GC	GENERAL CONTRACTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER – PERSON PROTECTION
HP	HORSEPOWER
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
KAIC	KILOAMPERES INTERRUPTING CURRENT RATING
KW	KILOWATTS
LTG	LIGHTING
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MOD	MOTOR OPERATOR DAMPER
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NL	NIGHT LIGHT WIRED AHEAD OF LOCAL LIGHTING CONTROL
OBC	OHIO BUILDING CODE
P	POLE
PC	PLUMBING CONTRACTOR
REC	RECEPTACLE
REX	REMOVE EXISTING ELECTRICAL DEVICE ALONG WITH RELATED CONDUIT AND WIRING, UON
TB	TELECOMMUNICATIONS BACKBOARD
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WIRE
WP	WEATHERPROOF
XFMR	TRANSFORMER
Ø	PHASE

WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I
ELECTRICAL SCHEDULES AND LEGENDS

VILLAGE OF CRESTLINE

E5
X



REV. NO.	DATE	CALCULATED	S.P.K.	CHECKED	T.J.N.
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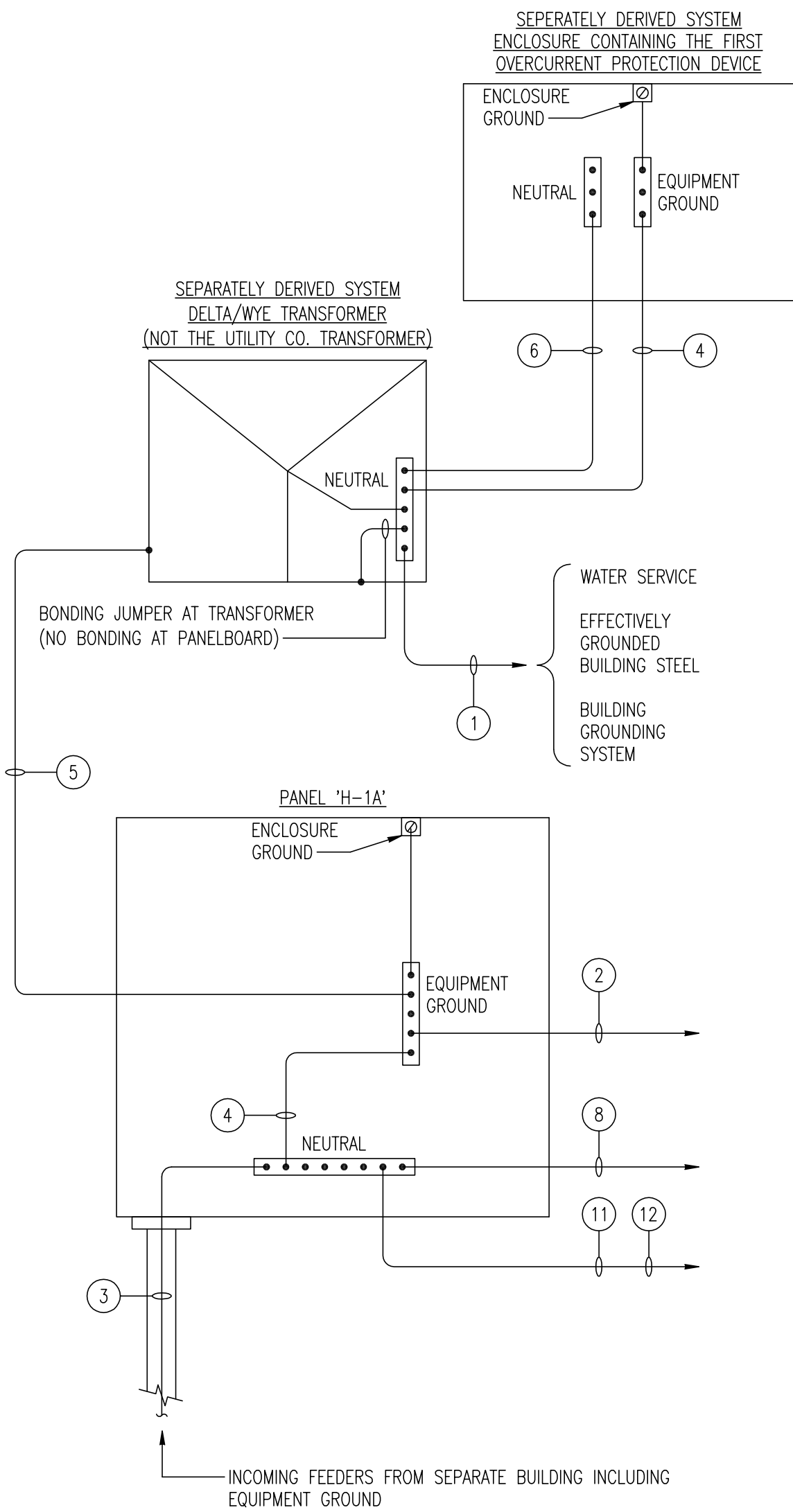
EQUIPMENT CONNECTION SCHEDULE													
LOCATION	NO.	DESCRIPTION	VOLTAGE	Ø	HP	FLA	KW	CONN.	CONDUIT AND WIRE SIZE	PANEL	CKT. NO.	C/B	
EXTERIOR	B-1	BLOWER	480	3	40	52.0	43.2	CP	4#2 & 1#8G., 1½"C.	7	7	80/3	5
EXTERIOR	B-2	BLOWER	480	3	40	52.0	43.2	CP	4#2 & 1#8G., 1½"C.	7	7	80/3	5
SLUDGE AREA 101	CON-1	CONVEYOR	480	3	2	3.4	2.8	CP	4#12 & 1#12G., ¾"C.	7	7	15/3	6
EXTERIOR	CU-1	AIR COOLED CONDENSING UNIT	208	1	—	10.0	2.1	FDS	2#12 & 1#12G., ¾"C.	L-1A	2,4	20/2	30AS/20AF
STORAGE	EBB-1	ELECTRIC BASEBOARD HEATER	120	1	—	8.3	1.0	DC	2#12 & 1#12G., ¾"C.	L-1A	8	20/1	2
STORAGE	EBB-2	ELECTRIC BASEBOARD HEATER	120	1	—	8.3	1.0	DC	2#12 & 1#12G., ¾"C.	L-1A	10	20/1	2
STAIRWELL	ECH-1	ELECTRIC CABINET HEATER	208	1	—	14.4	3.0	DC	2#12 & 1#12G., ¾"C.	L-1A	12,14	20/2	3
GARAGE AREA 100	EF-1	EXHAUST FAN	120	1	¼	5.8	0.7	MM	2#12 & 1#12G., ¾"C.	L-1A	20	20/1	
RESTROOM	EE-2	EXHAUST FAN	120	1	—	0.8	0.1	LS	2#12 & 1#12G., ¾"C.	L-1A	22	20/1	1
SLUDGE AREA 101	EF-3	EXHAUST FAN	120	1	¼	5.8	0.7	TS	2#12 & 1#12G., ¾"C.	L-1A	23	20/1	
PUMP AREA	EUH-1	ELECTRIC UNIT HEATER	208	3	—	10.4	3.8	DC	4#12 & 1#12G., ¾"C.	L-1A	32,34 36	15/3	8
STORAGE	EWB-1	ELECTRIC WATER HEATER	480	3	—	6.0	5.0	DC	3#12 & 1#12G., ¾"C.	H-1A	19,2 23	15/3	
MULTI-PURP 102	F-1	FURNACE	120	1	—	5.0	0.6	TS	2#12 & 1#12G., ¾"C.	L-1A	6	20/1	
PUMP AREA	P-1	PUMP	480	3	5	7.6	6.3	NDS	4#12 & 1#12G., ¾"C.	7	7	15/3	30AS 6
PUMP AREA	P-2	PUMP	480	3	5	7.6	6.3	NDS	4#12 & 1#12G., ¾"C.	7	7	15/3	30AS 6
GARAGE AREA 100	RH-1	RADIANT HEATER	120	1	—	5.0	0.6	DR	2#12 & 1#12G., ¾"C.	L-1A	16	20/1	4
GARAGE AREA 100	RH-2	RADIANT HEATER	120	1	—	5.0	0.6	DR	2#12 & 1#12G., ¾"C.	L-1A	16	20/1	4
GARAGE AREA 100	RH-3	RADIANT HEATER	120	1	—	5.0	0.6	DR	2#12 & 1#12G., ¾"C.	L-1A	18	20/1	4
SLUDGE AREA 101	SCP-1	SCREW PRESS	480	3	2	3.4	2.8	CP	4#12 & 1#12G., ¾"C.	7	7	15/3	6

EQUIPMENT CONNECTION SCHEDULE NOTES:

- 1 UNIT SHALL RECEIVE CONTROL WITH LIGHTING IN SAME ROOM VIA LIGHTING CONTRACTOR. VERIFY CONTROL WITH ARCHITECT.
- 2 EC SHALL PROVIDE MARKEL #E2910-04RS OR EQUAL WITH INTEGRAL THERMOSTAT OR APPROVED EQUAL SHALL BE FURNISHED AND INSTALLED BY EC.
- 3 MARKEL #HF3326TD-RP OR EQUAL WITH INTEGRAL THERMOSTAT AND DISCONNECT SWITCH SHALL BE FURNISHED AND INSTALLED BY EC.
- 4 RECEPTACLE SHALL BE MOUNTED TO STRUCTURAL MEMBER ON CEILING - COORDINATE IN FIELD.
- 5 NON-SIMULTANEOUS PUMPS SHALL RECEIVE BRANCH POWER VIA CONTROLLER. CONDUIT, WIRE AND CIRCUIT BREAKER SIZE GIVEN IN SCHEDULE IS FOR BRANCH TO PUMP FROM CONTROLLER. REFER TO PLAN NOTE #3 ON DRAWING 'E5'.
- 6 PUMPS SHALL RECEIVE BRANCH POWER VIA CONTROLLER. CONDUIT, WIRE, CIRCUIT BREAKER, AND SWITCH SIZE GIVEN IN SCHEDULE IS FOR BRANCH TO PUMP FROM CONTROLLER. REFER TO PLAN NOTE #6 ON DRAWING 'E4'.
- 7 EC SHALL PROVIDE POWER THROUGH SINGLE POINT CONNECTION TO CONTROL PANEL. REFER TO PLANS FOR CONTROL PANEL REQUIREMENTS AND CIRCUITING INFORMATION.
- 8 MARKEL #H3H5605T WITH INTEGRAL THERMOSTAT AND DISCONNECT SWITCH OR APPROVED EQUAL FURNISHED AND INSTALLED BY EC.

EQUIPMENT CONNECTION KEY:

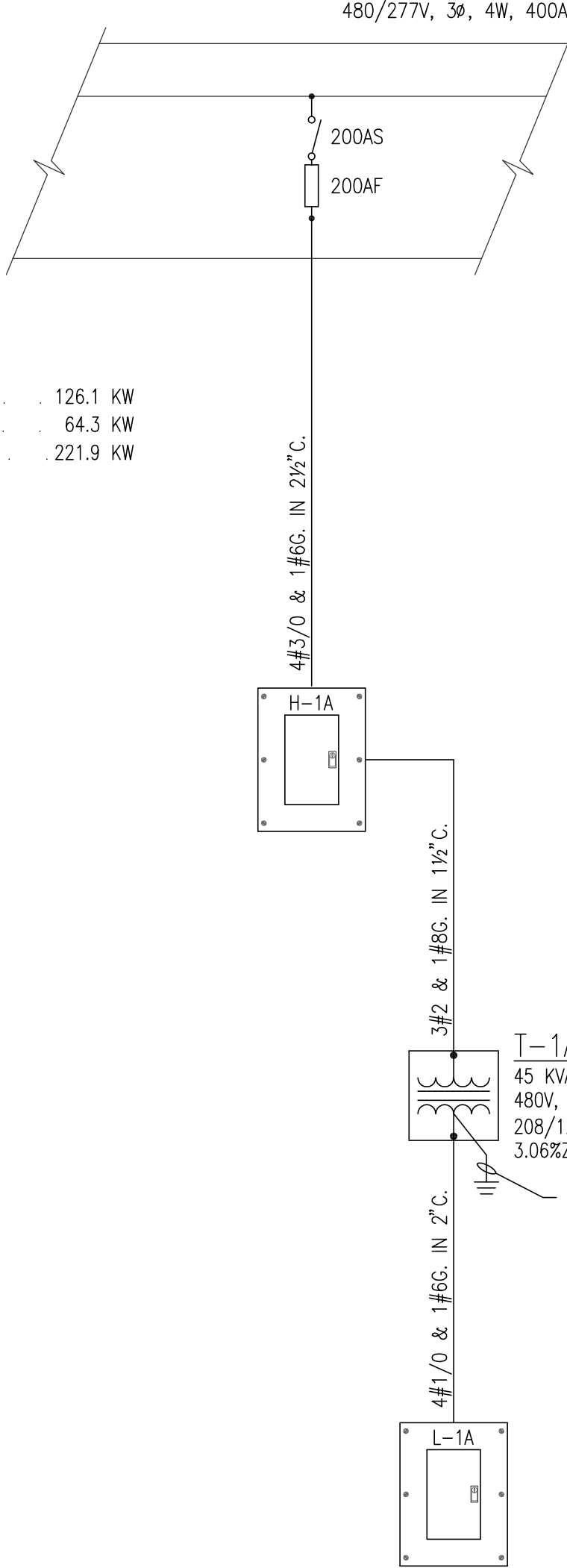
- CP: CONTROL PANEL
- DC: DIRECT CONNECTION
- DR: DEDICATED RECEPTACLE
- FDS: FUSED DISCONNECT SWITCH SIZED IN SCHEDULE NOTES
- LS: LIGHT SWITCH
- MM: MANUAL MOTOR CONTROLLER
- MS: COMBINATION MAGNETIC MOTOR STARTER/DISCONNECT SWITCH
- NDS: NON-FUSED DISCONNECT SWITCH SIZED IN SCHEDULE NOTES
- TS: THERMOSTAT SWITCH



SERVICE LOAD SUMMARY

EXISTING LOAD (FROM ELECTRIC BILLS) 126.1 KW
NEW LOAD ADDED TO BUILDING 64.3 KW
NEW CALCULATED LOAD 221.9 KW
125% OF EXISTING + LOAD ADDED

EXISTING MAIN DISTRIBUTION
PANEL 'MDP' (ETR)



ONE LINE POWER DIAGRAM

SCALE: NONE

ONE LINE POWER DIAGRAM SYMBOL LEGEND	
SYMBOL	DESCRIPTION
	METER AND CT CABINET
	FUSED DISCONNECT SWITCH
	TRANSFORMER
	BRANCH PANELBOARD
	GROUND

SERVICE GROUNDING ELECTRODE SYSTEM WIRING DIAGRAM

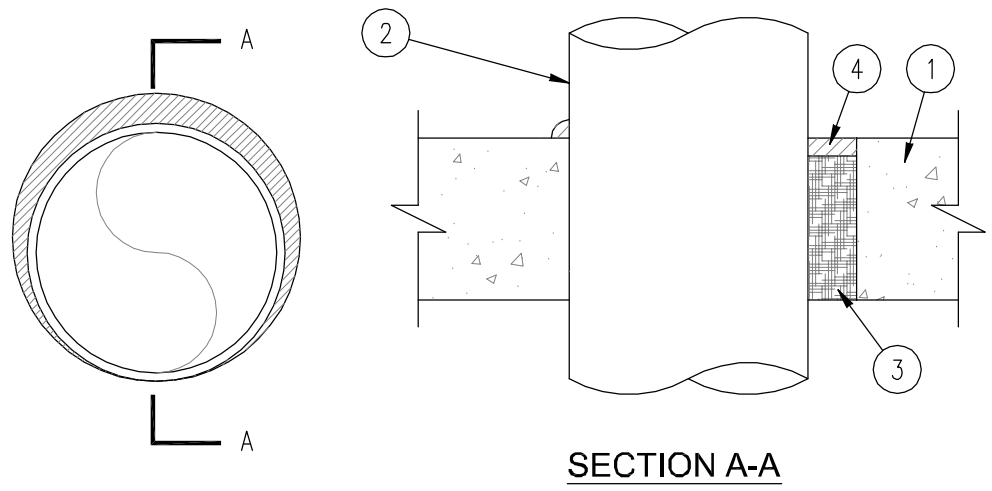
SCALE: NONE

NOTES:

- 1 THE GROUNDING ELECTRODE CONDUCTORS SHALL BE #6 PER TABLE 250.66 OF THE NEC. THE CONDUCTOR SHALL BE CONNECTED TO AN APPROVED GROUNDING ELECTRODE.
- 2 GROUND CONDUCTORS TO OTHER POINTS AND EQUIPMENT, AS REQUIRED BY NEC ARTICLE 250 AND SPECIFICATIONS SECTION 16050.
- 3 SERVICE ENTRANCE PHASE CONDUCTORS WITH GROUNDED (NEUTRAL) CONDUCTOR.
- 4 MAIN BONDING JUMPER SHALL BE #6 PER TABLE 250.66 OF THE NEC.
- 5 EQUIPMENT GROUND CONDUCTOR FOR SEPARATELY DERIVED SYSTEM. SIZE PER NEC TABLE 250.122.
- 6 GROUNDED (NEUTRAL) CONDUCTOR.
- 7 BONDING CONDUCTOR SHALL BE #6 PER TABLE 250.66 OF THE NEC.
- 8 GROUND CONDUCTOR TO TELECOMMUNICATIONS MAIN GROUNDING BUSBAR - SIZED PER TECHNOLOGY SYSTEM SUPPLIER REQUIREMENTS, #6 MINIMUM.
- 9 GROUND ROD ELECTRODE - PROVIDE #6 AWG COPPER GROUNDING ELECTRODE CONDUCTOR, PER NEC 250.66(A).
- 10 CONNECTION SHALL BE MADE WITHIN 5' OF BUILDING ENTRANCE PER NEC 250.52(A)(1)
- 11 METAL WATER PIPING AND STRUCTURAL STEEL NOT INTENTIONALLY GROUNDED SHALL BE BONDED PER NEC 250.104 AND NEC TABLE 250.66.
- 12 OTHER METAL PIPING (GAS, ETC.) SHALL BE BONDED PER NEC 250.104 AND NEC TABLE 250.122.

BRANCH CIRCUIT BREAKER PANEL SCHEDULE																	
PANEL: H-1A				BUSSING: 200A				VOLTAGE: 480/277V, 3P, 4W				MAIN DEVICE: 200A MCA					
MOUNTING: SURFACE				CONNECTED LOAD: 99.9 KW				DEMAND LOAD: 76.2 KW									
BRACING: 18 KAIC																	
CKT	DESCRIPTION	LTG	REC	DATA	HVAC	MISC	C/B	PH	C/B	MISC	HVAC	DATA	REC	LTG	DESCRIPTION	CKT	
1	PANEL 'L-1A'		1.5		4.9	3.0	60/3	A	20/1					2.5	GARAGE,SLUDGE,EXTERIOR	2	
3			1.6		4.6	1.6		B	20/1					1.2	MULTI, RR,HALL,BASEMENT	4	
5			0.6		4.0	3.9		C	20/1							SPARE	6
7	B-1 & B-2				14.4		80/3	A		0.4					GATE MOTOR	8	
9					14.4			B	15/3	0.4						10	
11					14.4			C		0.4						12	
13	CON-1					0.9	15/3	A							SPACE	14	
15						0.9		B							SPACE	16	
17						0.9		C							SPACE	18	
19	EWH-1					1.7	15/3	A							SPACE	20	
21						1.7		B							SPACE	22	
23						1.7		C							SPACE	24	
25	PRESS CONTROLLER					6.1	60/3	A							SPACE	26	
27						6.1		B							SPACE	28	
29						6.1		C							SPACE	30	
31	SPACE							A							SPACE	32	
33	SPACE							B							SPACE	34	
35	SPACE							C							SPACE	36	
37	SPACE							A							SPACE	38	
39	SPACE							B							SPACE	40	
41	SPACE							C							SPACE	42	

BRANCH CIRCUIT BREAKER PANEL SCHEDULE																							
PANEL: L-1A								BUSSING: 150A															
VOLTAGE: 208/120V, 3P, 4W								MAIN DEVICE: 150A MCB															
MOUNTING: SURFACE								CONNECTED LOAD: 25.7 KW															
BRACING: 22 KAIC								DEMAND LOAD: 23.2 KW															
CKT	DESCRIPTION	LTG	REC	DATA	HVAC	MISC	C/B	PH	C/B	MISC	HVAC	DATA	REC	LTG	DESCRIPTION	CKT							
1	UTILITY, PUMP RM.		0.4				20/1	A	20/2		1.1				CU-1	2							
3	MULTI-PURPOSE RM.		0.9			0.1	20/1	B			1.1					4							
5	RESTROOM		0.2				20/1	C	20/1		0.6				F-1	6							
7	SLDGE PRESS AREA, EXT.		0.7				20/1	A	20/1		1.0				EBB-1	8							
9	GARAGE AREA		0.7				20/1	B	20/1		1.0				EBB-2	10							
11	SLDGE PRESS AREA		0.4			0.1	20/1	C	20/2		1.5				ECH-1	12							
13	CNP PUMP		0.2				20/1	A			1.5					14							
15	EXTERIOR					0.1	20/1	B	20/1		1.2				RH-1 &RH-2	16							
17	SCREW PRESS SOLENOID					0.1	20/1	C	20/1		0.6				RH-3	18							
19	EXTERIOR		0.2				20/1	A	20/1	0.7					EF-1	20							
21	POLYMER SYSTEM					0.5	20/1	B	20/1	0.1					EF-2	22							
23	EF-3					0.7	20/1	C	30/2	2.3					DRYER	24							
25	SPARE						20/1	A		2.3						26							
27	SPARE						20/1	B	20/1	0.8					WASHER	28							
29	SPARE						20/1	C	20/1	0.7					SUMP PUMP	30							
31	SPARE						20/1	A		1.3					EUH-1	32							
33	SPARE						20/1	B	15/3	1.3						34							
35	SPARE						20/1	C		1.3						36							
37	SPARE						20/1	A							SPACE	38							
39	SPARE						20/1	B							SPACE	40							
41	SPARE						20/1	C							SPACE	42							



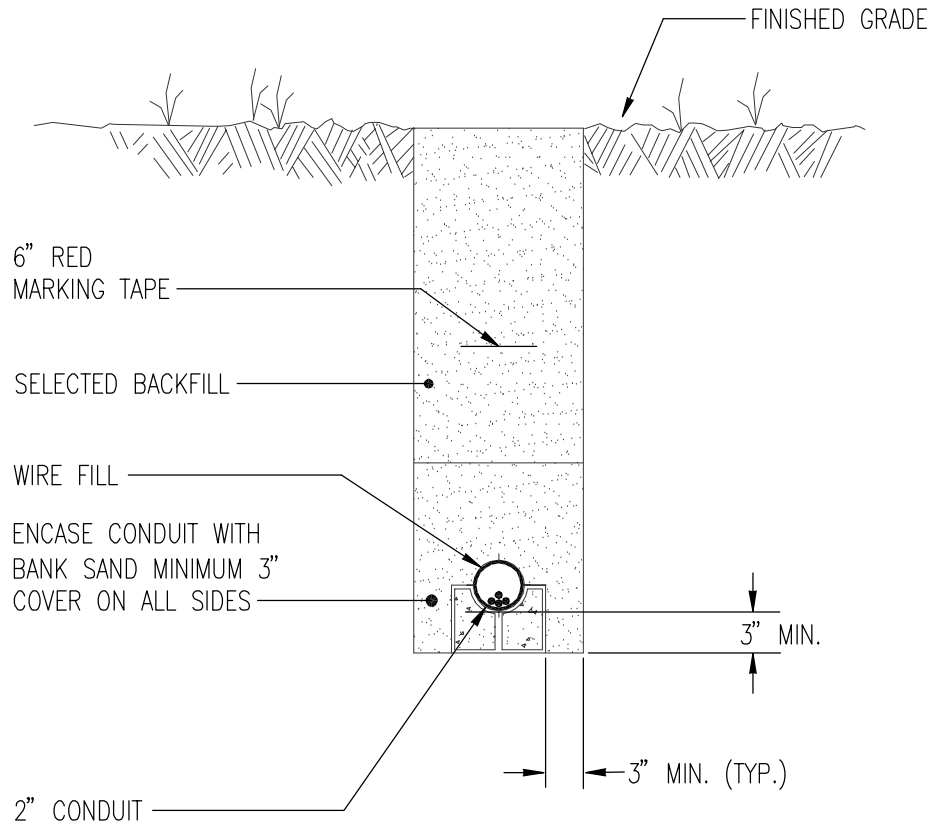
FIRESTOP DETAIL - METAL PIPE 2 HOUR CONCRETE FLOOR/WALL SYSTEM NO C-AJ-1435

SCALE: NONE

F-RATING = 2HR.
T-RATING = 0HR.

NOTES:

- FLOOR OR WALL ASSEMBLY – MINIMUM 4½" THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS. MAXIMUM DIAMETER OF OPENING IS 8".
- THROUGH PENETRANTS – ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED CONCENTRICALLY OR ECCENTRICALLY WITHIN FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR ASSEMBLY. THE ANNULAR SPACE BETWEEN PIPE CONDUIT OR TUBING AND THE PERIPHERY OF THE OPENING SHALL BE MINIMUM 0" (POINT OF CONTACT) TO MAXIMUM 1½". THE FOLLOWING TYPES OF PIPE, CONDUIT OR TUBING MAY BE USED:
 - STEEL PIPE – NOMINAL 30" DIAMETER (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
 - IRON PIPE – NOMINAL 30" DIAMETER (OR SMALLER) CAST OR DUCTILE IRON PIPE.
 - CONDUIT – NOMINAL 6" DIAMETER (OR SMALLER) RIGID STEEL CONDUIT.
 - CONDUIT – NOMINAL 4" DIAMETER (OR SMALLER) STEEL ELECTRICAL METALLIC CONDUIT.
 - COPPER TUBING – NOMINAL 6" DIAMETER (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
 - COPPER PIPE – NOMINAL 6" DIAMETER (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- PACKING MATERIAL – MINIMUM 2" THICKNESS OF MINIMUM 4.0 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
- FILL, VOID OR CAVITY MATERIALS – SEALANT SHALL BE MINIMUM 1½" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL.

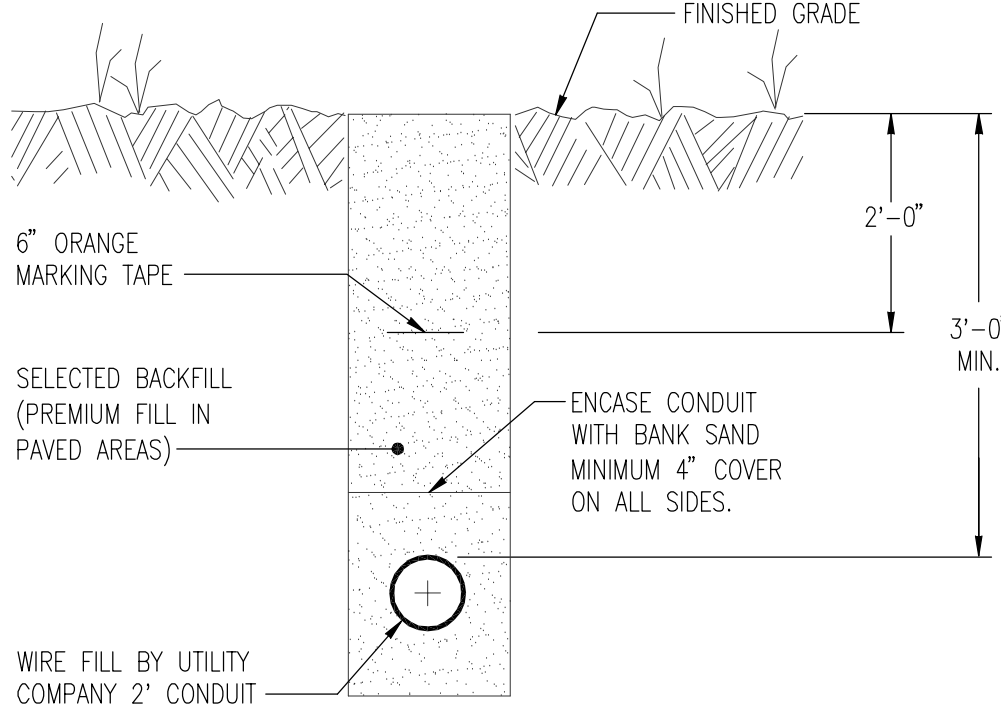


DUCT BANK DETAIL

SCALE: NONE

NOTES:

- MINIMUM SEPARATION BETWEEN CONDUITS SHALL BE 3".
- CONCRETE ENCASE CONDUITS UNDER ROADWAYS.
- REFER TO 'ONE LINE POWER DIAGRAM' ON DRAWING 'E6' FOR WIRE FILL.

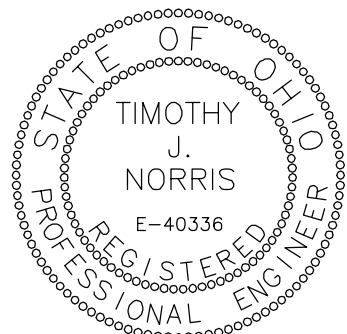


TELECOMMUNICATIONS UNDERGROUND RACEWAY DETAIL

SCALE: NONE

NOTES:

- MINIMUM SEPARATION BETWEEN CONDUITS SHALL BE 3".
- CONCRETE ENCASE CONDUITS UNDER ROADWAYS.



ELECTRICAL SPECIFICATIONS

ELECTRICAL GENERAL PROVISIONS

1.

THE PROVISIONS OF THE INSTRUCTIONS TO BIDDERS, GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, ALTERNATES, ADDENDA AND DIVISION 1 ARE A PART OF THIS SPECIFICATION. ELECTRICAL, ARCHITECTURAL, MECHANICAL AND ALL OTHER DRAWINGS AS WELL AS THE SPECIFICATIONS FOR ALL THE DIVISIONS SHALL BE DEFINED AS THE CONTRACT DOCUMENTS. CONTRACTOR SHALL REVIEW ENTIRE SET OF CONTRACT DOCUMENTS PRIOR TO BIDDING.
2.

VISIT THE SITE OF THE WORK AND BECOME FAMILIAR WITH THE CONDITIONS AFFECTING THE INSTALLATION. THIS CONTRACTOR SHALL FIELD VERIFY THAT ALL ELECTRICAL WORK CAN BE INSTALLED AS SHOWN ON THE DRAWINGS. ANY DISCREPENCY SHALL BE COMMUNICATED IN WRITING TO THE ARCHITECT OR ENGINEER PRIOR TO SUBMISSION OF A PROPOSAL. SUBMISSION OF A PROPOSAL SHALL PRESUPPOSE KNOWLEDGE OF SUCH CONDITIONS AND NO ADDITIONAL COMPENSATION SHALL BE ALLOWED WHERE EXTRA LABOR OR MATERIALS ARE REQUIRED BECAUSE OF IGNORANCE OF THESE CONDITIONS.
3.

"CONTRACTOR" AS USED WITHIN THE CONTEXT OF THE ELECTRICAL CONTRACT DOCUMENTS SHALL EXPLICITLY REFER TO THE "ELECTRICAL CONTRACTOR" AND THE ELECTRICAL CONTRACTOR'S "SUBCONTRACTORS". THE TERM "FURNISH" SHALL MEAN TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS. THE TERM "INSTALL" SHALL MEAN WORK WHICH INCLUDES THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS. THE TERM "PROVIDE" SHALL MEAN TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE. THE TERM "EQUAL" SHALL MEAN TO MEET OR EXCEED THE STANDARDS OF THE SPECIFIED PRODUCTS OR LISTED MANUFACTURERS.
4.

INCLUDE ALL LABOR, MATERIAL, EQUIPMENT, SERVICES AND PERMITS NECESSARY FOR THE PROPER COMPLETION OF ALL ELECTRICAL WORK SHOWN. ITEMS OMITTED, BUT NECESSARY TO MAKE THE ELECTRICAL SYSTEM COMPLETE AND WORKABLE, SHALL BE UNDERSTOOD TO FORM PART OF THE WORK. SECURE AND PAY FOR PERMITS AND INSPECTIONS REQUIRED FOR ELECTRICAL WORK.
5.

IT IS THE PURPOSE OF THE ELECTRICAL DRAWINGS TO INDICATE THE APPROXIMATE LOCATION OF ALL EQUIPMENT, DEVICES, ETC. ASCERTAIN EXACT LOCATIONS AND ARRANGE WORK ACCORDINGLY. THE RIGHT IS RESERVED TO EFFECT REASONABLE CHANGES IN THE LOCATION OF DEVICES UP TO THE TIME OF ROUGHING-IN. WITHOUT ADDITIONAL COST TO THE OWNER, CHANGES IN LOCATION OF DEVICES RESULTING FROM THE CONTRACTOR'S FAILURE TO COMPLY WITH THE CONTRACT DRAWING OR SPECIFICATION REQUIREMENTS SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.
6.

TEMPERATURE AND INTERLOCK CONTROLS SHALL BE PROVIDED AND WIRED BY A CONTROLS CONTRACTOR UNDER DIVISION 15. DIVISION 16 CONTRACTOR SHALL PROVIDE NECESSARY 120 VOLT POWER, TERMINATED AT JUNCTION BOXES, AS DIRECTED BY DIVISION 15 CONTRACTOR. LINE VOLTAGE (120 VOLT OR HIGHER) CONTROL DEVICES, SUCH AS THERMOSTATS AND AQUASTATS, WHICH CONTROL FRACTIONAL HORSEPOWER, 120 VOLT MOTORS, SHALL BE PROVIDED BY THE DIVISION 15 CONTRACTOR, AND SHALL BE WIRED BY THE DIVISION 16 CONTRACTOR.
7.

RACEWAY SYSTEMS, CONDUIT, BOXES, GROUNDING, BUSBARS, HARDWARE, ETC. REQUIRED FOR TECHNOLOGY SYSTEMS, CABLING AND DEVICES SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL FULLY COORDINATE ALL REQUIREMENTS WITH THE TECHNOLOGY SYSTEMS CONTRACTOR.
8.

WORK SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE PROVISIONS OF LOCAL AND STATE CODES, AS WELL AS THE NATIONAL ELECTRICAL CODE (NEC), AS INTERPRETED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
9.

CONSULT THE DRAWINGS, PRODUCT DATA, WIRING DIAGRAMS AND SHOP DRAWINGS COVERING THE WORK FOR VARIOUS OTHER TRADES, THE FIELD LAYOUTS OF THE CONTRACTORS FOR THE TRADE AND MAKE ADJUSTMENTS ACCORDINGLY IN LAYING OUT THE ELECTRICAL WORK.
10.

WARRANT THAT EQUIPMENT AND ALL WORK IS INSTALLED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE AND THAT ALL EQUIPMENT WILL MEET THE REQUIREMENTS SPECIFIED. GUARANTEE AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS; REPAIR OR REPLACE ANY DEFECTIVE WORK, MATERIAL OR EQUIPMENT WITHIN ONE YEAR FROM DATE OF FORMAL WRITTEN ACCEPTANCE BY THE OWNER.
11.

THE EXISTING ELECTRICAL AND TELECOMMUNICATIONS SERVICES, AND ALL EXISTING LOW VOLTAGE COMMUNICATION SYSTEMS WITHIN THE CAMPUS SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ANY SERVICE SHUTDOWNS THAT MAY BE REQUIRED SHALL BE SCHEDULED THROUGH THE OWNER AND SHALL BE DONE AT A TIME AS DIRECTED BY THE OWNER. NO ADDITIONAL COMPENSATION SHALL BE ALLOWED FOR THESE SHUTDOWN PERIODS EVEN THOUGH PREMIUM TIME WORK MAY BE REQUIRED. PROVIDE TEMPORARY SERVICE TO EQUIPMENT OR SYSTEMS THAT CANNOT BE SHUT DOWN, AS DETERMINED BY OWNER, AND AS DESCRIBED ELSEWHERE IN THESE SPECIFICATIONS.
12.

BIDS SHALL BE BASED UPON THE SPECIFIED PRODUCTS OR LISTED ALTERNATIVES. WHERE ONLY ONE MAKE IS NAMED, IT SHALL BE PROVIDED. VERBAL REQUESTS OR APPROVALS SHALL NOT BE BINDING ON THE ARCHITECT, ENGINEER OR OWNER.
13.

EQUIPMENT AND MATERIALS USED ON THIS PROJECT SHALL BE NEW AND U.L. LABELED FOR THE APPLICATION.
14.

PREPARE SHOP DRAWINGS AND PRODUCT DATA FOR LIGHTING FIXTURES, PANELBOARDS, MOTOR STARTERS AND ALL OTHER SPECIFIED SYSTEMS AND COMPONENTS. THE SUBMITTALS THAT ARE RETURNED SHALL BE USED FOR PROCUREMENT. WHERE ADDITIONAL INSTALLATION DRAWINGS, WIRING DIAGRAMS OR OTHER DRAWINGS ARE SPECIFIED AS A PART OF THE SUBMITTAL, THEY SHALL BE SUBMITTED AT THE SAME TIME WITH SHOP DRAWINGS AND PRODUCT DATA.
15.

THE CONTRACTOR SHALL KEEP ONE COMPLETE SET OF THE CONTRACT DRAWINGS ON THE PROJECT SITE ON WHICH SHALL BE RECORDED ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION. THE UPDATED CONTRACT DRAWINGS SHALL BECOME "RECORD DRAWINGS" OF THE COMPLETED CONSTRUCTION. AFTER THE PROJECT IS COMPLETED, THE RECORD DRAWINGS SHALL BE DELIVERED TO THE ARCHITECT IN GOOD CONDITION, AS A PERMANENT RECORD OF THE INSTALLATION AS CONSTRUCTED.
16.

PROVIDE NAMEPLATES ON PANELBOARDS, SAFETY SWITCHES, MOTOR STARTERS, SYSTEM DISTRIBUTION JUNCTION BOXES AND PULLBOXES, CONTROL PANELS, INDIVIDUAL OVERCURRENT PROTECTION DEVICES IN DISTRIBUTION TYPE PANELBOARDS AND RECEPTACLE COVERPLATES. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, LETTERING SHALL INCLUDE THE NAME OR DESIGNATION OF EQUIPMENT, HORSEPOWER, VOLTAGE RATING AND SERVICE DESIGNATION. NAMEPLATES SHALL BE LAMINATED PHENOLIC WITH A BLACK SURFACE AND WHITE CORE. IDENTIFICATION WITH A DYMO TYPE INSTRUMENT IS NOT PERMISSIBLE. THE INSIDE COVER OF ALL RECEPTACLE COVERPLATES SHALL BE PERMANENTLY MARKED TO INDICATE THE PANEL AND CIRCUIT NUMBER OF THE RECEPTACLE. THE OUTSIDE OF THE COVERPLATES FOR ALL JUNCTION BOXES SHALL BE PERMANENTLY MARKED TO INDICATE THE SYSTEM. IDENTIFICATION SHALL BE ON THE INSIDE OF COVERPLATES FOR ALL JUNCTION BOXES IF THEY ARE LOCATED IN FINISHED AREAS. IDENTIFICATION OF BRANCH CIRCUITS SHALL BE TYPEWRITTEN ON DIRECTORY CARDS FURNISHED WITH ALL PANELS AND PLACED IN THE CARD HOLDER ON THE DOOR.
17.

IDENTIFY SPARE CONDUITS AND CONDUIT STUBS AS FOLLOWS: IDENTIFY SYSTEM AND/OR PURPOSE AT SOURCE, IF POSSIBLE, AND AT TERMINATION END. ALSO, AT TERMINATION END, INDICATE LOCATION OF CONDUIT ORIGINATION.
18.

AFTER INSTALLATION, TEST FOR GROUNDS, SHORT CIRCUITS AND PROPER FUNCTION OF EACH NEW SYSTEM AND RELATED WIRING. FAULTS IN THE INSTALLATION SHALL BE CORRECTED.
19.

AFTER ALL TESTS AND ADJUSTMENTS HAVE BEEN COMPLETED, CLEAN ALL EQUIPMENT LEAVING EVERYTHING IN WORKING ORDER AT THE COMPLETION OF THIS WORK.

20.

PROVIDE A TEMPORARY ELECTRICAL SERVICE ADEQUATE IN SIZE FOR HEATING, FOR THE USE OF ALL TRADES AND FOR THE LIGHTING OF EACH ROOM DURING CONSTRUCTION. TEMPORARY SERVICE SHALL BE EXTENDED FROM THE OWNER'S EXISTING POWER DISTRIBUTION SYSTEM. THE OWNER MUST APPROVE OF THE POINT OF SUPPLY, THE METHOD OF EXTENSION AND THE ROUTING OF NECESSARY TEMPORARY FEEDERS. INSTALLATION SHALL CONFORM TO ARTICLE 590 OF THE NEC.
21.

ALL CUTTING AND PATCHING IN CONSTRUCTION AS NECESSARY FOR INSTALLATION OF THIS WORK SHALL BE THE RESPONSIBILITY OF THIS DIVISION. HAVE CUTTING DONE BY SKILLED MECHANICS AS CAREFULLY AS POSSIBLE AND WITH AS LITTLE DAMAGE AS POSSIBLE. PROVIDE CUTTING AND PATCHING FOR INSTALLATION OF NEW AND/OR RELOCATED DEVICES AND ASSOCIATED CONDUITS IN EXISTING WALLS TO REMAIN.
22.

DEMOLITION OF EXISTING ELECTRICAL EQUIPMENT IS A PART OF THE ELECTRICAL WORK. ALL CUTTING, PATCHING, FINISHING, ETC., FOR REMOVED AND RELOCATED ELECTRICAL EQUIPMENT AND DEVICES SHALL BE INCLUDED AS PART OF THE ELECTRICAL WORK. REFER TO THE CONTRACT DRAWINGS FOR EXACT REQUIREMENTS. PROPERLY DISPOSE OF ALL FLUORESCENT AND HID LAMPS, BALLASTS, IONIZATION TYPE SMOKE DETECTORS, BATTERIES AND PCB CONTAMINATED MATERIALS DURING DEMOLITION WORK AS REQUIRED BY LOCAL, STATE, AND REGIONAL CODES. IF ADDITIONAL INTERPRETATION IS REQUIRED REGARDING THE SCOPE OF DEMOLITION INTENT, CONTACT THE ENGINEER PRIOR TO BID.

BASIC MATERIALS AND METHODS

1.

ALL BOXES AND COVERPLATES SHALL BE SUITABLE FOR THE APPLICATIONS, RIGIDLY SUPPORTED FROM THE BUILDING STRUCTURE INDEPENDENT OF THE CONDUIT SYSTEM. ALL BOXES SHALL BE 4"x4"x2" DEEP MINIMUM WITH COVERPLATES SUITABLE FOR THEIR INTENDED USE. BOX STABILIZERS SHALL BE UTILIZED TO PROPERLY SUPPORT BOXES IN METAL STUD CONSTRUCTION.
2.

EXTERIOR UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 PVC, ENCASED IN CONCRETE UNDER DRIVES AND ROADWAYS WITH A MINIMUM 3" ENVELOPE. CONDUITS IN CONCRETE FLOORS, DAMP OR WET LOCATIONS, OR EXPOSED HIGH TRAFFIC AREAS WHERE SUBJECT TO PHYSICAL ABUSE SHALL BE HEAVY WALL RIGID GALVANIZED STEEL. ALL OTHER INTERIOR CONDUITS SHALL BE ELECTRICAL METALLIC TUBING (EMT), UNLESS OTHERWISE NOTED ON THE DRAWINGS OR WITHIN THESE SPECIFICATIONS. CONDUITS SHALL BE 3/4" TRADE SIZE, MINIMUM, UNLESS OTHERWISE NOTED ON THE DRAWINGS OR WITHIN THESE SPECIFICATIONS. ALL EMT CONDUITS SHALL HAVE COLD-ROLLED STEEL DOUBLE SET SCREW FITTINGS.
3.

CONDUITS THAT PASS FROM THE INTERIOR TO THE EXTERIOR OF THE BUILDING, OR ARE SUBJECT TO DIFFERENT TEMPERATURES, SHALL BE SEALED WITH AN APPROVED MATERIAL SUCH AS DUCT-SEAL TO PREVENT THE CIRCULATION OF COLD AIR TO A WARMER SECTION OF THE CONDUIT.

A.

CONDUITS THAT STUB THROUGH THE FOUNDATION WALLS SHALL BE SUPPLIED WITH PIPE SEALS AS MANUFACTURED BY LINK-SEAL, OR BY EQUIVALENT METHOD AS APPROVED BY THE ARCHITECT. PIPE SEALS SHALL BE EPDM (BLACK) WITH STAINLESS STEEL HARDWARE. THE ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY EXACT REQUIREMENTS WITH THE ARCHITECT BEFORE PROCUREMENT AND INSTALLATION OF THE PIPE SEALS.
4.

ALL BRANCH CIRCUIT CONDUITS SHALL BE EMT CONDUIT. A GREEN EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED IN ALL EMT CONDUIT. THE CONDUIT SHALL ITSELF QUALIFY AS AN EQUIPMENT GROUNDING RETURN PATH IN ACCORDANCE WITH NEC 250.118. WIRING SHALL BE AS SPECIFIED ELSEWHERE IN THIS SECTION.
5.

CONDUIT CONNECTIONS TO MOTORS, TRANSFORMERS, AND OTHER VIBRATING EQUIPMENT SHALL BE FLEXIBLE METAL "SEAL-TITE" TYPE "U" CONDUIT AS MANUFACTURED BY THE AMERICAN BRASS COMPANY OR EQUIVALENT AND SHALL BE OF THE SAME SIZE AS THE FEEDER CONDUIT.
6.

LOCAL LIGHT SWITCHES SHALL BE 20 AMPERE, 120/277 VOLTS, AC SPECIFICATION GRADE, WITH GROUNDING TERMINAL - HUBBELL #HBL-122 SERIES, PASS AND SEYMOUR #P520AC SERIES, OR LEVITON #122 SERIES.
7.

CEILING MOUNTED OCCUPANCY SENSORS SHALL BE 1000 SQUARE FOOT COVERAGE, ADAPTIVE TECHNOLOGY OCCUPANCY SENSORS - HUBBELL #ATD1000C OR EQUAL BY PASS & SEYMOUR OR LEVITON.
8.

DUPLEX RECEPTACLES SHALL BE 20A, 125V, 2 POLE, 3 WIRE GROUNDING.

A.

GENERAL PURPOSE "SPECIFICATION GRADE" DUPLEX RECEPTACLES: HUBBELL #5352, LEVITON #5362 OR PASS & SEYMOUR #5362.
9.

DUPLEX RECEPTACLES, WHERE INDICATED ON THE DRAWINGS OR WHERE REQUIRED BY CODE, SHALL HAVE INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER (GFI) PROTECTION AND SHALL BE 20A, 125V, 2 POLE, 3 WIRE GROUNDING: HUBBELL #GF5352, PASS & SEYMOUR #2091 OR LEVITON #8899. GFI RECEPTACLES SHALL NOT BE THROUGH-WIRED. PROVIDE INDIVIDUAL DUPLEX GFI RECEPTACLES AS SHOWN ON THE DRAWINGS.
10.

ALL RECEPTACLES SHALL BE PROVIDED WITH A SELF-GROUNDING CLIP AT THE MOUNTING SCREW.
11.

ALL SWITCHES AND RECEPTACLES SHALL BE IVORY UNLESS OTHERWISE INDICATED WITHIN THESE SPECIFICATIONS. VERIFY COLOR WITH THE ARCHITECT PRIOR TO PROCUREMENT OF THE DEVICES. ALL COVERPLATES SHALL BE SMOOTH HIGH IMPACT COMMERCIAL GRADE THERMOPLASTIC OR SMOOTH NYLON FINISH WITH COLOR TO MATCH THE DEVICES. IN UNFINISHED AREAS, USE CADMIUM PLATED, ROUND CORNER, STEEL COVERPLATES FOR SURFACE MOUNTED OUTLET BOXES. BOTH THE WIRING DEVICES AND THE COVERPLATES SHALL BE BY THE SAME MANUFACTURER.
12.

MANUAL MOTOR CONTROLLERS SHALL BE WESTINGHOUSE TYPE "MS" SERIES OR EQUIVALENT, WITH PILOT LIGHT, OVERLOADS AND ON/OFF SWITCH; FLUSH MOUNTED IN FINISHED AREAS. MANUAL MOTOR CONTROLLERS SHALL BE MANUFACTURED BY SQUARE D, GENERAL ELECTRIC, SIEMENS/ITE OR CUTLER HAMMER/WESTINGHOUSE. EACH MANUAL MOTOR CONTROLLER SHALL BE LISTED AS "SUITABLE AS MOTOR DISCONNECT".
13.

WIRE AND CABLE FOR BRANCH CIRCUITS AND FOR FEEDERS SHALL BE 90 DEGREES C., 600VOLT, TYPE THHN/THWN, COPPER ONLY, UNLESS OTHERWISE NOTED ON THE DRAWINGS. TYPE XHHW SHALL ALSO BE ACCEPTABLE FOR FEEDERS. MINIMUM SIZE FOR POWER AND LIGHTING BRANCH CIRCUITS SHALL BE #12.
14.

SAFETY SWITCHES SHALL BE HEAVY DUTY FUSIBLE OR NONFUSIBLE TYPE AS INDICATED ON THE DRAWINGS, AND SHALL BE SUITABLE FOR THE VOLTAGE AND CURRENT RATINGS AS SHOWN ON THE DRAWINGS.
15.

FUSES RATED 600 AMPERES OR LESS, 600 VOLTS OR LESS, SERVING ALL LOADS SHALL BE U.L. CLASS RK-1, BUSSMANN DUAL ELEMENT, TIME DELAY "LOW PEAK", TYPE LPN-RK (250 VOLT) OR TYPE LPS-RK (600 VOLT), OR APPROVED EQUIVALENT. FUSES OF EQUIVALENT OVERLOAD AND SHORT-CIRCUIT INTERRUPTING PERFORMANCE, AS MANUFACTURED BY RELIANCE FUSE, FERRAZ-SHAWMUT, LITTELFUSE, GENERAL ELECTRIC OR S & C ARE ACCEPTABLE. EXACT FUSE TYPE REQUIRED FOR MOTOR PROTECTION SHALL BE PROVIDED AS RECOMMENDED BY THE STARTER MANUFACTURER.
16.

ALL MOTOR STARTERS SHALL BE COMBINATION TYPE. VOLTAGE, PHASE, FUSE SIZE, AND HORSEPOWER SHALL BE AS INDICATED ON THE DRAWINGS. STARTERS SHALL BE SIZE 0 MINIMUM. STARTERS SHALL INCLUDE A FUSIBLE SAFETY SWITCH, A STARTER WITH THREE OVERLOAD DEVICES, AND A CONTROL CIRCUIT TRANSFORMER. EACH COMBINATION STARTER SHALL INCLUDE A CONTROL CIRCUIT TRANSFORMER WITH A 120 VOLT SECONDARY CONNECTION UNLESS OTHERWISE INDICATED ON THE DRAWINGS. STARTERS SHALL HAVE A GREEN RUNNING PILOT LIGHT, A HAND-OFF-AUTOMATIC SELECTOR SWITCH AND A MINIMUM OF TWO NORMALLY OPEN AND TWO NORMALLY CLOSED AUXILIARY CONTACTS, READY FOR CONTROL WIRING CONNECTIONS. VERIFY THE EXACT TYPE AND NUMBER OF AUXILIARY CONTACTS WITH THE DIVISION 15 CONTRACTOR. SINGLE PHASE STARTERS SHALL HAVE SIMILAR CHARACTERISTICS AS SPECIFIED FOR THREE PHASE STARTERS, AS APPLICABLE.

17.

DISCONNECT SWITCHES AND MOTOR STARTERS SHALL BE MANUFACTURED BY SQUARE "D", GENERAL ELECTRIC, SIEMENS/ITE, OR CUTLER HAMMER/WESTINGHOUSE.
18.

ANY CORE DRILLING OR CUTTING OF FIRE RATED FLOORS, SHAFTS AND WALLS SHALL BE FIRE STOPPED PRIOR TO FINISH PATCHING. ALL PENETRATIONS AND BACK BOXES SHALL BE SEALED IN ACCORDANCE WITH UL FIRE RESISTANCE HANDBOOK VOLUME II AND SHALL BE RATED TO MATCH THE FIRE RATING OF THE FLOORS, SHAFTS OR WALLS PENETRATED.
19.

PENETRATIONS THROUGH FIRE RATED FLOORS SHALL NOT EXCEED AN AGGREGATE AREA OF 1 SQUARE FOOT IN ANY 100 SQUARE FEET OF FLOOR AREA, OR AS DICTATED BY LOCAL CODES.
20.

CONDUITS SHALL BE CONTINUOUS AND SECURED TO ALL BOXES IN SUCH A MANNER THAT EACH CONDUIT SYSTEM SHALL BE ELECTRICALLY CONTINUOUS FROM THE POINT OF SERVICE TO ALL DEVICE BOXES. RUN CONDUITS CONCEALED UNLESS OTHERWISE INDICATED. THE ACTUAL ROUTING OF CONDUITS SHALL BE INSTALLED TO SUIT THE VARIOUS FIELD CONDITIONS.
21.

PERMISSION MUST BE OBTAINED FROM THE ARCHITECT TO RUN SURFACE MOUNTED RACEWAYS OR CONDUIT. THE ROUTING AND ELEVATION MUST BE COORDINATED WITH THE ARCHITECT BEFORE INSTALLATION. EXPOSED RACEWAYS SHALL BE PAINTED TO MATCH ADJACENT FINISHES.
22.

INDIVIDUAL BRANCH CIRCUITS ARE SHOWN ON THE DRAWINGS FOR CLARITY. LIGHTING AND RECEPTACLE CIRCUITS LESS THAN OR EQUAL TO 100 AMPERES MAY BE GROUPED FOR HOMERUNS, WITH A MAXIMUM OF THREE (3) CIRCUITS PER HOMERUN. NEUTRAL CONDUCTORS SHALL NOT BE SHARED.
23.

WIRING FROM LEGALLY REQUIRED EMERGENCY AND STANDBY POWER GENERATION SOURCES SHALL BE KEPT INDEPENDENT OF EACH OTHER AND INDEPENDENT OF ALL OTHER BRANCH CIRCUIT WIRING, AND SHALL NOT ENTER THE SAME RACEWAY, CABLE, BOX, OR CABINET WITH OTHER WIRING, UNLESS SPECIFICALLY ALLOWED BY THE NATIONAL ELECTRICAL CODE.
24.

FOR 120 VOLT BRANCH CIRCUITS WHERE SIZE IS NOT SHOWN, CONDUCTOR SIZE #12 MINIMUM SHALL BE USED FOR CIRCUITS LESS THAN 125 FEET, AND SIZE #10 MINIMUM SHALL BE USED FOR CIRCUITS 125 FEET OR GREATER. FOR 277 VOLT BRANCH CIRCUITS WHERE SIZE IS NOT SHOWN, CONDUCTOR SIZE #12 MINIMUM SHALL BE USED FOR CIRCUITS LESS THAN 250 FEET, AND SIZE #10 MINIMUM SHALL BE USED FOR CIRCUITS 250 FEET OR GREATER. GROUND CONDUCTORS SHALL ALSO BE INCREASED TO #10 ACCORDINGLY.
25.

IDENTIFY WIRE AND CABLE FOR BRANCH CIRCUITS AS CALLED FOR IN THE NATIONAL ELECTRICAL CODE. IDENTIFICATION OF FEEDERS SHALL BE BY MEANS OF COLORED TAPE AT TERMINALS.
26.

ADJACENT DEVICES OF THE SAME VOLTAGE CLASS SHALL BE MOUNTED IN GANGED BOXES.
27.

MOUNTING HEIGHTS TO THE CENTER OF OUTLET BOXES SHALL BE AS INDICATED ON THE DRAWINGS.
28.

VERIFY MOUNTING HEIGHTS AND LOCATIONS WITH THE ARCHITECT PRIOR TO ROUGH-IN. REFER TO DETAILS AND INTERIOR WALL ELEVATIONS SHOWN ON THE ARCHITECTURAL DRAWINGS.
29.

ALL RECEPTACLES SHALL BE MOUNTED WITH THE GROUND OPENING ABOVE THE PHASE AND NEUTRAL OPENINGS.
30.

ARRANGE EQUIPMENT IN ELECTRICAL ROOM TO FACILITATE ADDING EQUIPMENT IN FUTURE.
31.

ALL DEVICES SHALL BE SECURED WITH MORE THAN A SINGLE SCREW.
32.

ALL HARDWARE, SUPPORTS, HANGERS, BRACKETS, ANGLE IRON, CHANNELS, RODS AND CLAMPS NECESSARY TO INSTALL ELECTRICAL EQUIPMENT SHALL BE PROVIDED TO SUIT THE FIELD CONDITIONS AND THE APPLICATIONS INTENDED AS SHOWN ON THE DRAWINGS. THE USE OF PERFORATED STRAPS IS NOT PERMITTED.
33.

ALL EQUIPMENT MOUNTED ON INTERIOR EQUIPMENT ROOM WALLS WHERE ADDITIONAL SUPPORT IS REQUIRED SHALL BE ATTACHED TO 3/4" PAINTED PLYWOOD FIRE RATED BOARDS FURRED OUT 1" FROM WALL. BOARDS SHALL BE PAINTED TO MATCH WALL FINISHES.

POWER DISTRIBUTION

1.

THE ELECTRICAL SERVICE TO THE EXISTING BUILDING SHALL REMAIN. THE BUILDING'S EXISTING POWER DISTRIBUTION SYSTEM SHALL BE REPLACED AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN. THE BUILDING'S EXISTING GROUNDING ELECTRODE SYSTEM SHALL BE REPLACED AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.
2.

GROUND ALL ELECTRICAL SYSTEM CONDUITS, RACEWAYS, (CABLE TRAYS), MOTORS, PANELS, CABINETS, FIXTURES, METAL BOXES, AND OTHER EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ALL PROVISIONS OF THE NEC, STATE BUILDING CODE AND LOCAL OR REGIONAL CODES.
3.

GROUNDING OF THE ELECTRICAL SYSTEM SHALL BE BY MEANS OF AN INSULATED GROUNDING CONDUCTOR INSTALLED WITH FEEDER AND BRANCH CIRCUIT CONDUCTORS IN ALL CONDUITS, SIZED IN ACCORDANCE WITH NEC ARTICLE 250.122.
4.

INSTALL BONDING JUMPERS ACROSS ALL BUILDING EXPANSION JOINTS, AND ACROSS ALL CONDUIT EXPANSION FITTINGS.
5.

WHERE GROUNDING CONDUCTORS ARE SUBJECT TO MECHANICAL DAMAGE PROTECT SUCH CONDUCTORS BY ENCASEMENT IN CONCRETE OR INSTALLATION IN A RIGID METALLIC RACEWAY.
6.

ALL TERMINATIONS OF THE GROUNDING CONDUCTORS SHALL BE BY MEANS OF SOLDERLESS CONNECTIONS.
7.

GROUND ALL TRANSFORMERS IN ACCORDANCE WITH NEC ARTICLE 250.30. THE BONDING JUMPER SHALL BE DIRECTLY CONNECTED TO A GROUNDING ELECTRODE. THE TRANSFORMER CASE SHALL BE BONDED TO THE GROUNDING ELECTRODE CONDUCTOR, BUT SHALL NOT BE USED AS THE GROUNDING ELECTRODE. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED WITHIN RIGID METALLIC CONDUIT. NEUTRAL CONDUCTORS SHALL NOT BE USED FOR EQUIPMENT GROUNDING. A BONDING JUMPER SHALL NOT BE PROVIDED IN PANELBOARDS.
8.

FURNISH AND INSTALL BRANCH CIRCUIT BREAKER PANELBOARDS EQUIPPED WITH CIRCUIT BREAKERS, WITH FRAME AND TRIP RATINGS LISTED ON THE DRAWINGS. CIRCUIT BREAKERS SHALL BE THERMAL-MAGNETIC, MOLDED CASE BOLT-ON TYPE. PROVIDE SWITCHING "SWO" AND HVAC "HACR" TYPES AS REQUIRED. ALL CURRENT CARRYING PARTS OF THE BUS STRUCTURE SHALL BE TIN-PLATED ALUMINUM. EACH PANEL SHALL CONTAIN A 100% RATED NEUTRAL BUS AND A GROUNDING BUS. PANELS SHALL HAVE "DOOR-WITHIN-DOOR" TRIM, HINGED BOX TO FRONT TYPE WITH LATCH ON OUTER DOOR. ALL LOCKS SHALL BE KEYED ALIKE.
9.

EACH PANEL, AS A COMPLETE UNIT, SHALL HAVE A MINIMUM SYMMETRICAL SHORT CIRCUIT CURRENT RATING OF 22,000 AMPERES FOR 208Y/120 VOLT RATED PANELS AND 18,000 AMPERES FOR 480Y/277 VOLT RATED PANELS. CIRCUIT BREAKERS SHALL BE FULLY RATED. SERIES RATINGS ARE NOT PERMITTED.
10.

EACH PANEL SERVED DIRECTLY BY A TRANSFORMER SECONDARY SHALL HAVE A MAIN CIRCUIT BREAKER OR OTHER MAIN OVERCURRENT PROTECTION.
11.

NEW CIRCUIT BREAKERS OR FUSIBLE SWITCHES INSTALLED IN EXISTING PANELS SHALL MATCH THE EXISTING IN TYPE, MANUFACTURER (IF POSSIBLE), AND SHORT CIRCUIT RATINGS.
12.

PANELS SHALL BE AS MANUFACTURED BY SQUARE D, SIEMENS/ITE, GENERAL ELECTRIC OR CUTLER HAMMER/WESTINGHOUSE.

13.

PANELS SHALL BE MOUNTED SO THAT TOP OF THE CABINET IS AT 6'-0" ABOVE FLOOR. A GLAZED DIRECTORY FRAME SHALL BE PROVIDED INSIDE EACH PANEL DOOR AND SHALL BE OF SUFFICIENT SIZE TO GIVE A COMPLETE DESCRIPTION OF EACH CIRCUIT. TYPED DIRECTORY CARDS SHALL BE PROVIDED LISTING EACH CIRCUIT SERVED.
14.

THE BRANCH CIRCUIT NUMBERS USED ON THE DRAWINGS SHALL BE APPLIED FOR THE CONSTRUCTION. HOWEVER, AT THE COMPLETION OF THE WORK, CIRCUIT NUMBER ADJUSTMENTS SHALL BE MADE AS REQUIRED TO PROVIDE BALANCED PHASE LOADING ON EACH PANEL.
15.

SPARE CIRCUIT BREAKERS SHALL BE IDENTIFIED AS SUCH ON THE PANEL DIRECTORY CARDS AND SHALL BE LEFT IN THE "OFF" POSITION.
16.

TRANSFORMERS SHALL BE 115 DEGREES C. TEMPERATURE RISE ABOVE A 40 DEGREES C. AMBIENT. INSULATION SYSTEM SHALL BE UL RECOGNIZED FOR 220 DEGREES C. TRANSFORMERS SHALL HAVE (4) 2-1/2% ABOVE NORMAL, FULL CAPACITY PRIMARY TAPS.
17.

TRANSFORMERS SHALL BE AS MANUFACTURED BY ACME, SQUARE D, SIEMENS/ITE, GENERAL ELECTRIC, OR CUTLER HAMMER/WESTINGHOUSE.
18.

PROVIDE WALL MOUNTING PLATFORMS OR STRUCTURE MOUNTED PLATFORMS FOR EACH TRANSFORMER RATED BELOW 112.5 KVA ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

LIGHTING

1.

LIGHTING FIXTURES SHALL BE PROVIDED AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR PROVIDING PROPER MOUNTING ACCESSORIES. CONTRACTOR SHALL REFER TO THIS SPECIFICATION FOR LAMP AND BALLAST REQUIREMENTS. SUBMITTALS SHALL INCLUDE PRODUCT INFORMATION FOR FIXTURES, LAMPS, AND BALLASTS.
2.

FLUORESCENT ELECTRONIC BALLASTS SHALL BE ADVANCE "CENTIUM" PARALLEL INSTANT START FOR T8 LAMPS OR EQUAL BY VALMONT, MOTOROLA, OSRAM SYLVANIA, ESI OR MAGNETEK/TRIAD. BALLASTS SHALL HAVE A MINIMUM POWER FACTOR OF 98%, A MINIMUM BALLAST FACTOR OF 85%, A MAXIMUM CREST FACTOR OF 1.7, AND A MAXIMUM TOTAL HARMONIC DISTORTION OF 10%. BALLASTS SHALL OPERATE ABOVE 42 KHZ TO REDUCE POTENTIAL INTERFERENCE WITH INFRARED REMOTE CONTROL SYSTEMS.
3.

FLUORESCENT LINEAR LAMPS SHALL BE 800 SERIES, T-8, SPX, 3500 K, LOW MERCURY TYPE.
4.

ALL LAMPS SHALL BE MANUFACTURED BY GENERAL ELECTRIC, SYLVANIA OR PHILIPS.
5.

SURFACE MOUNTED FIXTURES MOUNTED ON CEILINGS OTHER THAN TO THE BUILDING STRUCTURE, SHALL BE SECURELY SUPPORTED IN A MANNER APPROVED BY THE ARCHITECT.
6.

ALL EXPOSED FLUORESCENT LINEAR LAMPS SHALL BE FURNISHED WITH CLEAR, LEXAN LAMP SLEEVES WITH END CAPS TO COORDINATE WITH LAMP TYPE. LAMP SLEEVES SHALL BE LISTED FOR THE TYPE OF LAMPS PROTECTED.
7.

SPARE LAMPS AMOUNTING TO 10% (MINIMUM OF 3) OF EACH TYPE AND SIZE OF EACH LAMP USED ON THE PROJECT SHALL BE SUPPLIED BY THE ELECTRICAL CONTRACTOR.
8.

LIGHTING FIXTURES SHALL BE INSTALLED IN ACCORDANCE WITH NEC ARTICLE 410. LOW VOLTAGE LIGHTING FIXTURES AND SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH NEC ARTICLE 411.

COMMUNICATIONS

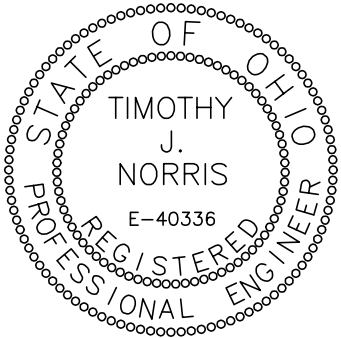
1.

NEW TELECOMMUNICATIONS BACKBOARDS SHALL BE 4" WIDE X 8" HIGH X 3/4" THICK AC PLYWOOD, PAINTED WITH (2) COATS OF FIRE RETARDANT WHITE PAINT ON BOTH SIDES PRIOR TO INSTALLATION. BACKBOARDS SHALL BE MOUNTED 6 INCHES ABOVE THE FINISHED FLOOR. THE RECEPTACLES SHOWN ON THE BACKBOARDS SHALL BE MOUNTED AT 18 INCHES ABOVE THE FINISHED FLOOR AND SHALL BE INSTALLED IN SURFACE MOUNTED, SINGLE GANG OUTLET BOXES WITH STAMPED, SHEET METAL COVER PLATES. VERIFY EXACT REQUIREMENTS WITH THE TECHNOLOGY CONTRACTOR PRIOR TO INSTALLATION.
2.

COMBINATION VOICE/DATA OUTLET BOXES SHALL BE 4 INCHES SQUARE WITH SINGLE GANG PLASTER RINGS. VOICE-ONLY, DATA-ONLY, FAX AND PAY TELEPHONE OUTLETS SHALL BE SIMILAR. BLANK COVERPLATES SHALL BE PROVIDED FOR ALL UNUSED OUTLETS. VERIFY EXACT REQUIREMENTS WITH THE TECHNOLOGY CONTRACTOR PRIOR TO INSTALLATION.
3.

ALL CONDUITS REQUIRED FOR COMBINATION VOICE/DATA OUTLETS AS SHOWN ON THE DRAWINGS SHALL BE INSTALLED COMPLETE WITH PULLWIRES. CONDUITS SHALL BE 1" MINIMUM.
4.

PROVIDE CONDUIT FROM EACH OUTLET UP TO THE NEAREST OPEN AREA CEILING SPACE AND PROVIDE AN INSULATED BUSHING AT EACH STUB.



WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I

ELECTRICAL SPECIFICATIONS

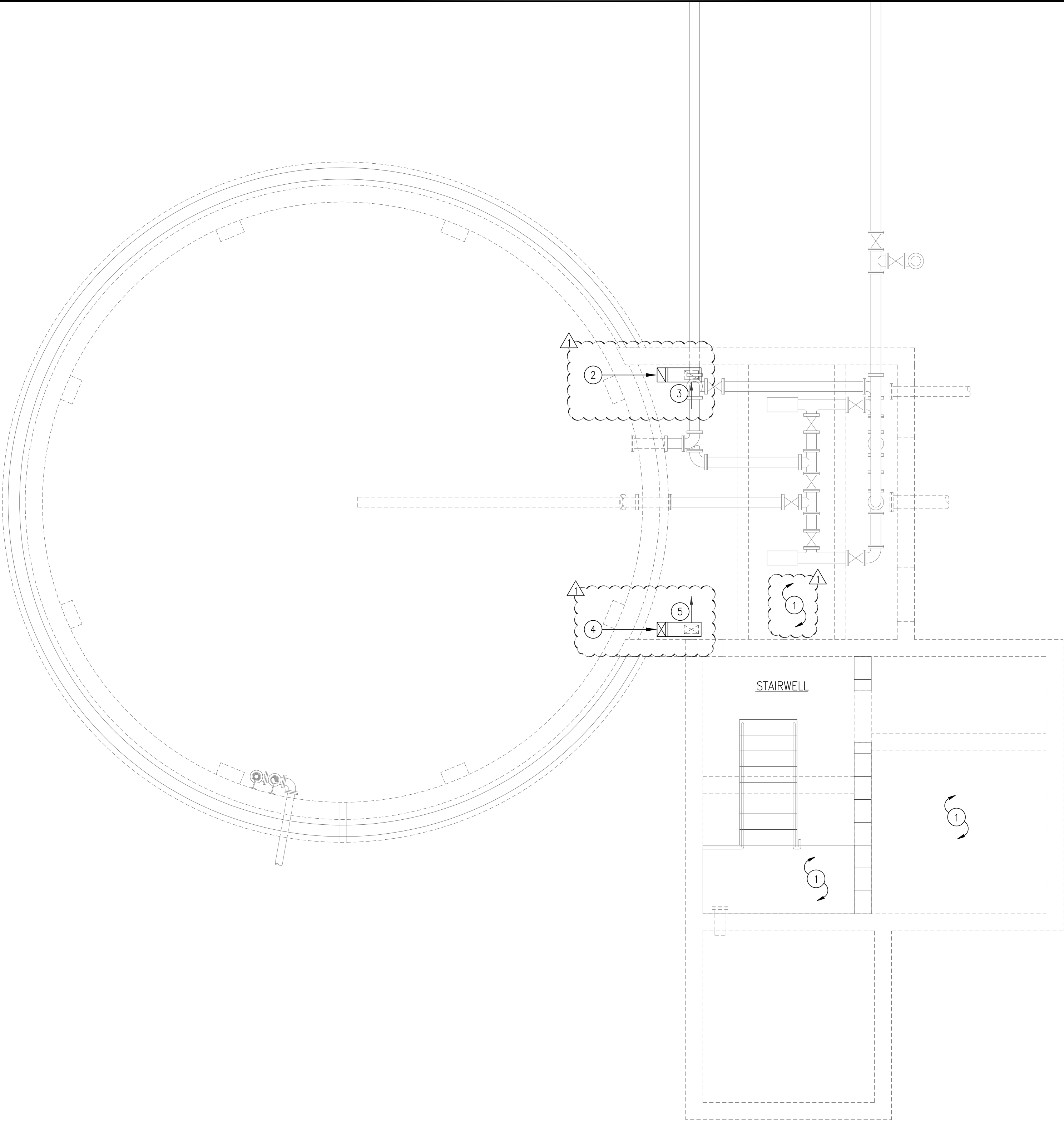
VILLAGE OF CRESTLINE

E8

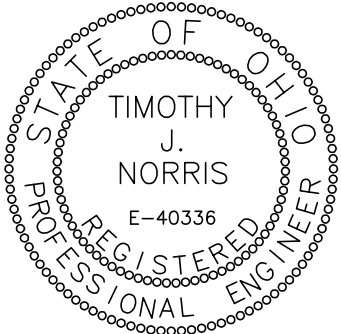
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PLAN NOTES:


- 1 REFER TO ELECTRICAL DRAWINGS FOR ELECTRIC HEAT IN THESE AREAS.
- 2 10"x6" EXHAUST DUCT UP, SEE DRAWING M2 FOR CONTINUATION. FURNISH AND INSTALL A FIRE DAMPER AT FIRE RATED PENETRATION AS REQUIRED.
- 3 FURNISH AND INSTALL A 10"x6" PRICE MODEL 800 (OR APPROVED EQUAL) EXHAUST AIR GRILLE TO EXHAUST 180 CFM.
- 4 10"x6" OUTSIDE AIR INTAKE DUCT UP, SEE DRAWING M2 FOR CONTINUATION. FURNISH AND INSTALL A FIRE DAMPER AT FIRE RATED PENETRATION AS REQUIRED.
- 5 FURNISH AND INSTALL A 10"x6" PRICE MODEL 520D (OR APPROVED EQUAL) OUTSIDE AIR GRILLE TO DELIVER 180 CFM.



 **BASEMENT MECHANICAL PLAN**
SCALE: 1/4" = 1'-0"



REV. NO.	DATE	CALCULATED	
		J.D.	T.J.N.
BID & PERMIT	04/10/14		
ADDENDUM	3/04/30/14		



WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I	
BASEMENT MECHANICAL PLAN	

VILLAGE OF CRESTLINE
M1
X

PLAN NOTES:

- 1

FURNISH AND INSTALL A 26"X26" OUTSIDE AIR INTAKE LOUVER WITH MOTOR OPERATED DAMPER. INTERLOCK WITH EXHAUST FAN (EF-1) AS REQUIRED. (2000 CFM)
- 2

4"Ø SINGLE WALL VENT PIPE THRU ROOF. SEE DETAIL "A" ON DRAWING M3.
- 3

4"Ø COMBUSTION AIR INTAKE PIPE THRU ROOF. SEE DETAIL "B" ON DRAWING M3.
- 4

FURNISH AND INSTALL A GREENHECK MODEL WL-10x3 WALL DISCHARGE LOUVER, CONNECT LOUVER TO 8"X8" DUCT AS INDICATED. (250 CFM)
- 5

FURNISH AND INSTALL A 10"X6" OUTSIDE AIR INTAKE LOUVER, CONNECT LOUVER TO 8"X6" DUCT, CONNECT 8"X6" DUCT WITH MOTOR OPERATED DAMPER TO FULL LINE SIZE RETURN AIR DUCT AT FURNACE AS INDICATED. (PROVIDE 140 CFM VENTILATION AIR)
- 6

MOUNT NEW AIR COOLED CONDENSING UNIT ON GRADE. MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL A 4" REINFORCED CONCRETE PAD AS REQUIRED. EXACT LOCATION OF UNIT ON GRADE TO BE DETERMINED IN FIELD WITH OWNER AND ARCHITECT PRIOR TO INSTALLATION. ROUTING OF REFRIGERANT PIPING SHALL BE COORDINATED WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION. SIZING OF PIPING AS PER UNIT MANUFACTURE'S RECOMMENDATIONS.
- 7

16"Ø SUPPLY AIR DUCT UP THRU FLOOR OF MEZZANINE ABOVE.
- 8

14"X12" RETURN AIR DUCT UP THRU FLOOR OF MEZZANINE ABOVE. CONNECT DUCT TO FULL LINE SIZE RETURN AIR DUCT AS INDICATED.
- 9

DROP 3/4" CONDENSATE DRAIN PIPE/DOWN WALL AND DUMP ONTO GRADE AS INDICATED.
- 10

FURNACE, COOLING COIL AND /RELATED SUPPLY AND RETURN AIR DUCT RUN ABOVE AT MEZZANINE LEVEL ABOVE, UNLESS OTHERWISE NOTED. FURNACE MOUNTED ON FLOOR OF MEZZANINE ABOVE.
- 11

FURNISH AND INSTALL A 8"X4" PRICE MODEL 520D (OR APPROVED EQUAL) SUPPLY AIR REGISTER TO DELIVER 100 CFM.
- 12

FURNISH AND INSTALL A 8"X4" PRICE MODEL 520D (OR APPROVED EQUAL) SUPPLY AIR REGISTER TO DELIVER 110 CFM.
- 13

FURNISH AND INSTALL A 10"X8" PRICE MODEL 520D (OR APPROVED EQUAL) SUPPLY AIR REGISTER TO DELIVER 245 CFM.
- 14

2 TON GAS-FIRED FURNACE WITH COOLING COIL, SEALED COMBUSTION TYPE, RUN INTAKE AND VENT PIPES UP THRU ROOF. SEE DETAIL ON DRAWING M3. (800 CFM)
- 15

DRYER VENT DUCT SHALL BE CONSTRUCTED OF METAL AND SHALL HAVE A SMOOTH INTERIOR FINISH. THE ENTIRE SYSTEM SHALL BE SUPPORTED AND SECURED IN PLACE. THE MALE END OF THE DUCT AT OVERLAPPED DUCT JOINTS SHALL EXTEND IN THE DIRECTION OF AIRFLOW. CLOTHES DRYER TRANSITION DUCTS USED TO CONNECT THE APPLIANCE TO THE EXHAUST DUCT SYSTEM SHALL BE LIMITED TO 8'-0" AND SHALL BE LISTED AND LABELED FOR THE APPLICATION. TRANSITION DUCTS SHALL NOT BE CONCEALED WITHIN CONSTRUCTION. FURNISH AND INSTALL A SEIHO MODEL SX-4 WALL MOUNTED ALUMINUM VENT LOUVER AS REQUIRED, CONNECT LOUVER TO 4"Ø DRYER VENT DUCT COMPLETE.
- 16

FURNISH AND INSTALL A 10"X6" PRICE MODEL 80 (OR APPROVED EQUAL) TRANSFER AIR GRILLE TO TRANSFER 110 CFM.

- 17

FURNISH AND INSTALL A 12"X18" PRICE MODEL 80D (OR APPROVED EQUAL) RETURN AIR GRILLE TO RETURN 600 CFM.
- 18

FURNISH AND INSTALL A 10"X8" EXHAUST AIR LOUVER AS INDICATED, CONNECT LOUVER TO 10"X6" DUCT. (180 CFM)
- 19

10"X6" EXHAUST DUCT DOWN, SEE DRAWING M1 FOR CONTINUATION. FURNISH AND INSTALL A FIRE DAMPER AT FIRE RATED PENETRATION AS REQUIRED.
- 20

FURNISH AND INSTALL A 10"X8" OUTSIDE AIR INTAKE AIR LOUVER AS INDICATED, CONNECT LOUVER TO 10"X6" DUCT. (180 CFM)
- 21

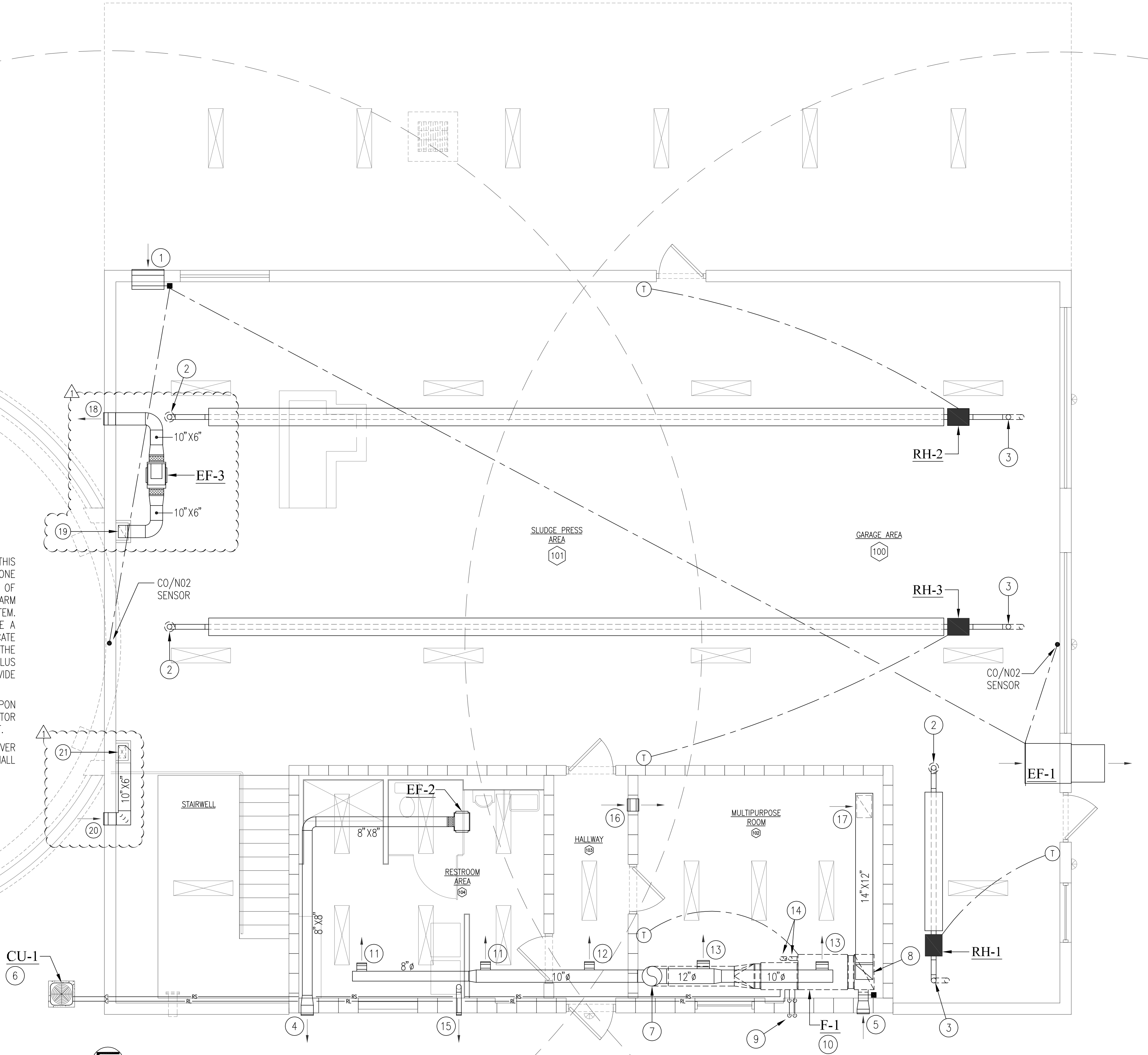
10"X6" OUTSIDE AIR INTAKE DUCT DOWN, SEE DRAWING M1 FOR CONTINUATION. FURNISH AND INSTALL A FIRE DAMPER AT FIRE RATED PENETRATION AS REQUIRED.

CARBON MONOXIDE/NITROGEN DIOXIDE MONITORING SYSTEM:

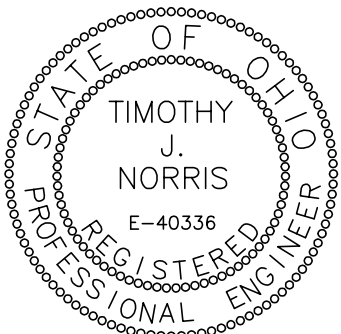
A COMPLETE OPERATIONAL SYSTEM SHALL BE PROVIDED UNDER THIS CONTRACT. CONTROLLER SHALL BE EQUAL TO ARMSTRONG ALL-IN-ONE COMBINATION CO/NO2 MONITOR (MODEL: AMC-IAVC). CONCENTRATIONS OF 25 PPM OF CO OR 1 PPM OF NO2 SHALL TRIGGER THE LOW LEVEL ALARM OF THE MONITORING SYSTEM AND SHALL ACTIVATE THE EXHAUST SYSTEM. CONCENTRATIONS OF 100 PPM OF CO OR 3 PPM OF NO2 SHALL CAUSE A HIGH LEVEL ALARM SET OF CONTACTS TO CLOSE, WHICH SHALL INDICATE ALARM CONDITIONS, LIGHT A LED, AND SIGNAL AN AUDIBLE ALARM. THE CONTROLLER SHALL HAVE LEDS TO INDICATE POWER, ALARM LEVEL, PLUS AUDIO INDICATOR. CAPABLE OF BEING SILENCED FOR HIGH ALARM. PROVIDE MANUAL OVERRIDE TEST SWITCH TO ACTIVATE EXHAUST SYSTEM.

ALL MOUNTING HEIGHTS PER MANUFACTURERS RECOMMENDATIONS. UPON ACTIVATION OF THE EXHAUST SYSTEM, THE OUTSIDE AIR LOUVER MOTOR OPERATED DAMPER SHALL OPEN AND THE EXHAUST SYSTEM SHALL START.

UPON DEACTIVATION OF THE EXHAUST SYSTEM THE OUTSIDE AIR LOUVER MOTOR OPERATED DAMPER SHALL CLOSE AND THE EXHAUST FAN SHALL TURN OFF.

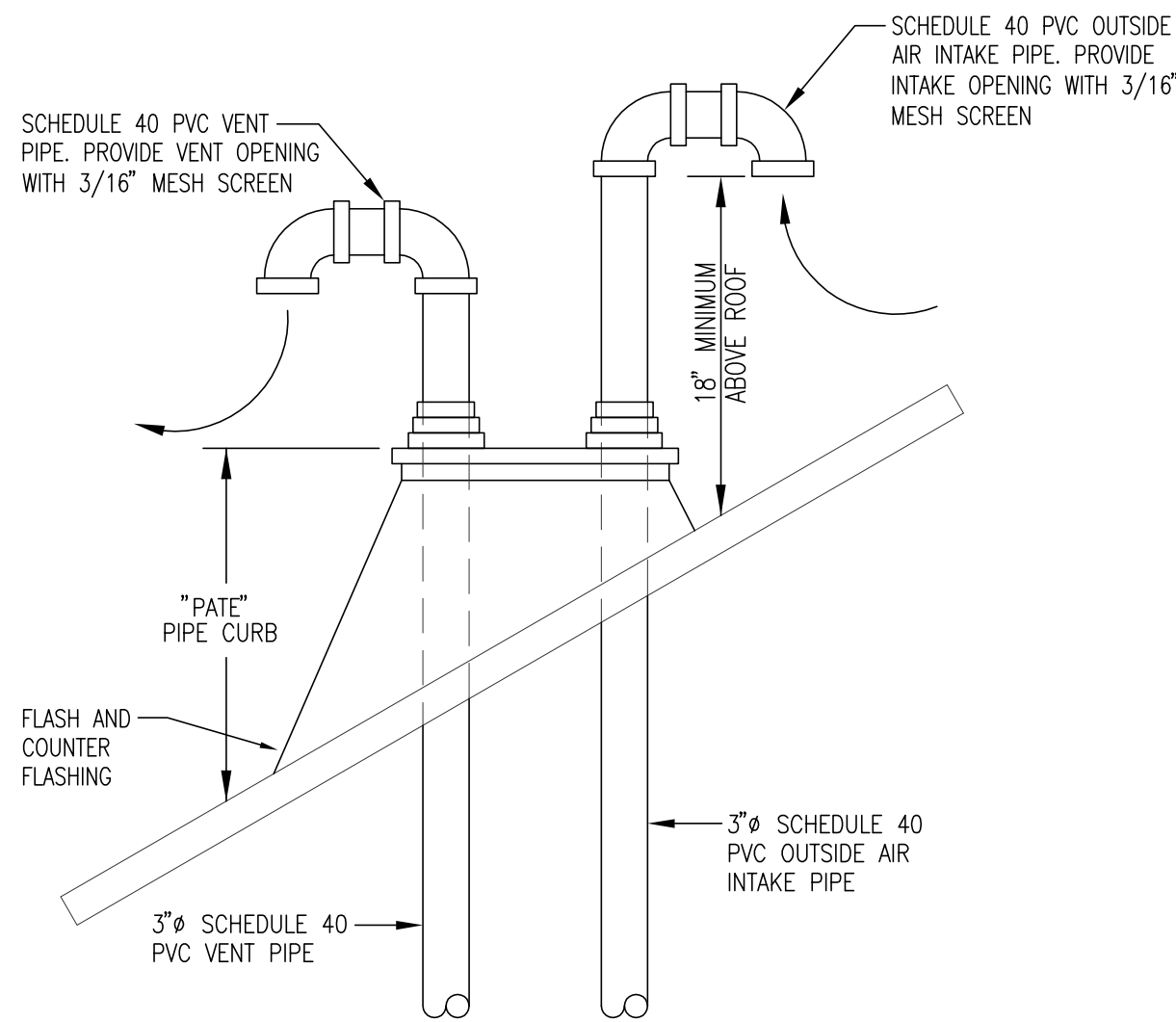


FIRST FLOOR MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

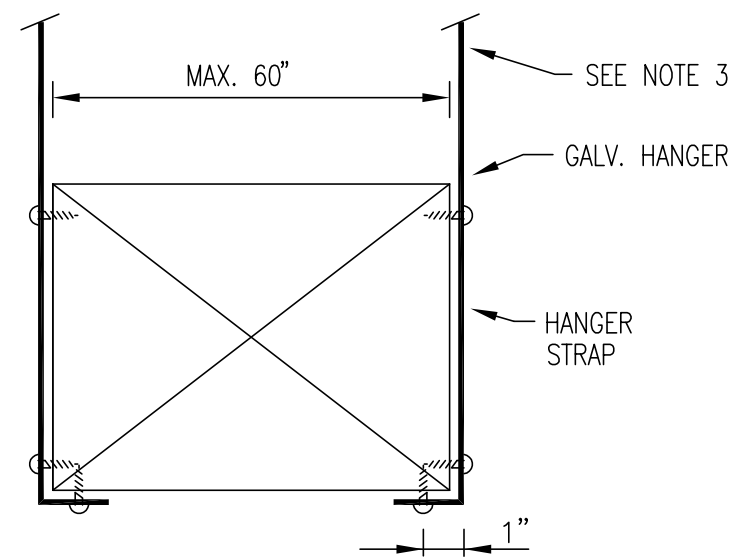


REV. NO.	DATE	CALCULATED	CHECKED
BID & PERMIT 04/10/14	J.D.		
ADDENDUM 3 04/30/14			T.J.N.



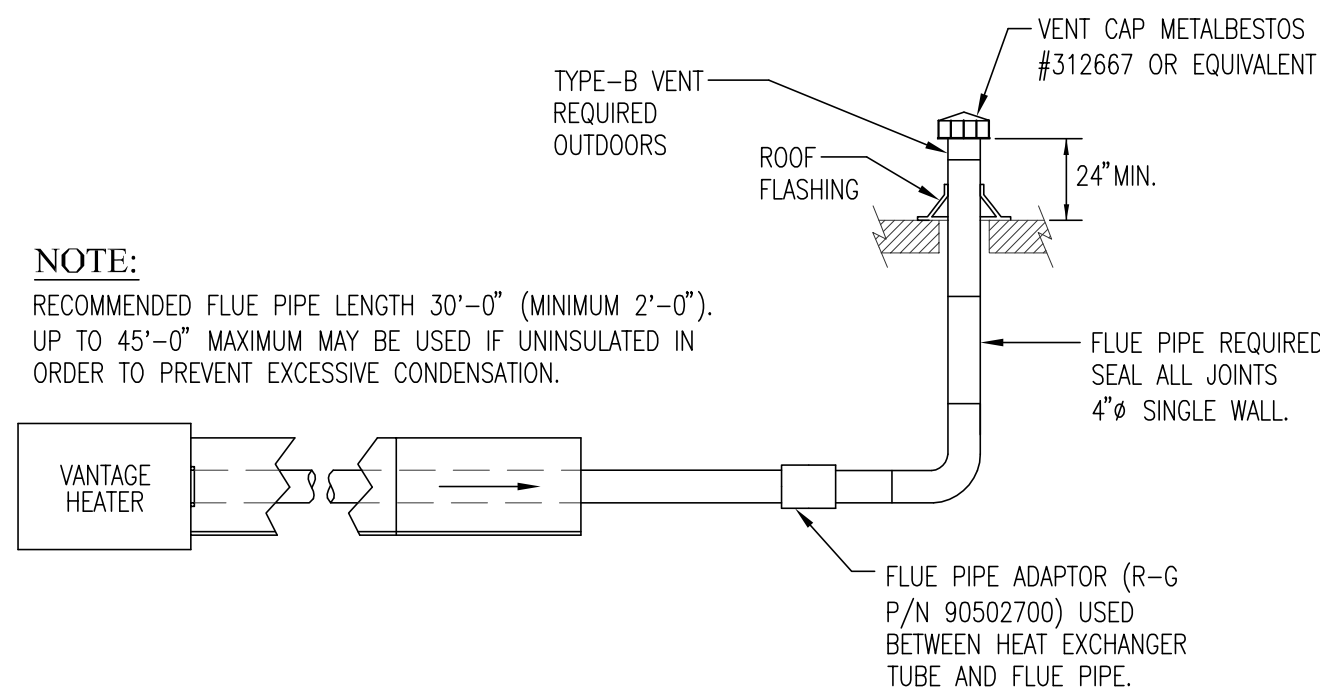


OUTSIDE AIR INTAKE AND
VENT PIPE THRU ROOF DETAIL
(FURNACE)
NO SCALE

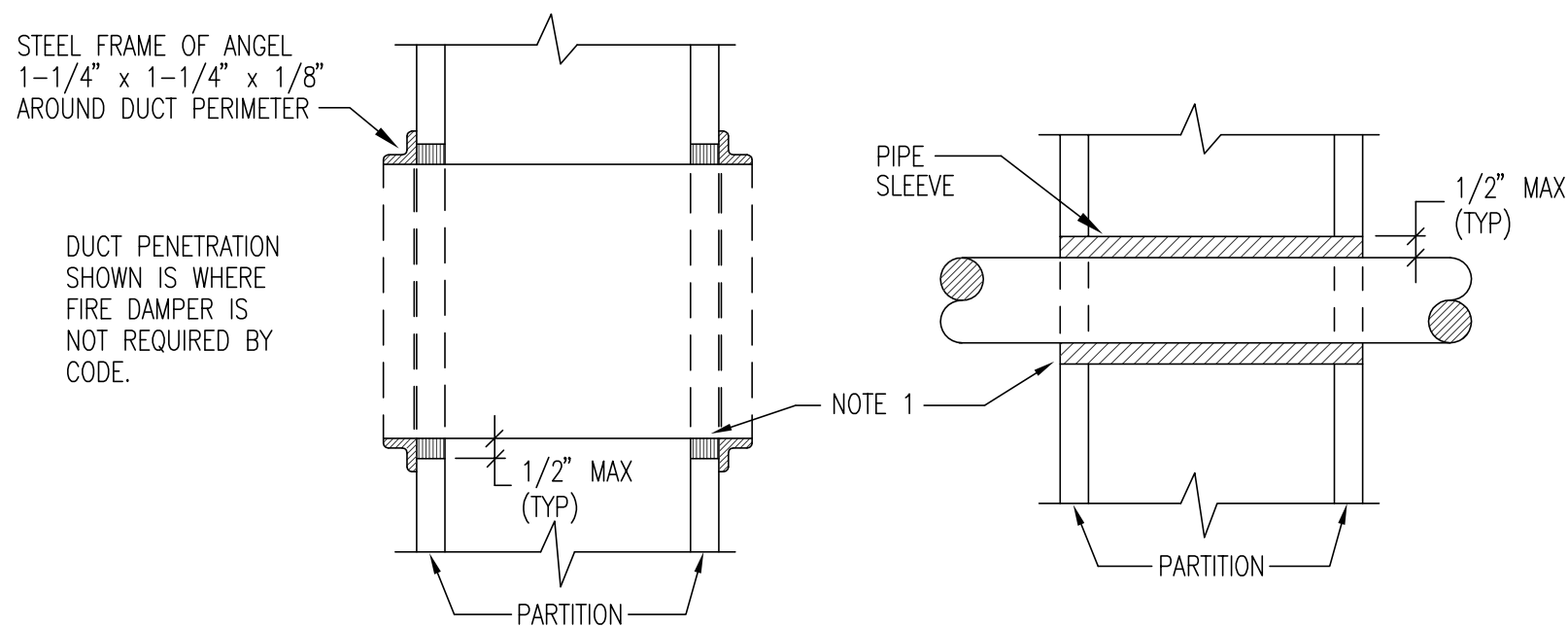


- NOTES:
- ON DUCTS OVER 48" WIDE, BOTTOM SHALL BE BRACED BY ANGLE. FOR CROSS SECTION AREA MORE THAN 8 SQ FT, DUCT SHALL BE BRACED BY ANGLES ON ALL FOUR SIDES.
 - CUTTING AND PATCHING SHALL BE LIMITED TO A MINIMUM AS REQUIRED FOR PROPER INSTALLATION.
 - SUPPORTS SHALL BE SPACED AND SIZED AS PER SMACNA.

DUCT HANGER SUPPORT DETAIL
NO SCALE

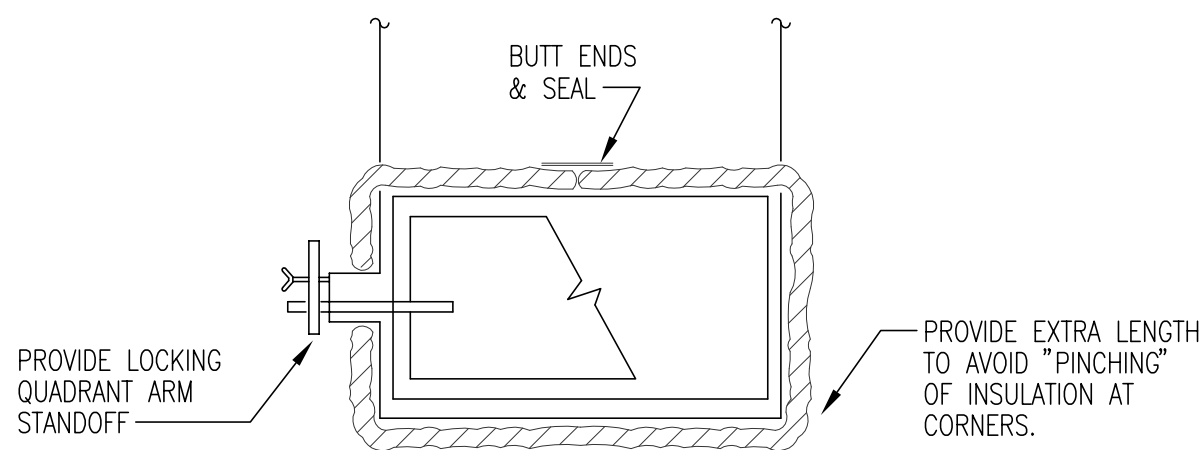


DETAIL-A

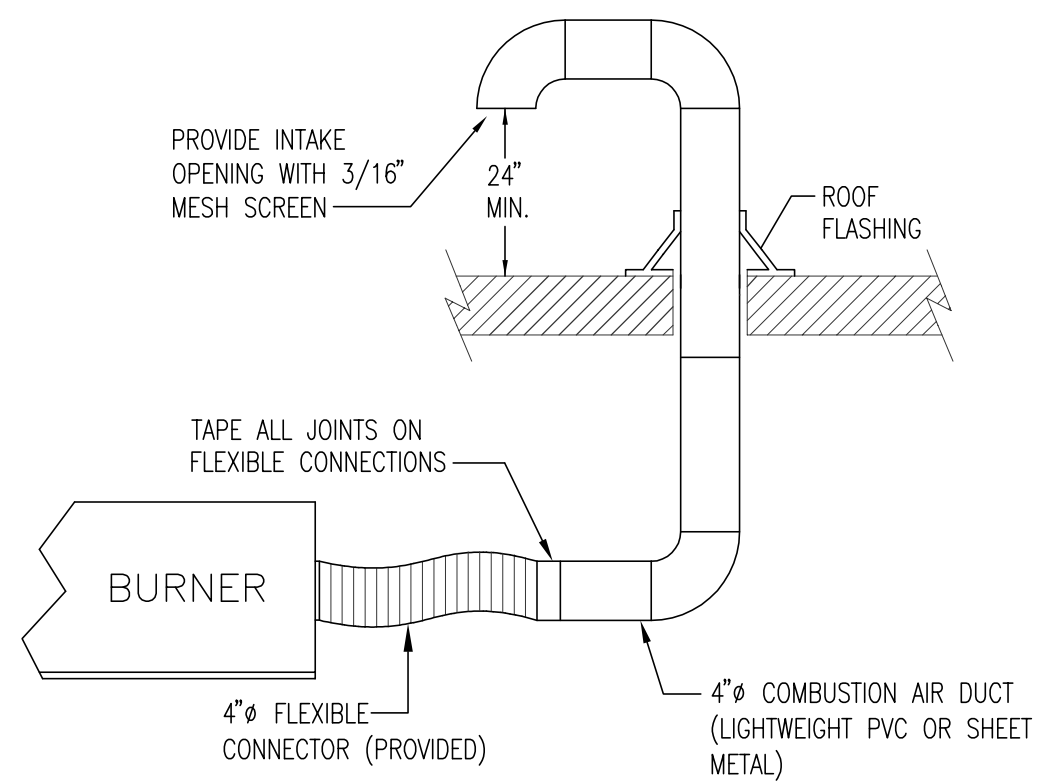


- NOTES:
- AT FIRE RATED PARTITIONS, ADD ADDITIONAL LAYER OF FIRE SAFING INSULATION AROUND PENETRATION SO AS TO FILL CAVITY.
 - DUCT AND PIPE PENETRATIONS THRU CORRIDOR WALLS ABOVE THE CEILING ARE TO BE FIRE STOPPED AROUND THE PENETRATION.

DUCT AND PIPE PENETRATIONS
NO SCALE

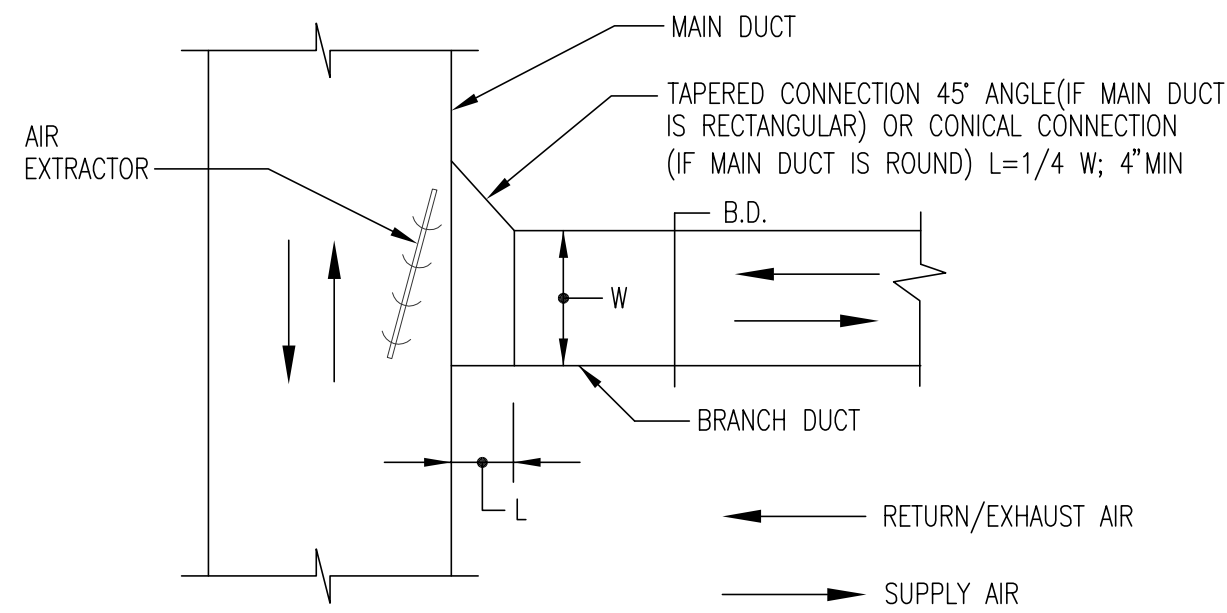


TYPICAL DUCT INSULATION & SUPPORTS
NEAR BALANCING DAMPERS
NO SCALE

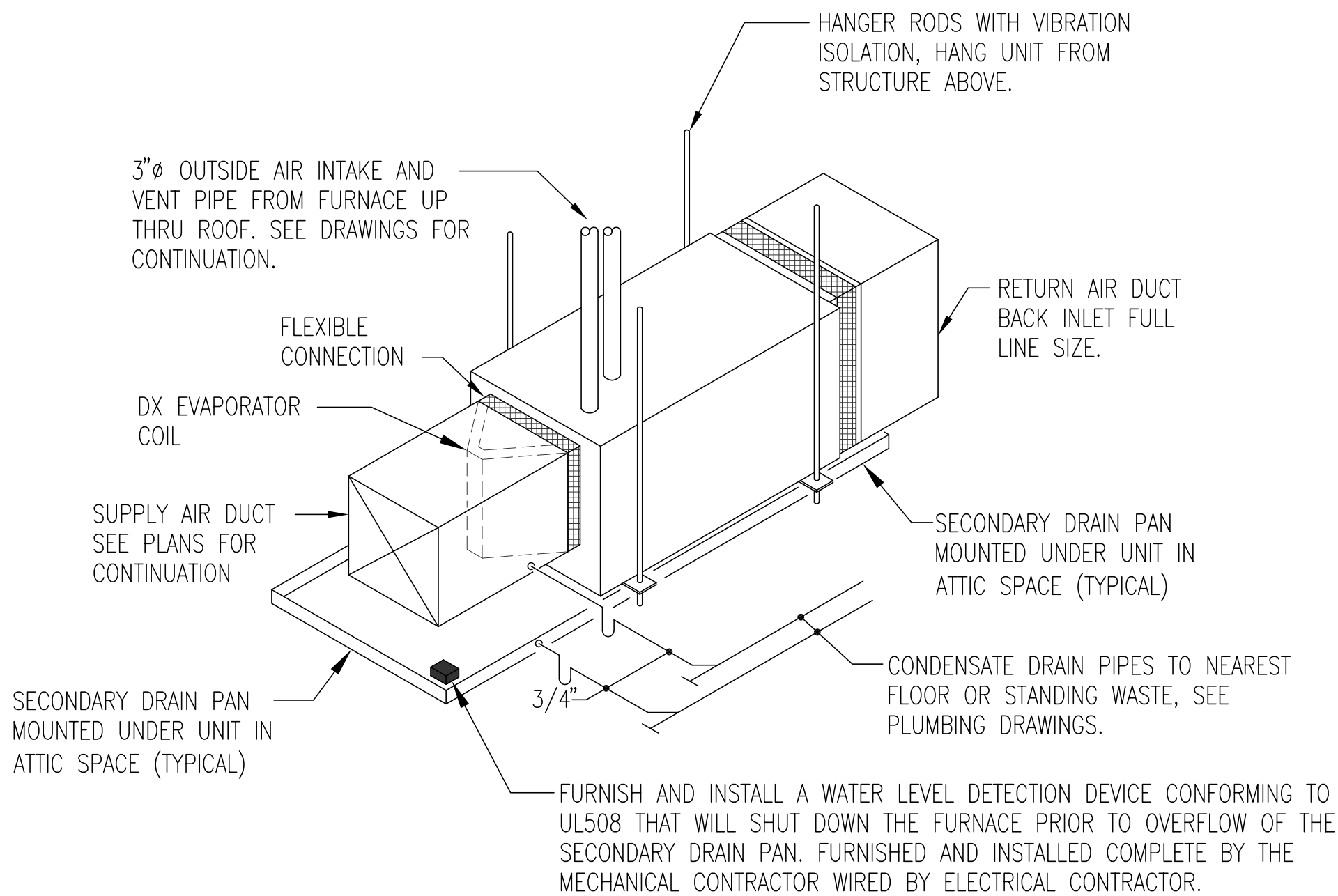


DETAIL-B

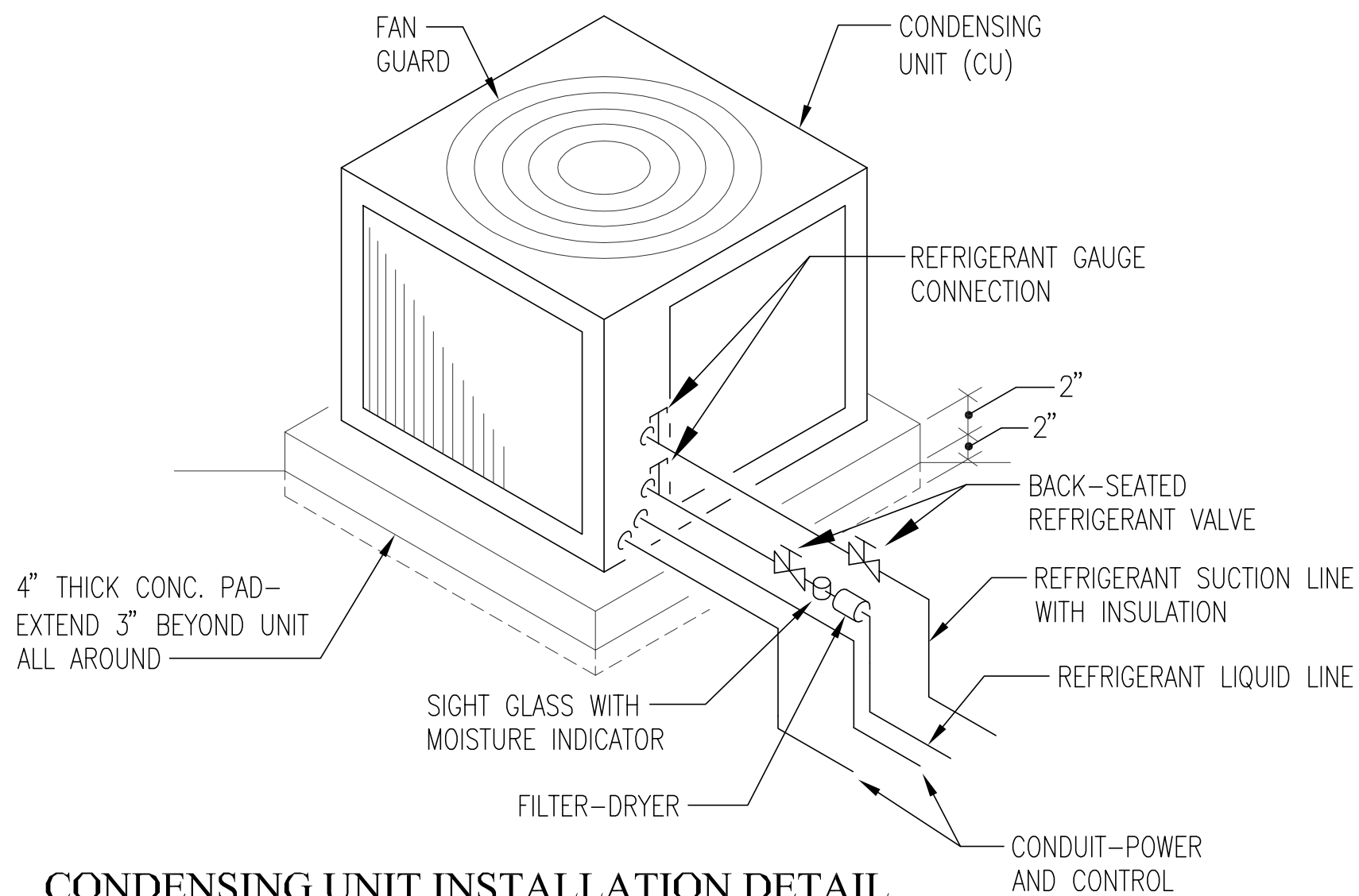
GAS FIRED RADIANT HEATER DETAILS
NO SCALE



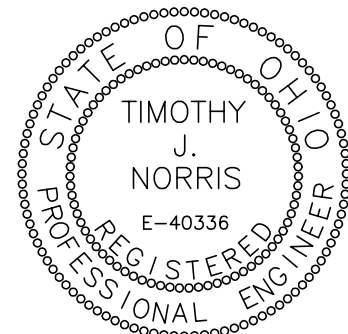
BRANCH TAKE-OFFS DETAIL
NO SCALE



HORIZONTAL FURNACE DETAIL
NO SCALE



CONDENSING UNIT INSTALLATION DETAIL
NO SCALE



GAS-FIRED FURNACE (F) SCHEDULE												
MARK	MANUFACTURE MODEL NUMBER	CFM	E.S.P.	MOTOR		HEATING CAPACITY		OUTSIDE AIR	COOLING CAPACITY		WEIGHT LBS	REMARKS
				H.P.	VOLTAGE	INPUT	OUTPUT		MANUFACTURE MODEL NUMBER	TOTAL COOLING CAPACITY		
F-1	TRANE TUH1B040A9241A	800	0.5"	1/5	120/60/1	40,000	38,000	140	TRANE 2TXCB024AC3	24,000	220 TOTAL	INTERLOCK WITH CU-1

EQUIPMENT SHALL BE "TRANE" OR APPROVED EQUAL. EQUIPMENT SHALL BE PROVIDED WITH SEALED COMBUSTION CHAMBER SUITABLE FOR PVC PIPE VENTING AND ALL REQUIRED ACCESSORIES FOR NATURAL GAS FIRING. UNIT SHALL BE PROVIDED WITH MULTI-SPEED DIRECT DRIVE BLOWER, HIGH EFFICIENT GAS HEATING FURNACE, PROGRAMMABLE THERMOSTAT, FILTER RACK WITH 1" DISPOSABLE FILTERS, FURNACE CONDENSATE NEUTRALIZER KIT, MATCHED "TRANE" CASED COOLING COIL.

AIR COOLED CONDENSING UNIT (CU) SCHEDULE						
MARK	MANUFACTURE MODEL NUMBER	ELECTRICAL DATA			WEIGHT LBS	REMARKS
		M.C.A.	M.F.S.	VOLTAGE		
CU-1	TRANE 4TTB3024E1	12.0	20.0	208/60/1	200	INTERLOCK WITH COOLING COIL @ F-1

EQUIPMENT SHALL BE "TRANE" OR APPROVED EQUAL. EQUIPMENT SHALL BE PROVIDED WITH TIME DELAY RELAY. BALL BEARING FAN MOTOR, MATCHED THERMOSTATIC EXPANSION VALVE, SUPPORT FEET, REFRIGERANT LINE SET, FILTER DRYER, CRANKCASE HEATERS, COMPRESSOR START ASSIST CAPACITOR AND RELAY.

EXHAUST FAN (EF) SCHEDULE								
MARK	MANUFACTURE MODEL NUMBER	CFM	S.P.	FAN MOTOR		TYPE	WEIGHT LBS	REMARKS
				HP	VOLTAGE			
EF-1	GREENHECK SBE-1H20-4	2000	0.25"	1/4	120/60/1	SIDEWALL PROP	100	WALL HOUSING, BACK DRAFT DAMPER GUARD & WEATHER HOOD
EF-2	GREENHECK SP-A290	250	0.25"	81 WATTS	120/60/1	CEILING EXHAUSTER	25	BACK DRAFT DAMPER, HANGER KIT REQUIRED FOR INSTALLATION
EF-3	GREENHECK BSQ-70-4	180	0.25"	1/4	120/60/1	INLINE EXHAUSTER	100	BACK DRAFT DAMPER, HANGER KIT REQUIRED FOR INSTALLATION

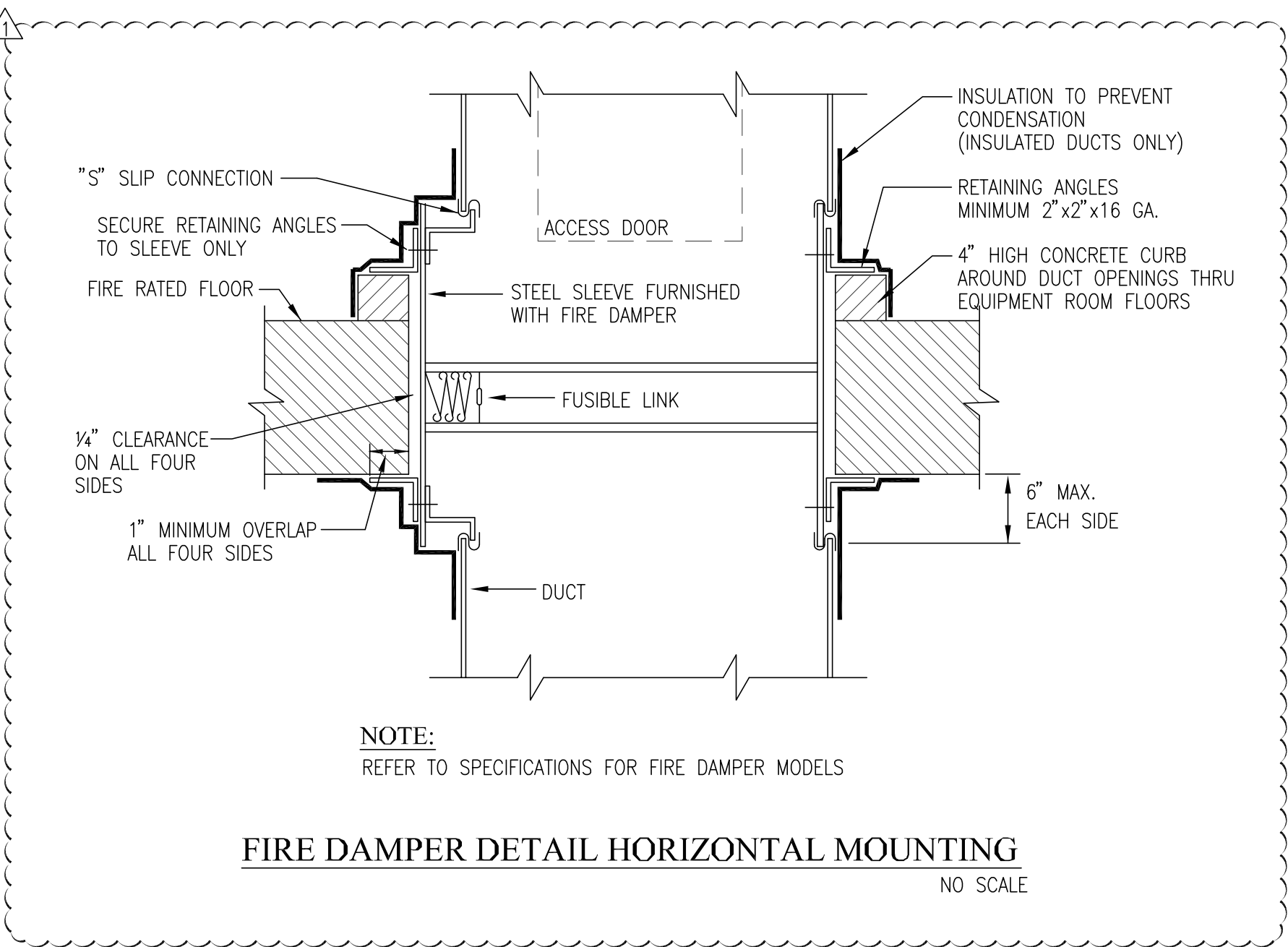
EQUIPMENT SHALL BE GREENHECK OR APPROVED EQUAL.

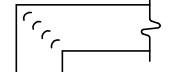
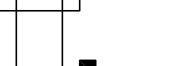


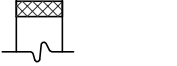



GAS-FIRED RADIANT HEATER SCHEDULE					
MARK	MANUFACTURER MODEL NUMBER	MBH	ELECTRICAL	LENGTH	REMARKS
RH-1	VANTAGE CTH2-40	40.0	5.0 AMPS 120/60/1-VOLTAGE	11' - 6"	
RH-2	VANTAGE CTH2-150	150.0	5.0 AMPS 120/60/1-VOLTAGE	51' - 6"	
RH-3	VANTAGE CTH2-150	150.0	5.0 AMPS 120/60/1-VOLTAGE	51' - 6"	

RADIANT HEATERS SHALL BE VANTAGE OR APPROVED EQUAL

VENTILATION (GARAGE AREA)						
SPACE	FLOOR AREA (FT2)	REQUIRED OA (CFM/FT2)	OCCUPANCY	REQUIRED (CFM/PERSON)	AIR DISTRIBUTION EFFECTIVENESS	REQUIRED OA (CFM)
Corridor A C105	2510	0.75	-	-	-	1883
TOTAL	2510					1883

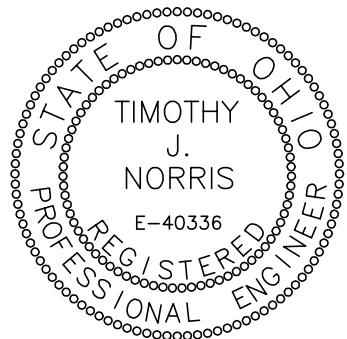
VENTILATION (F-1)						
SPACE	FLOOR AREA (FT2)	REQUIRED OA (CFM/FT2)	OCCUPANCY	REQUIRED (CFM/PERSON)	AIR DISTRIBUTION EFFECTIVENESS	REQUIRED OA (CFM)
Hallway 103	75	0.06	1	-	0.8	6
Multi Purpose 102	255	0.06	15	5	0.8	113
Rest Room 104	255	0.06	1	-	0.8	19
TOTAL	585					138



HVAC SYMBOLS AND ABBREVIATIONS	
SYMBOL	DESCRIPTION
	TURNING VANES
	BALANCING DAMPER
	MOTOR OPERATED DAMPER
	SUPPLY DUCT
	RETURN OR EXHAUST DUCT
	FLEXIBLE DUCT CONNECTION
	THERMOSTAT
	INDICATES PLAN NOTES
F	GAS-FIRED FURNACE
CU	AIR COOLED CONDENSING UNIT
EF	EXHAUST FAN
RH	RADIANT HEATER

GENERAL NOTES:

- DUCT RUN OUT SIZE SHALL BE THE SAME AS THE AIR OUTLET/INLET CONNECTION SIZE UNLESS OTHERWISE NOTED.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING MATERIALS AND EXACT LOCATIONS OF AIR DISTRIBUTION DEVICES.
- FLEXIBLE DUCTWORK SHALL BE INSTALLED WITHOUT KINKS AND WITHOUT BENDS GREATER THAN 30'.
- ALL DUCTWORK DIMENSIONS SHOWN ARE GROSS, NET FREE AREA OF WRAPPED INSULATION.
- ACCESS DOORS SHALL BE PROVIDED IN DUCTWORK FOR ACCESS TO ALL FIRE DAMPERS, SMOKE DAMPERS, MOTOR OPERATED DAMPERS AND COILS. (BOTH UPSTREAM AND DOWNSTREAM)
- INSTALL ALL EQUIPMENT REQUIRING AN ELECTRICAL CONNECTIONS IN SUCH A MANNER SO THAT PROPER CLEARANCE IS PROVIDED FOR SERVING PER NATIONAL ELECTRICAL CODE.
- FLEXIBLE DUCTWORK SHALL NOT PENETRATE THRU WALLS, RIGID SHEET METAL DUCTWORK IS REQUIRED AT ALL WALL PENETRATIONS.
- FLEXIBLE DUCTWORK SHALL NOT BE USED IN EXPOSED LOCATIONS.
- CONTRACTOR SHALL FURNISH AND INSTALL BALANCING DAMPERS AT ALL SUPPLY AND RETURN AIR BRANCH DUCTS AS REQUIRED FOR AIR BALANCE.
- DUCTWORK CONSTRUCTION AND INSTALLATION SHALL CONFORM TO OHIO AND INTERNATIONAL MECHANICAL CODE.
- MECHANICAL SYSTEM PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH OHIO AND INTERNATIONAL MECHANICAL CODE.
- FIRE STOPPING AROUND ALL PIPE AND DUCT PENETRATIONS THRU FLOOR AND WALLS SHALL BE IN ACCORDANCE WITH INTERNATIONAL MECHANICAL CODE.
- WHEN SUBMITTING SHOP DRAWINGS ON ALL EQUIPMENT PERTAINING TO THIS PROJECT, ALL ELECTRICAL REQUIREMENTS SHALL BE COORDINATED WITH THE ELECTRICAL PRIOR TO PURCHASING THE NEW EQUIPMENT. SUBMIT SHOP DRAWINGS WITH THE CORRECT VOLTAGES SHOWN ON THE MECHANICAL SCHEDULE SHEET.
- COORDINATE PLACEMENT OF NEW EQUIPMENT, ROUTING AND ELEVATIONS OF DUCTWORK WITH THE STRUCTURAL, PLUMBING AND ELECTRICAL SO AS NOT TO INTERFERE WITH STRUCTURAL BEAMS, JOISTS, PLUMBING EQUIPMENT, PLUMBING PIPING, ELECTRICAL EQUIPMENT, ELECTRICAL LIGHTING AND/OR CONDUIT RUNS BEING INSTALLED.
- FIELD VERIFY PRIOR TO INSTALLATION THAT ALL DUCTWORK CAN BE INSTALLED AS SHOWN ON THE DRAWINGS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER PRIOR TO FABRICATION.
- COORDINATE EXACT LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES WITH ARCHITECTURAL REFLECTED CEILING PLANS, REFER TO ARCHITECTURAL DRAWINGS AS REQUIRED.
- ROUTING OF REFRIGERANT PIPING TO BE DETERMINED IN FIELD. SIZING OF REFRIGERANT PIPING AS PER MANUFACTURER'S RECOMMENDATIONS.
- ALL MATERIALS EXPOSED WITHIN PLENUMS SHALL BE NON-COMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
- MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BIDDING PROCESS AND FIELD VERIFY EXISTING CONDITIONS. CONTRACTOR SHALL TAKE ALL INTERFERENCES INTO CONSIDERATION. PROVIDE ALL NECESSARY OFFSETS OR TRANSITIONS WITH EQUIVALENT AREAS TO MATCH DUCT SIZES INDICATED ON DRAWINGS.
- CONTRACTOR SHALL BE FAMILIAR WITH FACILITY STANDARDS, RULES AND REGULATIONS. ALL OWNER'S CRITERIA SHALL BE COMPLIED WITH AND INCLUDED IN THIS BID.
- MAINTAIN ALL MANUFACTURE'S RECOMMENDED SERVICE CLEARANCES FOR ALL EQUIPMENT.



MECHANICAL SPECIFICATIONS:

1. HVAC SYSTEMS BALANCING

A. GENERAL

1. PROVIDE ALL LABOR, MATERIALS, AND TOOLS REQUIRED TO PERFORM THE TESTING, ADJUSTING, AND BALANCING (TAB) OF ALL AIR AND WATER DISTRIBUTION SYSTEMS THAT ARE ASSOCIATED WITH THE HEATING AND COOLING SYSTEMS AS SPECIFIED HEREIN.

B. QUALITY ASSURANCE

1. STANDARDS

- A. AABC NATIONAL STANDARDS FOR TESTING AND BALANCING HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS.
- B. SUBMIT AABC NATIONAL PERFORMANCE GUARANTY WITH TEST & BALANCE REPAIR.
- C. THE TAB AGENCY MUST BE A CERTIFIED MEMBER OF THE AABC.
- D. SPECIFIED TOLERANCE: DEVIATION LIMITS FOR BALANCING THIS PROJECT ARE OUTLETS (+10%-5%) UNLESS MODIFIED BY THE ENGINEER ON A CASE BY CASE BASIS.
2. THE BALANCING WORK SHALL BE ACCOMPLISHED BY REGULAR EMPLOYEES OF THE TAB AGENCY UNDER THE DIRECT SUPERVISION OF A AABC CERTIFIED TEST AND BALANCE ENGINEER. THE TEST AND BALANCE ENGINEER'S REGISTRATION NUMBER SHALL APPEAR ON THE TEST AND BALANCE REPORT.
3. INSTRUMENTS USED FOR TESTING AND BALANCING OF AIR AND HYDRONIC SYSTEMS WILL HAVE BEEN CALIBRATED WITHIN A PERIOD OF SIX MONTHS AND CHECKED FOR ACCURACY PRIOR TO START OF THE WORK ON THIS PROJECT.
4. ANY CAPACITY DISCREPANCIES BEYOND THE SPECIFIED DEVIATION LIMITS OR ITEMS NOT IN ACCORDANCE WITH CONTRACT DOCUMENTS, WHICH MAY AFFECT THE TOTAL SYSTEM BALANCE, SHALL BE REPORTED TO THE ENGINEER AND HVAC CONTRACTOR FOR CORRECTIVE ACTION.
5. THE TEST AND BALANCE AGENCY SHALL PROVIDE AN EXTENDED WARRANTY OF NINETY (90) DAYS AFTER THE ENGINEER HAS APPROVED THE FINAL TEST AND BALANCE REPORT. DURING THIS PERIOD THE ENGINEER MAY REQUEST A RECHECK OR RESETING OF ANY DEVICE.
- A. THE HVAC CONTRACTOR SHALL PROVIDE COPIES OF SUBMITTALS FOR ALL ROTATING EQUIPMENT, TERMINAL BOXES, DIFFUSERS, COILS AND ANY OTHER EQUIPMENT INVOLVED IN THE TAB PROCESS. SUBMITTALS SHALL INCLUDE OPERATING CURVES FOR FANS, PUMPS AND BALANCING DEVICES; AND AUTOMATIC TEMPERATURE CONTROL DIAGRAM.
- B. WHEN REQUESTED BY THE HVAC CONTRACTOR THE TBE SHALL VISIT THE JOB SITE TO INSURE THAT THE SYSTEMS TO BE BALANCED ARE OPERATIONAL AND READY FOR TAB.

C. THE HVAC CONTRACTOR SHALL INSURE THAT:

1. ALL DAMPERS ARE INSTALLED IN THE OPEN POSITION.
2. THE TEMPERATURE CONTROL SYSTEM IS OPERATIONAL AND CAPABLE OF CONTROLLING SYSTEM SETPOINTS BEFORE TAB COMMENCES.

6. BALANCING AIR SYSTEMS

- A. TEST AND ADJUST EACH FAN SYSTEM TO PROVIDE PROPER AIR VOLUMES WITHIN THE SPECIFIED TOLERANCE. TOTAL AIR FLOW READINGS WILL BE ACHIEVED BY PITOT TUBE TRAVERSE WHEREVER POSSIBLE. SHEAVES, BELTS OR ADDITIONAL DAMPERS REQUIRED TO ACHIEVE VOLUMES WITHIN THE SPECIFIED TOLERANCE WILL BE PROVIDED AND INSTALLED BY THE HVAC CONTRACTOR.
- B. STATIC PROFILES WILL BE INCLUDED FOR EACH AIR HANDLING SYSTEM THAT CONTAINS COILS AND OTHER COMPONENTS IN THE FAN HOUSING, AND FOR ANY FAN THAT FOR SOME REASON DOES NOT MEET THE SPECIFIED TOLERANCE.
- C. IDENTIFY EACH TERMINAL BOX, DIFFUSER, GRILLE, REGISTER AND OTHER DEVICE AS TO LOCATION, AREA SERVED, MANUFACTURER, TYPE, SIZE, VOLUME REQUIRED AND TEST RESULTS.
- D. TEST AND FIELD ADJUST EACH TERMINAL BOX TO DELIVER THE SPECIFIED AIR UNDER ALL SPECIFIED CONTROL SEQUENCES.
- E. TEST AND ADJUST, UTILIZING DUCT DAMPERS WHENEVER POSSIBLE, EACH DIFFUSER, GRILLE, REGISTER AND OTHER DEVICE TO DELIVER AIRFLOWS WITHIN THE SPECIFIED TOLERANCE.
- F. TEST AND ESTABLISH SETPOINTS FOR DESIGN PERCENT FRESH AIR. MARK AND/OR RECORD SETTINGS.
- G. MARK ALL QUADRANT HANDLES, SPLITTER CONTROL RODS, AND OTHER DEVICES USED FOR BALANCING (NOT OUTLET DAMPERS). PLUG ALL HOLES.

7. BALANCING REPORT

- A. THE TAB AGENCY SHALL SUBMIT A FIELD COPY OF THE TEST REPORT FOR THE ENGINEERS REVIEW WHILE THE FINAL REPORTS ARE BEING PREPARED.
- B. THE TAB AGENCY SHALL SUBMIT SIX (6) COPIES OF THE TEST AND BALANCE REPORTS FOR APPROVAL.

2. DUCTS

- A. PROVIDE AND INSTALL ALL SUPPLY RETURN AND EXHAUST DUCTS. CONNECTION TO EQUIPMENT TO BE MADE WITH DOUBLE CANVAS. AIR DUCTS SHALL BE BUILT OF THE FOLLOWING GAUGE GALVANIZED IRON AND TO CONFORM TO SMACNA STANDARDS:

RECTANGULAR:	ROUND DUCTS
MAXIMUM SIDE UP TO 12"	26 GA. 12" DIA. 24 GA.
MAXIMUM SIDE UP TO 30"	24 GA.

- B. JOINT TO BE STRAIGHT, TYPE TO BE BEST SUITED FOR PARTICULAR SIZE, SECTIONS TO BE NO LONGER THAN 8 FEET. ALL SURFACES 15" OR WIDER SHALL BE CROSS BROKEN. WHERE DUCTS PASS THROUGH FLOOR, ROOF OR WALLS, SPACE AROUND DUCT SHALL BE PACKED WITH FIREPROOF MATERIAL. ALL SUPPLY ELBOWS ARE TO BE CURVED VANES. ALL GRILLES SHALL BE SCREWED TO FLANGED DUCTS WITH SPONGE RUBBER GASKETS AND MADE AIRTIGHT. ALL GRILLES ARE TO HAVE PRIME COAT FINISH.

3. DAMPERS AND DEFLECTORS

- A. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL BALANCING DAMPERS, SPLITTERS, AND DEFLECTORS NECESSARY TO PROPERLY DISTRIBUTE THE AIR. BALANCING DAMPERS SHALL BE INSTALLED IN EACH BRANCH DUCT AND AS REQUIRED TO PROPERLY BALANCE THE AIRFLOW. WHERE A GRILLE IS SUPPLIED SUCH THAT IT IS IMPRACTICAL TO PROVIDE A DAMPER IN THE BRANCH DUCT, A DAMPER SHALL BE PROVIDED WITH THE GRILLE.
- B. WHERE DAMPERS AND SPLITTERS ARE CONCEALED IN SUSPENDED CEILINGS, THEY SHALL BE PROVIDED WITH ACCESS DOORS, EXCEPT DOORS MAY BE OMITTED WHERE CEILINGS ARE OF THE REMOVABLE TYPE.
- C. ALL OTHER DAMPERS SHALL BE NO LONGER THAN 12" WIDE BY 48" LONG. WHERE NECESSARY, MORE THAN ONE BLADE SHALL BE PROVIDED. DAMPERS 24" AND LESS IN LENGTH SHALL BE 16 GAUGE.

4. VIBRATION ISOLATION AND FLEXIBLE CONNECTIONS

- A. AT DUCTS TO EQUIPMENT, PROVIDE VENT-FABRIC FLEXIBLE CONNECTIONS WITH A MINIMUM OF 6" FULL LENGTH, AND APPROVED BY THE GOVERNMENTAL AGENCIES HAVING JURISDICTION.
- B. ISOLATE PIPING FROM THE STRUCTURE IN A MANNER TO PREVENT TRANSMISSION OF VIBRATION.

5. DUCT INSULATION

- A. ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-5 INSULATION WHEN LOCATED IN UNCONDITIONED SPACES AND A MINIMUM OF R-8 WHEN LOCATED OUTSIDE THE BUILDING. WHEN LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING ENVELOPE OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-8 INSULATION.
- B. INSULATION MAY BE JOHNS MANVILLE, PITTSBURGH PLATE GLASS OR OWENS-CORNING.

6. REFRIGERANT PIPING

- A. REFRIGERANT PIPING SHALL BE TYPE L, HARD DRAWN, COPPER TUBING WITH WROUGHT COPPER RECESSED FITTINGS. INSULATE REFRIGERANT PIPING SUCTION LINE WITH ARMSTRONG CORK COMPANY, TYPE FR/ARMAFLEX. INSULATION THICKNESS SHALL BE 1/2". REFRIGERANT PIPING TO RUN FROM CONDENSING UNIT TO DIRECT EXPANSION COIL IN THE FURNACE.

7. CONDENSATE DRAIN PIPING

- A. CONDENSATE DRAIN PIPING FROM COOLING COILS TO BE SCHEDULE 40 PVC WITH SOLVENT WELDED FITTINGS.

8. VENT OUTLETS (FURNACES)

- A. VENT OUTLETS AND INTAKES FROM FURNACES TO BE SCHEDULE 40 PVC WITH SOLVENT WELDED FITTINGS. PVC PIPES SHALL CONNECT TO CONCENTRIC VENT KIT.

9. LOUVERS

- A. FURNISH EXTRUDED ALUMINUM AIR INTAKE STORMPROOF LOUVERS AS INDICATED ON DRAWINGS AND MADE BY AEROLITE MODEL CB630 OR APPROVED EQUAL. REMOVAL SCREEN WITH 1/2" MESH HAVING SAME FINISH AS LOUVERS SHALL BE NEATLY FITTED AND SECURED TO THE INSIDE FACE OF INTAKE. LOUVERS MUST HAVE MINIMUM 55% FREE OPENING. LOUVER SIZES GIVEN ARE NET CORE DIMENSIONS AND DO NOT INCLUDE ANY FRAME THICKNESS. FINISH LOUVERS DURANODIC MEDIUM BRONZE.

10. FURNACES

- A. FURNISH AND INSTALL AT LOCATIONS INDICATED ON DRAWINGS GAS FIRED WARM AIR, BLOWER TYPE FURNACES WITH ELECTRONIC SPARK IGNITION, COMPLETE WITH ELECTRONIC SAFETY CONTROLS, METAL FILTER RACK, REPLACEABLE FILTER MEDIA. FURNACES SHALL HAVE A CAPACITY INDICATED IN SCHEDULE ON DRAWING. FAN SHALL BE DIRECT DRIVEN OF CENTRIFUGAL TYPE.
- B. FURNACE TO HAVE A DIRECT EXPANSION COOLING COIL, SUITABLE FOR HORIZONTAL OPERATION WITH PLENUM ENCLOSURE CONSTRUCTED OF GALVANIZED STEEL. COILS TO HAVE A COOLING CAPACITY AS INDICATED IN SCHEDULE AND SHALL HAVE FACTORY INSTALLED REFRIGERANT METERING DEVICE AND BE EQUIPPED WITH REFRIGERANT PIPING AND FITTINGS FOR MECHANICAL CONNECTIONS.
- C. FURNACE AND COOLING COIL MAY BE BRYANT, LENNOX, OR EQUAL TO TRANE SPECIFIED.

11. CONDENSING UNIT

- A. FURNISH AND INSTALL WHERE SHOWN ON DRAWING AIR COOLED REFRIGERATION UNITS SET ON GRADE ON CONCRETE SLAB. MODEL AND CAPACITY AS SHOWN IN SCHEDULE ON DRAWING. UNIT COMPONENTS SHALL BE FACTORY WIRED AND ASSEMBLED ON COMMON BASE AND SHALL CONSIST OF COMPRESSOR, CONDENSER COIL, CONDENSER FAN AND MOTOR, RECEIVER, DRIER, CHARGING VALVES, ALL CONTROLS AND HOLDING CHARGE OF REFRIGERANT 410A.
- B. UNIT TO BE ARI RATED AND TO HAVE ZINC-COATED STEEL WEATHERPROOF HOUSING, ENAMEL FINISHED WITH SERVICE ACCESS PANELS, CONDENSER FAN TO HAVE DIRECT DRIVE MOTOR. THE COMPRESSOR TO BE HERMETIC SHELL TYPE WITH INTERNAL VIBRATION ISOLATION. CONDENSER COIL TO BE CONSTRUCTED OF COPPER TUBING WITH ALUMINUM FINS.
- C. UNIT TO BE FURNISHED WITH CRANKCASE HEATER, LIQUID RECEIVER AND REFRIGERANT DRIER. INTERNAL CONTROL SHALL CONSIST OF CONTACTORS FOR COMPRESSOR, CONDENSER FAN, HIGH PRESSURE CUT-OUT, COMPRESSOR PROTECTION CUT-OUT. FURNISH FOR LOW AMBIENT (C°F) OPERATION.
- D. CONDENSING UNIT MAY BE BRYANT, LENNOX, OR EQUAL TO TRANE SPECIFIED.

12. TEMPERATURE CONTROL

- A. ALL LOW AND LINE VOLTAGE TEMPERATURE CONTROL WIRING IS PART OF THIS CONTRACT. ALL WIRING SHALL BE IN CONDUIT AND INSTALLED IN CONFORMANCE WITH THE REQUIREMENTS OF THE ELECTRICAL SPECIFICATIONS.

B. FURNACE

1. STANDARD CONTROLS SHALL BE FACTORY SUPPLIED WITH THERMOSTAT WHICH SHALL MAINTAIN DISCHARGE TEMPERATURE BY CYCLING THE GAS HEATING OR ELECTRIC COOLING AS REQUIRED. A SUB-BASE SWITCH SHALL INCLUDE FAN "ON-AUTO" AND "HEAT-OFF-COOL" POSITIONS. CONDENSING UNIT SHALL BE ELECTRICALLY INTERLOCKED WITH THE FURNACE FAN SO THAT IT MUST BE IN OPERATION WHENEVER COOLING IS ON. ROOM THERMOSTAT SHALL MAINTAIN SPACE CONDITIONS.

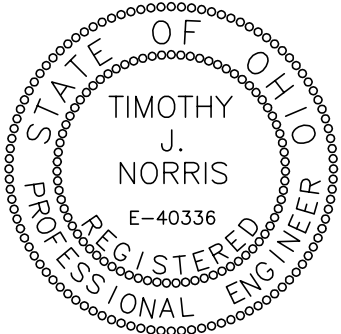
C. RADIANT HEATERS

1. STANDARD CONTROLS SHALL BE FACTORY SUPPLIED WITH THERMOSTAT WHICH SHALL MAINTAIN TEMPERATURE BY CYCLING THE GAS HEATING AS REQUIRED. ROOM THERMOSTAT SHALL MAINTAIN SPACE CONDITIONS.

WASTEWATER TREATMENT PLANT IMPROVEMENTS - PHASE I
MECHANICAL SPECIFICATIONS

VILLAGE OF CRESTLINE

M5
X



REV. NO.	DATE	CALCULATED	J.D.
BID & PERMIT 04\10\14	04\10\14		
ADDENDUM 3 04\30\14			
		CHECKED	T.J.N.