

PACKAGED AIR COOLED HEAT PUMP UNIT SCHEDULE

UNIT No.	LOCATION	SERVICE	COOLING (MBH)		EVAPORATOR DATA									
			TOTAL	SENSIBLE	CFM	FAN TYPE	DRIVE TYPE	ESP	MOTOR HP	RPM	ENTERING AIR		LEAVING AIR	
											DB (°F)	WB (°F)	DB (°F)	WB (°F)
ACU-1-1	GROUND	STORAGE	79.7	59.5	2,880	FC	BELT	1.4	2	1,257	80	67	61	60.8

PACKAGED HEAT PUMP SCHEDULE (CONT'D)

CONDENSER DATA					COMPRESSOR DATA			
QUANTITY	CFM	FAN TYPE	DRIVE TYPE	MOTOR HP	RPM	QUANTITY	HP	RLA
1	5,800	PROP	DIRECT	0.7	1,100	1	5.9	22.4

PACKAGED HEAT PUMP SCHEDULE (CONT'D)

UNIT ELECTRICAL DATA						
VOLTS	PHASE	HZ	UNIT MCA	OPERATING WT. (LBS)	MANUF. MODEL #	REMARKS
208	3	60	84.5	1,000	TRANE WSC	-

1. PROVIDE UNIT WITH THE FOLLOWING OPTIONAL ACCESSORIES: POWERED CONVENIENCE OUTLET, RETURN AIR SMOKE DETECTOR, 2" MERV 8 FILTERS, CLOGGED FILTER/FAN FAILURE SWITCH, 13.5 KW ELECTRIC HEATER, ROOF CURB, UNIT-MOUNTED CIRCUIT BREAKER, AND REMOTE THERMOSTAT.

DIFFUSER SCHEDULE

DESIGNATION	SERVICE	CFM RANGE	MAX NC	TYPE	NECK SIZE (IN.)/SIZE & NO. OF SLOTS	NOMINAL OVERALL DIMENSION WxL (IN.)	MANUF. MODEL	REMARKS
CG-A	SUPPLY	250-400	25	GRILLE	10" x 10"	24" x 24"	TITUS 300	-
CG-B	RETURN	600-800	15	GRILLE	16" x 16"	24" x 24"	TITUS 350	-
CG-C	EXHAUST	2000-3000	38	GRILLE	24" x 24"	24" x 24"	TITUS 350	-

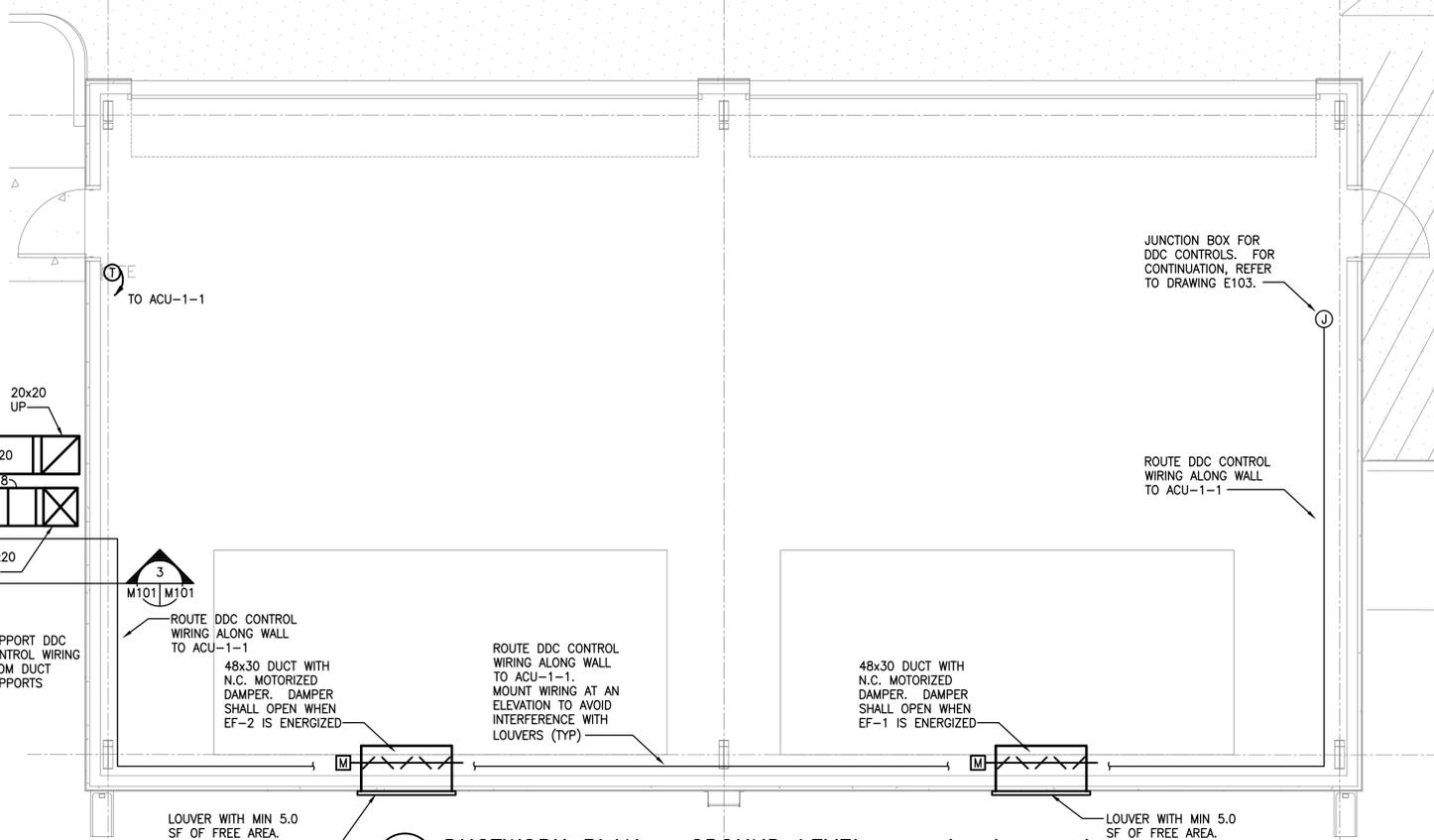
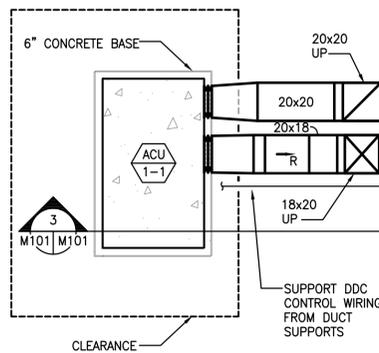
FAN SCHEDULE

UNIT No.	LOCATION	SERVICE	FAN TYPE	PERFORMANCE DATA				CONSTRUCTION DATA			
				CFM	TOTAL SP (IN. W.G.)	RPM	BHP	MAX. OV (FPM)	CLASS	ROT	DISCHARGE
EF-1	ROOF	STORAGE	CENTRIF.	2,500	0.75	1,460	0.733	1,696	1	-	DB
EF-2	ROOF	STORAGE	CENTRIF.	2,500	0.75	1,460	0.733	1,696	1	-	DB

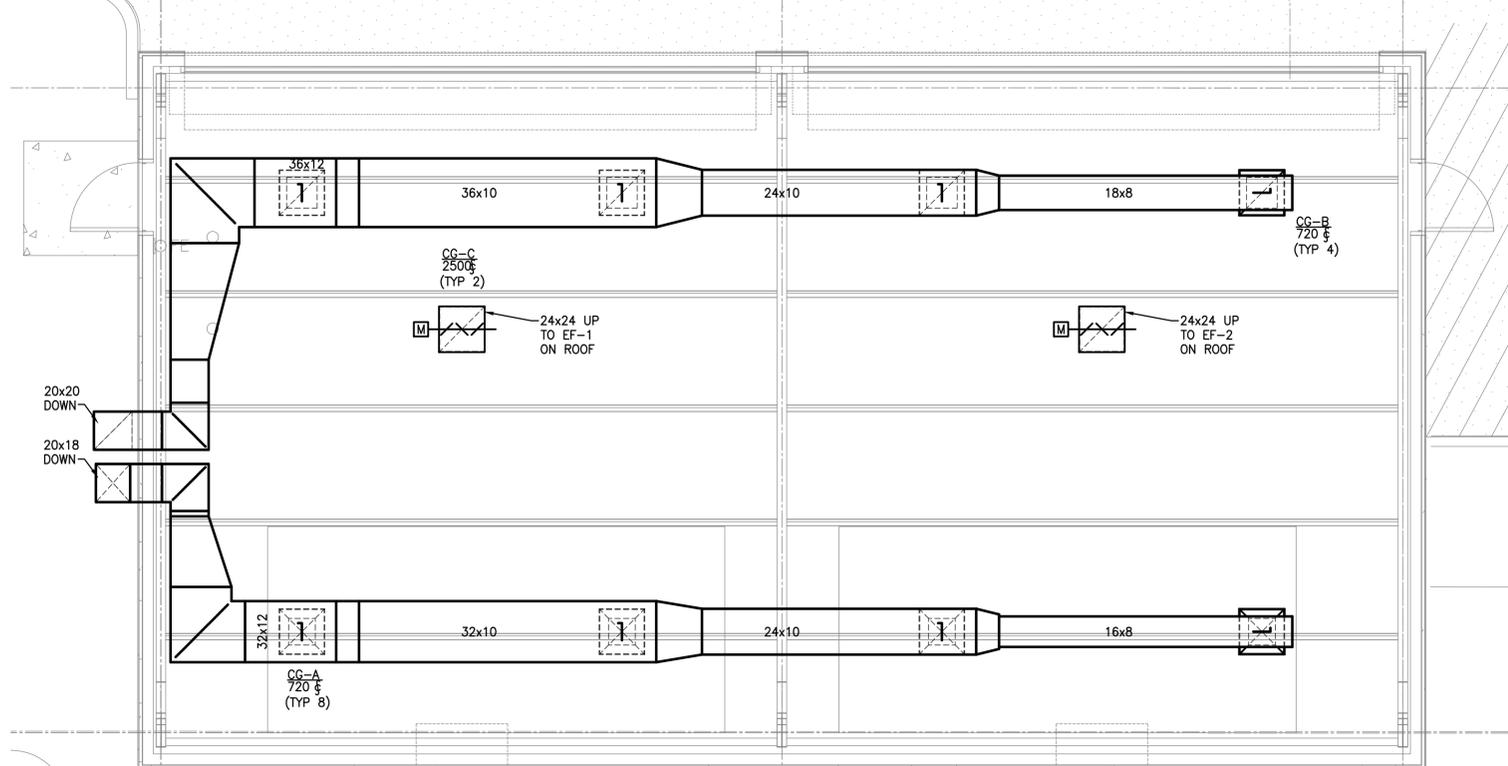
FAN SCHEDULE (CONT'D)

DRIVE TYPE	MHP	STARTER TYPE	ELECTRICAL DATA			VIBRATION ISOLATION			MANUF. MODEL #	REMARKS
			VOLTS	PHASE	HZ	MOUNTING TYPE	BASE TYPE	MIN. STATIC DEFLECTION (IN.)		
BELT	1	-	208	3	60	ROOF CURB	-	-	COOK ACE-B	-
BELT	1	-	208	3	60	ROOF CURB	-	-	COOK ACE-B	-

1. PROVIDE FANS WITH THE FOLLOWING OPTIONAL ACCESSORIES: EXTENDED LUBE LINES, ROOF CURB, MOTORIZED BACKDRAFT DAMPER, AND NEMA 3R DISCONNECT.



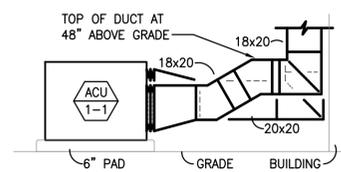
1 DUCTWORK PLAN - GROUND LEVEL
SCALE: 1/4" = 1'-0"



2 DUCTWORK PLAN - BELOW ROOF
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

- DISTRIBUTION DUCTWORK AND GRILLES SHALL BE ROUTED BELOW THE ROOF STRUCTURE AND ABOVE THE CRANE RAIL SYSTEM.
- EF-1 AND EF-2 SHALL EACH BE CONTROLLED BY AN INDIVIDUAL SWITCH LOCATED AT THE NEAREST DOOR. ENERGIZING EACH FAN SHALL OPEN BOTH THE FAN'S NORMALLY-CLOSED BACKDRAFT DAMPER AND THE NORMALLY-CLOSED MOTORIZED DAMPER ON THE ASSOCIATED AIR INTAKE, LOCATED AT GROUND LEVEL.
- WITHIN THE STORAGE FACILITY, COORDINATE DISTRIBUTION DUCTWORK ROUTING AND ELEVATIONS WITH BUILDING CRANE LOCATION, ROOF STRUCTURE, AND STORAGE CLEARANCE REQUIREMENTS.
- PROVIDE SPLASH BLOCK ADJACENT TO EQUIPMENT CURB TO RECEIVE TRAPPED ACU CONDENSATE.



3 ACU DUCT ELEVATION
SCALE: 1/4" = 1'-0"

DATE	DESCRIPTION	APPR.
07/23/15	FINAL SUBMISSION	
12/11/14	REVISED 95% SUBMISSION	
08/09/13	95% SUBMISSION	
07/09/13	CONCEPT SUBMISSION	

NAVAC

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REVIEWED BY	RRS		
FM/DM			
CHIEF ENG/ARCH			

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON
NSF CARDEROCK

NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON
BETHESDA, MD
CARDEROCK
PROTOTYPE MATERIALS STORAGE FACILITY
MECHANICAL DUCTWORK PLAN

CODE ID. NO. 80091 | SIZE D
SCALE: AS SHOWN
MAXIMO NO.
STA. PROJ. NO.
WORK ORDER NO. 1182246
CONSTR. CONTR. NO.
NAVFAC DRAWING NO.
SHEET OF
M101

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ELECTRICAL SYMBOLS LIST

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

ANNOTATION

KEY NOTES

LIGHTING SYMBOLS

REFER TO LIGHTING SCHEDULE ON E101 FOR DEFINITION OF LIGHTS

- 2'x4' FLUORESCENT FIXTURE
A = FIXTURE TYPE
- 2'x4' FLUORESCENT FIXTURE EQUIPPED WITH 90 MINUTES EMERGENCY BACKUP BATTERY PACK OR ON EMERGENCY LIFE SAFETY CIRCUIT.
A = FIXTURE TYPE
- CEILING/WALL MOUNTED EXIT SIGN DIRECTIONAL ARROWS WHERE INDICATED
SHADED AREAS INDICATE ILLUMINATED FACE/FACES
- EXTERIOR WALL MOUNTED LIGHTING FIXTURE. FOR DETAIL REFER TO LIGHTING SCHEDULE.

POWER SYMBOLS

- 15 or 20A, 125V DUPLEX RECEPTACLE
FLUSH WALL MOUNTED @ 18" AFF, UON
WP = WEATHER PROOF
- 15 or 20A, 125V DUPLEX RECEPTACLE, GFI TYPE
FLUSH WALL MOUNTED @ 18" AFF, UON
- 30/30/3 COMBINATION MOTOR CONTROLLER / DISCONNECT SWITCH
<SWITCH AMPS>/<FUSE AMPS>/<POLES>, VOLTAGE RATING AS REQUIRED
- 208/120V PANELBOARD
SURFACE MOUNTED
- STANDARD 1-POLE TOGGLE SWITCH WALL MOUNDED @ 48" AFF
- MOTOR RATED 3-POLE SWITCH
- SINGLE POLE SWITCH, FLUSH WALL MOUNTED @ 48" AFF, UON
3 = THREE-WAY
- CEILING MOUNTED OCCUPANCY SENSOR
- PHOTOCCELL CONTROL SWITCH
WALL MOUNTED @ 10" BELOW FINISHED CEILING
- MOTOR
- JUNCTION BOX
CEILING MOUNTED WITH IN 2' OF EQUIPMENT TO SERVED.
- DOCK DOOR / CRANE OPERATOR PROVIDE CONNECTION TO MOTOR CONTROLLER
- GARAGE DOOR STATUS SWITCH (OPEN/CLOSED) USED TO INTERLOCK WITH OPERATION OF AIR HANDLING UNIT.
- MOTORIZED DAMPER
- HOMERUN-NUMERAL WHERE USED INDICATES DESIGNATED PANEL AND CIRCUIT NUMBER FOR REFERENCE ONLY. WHERE CONDUIT IS NOT SPECIFIED USE AC OR MC CABLE FOR APPLICATION.
2#12+1#12G-3/4" FOR ONE CKT. HOMERUN IN CONDUIT, UON
3#12+1#12G-3/4" FOR TWO CKT. HOMERUN IN CONDUIT, UON
4#12+1#12G-3/4" FOR THREE CKT. HOMERUN IN CONDUIT, UON
- 2-INSULATED COPPER GROUND CONDUCTORS
- SUPER NEUTRAL - INSULATED CONDUCTOR OR CONDUCTORS
- 3-PHASE CONDUCTORS
- CONDUIT OR RACEWAY TURNING UP
- CONDUIT OR RACEWAY TURNING DOWN
- EXISTING CONDUIT/EQUIPMENT TO BE REMOVED
- EXISTING CONDUIT/EQUIPMENT TO REMAIN
- NEW CONDUIT/EQUIPMENT
- NEW UNDERGROUND/IN SLAB CONDUIT
- MECHANICAL EQUIPMENT, SHOWN FOR COORDINATION PURPOSES ONLY
- NEW GROUND CABLE
DENOTES EXISTING-TO-REMAIN
DENOTES FOR DEMOLITION
- NEW UNDERGROUND PRIMARY CABLE
DENOTES EXISTING-TO-REMAIN
DENOTES FOR DEMOLITION
- NEW UNDERGROUND SECONDARY CABLE
DENOTES EXISTING-TO-REMAIN
DENOTES FOR DEMOLITION

ABBREVIATIONS

(NOT ALL ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT)

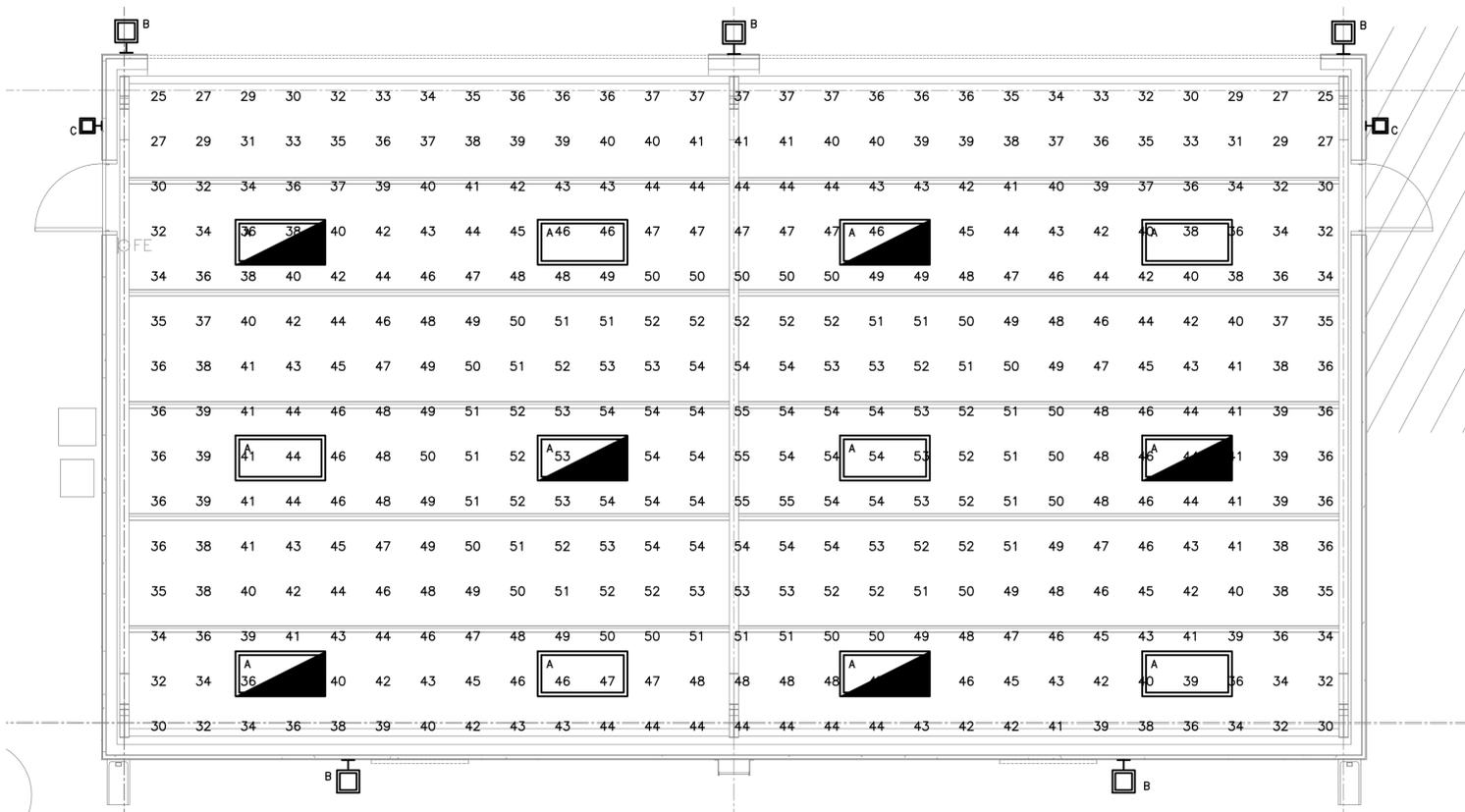
- +
- (E) EXISTING TO REMAIN
- (ER) EXISTING TO BE REMOVED
- (ERR) EXISTING TO BE REMOVED & RELOCATED
- (ERR0) EXISTING TO BE REMOVED & RETURNED TO OWNER
- (N) NEW
- (RE) RELOCATED EXISTING
- 1P SINGLE POLE
- 2P TWO POLE
- 3P THREE POLE
- A AMPERE
- AFF ABOVE FINISHED FLOOR
- AIC AMPERE INTERRUPTING CAPACITY
- AWG AMERICAN WIRE GAUGE
- BLDG BUILDING
- C CONDUIT
- CB CIRCUIT BREAKER
- CKT CIRCUIT
- CONT CONTINUATION
- CU COPPER
- °C DEGREE CELSIUS
- CL CEILING MOUNT
- DEG DEGREE
- °F DEGREE FAHRENHEIT
- FMC FLEXIBLE METAL CONDUIT
- DIA DIAMETER
- DISC DISCONNECT
- DIV DIVISION
- EC ELECTRICAL CONTRACTOR
- ELEC ELECTRICAL
- EM EMERGENCY
- EMT ELECTRICAL METALLIC TUBING
- FA FIRE ALARM
- FL FLOOR
- FLA FULL LOAD AMPERES
- FLEX FLEXIBLE
- G GROUND
- GFI GROUND FAULT INTERRUPTER
- GRC GALVANIZED RIGID CONDUIT
- HP HORSE POWER
- HZ HERTZ
- IG ISOLATED GROUND
- IMC INTERMEDIATE METAL CONDUIT
- JB JUNCTION BOX
- KCMIL/MCM THOUSAND CIRCULAR MILS
- KV KILOVOLT
- KVA KILOVOLT AMPERE
- KW KILOWATT
- KWH KILOWATT HOUR
- LTG LIGHTING
- MCB MAIN CIRCUIT BREAKER
- MTD MOUNTED
- N NEUTRAL
- NC NORMALLY CLOSED
- NO NORMALLY OPEN
- P POLE
- PB PULL BOX
- ∅ PHASE
- PNL PANEL
- PVC POLYVINYL CHLORIDE CONDUIT
- PWR POWER
- REC RECEPTACLE
- RMC RIGID METAL CONDUIT
- SPD SURGE PROTECTION DEVICE
- SPEC SPECIFICATION
- SW SWITCH
- SYS SYSTEMS
- TYP TYPICAL
- UON UNLESS OTHERWISE NOTED
- V VOLTS
- VFD VARIABLE FREQUENCY DRIVE
- WP WEATHERPROOF
- XFMR TRANSFORMER
- Y WYE
- Δ DELTA

GENERAL NOTES

- DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL BENDS, OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, AS REQUIRED. MAINTAIN HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. THE EXACT LOCATIONS OF DEVICES AND EQUIPMENT ARE SUBJECT TO THE APPROVAL OF THE OWNER, WHO RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGES IN LOCATION WITHOUT EXTRA COST.
- INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES. AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. NOTIFICATION MUST BE GIVEN AT LEAST 5 DAYS PRIOR TO SHUT DOWN. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.
- SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOLTS (HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AND BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK). NAILS, RAWL PLUGS AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTURE, PROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS OF METALLIC RACEWAYS NOT MORE THAN 10' APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
- CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREAD OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.
- HORIZONTAL OR CROSS RUNS IN PARTITIONS AND WALLS ARE NOT PERMITTED. DO NOT RUN CONDUIT IN PRECAST ROOF SLABS, IN 2" SLABS OR IN TERRAZZO FLOOR FINISH.
- LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10' LONG IN WHICH WIRING IS NOT INSTALLED: FURNISH NYLON PULL STRING.
- SET BOXES SQUARE AND TRUE WITH BUILDING FINISH. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRONS.
- LOCATIONS INDICATED FOR LOCAL WALL SWITCHES ARE SUBJECT TO MODIFICATIONS AT OR NEAR DOORS. INSTALL SWITCH ON SIDE OPPOSITE HINGE. VERIFY FINAL HINGE LOCATIONS IN FIELD PRIOR TO SWITCH OUTLET INSTALLATION.
- COVERS OF JUNCTION AND PULLBOXES SHALL BE READILY ACCESSIBLE.
- PROVIDE PULLBOXES WHERE INDICATED, WHERE REQUIRED BY CODE AND WHEREVER NECESSARY TO FACILITATE PULLING OF WIRE. COORDINATE PULLBOX LOCATIONS WITH OTHER TRADES.
- EMPTY RACEWAY RUNS: PROVIDE PULLBOXES EVERY 100' AND AS INDICATED. COORDINATE LOCATIONS WITH OTHER TRADES.
- JUNCTION AND PULLBOXES: BOXES SHALL BE ACCESSIBLE. LOCATE GENERALLY NOT EXPOSED IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT.
- SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
- CONNECT CONDUIT TO MOTOR TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18" LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
- PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32°F (0°C). PROVIDE CABLE SUPPORTS FOR WIRE IN RISER CONDUITS AS REQUIRED BY CODE.
- WIRE COLOR CODING: AS PER CODE. WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION FOR OVERLAP COLOR TAPING OF CONDUCTORS (MINIMUM LENGTH 6") IN ACCESSIBLE LOCATIONS. COLOR CODING, ONCE SELECTED, MUST BE USED CONSISTENTLY FOR THE ENTIRE PROJECT.

			01/23/15	12/11/14	08/09/13	07/09/13	DATE		APPR
			FINAL SUBMISSION	REVISED 95% SUBMISSION	95% SUBMISSION	CONCEPT SUBMISSION	DESCRIPTION		SYN
PENNONI ASSOCIATES INC. 14532 Lee Road Chantilly, VA 20151 T 703.449.6700 F 703.449.6713									
DES MAN		DRW MAN							
REVIEWED BY		RRS							
PM/DM		CHIEF ENG/ARCH							
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON NSFCARDEROCK BETHESDA, MD CARDEROCK PROTOTYPE MATERIALS STORAGE FACILITY ELECTRICAL LEGEND & GENERAL NOTES									
CODE ID. NO. 80091		SIZE D							
SCALE: AS SHOWN									
MAXIMO NO.									
STA. PROJ. NO.									
WORK ORDER NO. 1182246									
CONSTR. CONTR. NO.									
NAVFAC DRAWING NO.									
SHEET		OF							
E001									

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1 PHOTOMETRICS AT 3' AFF
SCALE: 1/4" = 1'-0"

SPACE AND LIGHTING CHARACTERISTICS:

STORAGE AREA, SPACE: 1690SF
 CEILING CAVITY REFLECTANCE: 50%
 WALLS REFLECTANCE: 30%
 FLOOR REFLECTANCE: 20%
 LIGHTING INSTALLATION HEIGHT: 28'AFF (TO THE FIXTURE LENS)
 NUMBER OF LIGHTING FIXTURES: 12,
 NUMBER OF LAMPS IN THE FIXTURE: 6,
 LAMP: F32T8,
 LAMP LUMENS: 2800 Lm,
 TOTAL POWER INPUT PER FIXTURE: 189W,
 COLOR RENDERING INDEX: 83CRI,
 TOTAL FIXTURE LUMENS PER WATT: 102lm/W
 TOTAL LIGHTING LOAD DENSITY: 1.2W/SF

STANDARDS:

① NAVCRANECEN INSTRUCTION 11450.2 DATED 18 MARCH 2013
 SECTION 2-5.23.2 (g): "THE FLOOR ARE BENEATH A BRIDGE CRANE SHALL BE ILLUMINATED TO 40FC (FOOF-CANDLES) AT A WORK PLANE 3 FEET ABOVE THE FLOOR"

IECC 2009, TABLE 500.5.2
 INTERIOR LIGHTING POWER ALLOWANCE FOR WAREHOUSE SHALL NOT EXCEED 0.8 W/SF.

IESNA 10TH EDITION
 TARGET ILLUMINATION LEVEL FOR STORAGE/SUPPLY IS 30FC AT 0' LEVEL (AT FLOOR LEVEL).

UFC 3-530-01; LIGHTING CONTROLS; REFERENCES IES 10TH EDITION HANDBOOK.
 TABLE 2-1. FOR LIGHTING CONTROL,
 CHAPTER 7: INTERIOR APPLICATIONS; WAREHOUSE: 30FC +/-10%.

NEC 2008, SECTION 220.12, TABLE 220.12 (GENERAL LIGHTING LOADS BY OCCUPANCY)
 GENERAL LIGHTING LOAD FOR WAREHOUSE/ STORAGE SHALL NOT BE LESS THAN 0.25VA/SF (0.23W/SF)

STATISTICS				
DESCRIPTION	AVG	MAX	MIN	MAX/MIN
0 AFF	40 fc	50 fc	24 fc	2.1:1
3 AFF	43 fc	55 fc	25 fc	2.2:1

DRAWING KEY NOTES:

① THE DESIGN COMPLIES WITH THE NAFAC STANDARD "NAVCRANECE" LISTED ABOVE.

DATE	07/09/13	DESCRIPTION	CONCEPT SUBMISSION
DATE	08/09/13	DESCRIPTION	95% SUBMISSION
DATE	12/11/14	DESCRIPTION	REVISED 95% SUBMISSION
DATE	01/23/15	DESCRIPTION	FINAL SUBMISSION

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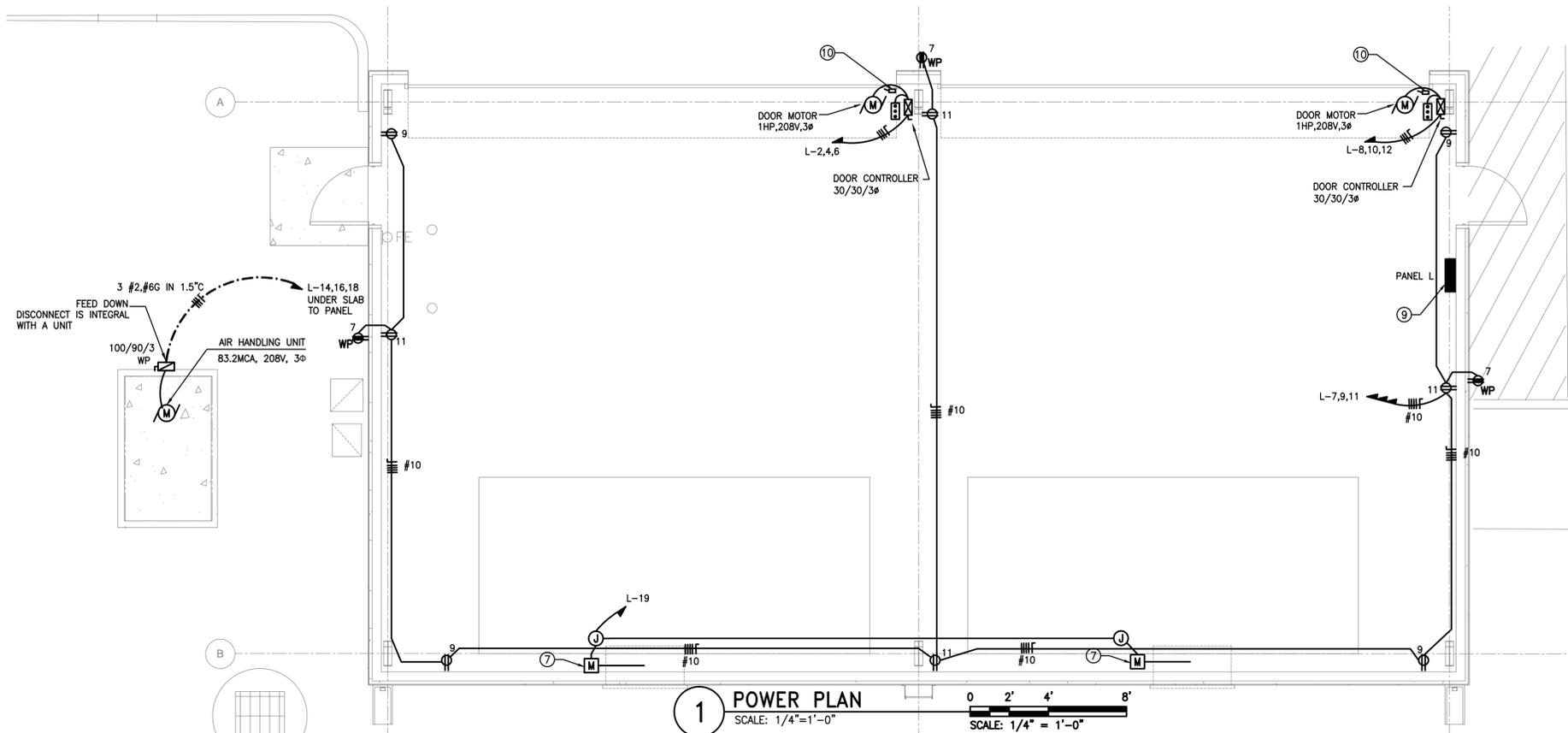
DESIGN MAN: MAN
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DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND
 WASHINGTON, DC
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 CARDEROCK
 PROTOTYPE MATERIALS STORAGE FACILITY
 PHOTOMETRIC CALCULATION LIGHTING PLAN

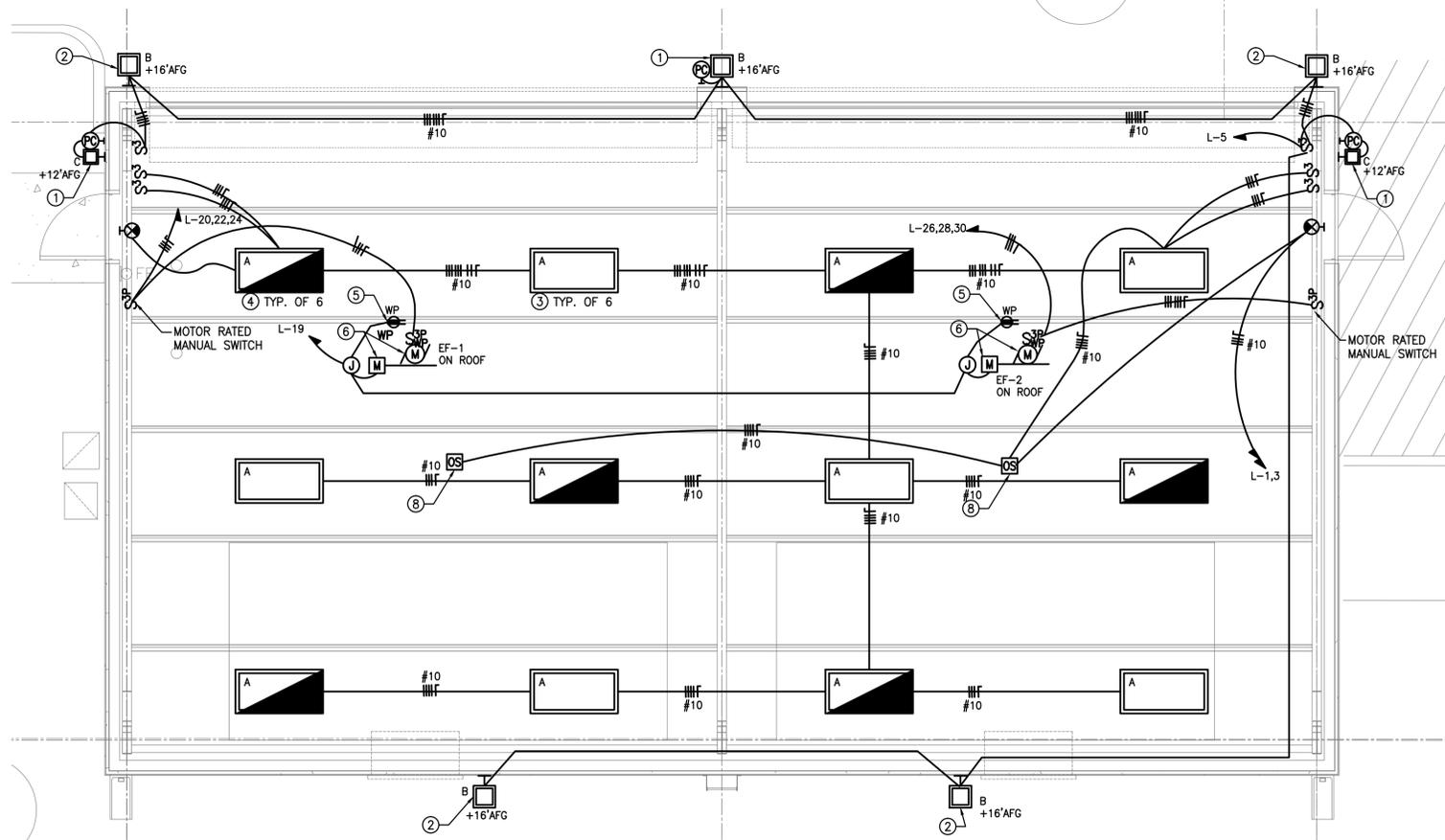
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DRAWFORM REVISION: 01 MAY 2008



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



2 LIGHTING PLAN & ROOF MOUNTED EQUIPMENT
SCALE: 1/4" = 1'-0"

- DRAWING KEY NOTES:**
- ① LIGHTING FIXTURE CONTROLLED BY PHOTOCELL ONLY.
 - ② LIGHTING FIXTURE CONTROLLED BY PHOTOCELL WITH OVERRIDE 3-WAY SWITCHING.
 - ③ LIGHTING FIXTURE EQUIPPED WITH DUAL BALLAST FOR DOUBLE SWITCHING (2 LAMPS + 4 LAMPS = 6 LAMPS).
 - ④ LIGHTING FIXTURE EQUIPPED WITH DUAL BALLAST FOR DOUBLE SWITCHING (2 LAMPS + 4 LAMPS = 6 LAMPS) AND EMERGENCY BATTERY BALLAST FOR TWO LAMPS IN EACH FIXTURE.
 - ⑤ GFI RECEPTACLE IN WEATHERPROOF ENCLOSURE ROOF MOUNTED NEXT TO MECHANICAL EQUIPMENT.
 - ⑥ ROOF MOUNTED EXHAUST FAN WITH ASSOCIATED MOTORIZED DAMPER. THE DAMPER SHALL OPEN DURING OPERATION OF THE EXHAUST FAN. THIS CONTROL WILL BE ACCOMPLISHED BY DIVISION 23.
 - ⑦ WALL MOUNTED MOTORIZED DAMPER. THE DAMPER SHALL OPEN DURING OPERATION OF THE ROOF EXHAUST FANS INDICATED IN NOTE ABOVE. THIS CONTROL WILL BE ACCOMPLISHED BY DIVISION 23.
 - ⑧ OCCUPANCY SENSOR WITH 360° VIEW AND 30' RANGE, DUAL TECHNOLOGY. OCCUPANCY SHALL BE EQUIPPED WITH DUAL CONTACT FOR TWO INDIVIDUAL INCOMING CIRCUITS OPERATION. THE DETECTOR SHALL BE LISTED FOR HIGH BAY APPLICATION. DETECTOR SHALL BE INSTALLED DIRECTLY BELOW MECHANICAL DUCT.
 - ⑨ FOR PANEL DETAILS AND CONNECTION REFER TO DRAWING E102 AND E103.
 - ⑩ PROVIDE DOOR SWITCH TO INTERLOCK (AHU) AIR HANDLING UNIT STARTER WITH THE THE DOOR CLOSE OR OPEN CONDITION. THE AHU SHALL NOT START WHEN MINIMUM ONE OF TWO DOORS IS OPEN. THE AHU SHOULD START ONLY IF BOTH DOORS ARE CLOSE. COORDINATE THIS WORK WITH A MANUFACTURER REPRESENTATIVE OF AHU. PROVIDE PLACARD NEXT TO THERMOSTAT TO READ: "AHU IS INTERLOCK WITH GARAGE DOORS. UNIT WILL NOT START IF ONE OF TWO DOORS IS OPEN"

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DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON
NSF CARDEROCK
BETHESDA, MD
CARDEROCK
PROTOTYPE MATERIALS STORAGE FACILITY
ELECTRICAL POWER & LIGHTING PLAN

CODE ID. NO. 80091	SIZE D
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PANEL: "LV31" (NEW)
 LOCATION: STRUCTURE ON PAD NEXT TO 112.5KVA XFMR
 BUILDING: PAD FOR DISTRIBUTION EQUIPMENT
 FED FROM: 480V 3PH, CABINET VIA 112.5 KVA XFMR
 FEEDER SIZE: 4 #600 KCML, #3G IN 4"C
 MANUFACTURER/MODEL: GE, SERVICE ENTRANCE /SPECTRA TWIN

208/120 VOLTS, 3 PHASE, 4 WIRE
 MOUNTING: SURFACE FLUSH
 BUS: COPPER ALUMINUM
 GROUND ISOLATED GROUND
 NEMA ENCLOSURE TYPE: 3R
 ARC FLASH HAZARD CATEGORY: --

MAIN BUS: 400 AMPS
 MAIN BRK: 400 AMPS 3P 100%R
 NEUTRAL: 100% AIC: 18K AMPS
 LUGS: FEED THRU MLO
 FEED: TOP BOTTOM
 SHUNT TRIP

CKT. NO.	TRIP AMPS	DESCRIPTION OF LOAD	PER PHASE (kVA)			DESCRIPTION OF LOAD	TRIP AMPS	CKT. NO.
			LOAD (kVA)	A	B			
1	60	EXISTING	0.0	0.8	0.8	EXISTING, REC. ROLLER, GFIC CB	20	2
3	2	9" ROLE MACHINE	0.0	0.6	0.6	EXISTING LIGHTING ROLLER	20	4
5		"BREAKER POSITION -OFF" (NOT USED)	0.0		0.0	SPARE "OFF"	20	6
7	100	EXISTING	0.0	0.8	0.8	EXISTING ON SHEAR GFI	20	8
9	2	OHM TEMP. SERV.	0.0	5.0	5.0	EXISTING HAZMAT CONTAINER	100	10
11		"BREAKER POSITION -OFF" (NOT USED)	0.0		5.0		20	12
13	150	EXISTING	11.0	11.0	0.0	SPARE "OFF"	20	14
15	2	CINCINNATI SHEAR	11.0	11.0	0.0	EQUIPPED SPACE	-	16
17			11.0		0.0	EQUIPPED SPACE	-	18
19	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	20
21	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	22
23	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	24
25	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	26
27	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	28
29	-	EQUIPPED SPACE	0.0	0.0	0.0	EQUIPPED SPACE	-	30
		FEED THRU LUGS	0.0	21.6	21.6	NEW PANEL "L" IN	250	32
			0.0	21.6	21.6	PROTOTYPE MATERIAL STORAGE FACILITY	34	36
			0.0	0.0	0.0			
			0.0	0.0	0.0			
			0.0	0.0	0.0			
			0.0	0.0	0.0			

LOAD TYPE	PANEL	THRU	DEMAND FACTOR	DEMAND	34.2	38.2	37.6	PANEL	TOTAL CONNECTED
LIGHTING	5.0	0.0	x1.0	5.0 KVA	0.0	0.0	0.0	THRU	110.0 KVA
RECEPTACLE	14.0	0.0	NEC 220.44	12.0 KVA				TOTAL DEMAND	79.6 KVA
MECHANICAL	40.0	0.0	0.8	32.0 KVA				TOTAL DEMAND	220.9 AMPS
OTHER	51.0	0.0	0.6	30.6 KVA				PLUS 25% PER NEC	276.2 AMPS
					110.0			TOTAL	

PANEL KEY NOTES:
 ① NEW 250A CIRCUIT BREAKER IN THE PANEL CONNECTED TO THE FEED THRU LUGS.
 ② EXISTING LOADS/CIRCUITS RELOCATED FROM THE ORIGINAL PANEL (DEMOLISHED). THE CONTRACTOR SHALL VERIFY THE EXISTING CONDITION AND SHALL REPORT TO THE CONTRACTING OFFICER AND THE ENGINEER IF THE EXISTING CONDITIONS ARE DIFFERENT FROM DEPICTED IN THIS SCHEDULE.
 ③ NEW 400A PANEL LV31 MUST ACCOMMODATE UP TO 225A BRANCH CIRCUIT BREAKERS. MINIMUM SIZE OF THE PANEL SHALL BE 89"Hx36"W 3R BOX.

PANEL: "L" (NEW)
 LOCATION: EAST WALL INSIDE PROTOTYPE MAT. STORAGE FACILITY
 BUILDING: CARDEROCK PROTOTYPE MATERIALS STORAGE FACILITY
 FED FROM: DISTRIBUTION PANEL LV31
 FEEDER SIZE: 4 #250, #4G
 MANUFACTURER/MODEL: GE, SERVICE ENTRANCE /AQ

208/120 VOLTS, 3 PHASE, 4 WIRE
 MOUNTING: SURFACE FLUSH
 BUS: COPPER ALUMINUM
 GROUND ISOLATED GROUND
 NEMA ENCLOSURE TYPE: 1
 ARC FLASH HAZARD CATEGORY: --

MAIN BUS: 250 AMPS
 MAIN BRK: 250 AMPS 3 P
 NEUTRAL: 100% AIC: 10K AMPS
 LUGS: FEED THRU MLO
 FEED: TOP BOTTOM
 SHUNT TRIP

CKT. NO.	TRIP AMPS	DESCRIPTION OF LOAD	PER PHASE (kVA)			DESCRIPTION OF LOAD	TRIP AMPS	CKT. NO.
			LOAD (kVA)	A	B			
1	20	INTERIOR LIGHTING 1 OF 2	1.0	1.5	0.5	DOOR MOTOR - OPENER-1	30	2
3	20	INTERIOR LIGHTING 2 OF 2	1.0	1.5	0.5	1HP/3Ø		4
5	20	EXTERIOR LIGHTING	0.2		0.7			6
7	20	REC. GFI EXTERIOR	0.7	1.2	0.5	DOOR MOTOR - OPENER-2	30	8
9	20	REC. INTERIOR	0.7	1.2	0.5	1HP/3Ø		10
11	20	REC. INTERIOR	0.7	1.2	0.5			12
13	20	SPARE	0.0	8.0	8.0	AIR HANDLING UNIT	100	14
15	20	SPARE	0.0	8.0	8.0	6-TON		16
17	20	SPARE	0.0		8.0			18
19	15	LOUVER CONTROL	0.4	0.9	0.5	EF-1	15	20
21	20	FIRE ALARM PANEL	0.1	0.6	0.5	1HP/3Ø, ROOF MOUNTED		22
23	-	SPACE	0.0		0.5			24
25	-	SPACE	0.0	0.5	0.5	EF-2	15	26
27	-	SPACE	0.0	0.5	0.5	1HP/3Ø, ROOF MOUNTED		28
29	-	SPACE	0.0		0.5			30
31	-	SPACE	0.0	0.0	0.0	SPARE	20	32
33	-	SPACE	0.0	0.0	0.0	SPARE	20	34
35	-	SPACE	0.0	0.0	0.0	SPARE	20	36
		FEED THRU LUGS	0.0	10.0	10	DESIGNATED FOR FUTURE CRANE	200	38
			0.0	10.0	10			40
			0.0		10			42

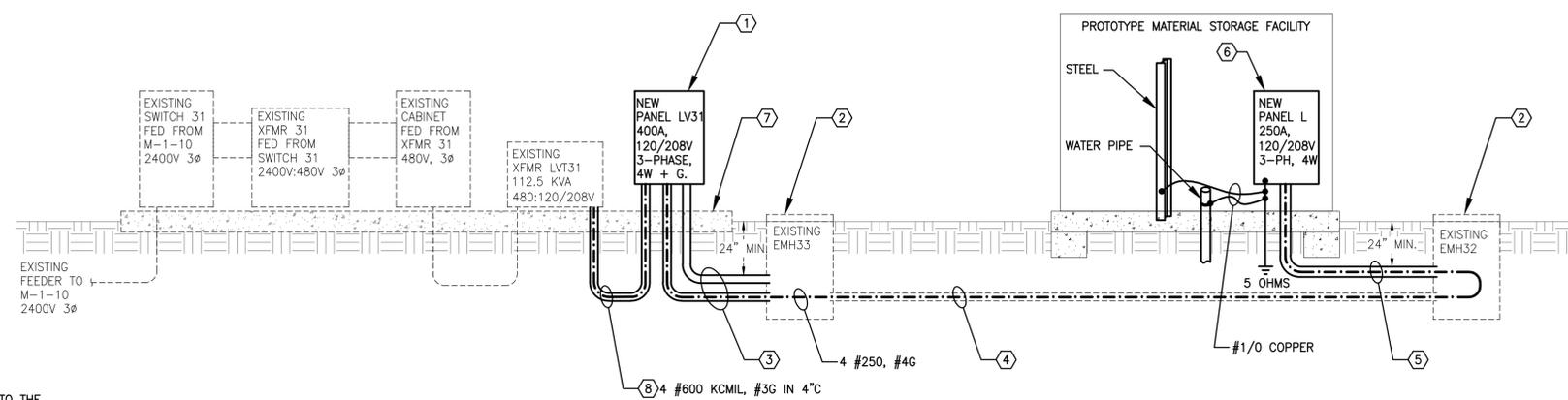
LOAD TYPE	PANEL	THRU	DEMAND FACTOR	DEMAND	22.1	21.8	20.9	PANEL	TOTAL CONNECTED
LIGHTING	2.2	0.0	x1.0	2.2 KVA	0.0	0.0	0.0	THRU	64.8 KVA
RECEPTACLE	2.1	0.0	NEC 220.44	2.1 KVA				TOTAL DEMAND	52.7 KVA
MECHANICAL	29.2	0.00000	0.80	23.4 KVA				TOTAL DEMAND	146.3 AMPS
OTHER	31.3	0.00000	0.8	25.0 KVA				PLUS 25% PER NEC	182.8 AMPS
					64.8			TOTAL	

PANEL KEY NOTES:
 ① PROVIDE WITH 3#2, #6G, 1.5"C
 ② 200A CIRCUIT BREAKER IN THE PANEL CONNECTED TO THE FEED THRU LUGS. THE CB SHALL BE DESIGNATED FOR FUTURE CRANE.

LIGHTING FIXTURE SCHEDULE

FIXT. TYPE	DESCRIPTION	MOUNTING	LAMPS				BALLAST		VOLTAGE	INPUT WATTAGE	MANUFACTURER	CATALOG NUMBER
			NO.	WATTS/ TYPE	LUMENS	COLOR	NO.	INTEGRAL/REMOTE REMARKS				
A	STEEL CONSTRUCTION W/ EMBOSSEMENTS DUAL BALLAST W/ EMERGENCY BATTERY PACK	SURFACE /SUPPORT	6	32W T8 6x(2900)LM	17,400/ FIXTURE	4100	2	2LAMPS+4LAMPS	120	169	COLUMBIA	LHR4-6-32-M4R-ST-24EP-U-EL -FSCA - 2 CIRCUITS
B	LED FULL CUT-OFF IDA COMPLIANT	SURFACE WALL	30	LED TOTAL4673LM	4,673	5000	1	DRIVER	120	71	HUBBELL OUTDOOR LTG.	LMC-30LU-5K-3--3-PC1 WHERE INDICATED ①
C	LED PERIMETER ILLUMINATION WITH ACRYLIC DIFFUSER	SURFACE WALL	9	LED TOTAL1460LM	1,460	5000	1	DRIVER	120	21	HUBBELL OUTDOOR LTG.	LNC-9LU-5K-5 -PC2 WHERE INDICATED ①
D	LED EXIST SIGN, RED LETTERS WITH EMERGENCY BATTERY PACK AND CHARGER.	SURFACE WALL-	X	LED	-	-	1	DRIVER	120	5	HUBBELL DUAL-LITE	SE-S-R-WN-E-I

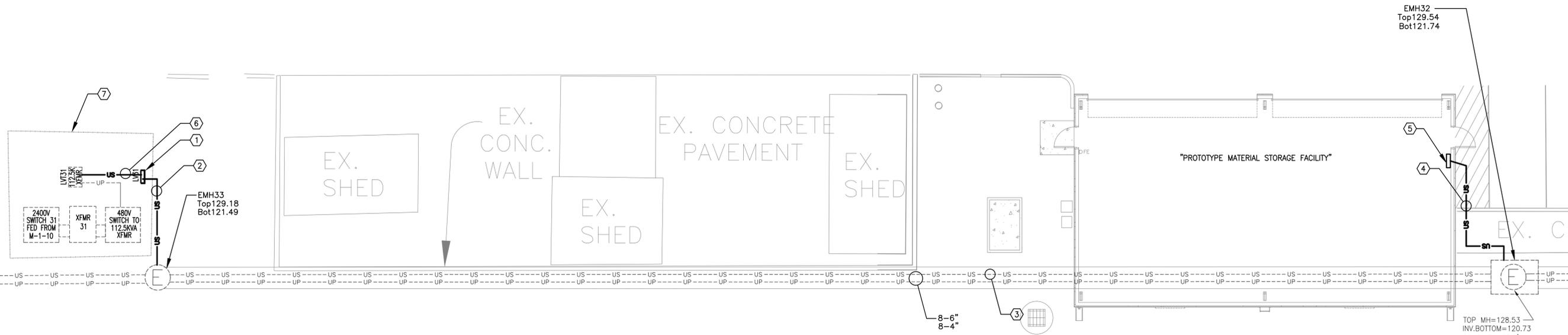
NOTES: ① LIGHTING FIXTURE CAN BE EQUIPPED WITH INTEGRAL PHOTOCCELL.



POWER RISER DIAGRAM KEY NOTES:
 ① EXISTING PANEL CANNOT ACCOMMODATE BRANCH CIRCUIT BREAKERS OVER 125A AND MUST BE REPLACED WITH NEW 400A PANEL WITH BRANCH CIRCUIT BREAKERS SIZE UP TO 225A. FOR NEW PANEL DETAILS REFER TO PANEL SCHEDULE ON THIS DRAWING. FOR PANEL LOCATION REFER TO DRAWING E103. THE NEW PANEL SHALL BE REINSTALLED ON THE EXISTING SUPPORTING STRUCTURE.
 ② EXISTING MANHOLES EMH33 AND EMH32 RETAIN (3) SPARE CONDUITS BETWEEN THEM. ONE OF THE EXISTING CONDUIT SHALL BE CLEANED AND USED FOR INSTALLATION OF THE NEW FEEDER TO PANEL L.
 ③ PROVIDE (2)-3" & (2)-2.5" CONDUITS FROM THE NEW PANEL LV31 TO THE MANHOLE EMH33. ONE 3" CONDUIT SHALL BE DEDICATED FOR FEEDER FROM PANEL LV31 TO PANEL L. THE OTHER (3) REMAINING CONDUITS SHALL BE SPARE CONDUITS WITH PULL STRING FOR FUTURE USE.
 ④ THE FEEDER BETWEEN MANHOLES EMH33 AND EMH32 SHALL RUN IN EXISTING CONDUIT. THE CONTRACTOR SHALL CLEAN EXISTING CONDUIT.
 ⑤ PROVIDE 4" CONDUIT FROM MANHOLE EMH32 TO PANEL L. THIS CONDUIT SHALL BE DEDICATED FOR FEEDER FROM PANEL LV31 TO PANEL L.
 ⑥ FOR WORK IN THE BUILDING REFER TO DRAWING E101. FOR PANEL DETAILS REFER TO PANEL SCHEDULES ON THIS SHEET.
 ⑦ EXISTING CONCRETE PAD FOR ELECTRICAL DISTRIBUTION EQUIPMENT. AFTER COMPLETION OF THE ELECTRICAL WORK THE CONTRACTOR SHALL REPAIR EXISTING PAD TO IT'S ORIGINAL CONDITION.
 ⑧ REFER TO NOTE #6 ON DRAWING E103.

01/23/15	12/11/14	08/09/13	07/09/13	DATE	APPR		
FINAL SUBMISSION	REVISED 95% SUBMISSION	95% SUBMISSION	CONCEPT SUBMISSION	DESCRIPTION	SYM		
PENNONI ASSOCIATES INC. 14532 Lee Road Chantilly, VA 20151 T 703.449.6700 F 703.449.6713							
DES MAN	DRW MAN						
REVIEWED BY RRS							
PM/DM							
CHIEF ENG/ARCH							
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON IFT - FWD							
NSF CARDEROCK BETHESDA, MD CARDEROCK PROTOTYPE MATERIALS STORAGE FACILITY ELECTRICAL SCHEDULES							
CODE ID. NO. 80091 SIZE D SCALE: AS SHOWN MAXIMO NO. STA. PROJ. NO. WORK ORDER NO. 1182246 CONSTR. CONTR. NO. NAVFAC DRAWING NO.							
SHEET OF							
E102							
Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 30227, Expiration Date: 05-28-2016.							
DRAWING REVISION: 01 MAY 2008							

WITEK ROAD



1 ELECTRICAL SITE PLAN
SCALE: 1/8" = 1'-0"

SITE PLAN KEY NOTES:

- 1 EXISTING PANEL SHALL BE REPLACED WITH NEW PANEL AT SAME LOCATION. COORDINATE EXISTING CONDUIT FEEDER AND THE BRANCH CIRCUIT RECONNECTION TO NEW PANEL. FOR NEW PANEL DETAILS REFER TO PANEL SCHEDULE ON THIS DRAWING E102.
- 2 PROVIDE NEW TWO (2) 3" & (2) 2.5" CONDUITS FROM THE NEW 400A PANEL TO THE EXISTING MANHOLE 33. THE CONTRACTOR SHALL COORDINATE CONDUITS ENTRY TO THE EXISTING MANHOLE WITH LOCATION OF THE EXISTING CABLES. THE EXISTING CABLES ARE ENERGIZED INCLUDING CABLES OVER 600V. ONE 3" CONDUIT SHALL BE DEDICATED FOR NEW FEEDER FROM 400A PANEL LV31 TO NEW PANEL "L" IN NEW BUILDING "PROTOTYPE MATERIAL STORAGE FACILITY". THE (3) REMAINING CONDUIT SHALL BE SPARE FOR FUTURE USE. THE EXISTING MANHOLE CONTAINS THREE (3) SPARE CONDUITS IN EACH OPPOSITE DIRECTION.
- 3 THE FEEDER FOR PANEL "L" SHALL BE PULLED TO THE EXISTING CONDUITS BETWEEN MANHOLE #33 AND #32. THE CONTRACTOR SHALL VERIFY CONDITION OF THE EXISTING CONDUIT. THE EXISTING CONDUIT SHALL BE CLEANED BEFORE ATTEMPTING TO PULL THE CONDUCTORS. THE EXISTING CONDUIT SHALL BE MADE AVAILABLE FOR NEW CONSTRUCTION.
- 4 PROVIDE NEW 4" CONDUIT FROM THE MANHOLE 32 TO THE NEW PANEL "L" LOCATED IN NEW BUILDING.
- 5 NEW PANEL "L". FOR WORK WITHIN THE BUILDING REFER TO DRAWING E101. FOR PANEL DETAILS REFER TO DRAWING E102.
- 6 THE FIELD INVESTIGATION COULD NOT DETERMINE SIZE OF THE EXISTING FEEDER FROM 112.5KVA XFMR LV31 TO THE EXISTING PANEL LV31. THIS FEEDER SHALL BE COPPER OR EQUIVALENT RATED AT 400A. THE CONTRACTOR SHALL INFORM CONTRACTING OFFICER IF THIS FEEDER IS SMALLER THAN THE ONE INDICATED IN THE NOTE. THE CONTRACTOR SHALL PROVIDE ALTERNATE FOR REPLACING THE EXISTING FEEDER WITH COPPER 4 #600 #36 IN 4" CONDUIT. PROVIDE ALL WORK ASSOCIATED WITH REPLACEMENT OF THE FEEDER.
- 7 EXISTING FENCED CONCRETE PAD FOR ELECTRICAL DISTRIBUTION EQUIPMENT. REPAIR TO ORIGINAL CONDITION.

VOLTAGE DROP CALCULATION FOR FEEDER FROM PANEL LV31 TO PANEL L: NEC TABLE 9.

FEEDER SELECTION BASE ON THE 250A CB PROTECTION AND LOAD IS 4 #250KCMIL COPPER.
 FEEDER PROTECTION = 250A CB,
 MAX. LOAD CARRIED BY THE FEEDER = 196A, (INCLUDING SPARE FOR FUTURE LOAD +25%)
 FEEDER LOCATION = BETWEEN DISTRIBUTION PANEL LV31 AND PANEL L,
 FEEDER DISTANCE = 250' (FEET)
 CONDUCTORS COPPER Z = 0.073 OHMS/1000' (FEET)

CALCULATION:

$$V_{D L-N} = \frac{Z \cdot I \cdot L}{1000} = (0.073 \cdot 250 \cdot 196) / 1000 = 3.68V$$

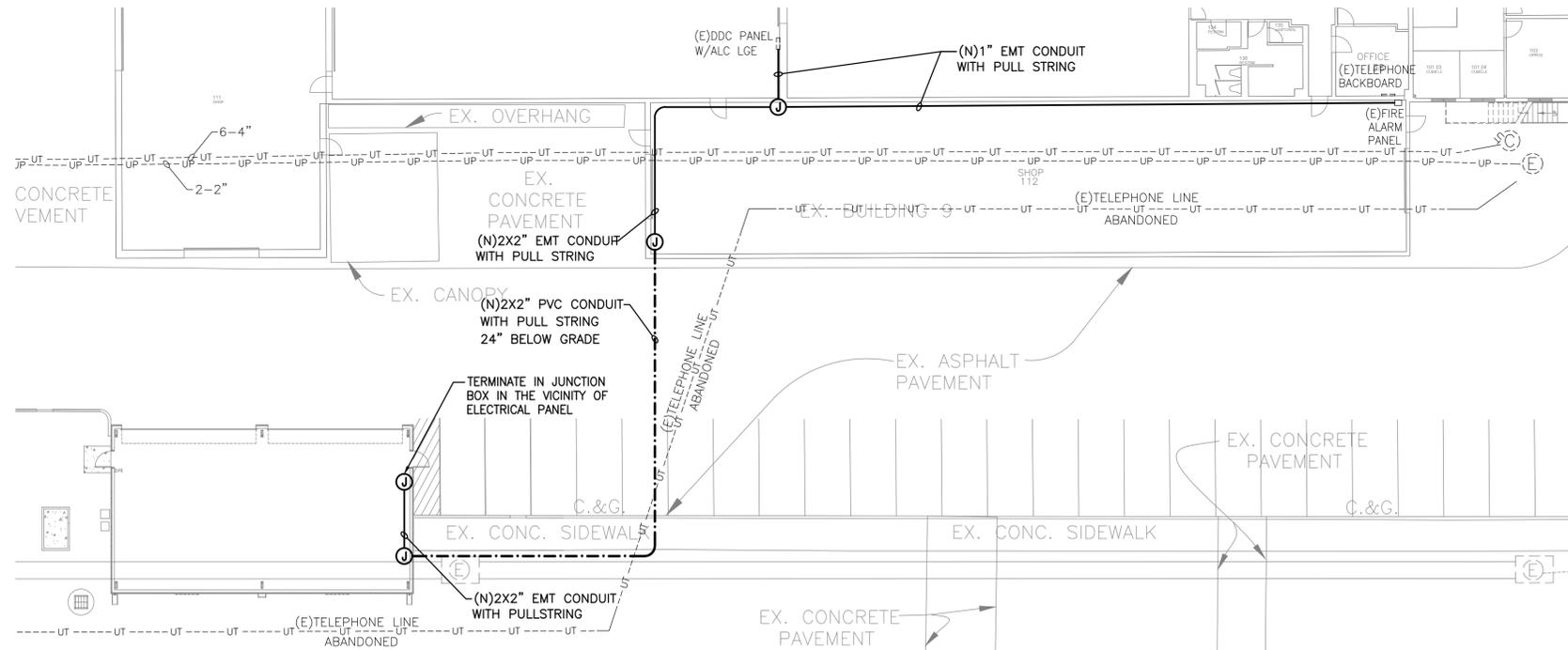
$$V_{D\%} = \frac{V_{D L-N}}{V_{L-N}} \cdot 100\% = (3.68V / 120V) \cdot 100\% = 3.07\% \text{ (PHASE TO NEUTRAL)}$$

VOLTAGE DROP VALUE IS ACCEPTABLE.

$$V_{D L-L} = \frac{Z \cdot I \cdot L}{1000} \cdot \sqrt{3} = (0.073 \cdot 250 \cdot 196 \cdot 1.73) / 1000 = 5.31V$$

$$V_{D\%} = \frac{V_{D L-L}}{V_{L-L}} \cdot 100\% = (5.31V / 208V) \cdot 100\% = 2.55\% \text{ (PHASE TO PHASE)}$$

VOLTAGE DROP VALUE IS ACCEPTABLE.



2 ELECTRICAL SITE PLAN - TELE/DATA ROUTING
SCALE: 1/16" = 1'-0"

DATE	DESCRIPTION	BY	APPR
07/23/15	FINAL SUBMISSION		
12/11/14	REVISED 95% SUBMISSION		
08/09/13	95% SUBMISSION		
07/09/13	CONCEPT SUBMISSION		



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DES MAN	RRS
REVIEWED BY	RRS
FM/DM	
CHIEF ENG/ARCH	

DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND
 WASHINGTON
 BETHESDA, MD
 NSF CARDEROCK
 CARDEROCK
 PROTOTYPE MATERIALS STORAGE FACILITY
ELECTRICAL SITE PLAN

CODE ID. NO. 80091	SIZE D
SCALE: AS SHOWN	
MAXIMO NO.	
STA. PROJ. NO.	
WORK ORDER NO. 1182246	
CONSTR. CONTR. NO.	
NAVFAC DRAWING NO.	
SHEET OF	E103

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 30227, Expiration Date: 05-28-2016.