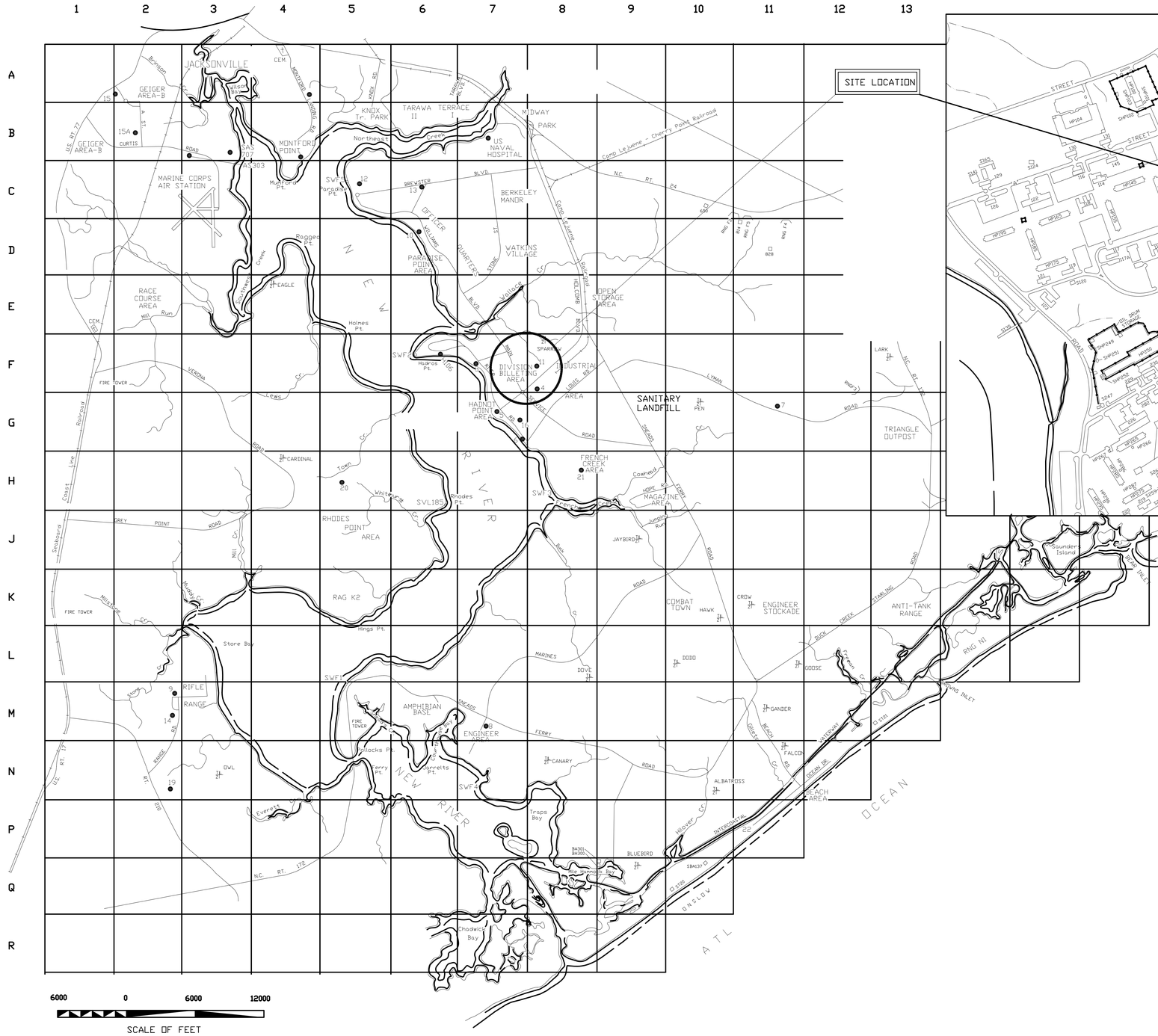
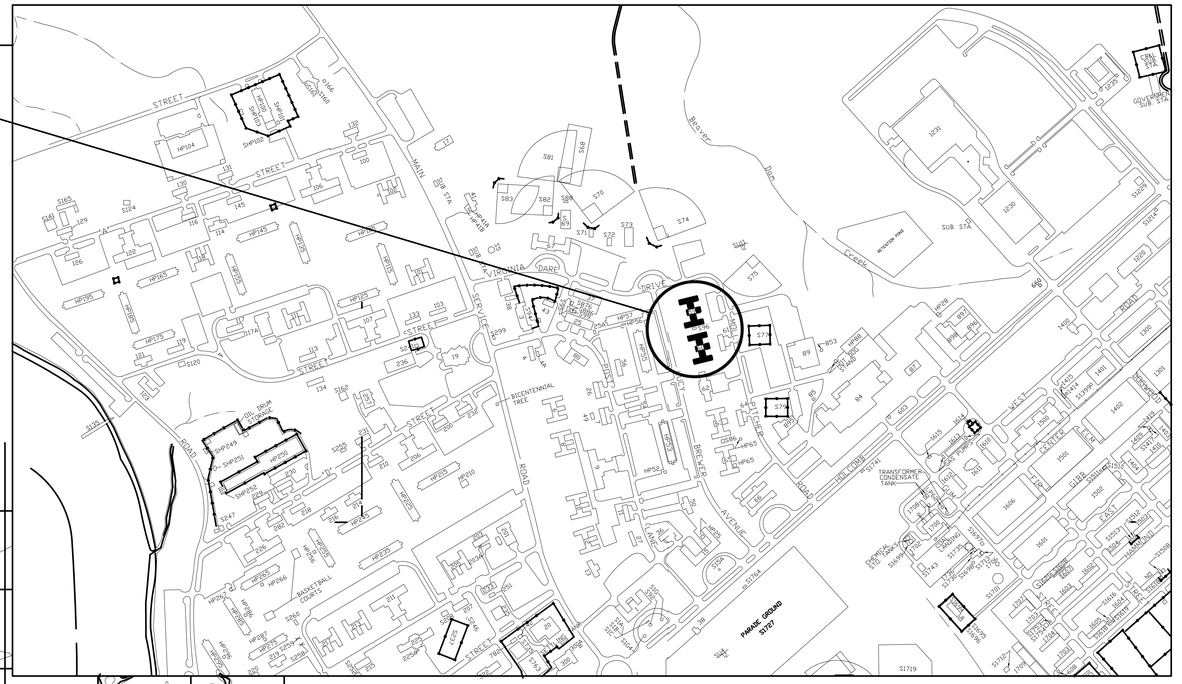
REVISIONS			
SYM		DATE	APPROVED





DRAWING INDEX

NAV FAC DWG NO	SHEET NO	TITLE
12504708	T-1	VICINITY, LOCATION AND SITE LOCATION MAPS
12504709	A1	FLOOR PLANS
12504710	M1	MECHANICAL SITE PLAN
12504711	M2	BLDG MECHANICAL PLANS
12504712	M3	MECHANICAL ROOM AND ATTIC PLANS
12504713	M4	HEATING P & ID AND SCHEDULES
12504714	M5	CHILLER P & ID AND SCHEDULES
12504715	E1	ELECTRICAL PLANS, DETAIL, & NOTES
12504716	E2	ELECTRICAL RISER DIAGRAM, SCHEDULE, & DETAIL
12504717	E3	ELECTRICAL PLANS, DETAIL, & NOTES

REFERENCE DRAWINGS

NAV FAC DWG NO	SHEET NO	TITLE
		THERMACOR PROCESS INC., DWG D-8841

LOCATION MAP - U. S. MARINE CORPS BASE - CAMP LEJEUNE, N.C.

T1

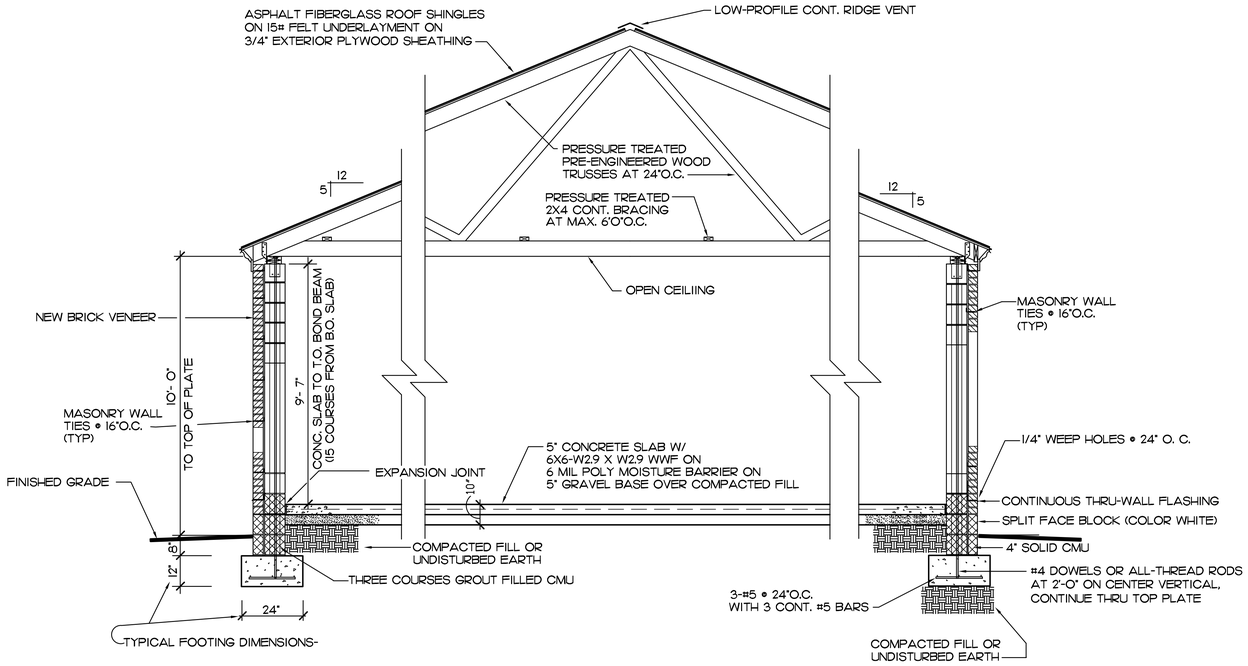
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

DES. J A ELLIOTT
DR. J A ELLIOTT
CHK. A L GARCIA
SUBMITTED BY: J A ELLIOTT
DESIGN DIR. B R MARSHBURN
APPROVED: PWO OR OICC DATE
B R MARSHBURN 8.24.7
SATISFACTORY TO: DATE

REPLACE CHILLER BUILDINGS 59 & 60
MECHANICAL PLANS AND DETAILS

SIZE F | CODE IDENT. NO. 80091 | NAVFAC DRAWING NO. 12504708
CONST. CONTR. N40085-07-B-0008
SCALE: NOTED | SPEC. | SHEET 1 OF 10

REVISIONS			
SYM		DATE	APPROVED



A1 | A1 BUILDING SECTION

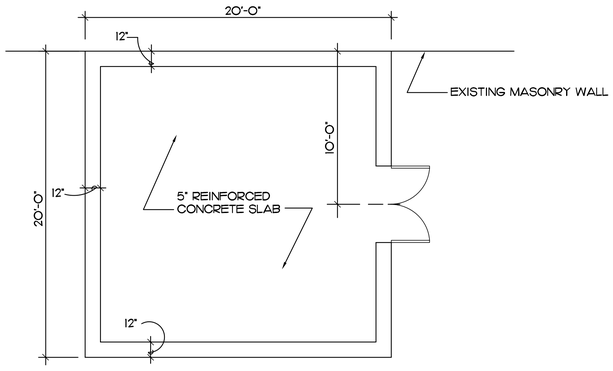
SCALE 1/2" = 1'-0"

GENERAL NOTES

1. THIS DRAWING INDICATES GENERAL CONDITIONS WITH INFORMATION COMPILED FROM SURFACE OBSERVATION AND RECORD DRAWINGS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ACTUAL FIELD VERIFICATION PRIOR TO BIDDING, ORDERING MATERIALS AND DURING EVERY STEP OF CONSTRUCTION FOR EXISTING SURFACES, DIMENSIONS AND CONDITIONS.
3. REPAIR AND REFINISH AREAS DAMAGED OR DISTURBED BY NEW WORK TO BE PROVIDED UNDER THIS CONTRACT.
4. PROVIDE ROOF CONSTRUCTION OF ASPHALT SHINGLES ON 15# FELT ON 3/4" PLYWOOD SHEATHING ON TRUSSES AT 24" ON CENTER. ASPHALT SHINGLES SHALL MATCH EXISTING. SUBMIT SEALED SHOP DRAWINGS FOR ENGINEERED TRUSSES.
5. PROVIDE GALVANIZED 16 GAGE STEEL DOORS, SEAMLESS CONSTRUCTION, EXTRA HEAVY DUTY. FRAME SHALL BE 16 GAGE GALVANIZED. DOORS SHALL BE FACTORY PRIMED AND FIELD PAINTED.
6. PROVIDE AND INSTALL ALL GRADE I FINISH HARDWARE AS FOLLOWS:

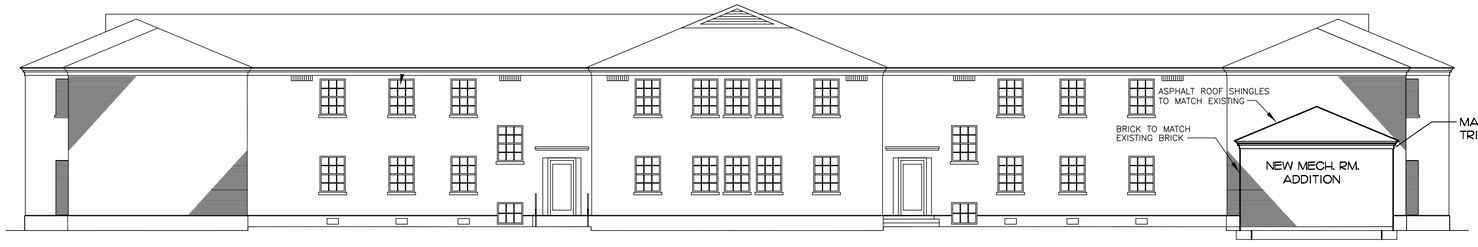
3 PAIR HINGES	4 1/2" X 4 1/2", A5IIII
I LOCK SET & LATCH SET	FUNCTION 82, BHMA 630
I SET OF JAMB SIDE FLUSH BOLTS, (TOP AND BOTTOM)	LO4101, BHMA 630
I SET OF DUSTPROOF STRIKES, (TOP AND BOTTOM)	LO4021, BHMA 630

7. NEW CONCRETE SLAB WILL BE OF 4,000 P.S.I. CONCRETE WITH A SMOOTH FINISH.
8. PROVIDE 8 FT. HIGH BRICK SCREEN WITH 4" PRE CAST COPING. SCREEN TO HAVE TWO 4'-6" STEEL GATES AT ENTRANCE. SEE SITE PLAN FOR DIMENSIONS. PROVIDE FOUNDATION AND FOOTING AS REQUIRED. BRICK USED WILL MATCH BRICK OF ADJACENT BUILDINGS. SCREEN WILL BE SIMILAR TO THOSE OF ADJACENT BUILDINGS.



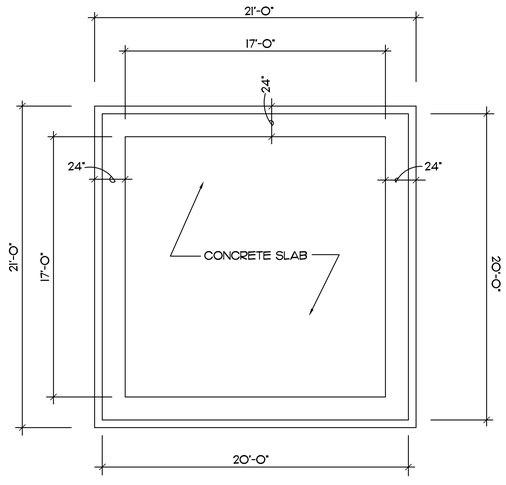
FLOOR PLAN

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



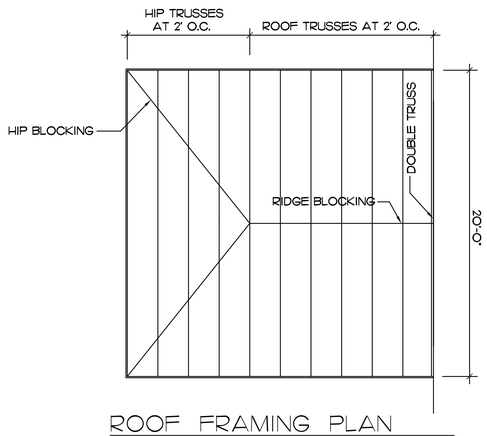
FRONT ELEVATION

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



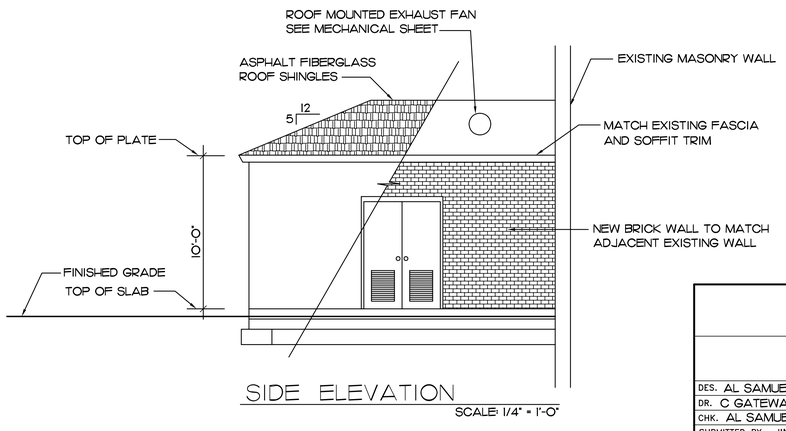
FOUNDATION PLAN

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



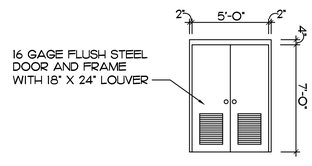
ROOF FRAMING PLAN

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



SIDE ELEVATION

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



DOOR TYPE

A-1

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

REPLACE CHILLER BUILDING 59 & 60

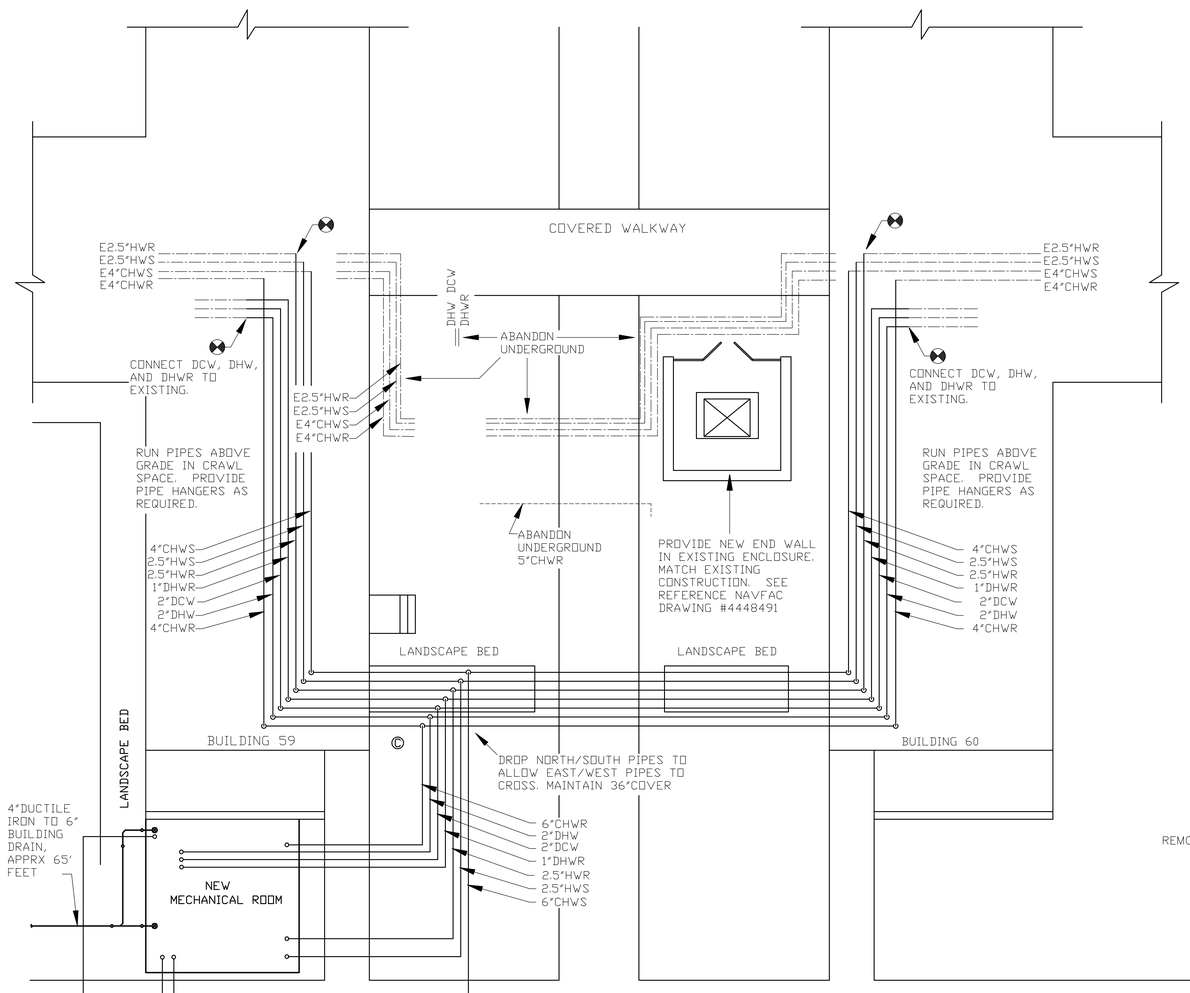
PLANS, ELEVATIONS, AND NOTES

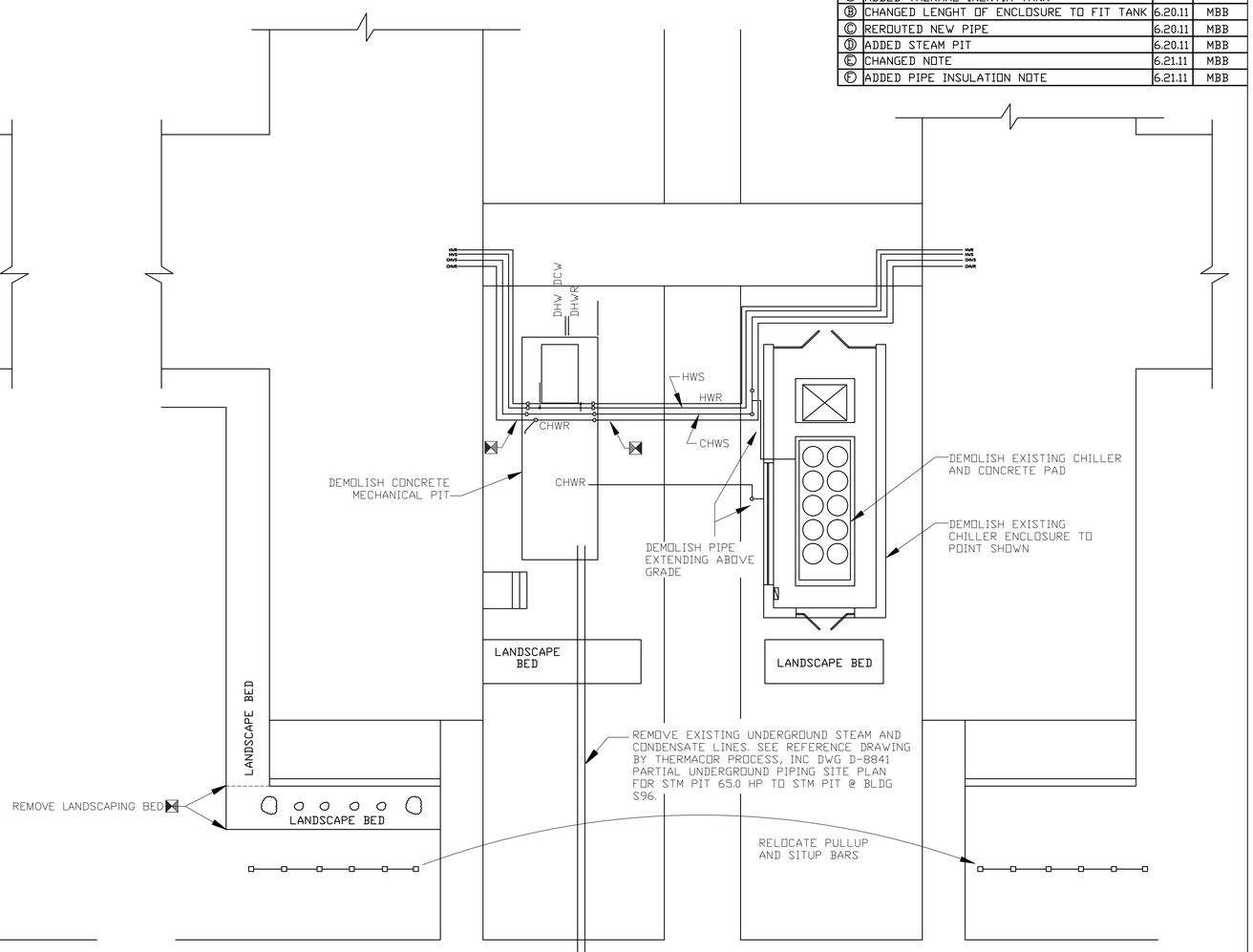
DES.	AL SAMUEL
DR.	C GATEWAY
CHK.	AL SAMUEL
SUBMITTED BY:	JIM ELLIOTT
DESIGN DIR.	BRIAN MARSHBURN
APPROVED: PWO OR OICC	DATE: B. MARSHBURN AUG 24, 2007
SATISFACTORY TO:	DATE

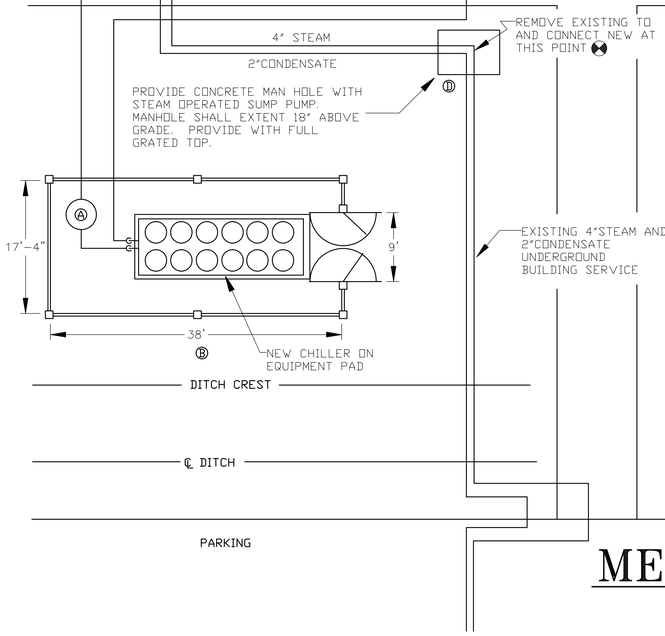
SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504709 | CONST. CONTR. NO. N40085-07-B-0008

SCALE: NOTED | SPEC. 05-07-0008 | SHEET 2 OF 10

REVISIONS			
SYM		DATE	APPROVED
Ⓐ	ADDED THERMAL INERTIA TANK	6.20.11	MBB
Ⓑ	CHANGED LENGHT OF ENCLOSURE TO FIT TANK	6.20.11	MBB
Ⓒ	REROUTED NEW PIPE	6.20.11	MBB
Ⓓ	ADDED STEAM PIT	6.20.11	MBB
Ⓔ	CHANGED NOTE	6.21.11	MBB
Ⓕ	ADDED PIPE INSULATION NOTE	6.21.11	MBB







UNDERGROUND PIPING MATERIAL NOTES

STEAM & CONDENSATE

PROVIDE PRE-ENGINEERED CLASS A STEEL UNDERGROUND STEAM AND CONDENSATE. SCH 40 STEEL STEAM, SCH 80 STEEL CONDENSATE, EACH IN 10 GAGE CONDUIT WITH 20MIL FUSION-BONDED EPOXY COATING OR EQUALVALENT. INSULATED WITH MINERAL WOOL, 2" FOR STEAM, 1" FOR CONDENSATE, WITH 1" AIR GAP. PROVIDE EXPANSION COMPENSATION, AND ANCHORS AS REQUIRED.

HOT AND CHILLED WATER

PROVIDE PRE-ENGINEERED/INSULATED UNDERGROUND PIPING SYSTEM. FOR SIZES 4" AND UNDER: TYPE K COPPER CARRIER PIPE WITH 1.9" THICK FACTORY INJECTED POLYURETHANE FOAM INSULATION ENCASED INTO A PVC OUTER JACKET. FOR SIZES GREATER THAN 4": SCH 40 STEEL WITH 1.2" THICK FACTORY INJECTED POLYURETHANE FOAM INSULATION ENCASED INTO A PVC OUTER JACKET.

DOMESTIC COLD WATER

TYPE K COPPER, UNINSULATED

DOMESTIC HOT WATER & HOT WATER RETURN

PROVIDE PRE-ENGINEERED/INSULATED UNDERGROUND PIPING SYSTEM. TYPE K COPPER CARRIER PIPE WITH 1.5" MINIMUM THICK FACTORY INJECTED POLYURETHANE FOAM INSULATION ENCASED INTO A PVC OUTER JACKET.

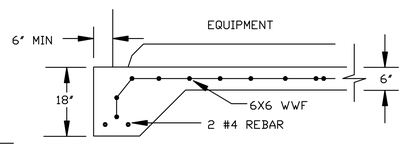
MECHANICAL SITE NOTES ©

1. CONSTRUCT NEW MECHANICAL ROOM COMPLETE WITH EQUIPMENT, INSTALL NEW CHILLER, INSTALL UNDERGROUND PIPING, INSTALL PIPING IN CRAWL SPACE, AND CONNECT NEW PIPE TO EXISTING PIPE BEFORE DEMOLISHING EXISTING MECHANICAL PIT AND EXISTING CHILLER. WELD IN NEW PIPE CONNECTIONS, AS SHOWN ON DRAWING M5, DURING NON BUSINESS HOURS TO FACILITATE THE TRANSITION TO THE NEW CHILLED WATER, HOT WATER, AND DOMESTIC WATER SYSTEM WITH MINIMAL OUTAGE. ONLY DEMOLISH MECHANICAL PIT AND CHILLER AFTER NEW SYSTEM IS OPERATIONAL.

2. CONSTRUCT AND INSTALL MANHOLE, NEW UNDERGROUND STEAM AND CONDENSATE PIPE, AND NEW STEAM PIPE CONNECTIONS (DRAWING M5) WHEN THERE IS NO OR LITTLE NEED FOR BUILDING HEAT. DEMOLISH EXISTING STEAM AND CONDENSAGE PIPE AFTER NEW SYSTEM IS OPERATIONAL. THIS SEQUENCE IS SPECIFIED TO HELP MINIMIZE BUILDING HEAT OUTAGES IF TRANSITION TO NEW SYSTEM HAPPENS DURING THE HEATING SEASON.

3. REMOVE EXISTING CHILLER AND CHILLER ENCLOSURE, CLOSE IN TRANSFORMER YARD.

4. GRADE TO MATCH EXISTING, RETURN LANDSCAPE BEDDING TO ORIGINAL CONDITION, PROVIDE SOD TO REPAIR DAMAGE BY CONSTRUCTION.



NEW EQUIPMENT PAD DETAIL

NOT TO SCALE

MECHANICAL SITE PLAN

SCALE: 1/8"=1'0"

EXISTING SITE PLAN

SCALE: 1/8"=1'0"

© PIPING INSULATION NOTES

PROVIDE FOLLOWING INSULATION TO EXPOSED PIPE IN CRAWL SPACES AND MECHANICAL ROOM. IN ADDITION, PROVIDE VAPOR BARRIER ON CHWS, CHWR, AND DCW PIPE.

CHWS/CHWR:	2" POLYSTYRENE OR 2" POLYISOCYANURATE
HWS/HWR:	2.5" MINERAL FIBER, 2" POLYISOCYANURATE, OR 1.5" CELLULAR PHENOLIC
DHW/DHWR:	1.5" MINERAL FIBER, 1.5" POLYISOCYANURATE, OR 1" CELLULAR PHENOLIC

LEGEND

CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN

A PREFIX OF "E" INDICATES EXISTING

DEMOLISH/REMOVE TO THIS POINT

CONNECT NEW TO EXISTING AT THIS POINT

8 6 4 2 0 8 16 24 32 40 48 56

GRAPHIC SCALE 1/8"=1'0"

M1

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

DES. J A ELLIOTT
DR. J A ELLIOTT
CHK. A L GARCIA
SUBMITTED BY: J A ELLIOTT
DESIGN DIR. B R MARSHBURN
APPROVED: PWO OR OICC — DATE: B R MARSHBURN 8.24.7
SATISFACTORY TO: — DATE:

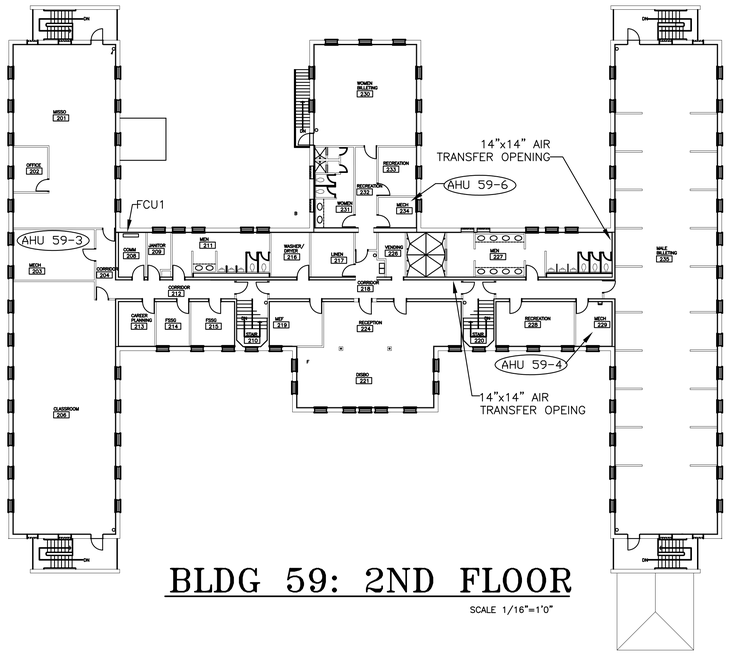
REPLACE CHILLER BUILDINGS 59 & 60

MECHANICAL SITE PLAN

SIZE: F | CODE IDENT. NO: 80091 | NAVFAC DRAWING NO.: 12504710 | CONST. CONTR. N40085-07-B-0008

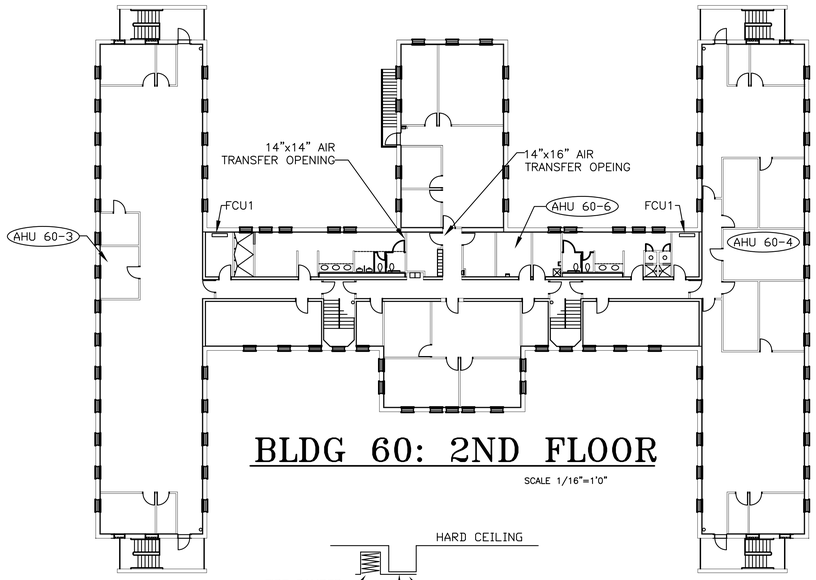
SCALE: NOTED | SPEC. 05-07-0008 | SHEET 3 OF 10

REVISIONS			
SYM		DATE	APPROVED



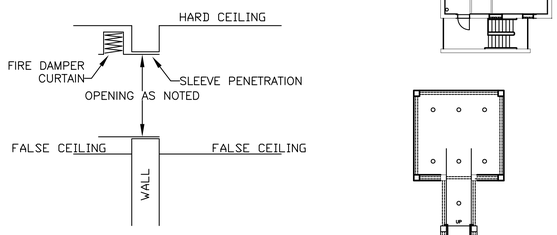
BLDG 59: 2ND FLOOR

SCALE 1/16"=1'0"



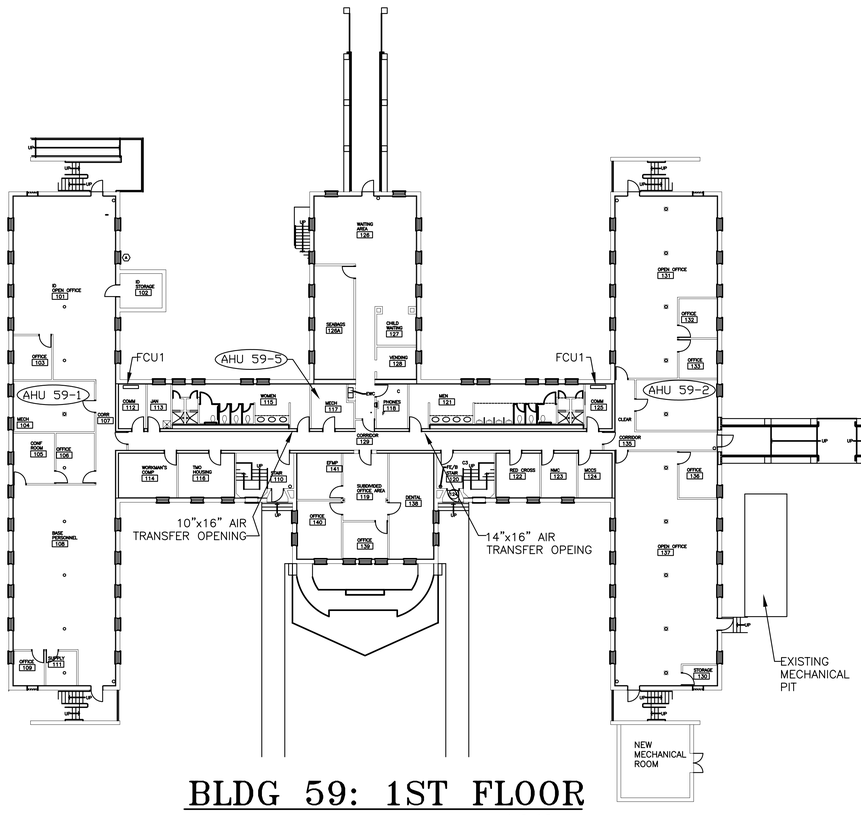
BLDG 60: 2ND FLOOR

SCALE 1/16"=1'0"



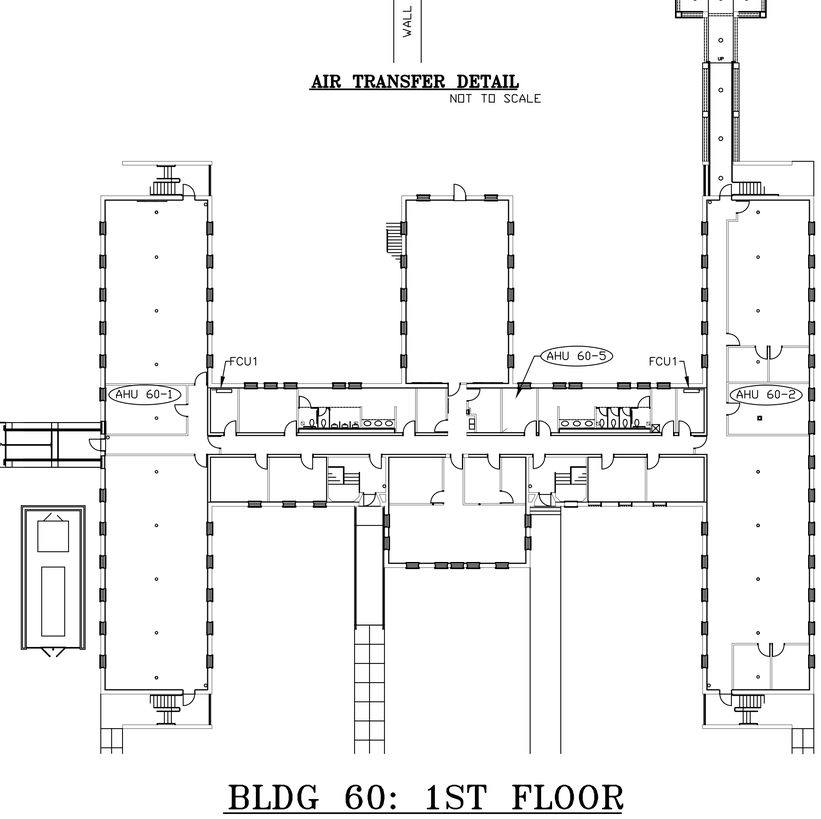
AIR TRANSFER DETAIL

NOT TO SCALE



BLDG 59: 1ST FLOOR

SCALE 1/16"=1'0"



BLDG 60: 1ST FLOOR

SCALE 1/16"=1'0"

16 12 8 4 0 16 32 48 64 80

GRAPHIC SCALE 1/16"=1'0"

AIR HANDLER SCHEDULE

AIR HANDLER	TOTAL CFM	OUTSIDE AIR CFM	AIR HANDLER MOTOR HP	AIR HANDLER ELECTRICAL	OA FAN SIZE *	OA FAN RPM-HP	HEATING COIL GPM	COOLING COIL GPM
59-1	3500	500	3	208V/3Ø	12x12"	1550-1/10	12	29
59-2	3500	500	3		12x12"	1550-1/10	12	29
59-3	3800	1100	5		14x14"	1725-1/4	15	35
59-4	4100	700	5		12x12"	1550-1/8	15	38
59-5	3200	400	3		12x12"	1550-1/15	12	26
59-6	3400	400	3		12x12"	1550-1/15	12	28
60-1	3500	600	3		12x12"	1550-1/8	12	29
60-2	3500	400	3		12x12"	1550-1/15	12	29
60-3	3800	400	5		12x12"	1550-1/15	15	35
60-4	3800	400	5		12x12"	1550-1/15	15	35
60-5	3200	400	3		12x12"	1550-1/15	12	26
60-6	3400	400	3		12x12"	1550-1/15	12	28

OUT SIDE AIR FAN SHALL BE CENTRIFUGAL INLINE, DIRECT DRIVE WITH GIVEN CFM AT 1/4" EXTERNAL STATIC PRESSURE, 120VOLT WITH INTEGRAL DISCONNECTING MEANS..

CONSTRUCTION NOTES:

1. REMOVE COMBINATION MOTOR STARTER/DISCONNECT FOR EACH AIR HANDLER. PROVIDE COMBINATION MOTOR STARTER/DISCONNECT AND VARIABLE FREQUENCY DRIVE (VFD) WITH BACNET INTERFACE. VFD DOES NOT REQUIRE BYPASS OR RFI/EMI FILTERS. SEE ELECTRICAL SHEETS

2. REMOVE SECTION OF OUTSIDE AIR INTAKE DUCT. PROVIDE OUTSIDE AIR FAN WITH NEW TRANSITION DUCTING TO FIT BETWEEN INTAKE LOUVER (PLENUM) AND RETURN AIR PLENUM. PROVIDE MOTORIZED SHUT OFF DAMPER AND BALANCE DAMPER. RE-USE SHUT OFF DAMPER MOTOR OPERATOR. SEE SHEET M5.

3. REMOVE TWO WAY CONTROL VALVE FROM HOT WATER COIL AND PROVIDE THREE WAY VALVE WITH COIL BYPASS. AHUs 59-4 AND 60-3 ONLY.

4. TEST AND BALANCE HOT AND COLD WATER FLOW TO ALL AIR HANDLERS

5. CUT WALL AIR TRANSFER OPENINGS ABOVE THE CEILING INTO THE RESTROOM WHERE SHOWN (6 TOTAL). PROVIDE STATIC FIRE DAMPER PROTECTION OF PENETRATION. PROVIDE ONE EGG GRATE TRANSFER GRILL IN EACH BATHROOM WITH NEW TRANSFER OPENING (4 TOTAL).

FAN COIL UNIT SCHEDULE

FOR TESTING AND BALANCING ONLY

FAN COIL UNIT	COOLING GPM	HEATING GPM	BLDG 59 QUANTITY	BLDG 60 QUANTITY
FCU1	2.0	1.0	3	4

M2

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

DES. J A ELLIOTT
DR. J A ELLIOTT
CHK. A L GARCIA
SUBMITTED BY: J A ELLIOTT
DESIGN DIR. B R MARSHBURN
APPROVED: PWO OR OICC DATE
B R MARSHBURN 8.24.7
SATISFACTORY TO: DATE

REPLACE CHILLER BUILDINGS 59 & 60

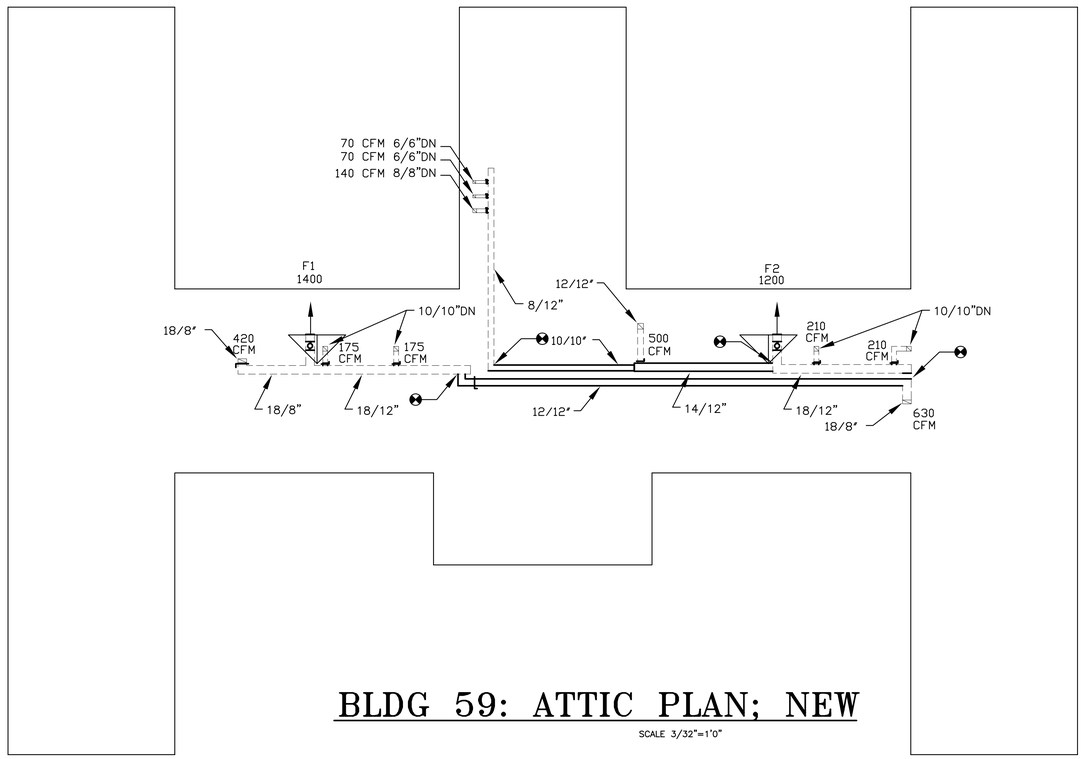
BLDG MECHANICAL PLANS

SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504711

CONST. CONTR. N40085-07-B-0008

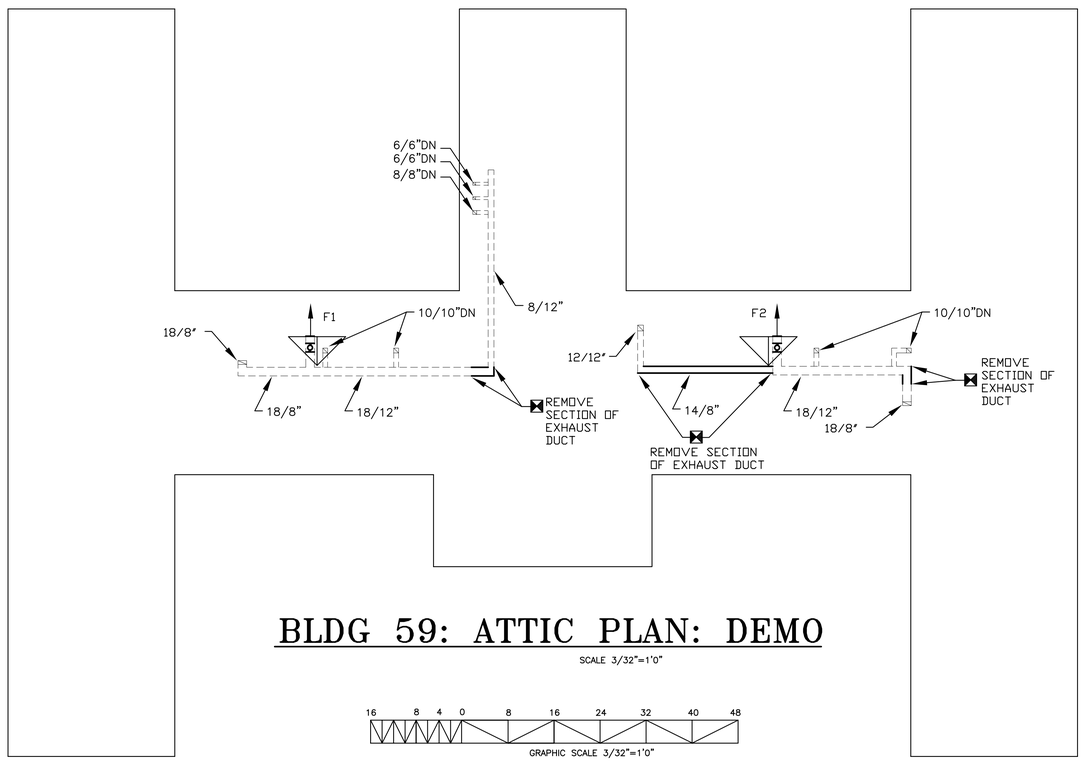
SCALE: NOTED | SPEC. 05-07-0008 | SHEET 4 OF 10

REVISIONS			
SYM		DATE	APPROVED



BLDG 59: ATTIC PLAN; NEW

SCALE 3/32"=1'0"



BLDG 59: ATTIC PLAN: DEMO

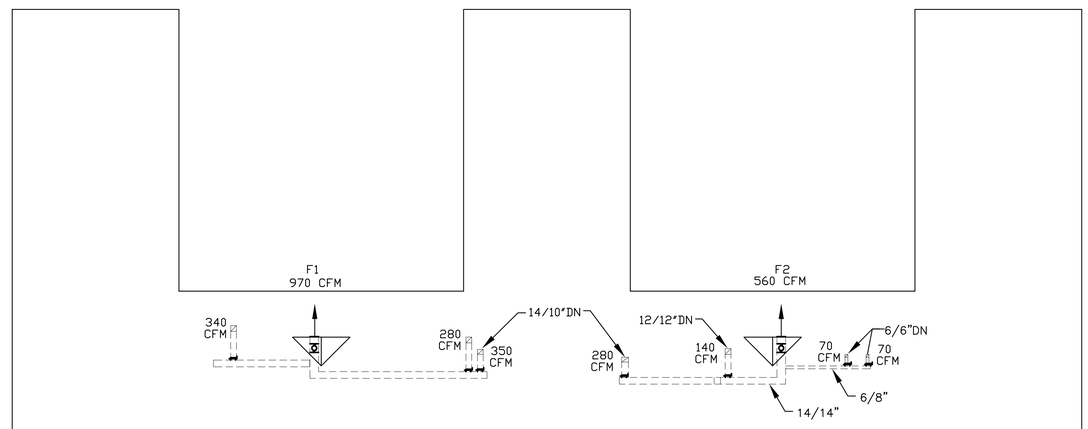
SCALE 3/32"=1'0"

16 8 4 0 8 16 24 32 40 48

GRAPHIC SCALE 3/32"=1'0"

8 6 4 2 0 4 8 16 24

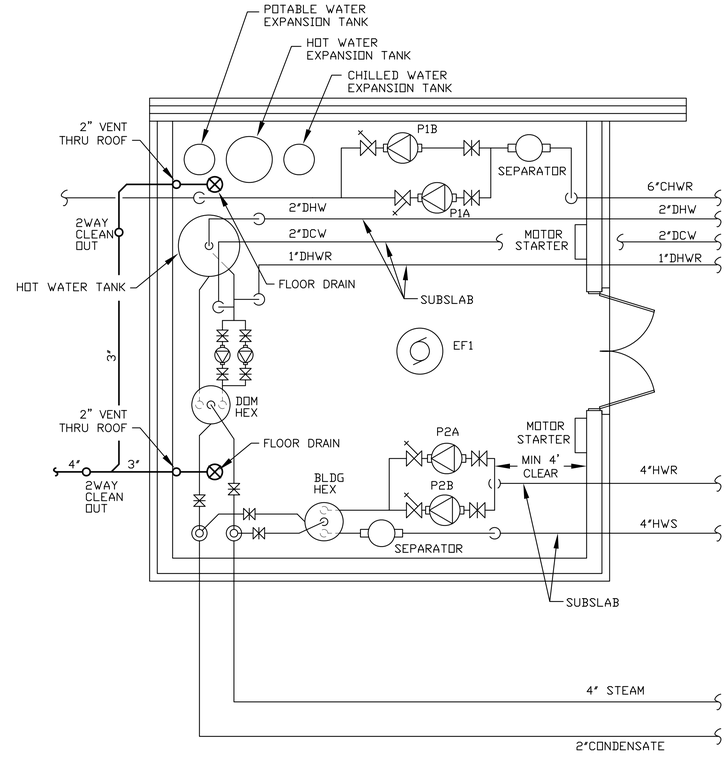
GRAPHIC SCALE 3/8"=1'0"



BLDG 60: ATTIC PLAN

TEST AND BALANCE

SCALE 3/32"=1'0"



MECHANICAL ROOM PLAN

SCALE: 3/8"=1'0"

CONSTRUCTION NOTES:

1. PROVIDE MECHANICAL EQUIPMENT IN NEW MECHANICAL ROOM AS SHOWN. ALLOW FOR MAINTENANCE ACCESS TO EQUIPMENT.
2. MODIFY EXHAUST DUCT IN ATTIC OF BLDG 59 AS SHOWN. ADD BALANCE DAMPERS TO EACH BRANCH TIE IN.
3. TEST AND BALANCE EXHAUST AIR FLOWS IN BLDG 59 AND 60 AS SHOWN.
4. PROVIDE 3" FLOOR DRAINS WITH TRAP PRIMERS AS SHOWN. WASTE AND VENT PIPING SHALL BE HUB AND SPIGOT CAST IRON.

LEGEND

REMOVE EXISTING TO THIS POINT

CONNECT NEW TO EXISTING AT THIS POINT

M3

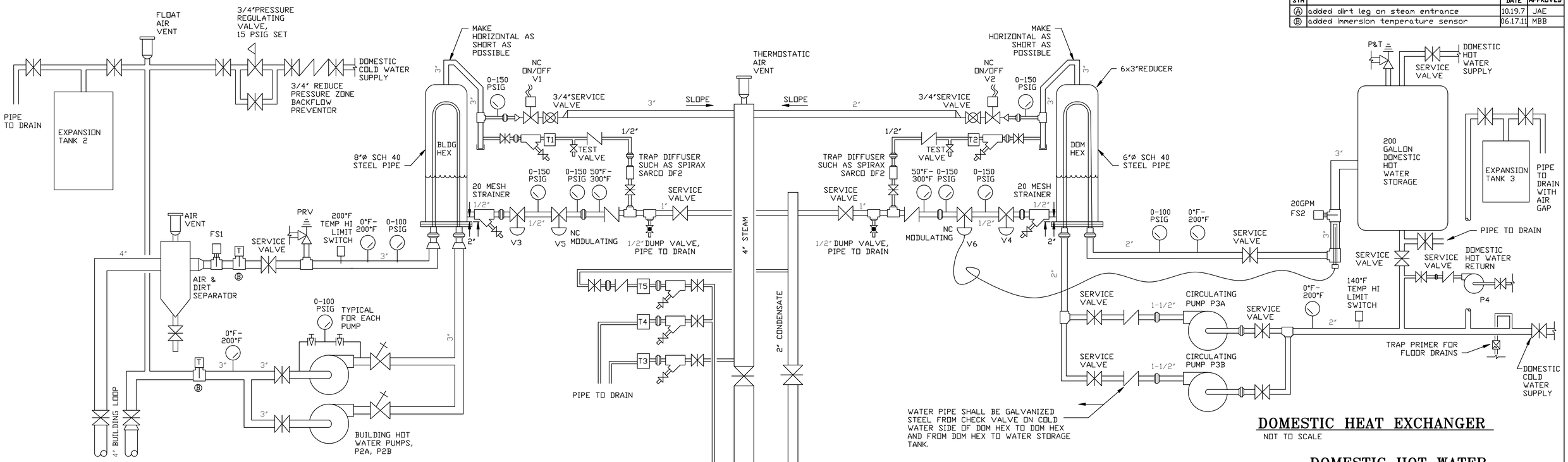
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

DES. J A ELLIOTT
DR. J A ELLIOTT
CHK. R K WERNER
SUBMITTED BY: J A ELLIOTT
DESIGN DIR. B R MARSHBURN
APPROVED: PWO OR OICC DATE
B R MARSHBURN 8.24.7
SATISFACTORY TO: DATE

REPLACE CHILLER BUILDINGS 59 & 60
MECHANICAL ROOM PLAN AND ATTIC PLANS

SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504712
CONST. CONTR. N40085-07-B-0008
SCALE: NOTED | SPEC. 05-07-0008 | SHEET 5 OF 10

REVISIONS			
SYM		DATE	APPROVED
Ⓐ	added dirt leg on steam entrance	10.19.7	JAE
Ⓑ	added immersion temperature sensor	06.17.11	MBB

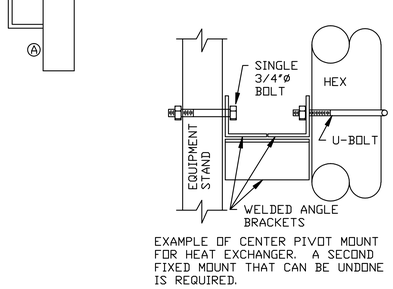


BUILDING HEAT EXCHANGER

NOT TO SCALE

DOMESTIC HEAT EXCHANGER

NOT TO SCALE



EXAMPLE OF CENTER PIVOT MOUNT FOR HEAT EXCHANGER. A SECOND FIXED MOUNT THAT CAN BE UNDONE IS REQUIRED.

BLDG HEAT SYSTEM OPERATION:

-VALVE V1 IS OPENED WHEN WATER FLOW IS DETECTED AND TEMP LIMIT SWITCH IS UNDER SET POINT. HEAT EXCHANGER WILL FILL WITH LINE PRESSURE STEAM. ADJUST FLOW SWITCH TO MAKE WITH ALL AIR HANDLER TWO WAY VALVES CLOSED, AND BREAK WITH ONE THREE WAY VALVE VALVED OUT OF SERVICE.
-STEAM WILL CONDENSE AND COLLECT IN THE HEAT EXCHANGER UNTIL BOTH V3 AND V5 OPEN TO ALLOW CONDENSATE DISCHARGE.
-CONTROL IS ACHEIVED BY MODULATING V5 BY HEATED WATER TEMPERATURE. RESTRICTING THE OULET OF CONDENSATE WILL BACK UP THE WATER LEVEL IN THE HEAT EXCHANGER THEREBY REDUCING THE HEAT EXCHANGER AREA, AND REDUCING HEAT TRANSFER.
-V3 MODULATE TO ACT AS A HIGH LIMIT TO ENSURE SUBCOOLED CONDENSATE AND PROTECT AGAINST A RUNAWAY CONDITION IN THE EVENT OF V5 OPEN FAILURE.
-SEE SHEET M5 FOR INTERFACE WITH BUILDING DDC.

DOMESTIC HOT WATER SYSTEM OPERATION:

-VALVE V2 IS OPENED WHEN WATER FLOW IS DETECTED AND TEMP LIMIT SWITCH IS UNDER SET POINT. HEAT EXCHANGER WILL FILL WITH LINE PRESSURE STEAM. ADJUST FLOW SWITCH TO MAKE WITH ONE PUMP ON, ONE PUMP OFF.
-STEAM WILL CONDENSE AND COLLECT IN THE HEAT EXCHANGER UNTIL BOTH V4 AND V6 OPEN TO ALLOW CONDENSATE DISCHARGE.
-CONTROL IS ACHEIVED BY MODULATING V4 BY HEATED WATER TEMPERATURE. RESTRICTING THE OULET OF CONDENSATE WILL BACK UP THE WATER LEVEL IN THE HEAT EXCHANGER THEREBY REDUCING THE HEAT EXCHANGER AREA, AND REDUCING HEAT TRANSFER.
-V4 MODULATE TO ACT AS A HIGH LIMIT TO ENSURE SUBCOOLED CONDENSATE AND PROTECT AGAINST A RUNAWAY CONDITION IN THE EVENT OF V6 OPEN FAILURE.
-SEE SHEET M5 FOR INTERFACE WITH BUILDING DDC.

SYSTEM GOALS:
-THIS IS A CLOSED STEAM SYSTEM
-REDUCES FLASH STEAM LOSS
-SUBCOOLS CONDENSATE
-REDUCES WATER HAMMER BY USING VERTICAL HEAT EXCHANGER
-RETURNS CONDENSATE TO CENTRAL PLANT WITH STEAM PRESSURE, ELIMINATING NEED FOR CONDENSATE PUMP
-ELIMINATES NEED FOR PRESSURE REGULATING VALVE

VALVE SCHEDULE

ID	SERVICE	TYPE		CAPACITY	RATED PSID	SERVICE PSIG/TEMP	REMARKS
V1	BLDG HEAT	ELECTRIC ACTUATED STEAM BALL	2 POSITION 2 WAY	1500 #/HR	25	150/365°F	-SPRING RETURN NORMALY CLOSED. -OPENS WITH 120V FROM HI LIMIT SWITCH AND FLOW SWITCH. -SUCH AS SPIRAX-SARCO M10V BALL VALVE WITH ACTUATOR AND VALVE STEM EXTENSION. DO NOT MOUNT ACTUATOR ABOVE VALVE.
V2	DOMESTIC WATER	ELECTRIC ACTUATED STEAM BALL	2 POSITION 2 WAY	660 #/HR	25	150/365°F	
V3	BLDG HEAT	HEAT ACTUATED TRAP	MODULATING 2 WAY	1.3 Cv		150/300°F	-INLINE TEMPERATURE CONTROL VALVE -200°F SET TEMPERATURE -SUCH AS THERM-OMEGA-TECH HAT
V4	DOMESTIC WATER	HEAT ACTUATED TRAP	MODULATING 2 WAY	1.3 Cv		150/300°F	
V5	BLDG HEAT	ELECTRIC ACTUATED, DDC CONTROLLED	MODULATING 2 WAY	.5 Cv		150/300°F	
V6	DOMESTIC WATER	SELF POWERED WATER TEMP CONTROLLED	MODULATING 2 WAY	.18 Cv		150/300°F	-SUCH AS SPIRAX-SARCO BX WITH SA121 ACTUATOR, 105-225°F RANGE
PRV	BLDG HEAT	PRESSURE RELIEF VALVE	SAFETY	2,700 MBTH	45 PSIG SET		
P&T	DOMESTIC WATER	PRESSURE & TEMPERATURE RELIEF VALVE	SAFETY	2,700 MBTH	75 PSIG SET		
59-4	AIR HANDLER REHEAT COIL	DDC CONTROLLED, ELECTRIC,	MODULATING 3 WAY	15 GPM			
60-3				15 GPM			

HEAT EXCHANGER SCHEDULE

ID	SERVICE	CONDENSING CAPACITY	STEAM PSIG	WATER				TUBING	REMARKS
				GPM	PSIG	PSID	EWT		
BLDG HEX	BUILDING HEAT	1,300 MBTH	150	161	30	2	160°F	SINGLE WALL	-VERTICAL SHELL AND TUBE, TWO PASS. -TOTAL TUBE LENGTH IS CONDENSING SURFACE AREA PLUS 70% FOR SUBCOOLING AREA. -SHELL MAY BE FACTORY OR SHOP FABRICATED. -TUBE SHEET SHALL BE SERRATED ADN DOUBLE REAMED, OR BRAZED. -SHALL BE MOUNTED SUCH THAT IT MAY BE PIVOTTED FROM A CENTER MOUNTING POINT TO PULL THE TUBE BUNDLE AFTER DISCONNECTING STEAM, CONDENSATE, AND WATER UNIONS. -SUCH AS BELL & GOSSET SU83-2 TUBE BUNDLE.
DOM HEX	DOMESTIC HOT WATER	537 MBTH	150	30	55	2	50°F	VENTED DOUBLE WALL	-VERTICAL SHELL AND TUBE, TWO PASS. -TOTAL TUBE LENGTH IS CONDENSING SURFACE AREA PLUS 50% FOR SUBCOOLING AREA. -SHELL MAY BE FACTORY OR SHOP FABRICATED. -TUBE SHEET SHALL BE SERRATED ADN DOUBLE REAMED, OR BRAZED. -SHALL BE MOUNTED SUCH THAT IT MAY BE PIVOTTED FROM A CENTER MOUNTING POINT TO PULL THE TUBE BUNDLE AFTER DISCONNECTING STEAM, CONDENSATE, AND WATER UNIONS. -TUBE SIDE SHALL BE SUITABLE FOR POTABLE WATER. -SUCH AS BELL & GOSSET DTCW-648 TUBE BUNDLE.

STEAM TRAP SCHEDULE

ID	TYPE	#/HR CAP	RATED PSID	MAX PSID	REMARKS
T1	FLOAT & THERMOSTATIC	280	10	150	
T2	FLOAT & THERMOSTATIC	280	10	150	
T3	FLOAT & THERMOSTATIC	500	5	15	TRAP SHALL LOCKOUT AT 15 PSID. TRAP BODY AND MECHANISMS SHALL BE RATED FOR 150 PSI.
T4	FLOAT & THERMOSTATIC	500	5	15	
T5	INVERTED BUCKET TRAP	100	75	150	

PUMP SCHEDULE

ID	SERVICE	TYPE	GPM	HEAD	MIN PUMP EFF	HP	VOLTAGE	
P1A P1B	CHILLED WATER	INLINE CENTRIFUGAL	377	75'	71%	10	208V/3ø	ALTERNATING REDUNDANT PUMPS
P2A P2B	BLDG HEAT	INLINE CENTRIFUGAL	161	50'	60%	5	208V/3ø	ALTERNATING REDUNDANT PUMPS
P3A P3B	DOMESTIC HOT WATER CIRCULATING	INLINE CENTRIFUGAL	25	17.5'		1/6	120V/1ø	SUCH AS B&G PL-36 PUMPS TO RUN CONCURRENTLY
P4	DOMESTIC HOT WATER RETURN	INLINE CENTRIFUGAL	10	17.5'		1/12	120V/1ø	

LEGEND

- IMMERSION TEMPERATURE SENSOR Ⓑ
- UNION
- PRESSURE GAGE
- ELECTRIC VALVE
- STRAINER WITH BLOW DOWN VALVE
- T2 STEAM TRAP
- TRIPLE DUTY VALVE SERVICE, CHECK, & FLOW CONTROL
- GATE OR BALL VALVE
- GLOBE VALVE
- BRONZE SWING CHECK VALVE
- FS2 FLOW SWITCH

M4

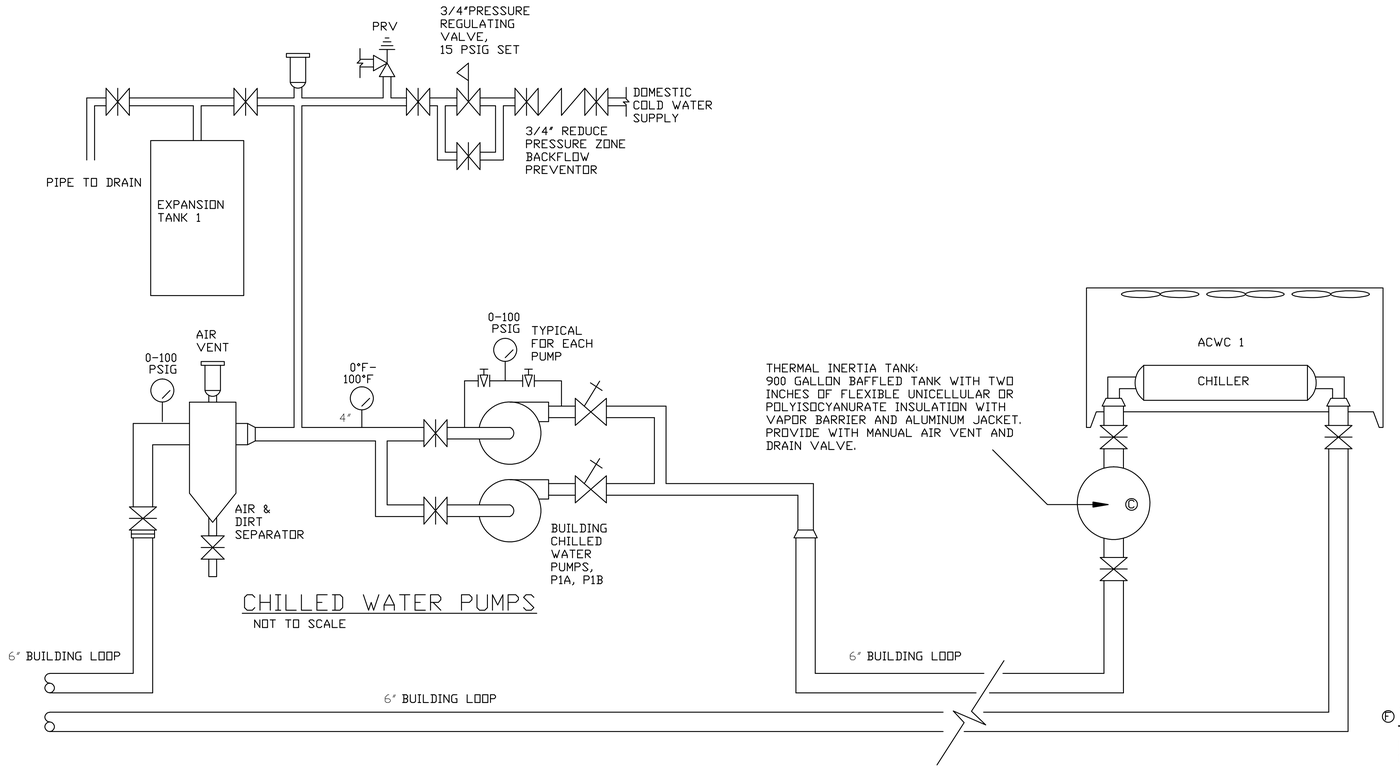
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

REPLACE CHILLER BUILDINGS 59 & 60
HEATING P&ID AND SCHEDULES

DES.	J A ELLIOTT
DR.	J A ELLIOTT
CHK.	A L GARCIA
SUBMITTED BY:	J A ELLIOTT
DESIGN DIR.	B R MARSHBURN
APPROVED: PWO OR OICC	DATE: B R MARSHBURN 8.24.7
SATISFACTORY TO:	DATE

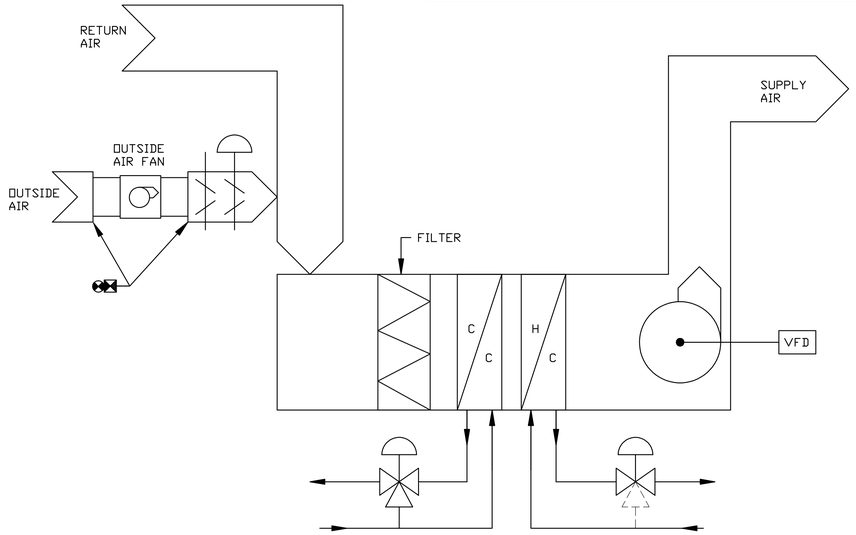
SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504713 | CONST. CONTR. N40085-07-B-0008
SCALE: NOTED | SPEC. 05-07-0008 | SHEET 6 OF 10

REVISIONS			
SYM		DATE	APPROVED
Ⓐ	CORRECTED NOTES	6.17.11	MBB
Ⓑ	REMOVED R22 AS ACCEPTABLE REFRIGERANT, ADDED R410A	6.17.11	MBB
Ⓒ	ADDED THERMAL INERTIA TANK	6.20.11	MBB
Ⓓ	ADDED DETAIL	6.20.11	MBB
Ⓔ	CHANGED MINIMUM ACCEPTANCE VOLUME	6.21.11	MBB
Ⓕ	ADDED HYDRONIC SYSTEM NOTES	6.21.11	MBB



CHILLED WATER SCHEMATIC

NOT TO SCALE



AIR HANDLER FLOW DIAGRAM

EXHAUST FAN SCHEDULE

ID	SERVICE	TYPE	VOLUME AND SP	REMARKS
EF1	MECHANICAL ROOM	ROOF MOUNTED AXIAL PROPELLER EXHAUST FAN	1500 CFM @ .03" SP	-WITH BIRD SCREEN -WITH ELECTRICAL DISCONNECTING MEANS -WITH FLASHING FLANGE FOR SHINGLE ROOF -PROVIDE WALL MOUNTED THERMOSTAT

EXPANSION TANK SCHEDULE

ID	SERVICE	TYPE	MAX PSI	MININUM ACCEPTANCE VOLUME	REMARKS
EXPANSION TANK 1	CHILLER WATER	BLADDER	125	15 GAL Ⓔ	FABRICATED STEEL SHELL DESIGNED AND CONSTRUCTED PER ASME SECTION VIII. DIV. 1 BLADDER SHALL BE ABLE TO EXPAND TO FILL THE SHELL WITHOUT DAMAGE.
EXPANSION TANK 2	HOT WATER	BLADDER	125	30 GAL	
EXPANSION TANK 3	POTABLE WATER	BLADDER	125	22 GAL	FABRICATED STEEL SHELL DESIGNED AND CONSTRUCTED PER ASME SECTION VIII. DIV. 1. ALL WETTED COMPONENTS SHALL BE FDA APPROVED MATERIAL FOR POTABLE WATER. BLADDER SHALL BE ABLE TO EXPAND TO FILL THE SHELL WITHOUT DAMAGE.

AIR COOLED CHILLER SCHEDULE

ID	SERVICE	TYPE	CAPACITY	GPM	HEAD	MIN IPLV (EFF)	VOLTAGE	
ACWC 1	BLDGS 59 & 60	AIR COOLED WATER CHILLER	145 TONS @ ARI CONDITIONS	377	15'	14.0	208V/3ø	-R410A OR R134A REFRIGERANT Ⓑ -PROVIDE ALUMINUM FINS ON COPPER TUBE CONDENSER COIL WITH COATING THAT PASS THE ASTM B117-90 3000 HR SALT SPRAY RESISTANCE TEST AS INSTALLED. -PROVIDE TWO INDEPENDENT REFRIGERANT CIRCUITS -PROVIDE REMOVABLE CORE FILTER DRYER ON SUCTION LINE -PROVIDE LIQUID AND SUCTION LINE SERVICE VALVES ON EACH REFRIGERANT CIRCUIT -DO NOT WELD ON CHILLER CONNECTIONS, PROVIDE GROOVED OR FLANGED COUPLINGS. -PROVIDE 16-20 MESH STRAINER ON WATER INLET. -PROVIDE 5 YEAR WARRANTY ON COMPRESSOR PARTS -PROVIDE PHASE MONITORS WITH PHASE UNBALANCE PROTECTION, OVER/UNDER VOLTAGE PROTECTION;PHASE LOSS PROTECTION;DELAY OF BREAK TIMER TO DELAY AUTOMATIC RESTARTS; NON CRITICAL FAULT DELAY; PROGRAMMABLE AUTO/MANUAL RESET; LOAD AND LINE SIDE MONITORING -PROVIDE 15 AMP/120 VOLT GFCI PROTECTED CONVIENCE OUTLET

BUILDING CONTROL NOTES:

1) PROVIDE MATERIAL AND LABOR TO AUTOMATE CONTROL OF EXISTING EXHAUST FANS.

2) BLDG 59-EF1 SHALL RUN WHENEVER AIR HANDLER 59-5 IS IN OCCUPIED MODE.
BLDG 59-EF2 SHALL RUN WHENEVER AIR HANDLER 59-6 IS IN OCCUPIED MODE.
BLDG 60-EF1 SHALL RUN WHENEVER AIR HANDLER 60-5 IS IN OCCUPIED MODE.
BLDG 60-EF2 SHALL RUN WHENEVER AIR HANDLER 60-6 IS IN OCCUPIED MODE.

3) EXTEND/PROVIDE CONDUIT AND CONDUCTORS TO NEW MECHANICAL ROOM. CONTROL NEW EQUIPMENT FROM EXISTING JOHNSON CONTROLS SUPERVISORY BUILDING CONTROLLER (NAE).

4) THE CHILLED WATER SYSTEM SHALL OPERATE WHENEVER OUTSIDE AIR TEMPERATURE IS ABOVE 55°F (ADJUSTABLE) AND ANY AIR HANDLER IS CALLING FOR COOLING. CHILLED WATER SYSTEM IS OPERATED BY ENERGIZING A CHILLED WATER PUMP (P1A OR P1B), AND ENABLING THE CHILLER. P1A AND P1B ENERGIZED THRU AN ALTERNATOR, ONLY ONE PUMP RUNS AT A TIME. THE DDC DOES NOT SELECT WHICH PUMP. AUXILIARY CONTACTS SHALL INDICATE WHICH PUMP IS RUNNING. SUPPLY AND RETURN WATER TEMPERATURES SHALL BE SENSED BY THE DDC.

Ⓐ 5) THE HOT WATER SYSTEM SHALL OPERATE WHENEVER ANY AIR HANDLER IS CALLING FOR HEATING. HOT WATER SUPPLY TEMPERATURE SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE, ABOVE 55°F, SP=120°F(ADJUSTABLE). BELOW 55°F, RESET SETPOINT LINEARLY FROM 120°F TO 180°F ON OUTSIDE AIR FROM 55°F TO 20°F. HOT WATER SYSTEM IS OPERATED BY ENERGIZING A HOT WATER PUMP (P2A OR P2B). P2A AND P2B ENERGIZED THRU AN ALTERNATOR; ONLY ONE RUNS AT A TIME. THE DDC DOES NOT SELECT WHICH PUMP. AUXILIARY CONTACTS SHALL INDICATE WHICH PUMP IS RUNNING. SUPPLY AND RETURN WATER TEMPERATURES SHALL BE SENSED BY THE DDC. CONTROL VALVE V1 POSITION SHALL BE MONITORED BY THE DDC.

6) CONTROL OF THE DOMESTIC WATER HEATER SHALL BE BY LOCAL CONTROLS. DDC SHALL SENSE SUPPLY WATER TEMPERATURE AND MONITOR V2 POSITION.

7) EXISTING VAV TERMINAL UNITS TO REMAIN UNCHANGED.

AIR HANDLER CONTROL NOTES:

1) REMOVE EXISTING AIR HANDLER CONTROLLER AND PROVIDE BACNET COMPLIANT AIR HANDLER CONTROLLER FOR EACH AIR HANDLER. CONTROLLER SHALL FULLY COMMUNICATE WITH EXISTING JOHNSON CONTROLLS SUPERVISORY BUILDING CONTROLLE (NAE). EACH AIR HANDLER SHALL HAVE INDEPENDENTLY SETTABLE OCCUPIED/UNOCCUPIED SCHEDULE.

2) IN THE OCCUPIED MODE:
A) THE AIR HANDLER FAN SHALL RUN CONTINUOUSLY
B) THE OUTSIDE AIR DAMPER SHALL BE OPEN
C) THE EXHAUST FAN SHALL RUN
D) SPACE TEMPERATURE SHALL BE CONTROLLED BASED ON RETURN AIR SENSOR. FROM FULL COOLING TO FULL HEATING THE FOLLOWING SHALL BE MODULATED IN SEQUENCE, WITH A DEAD BAND BETEEN HEATING AND COOLING:
-FAN VOLUME FROM 100% DESIGN TO 50% DESIGN
-COOLING VALVE FROM 100% 0% FLOW TO THE COIL
-HEATING VALVE FROM 0% TO 100% FLOW TO THE COIL.
-FAN SPEED FROM 50% TO 100% VOLUME.
E) THE HUMIDITY WILL BE CONTROLLED BASED ON RETURN AIR SENSOR. ABOVE SET POINT THE COOLING VALVE SHALL BE STROKED TO FULL FLOW THRU THE COIL. FAN SPEED AND THE HEATING VALVE SHALL BE CONTROLLED AS ABOVE EXCEPT THE HEATING VALVE SHALL CONTROL TO THE COOLING SET POINT WHEN AMBIENT TEMPERATURE IS ABOVE 65°F.

3) IN THE UNOCCUPIED MODE:
A) THE COOLING SHALL NOT OPERATE
B) THE AIR HANDLER FAN AND HEATING VALVE SHALL CYCLE TO FULL VOLUME TO MAINTAIN SETPOINT
C) THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED.
D) THE EXHAUST FANS SHALL REMAIN OFF.

4) IN THE WARM UP/COOL DOWN MODE:
A) THE AIR HANDLER SHALL OPERATE AS IN THE OCCUPIED MODE EXCEPT THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED.
B) THE EXHAUST FANS SHALL REMAIN OFF
C) THE WARM UP/COOL DOWN MODE SHALL LAST FOR 30 MINUTES AT THE START OF THE OCCUPIED MODE.

5) FREEZE PROTECTION, ALL MODES. A FREEZE STAT LOCATED ON THE ENTERING SIDE OF THE COOLING COIL SHALL BE WIRED TO THE AIR HANDLER CONTROLLER. UPON INITIATION THE AIR HANDLER FAN SHALL STOP, THE OUTSIDE AIR DAMPER SHALL CLOSE, AND HOT AND COLD WATER VALVES SHALL OPEN TO THE COIL. THE FREEZE STAT SHALL BE AUTOMATIC RESET. THE AIR HANDLER CONTROLLER SHALL REQUIRE MANUAL RESET OF THE TRIPPED CONDITION.

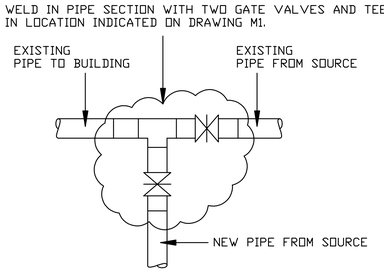
6) THE SMOKE DETECTORS SHALL STOP THE AIR HANDLER FAN AND INITIATE AN ALARM TO THE FIRE ALARM SYSTEM. AN ALARM SHALL REQUIRE A MANUAL RESET.

Ⓕ HYDRONIC SYSTEM NOTES:

PROVIDE A CHEMICAL SHOT FEEDER FOR BOTH THE HOT WATER AND CHILLED WATER SYSTEMS.

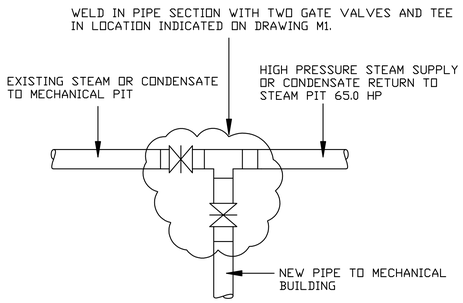
CLEAN AND FLUSH BOTH THE HOT WATER AND CHILLED WATER SYSTEMS. CHEMICALLY TREAT BOTH THE HOT WATER AND CHILLED WATER SYSTEMS WITH SODIUM SULFITE AND SODIUM LAURDYL SARCOSINATE. REFER TO CAMP LEJEUNE GUIDE SPECIFICATION SECTION 23 24 00 (HYDRONIC PIPE CLEANING AND FLUSHING PROCEDURES) FOR MORE GUIDANCE.

MINIMIZE OUTAGES WHILE PERFORMING HYDRONIC SYSTEM CLEANING.



Ⓓ NEW PIPE CONNECTION; HW AND CHW

NOT TO SCALE



Ⓓ STEAM CONNECTION IN NEW MANHOLE

NOT TO SCALE

M5

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

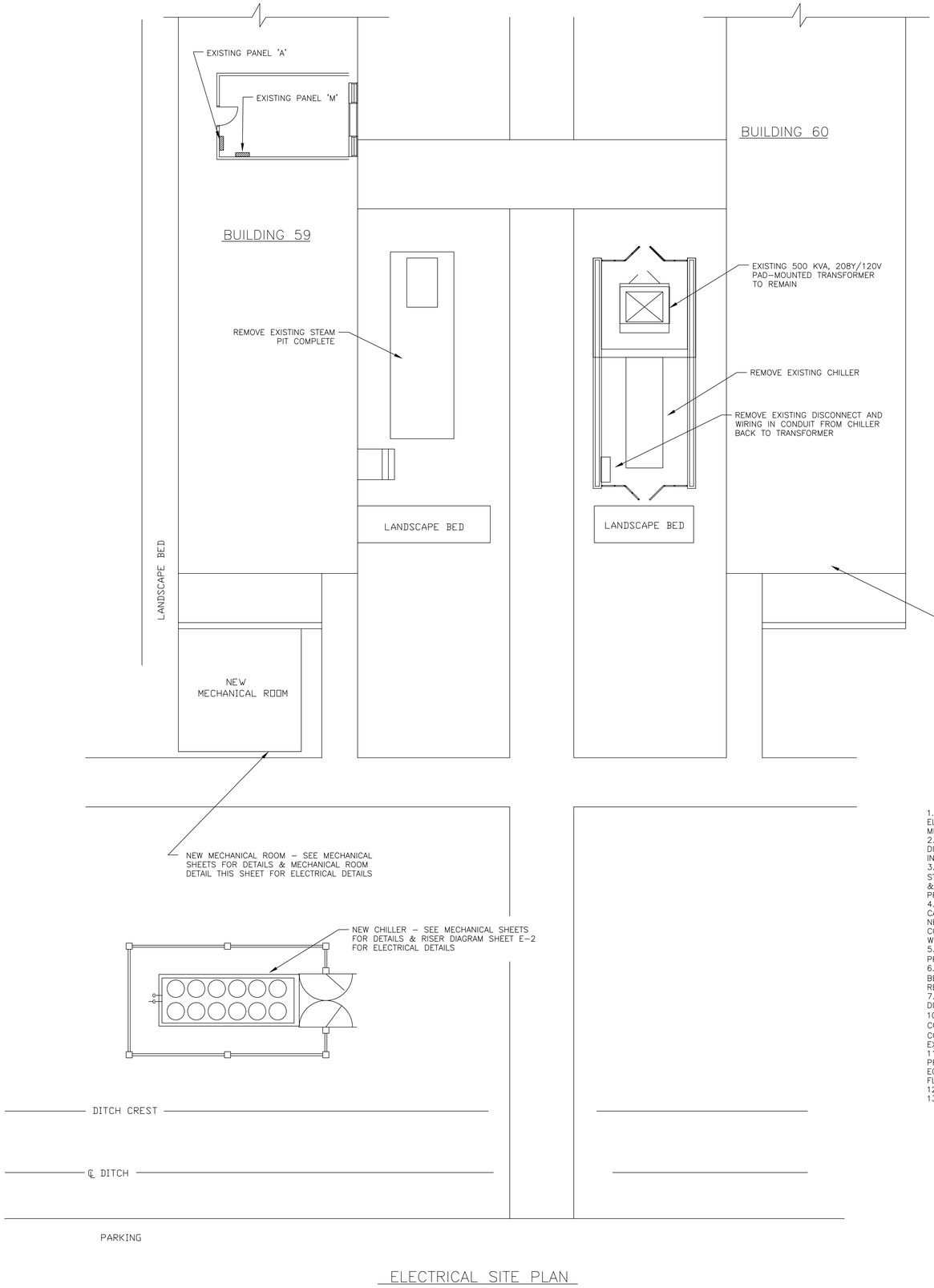
REPLACE CHILLER BUILDINGS 59 & 60

COOLING P&ID AND SCHEDULES

DES.	J A ELLIOTT
DR.	J A ELLIOTT
CHK.	A L GARCIA
SUBMITTED BY:	J A ELLIOTT
DESIGN DIR.	B R MARSHBURN
APPROVED: PWO OR OICC	DATE
B R MARSHBURN	8.24.7
SATISFACTORY TO:	DATE

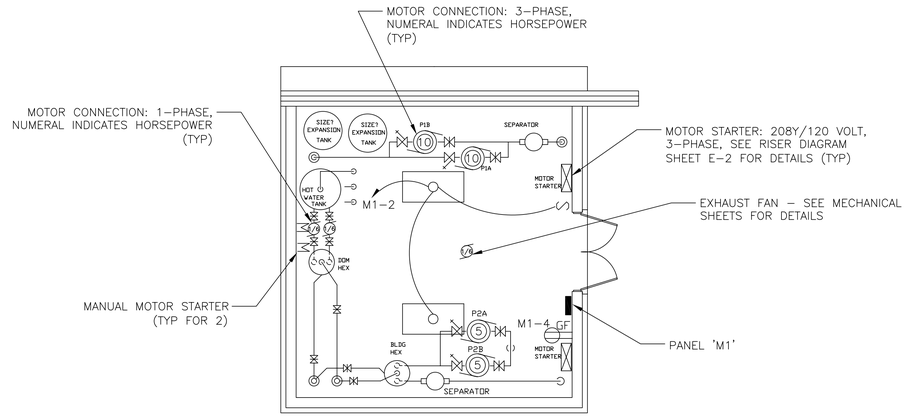
SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504714
CONST. CONTR. N40085-07-B-0008
SCALE: NOTED | SPEC. 05-07-0008 | SHEET 7 OF 10

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED



ELECTRICAL SITE PLAN

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



MECHANICAL ROOM DETAIL

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

DEMOLITION NOTES

1. VERIFY CIRCUIT NUMBERS & DE-ENERGIZE CIRCUITS PRIOR TO BEGINNING WORK. EXISTING WIRING TO BE REMOVED SHALL BE DISCONNECTED FROM ITS SOURCE & REMOVED.
2. FOR CLARITY, WIRING & CONDUITS ARE NOT SHOWN.
3. SEE ARCHITECTURAL & MECHANICAL DRAWINGS FOR CONSTRUCTION & EQUIPMENT TO BE REMOVED. REMOVE ASSOCIATED WIRING & DISTRIBUTION EQUIPMENT.

ELECTRICAL NOTES

1. WORK & MATERIALS, UNLESS NOTED OTHERWISE AS EXISTING, ARE NEW & SHALL BE PROVIDED BY THE CONTRACTOR. ELECTRICAL INSTALLATION SHALL CONFORM TO REQUIREMENTS OF NFPA 70, & REQUIREMENTS SPECIFIED HEREIN. WORK PLACE SHALL MEET REQUIREMENTS OF NFPA 70E.
2. ELECTRICAL PLANS ARE PARTIALLY DIAGRAMMATIC. REFER TO ARCHITECTURAL, CIVIL, & MECHANICAL DRAWINGS FOR GUIDANCE ON DIMENSIONS, CEILING HEIGHTS, FINISHES, DETAILS, LOCATION OF DUCTS, PIPES, & STRUCTURAL SUPPORTS, & BUILDING ORIENTATION. INSTALL ELECTRICAL SYSTEMS WITHOUT INTERFERING WITH DUCTS, PIPES, STRUCTURES, OTHER SYSTEMS.
3. PROVIDE ADDITIONAL SUPPORTS FOR SWITCHES, RACEWAYS, & OTHER ELECTRICAL EQUIPMENT WHEREVER THE BUILDING STRUCTURE IS NOT SUITABLE FOR DIRECT MOUNTING. PROVIDE MINIMUM 1/4 INCH AIR SPACE BETWEEN CONCRETE/MASONRY SURFACE & ELECTRICAL DEVICES & OUTLETS. VERIFY ALL EQUIPMENT CHARACTERISTIC & MOUNTING REQUIREMENTS PRIOR TO ROUGH-IN. PROVIDE PROPER ACCESSORIES, TRIMS, ETC., TO SUIT THE MOUNTING SYSTEM.
4. CUT EXISTING SURFACES AS REQUIRED TO INSTALL CONDUIT, RACEWAYS & OTHER ELECTRICAL WORK; REPAIR ALL DAMAGE CAUSED BY WORK CUTTING SHALL BE DONE BY SAWING ALONG STRAIGHT LINES. THE AMOUNT OF CUTTING SHALL BE THE MINIMUM NECESSARY TO ACCOMMODATE NEW WORK. NO FLAME CUTTING SHALL BE PERMIT WITHOUT THE WRITTEN PERMISSION OF THE CONTRACTING OFFICER. HOLES SHALL BE ROTARY DRILLED & THE SIZE SHALL BE THE MINIMUM NECESSARY TO ACCOMMODATE THE WORK.
5. CHECK THE NAMEPLATE BRANCH-CIRCUIT SELECTION CURRENT OF EACH MOTOR DRIVEN UNIT DELIVERED TO THE SITE & PROVIDE PROPERLY SIZED OVERCURRENT / SHORT-CIRCUIT PROTECTION IN EACH RELATED PROTECTIVE DEVICE.
6. WHERE CONDUIT & WIRING HAS NOT BEEN SHOWN ON DRAWINGS, THE ARRANGEMENT & ROUTING OF THE BRANCH CIRCUITS WILL BE AT CONTRACTOR'S DISCRETION IN ACCORDANCE WITH GENERALLY ACCEPTED GOOD PRACTICE FOR COMMERCIAL WORK & N.E.C. CODE REQUIREMENTS.
7. PANELBOARD SHALL BE EQUIPPED WITH THERMAL MAGNETIC TYPE BOLT-IN BRANCH BREAKERS. PROVIDE UPDATED PANELBOARD DIRECTORY IN EXISTING PANELBOARD; INDICATE LOADS SERVED BY EACH CIRCUIT OF PANELBOARD.
10. ALL CONDUCTORS SHALL BE COPPER. PROVIDE INSULATED CONDUCTORS WITH EQUIPMENT GROUNDING (E.G.) CONDUCTOR IN CONDUIT & RACEWAYS; WIRE & CONDUIT SIZES AS INDICATED. COLOR CODING OF 208/120 VOLT SYSTEM UNGROUNDED CONDUCTORS: PHASE A - BLACK; PHASE B - RED; PHASE C - BLUE. INSULATION SHALL BE 600- VOLT, TYPE THWN-2/THHN-2 EXCEPT TYPE TW FOR GROUNDING CONDUCTOR.
11. PROVIDE INSULATED CONDUCTORS INSTALLED IN INTERMEDIATE METAL CONDUIT OR SCHEDULE 80 PVC AS INDICATED EXCEPT PROVIDE FLEXIBLE PVC CONDUIT BETWEEN 3 & 6 FEET IN LENGTH FOR RECESSED & SEMI-RECESSED LIGHTING FIXTURES & FOR EQUIPMENT & MOTORS SUBJECT TO VIBRATION OR MOVEMENT. PROVIDE SEPARATE EQUIPMENT GROUNDING CONDUCTOR ACROSS FLEXIBLE CONNECTIONS.
12. SEAL ALL CONDUIT & RACEWAY PENETRATIONS FROM CONDITIONED SPACE TO NON-CONDITIONED SPACE.
13. MECHANICAL & ELECTRICAL CONTRACTORS SHALL COORDINATE WORK TO BE DONE.

E-1

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

REPLACE CHILLER BUILDINGS 59 & 60

PLANS, DETAIL, & NOTES

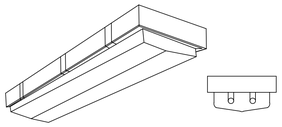
DES.	J. TRIPP
DR.	J. TRIPP
CHK.	J. TRIPP
SUBMITTED BY:	J. ELLIOTT
DESIGN DIR.	B.R. MARSHBURN, PE
APPROVED: PWO OR OICC	DATE: B.R. MARSHBURN, PE 8-24-07
SATISFACTORY TO:	DATE

SIZE	CODE IDENT. NO	NAVFAC DRAWING NO.
F	80091	12504 715

CONST. CONTR. NO. N40085-07-B-0008

SCALE: NOTED | SPEC. | SHEET 8 OF 10

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED



LUMINAIRE REQUIREMENTS

1. MOLDED 100% ACRYLIC DIFFUSE LENS (NOT CLEAR) FULLY GASKETED WITH FIBERGLASS OR PLASTIC HOUSING.
2. PROVIDE A MINIMUM OF 6 PLASTIC LATCHES TO SECURE LENS.
3. BALLAST SHALL BE HIGH POWER FACTOR (≥ .9) INSTANT START CLASS P ELECTRONIC BALLAST WITH A SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS - ONE AT EACH END.
4. UL LISTED FOR DAMP OR "WET" LABEL AS INDICATED.
5. OVERALL LUMINAIRE LENGTH SHALL BE 48" NOMINAL.
6. MINIMUM COEFFICIENT OF UTILIZATION (CU) WITH CAVITY REFLECTANCES OF 80% CEILING, 50% WALLS AND 20% FLOOR SHALL BE:

RCR	TYPE A	TYPE B
1	CU = 76	70
2	65	60
3	57	52
4	50	46

7. MINIMUM SPACING CRITERIA: 1.5
8. HOUSING SHALL HAVE INTERNAL GREEN GROUNDING SCREW.

TYPE A - 1 F32/T8 LAMP.
TYPE B - 2 F32/T8 LAMPS.

HOUSING OPTIONS
1. UL LISTED FOR1. UL LISTED FOR DAMP LOCATIONS.
2. UL LISTED FOR WET LOCATIONS.

WET/DAMP LOCATION LUMINAIRES

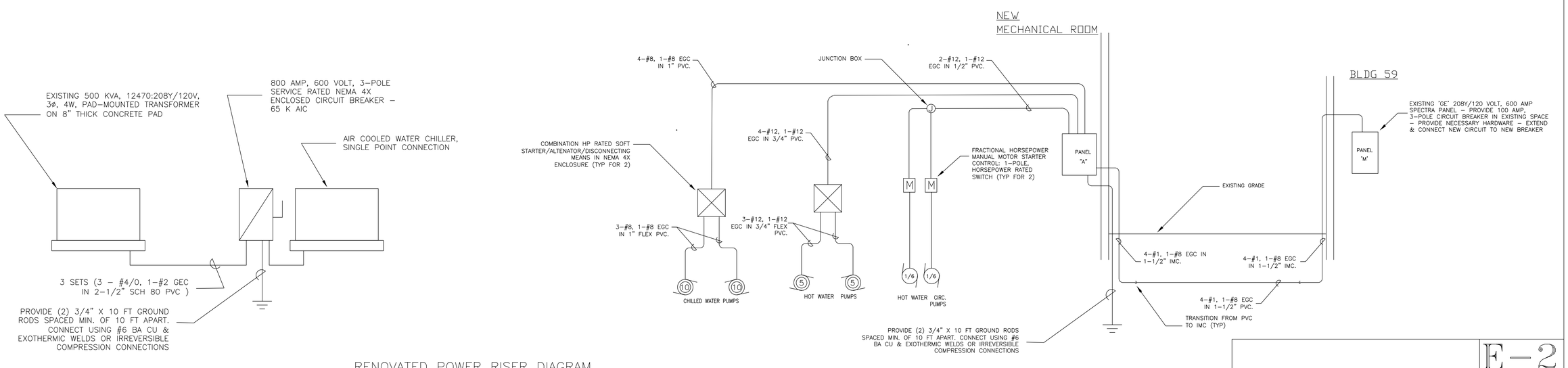
SKETCH DATE NOVEMBER 1995 | STYLE NL-8

PANELBOARD "M1" SCHEDULE

LOAD SERVED	WIRE SIZE	TRIP POLE	CKT NO.	VOLT - AMP/PHASE A	B	C	CKT NO.	TRIP POLE	WIRE SIZE	LOAD SERVED
CHILLED WATER PUMP 10 HP	#8	80/3	1				2	20/1	#12	LIGHTS
	#8		3				4	20/1	#12	RECEPTACLE
	#8		5				6	15/1	#12	EXHAUST FAN
HOT WATER PUMP 5 HP	#10	45/3	7				8	15/1	#12	H/W RETURN PUMP
	#10		9				10	–	–	SPACE
	#10		11				12	–	–	SPACE
H/W CIRC PUMPS	#12	20/1	13				14	–	–	SPACE
SPACE	–	–	15				16	–	–	SPACE
SPACE	–	–	17				18	–	–	SPACE

208Y/120V, 100A MLO, 3-PHASE, 4-WIRE IN NEMA 3R LOCKABLE ENCLOSURE, SEC RATED

NEW PANEL 'M1'



RENOVATED POWER RISER DIAGRAM

NO SCALE

E-2

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

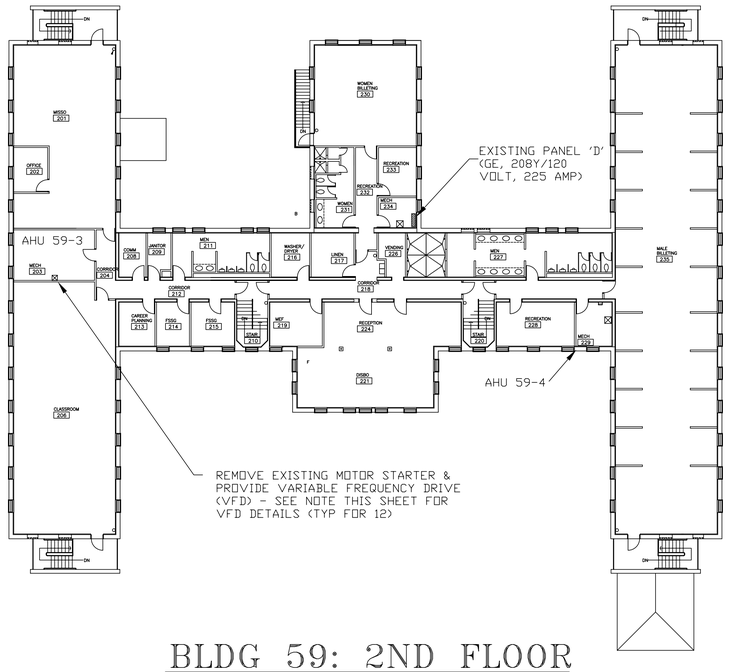
REPLACE CHILLER BUILDINGS 59 & 60

RISER DIAGRAM, SCHEDULE , & DETAIL

DES.	J. TRIPP
DR.	J. TRIPP
CHK.	J. TRIPP
SUBMITTED BY:	J. ELLIOTT
DESIGN DIR.	B R MARSHBURN PE
APPROVED: PWO OR OICC	DATE
B R MARSHBURN PE 8-24-07	
SATISFACTORY TO:	DATE

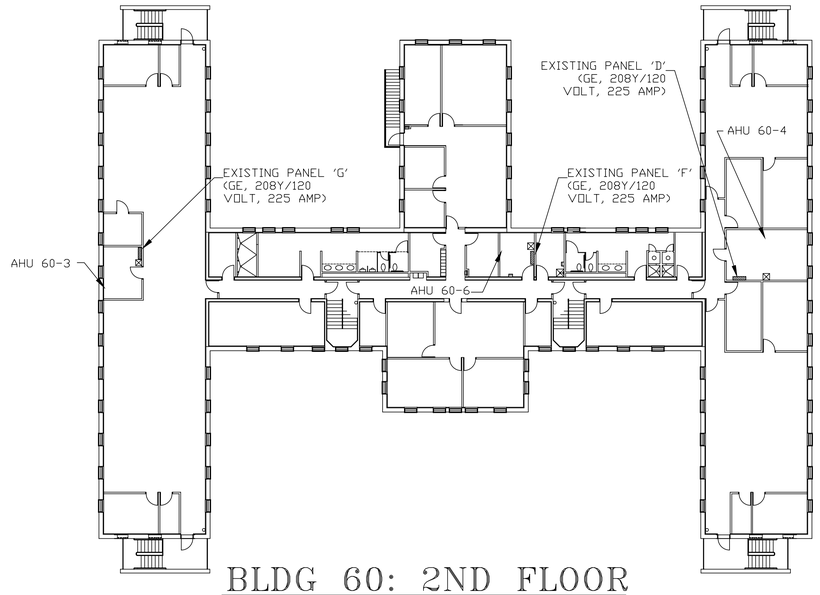
SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504 716
CONST. CONTR. NO. N40085-07-B-0008
SCALE: NOTED | SPEC. | SHEET 9 OF 10

REVISIONS			
SYM		DATE	APPROVED



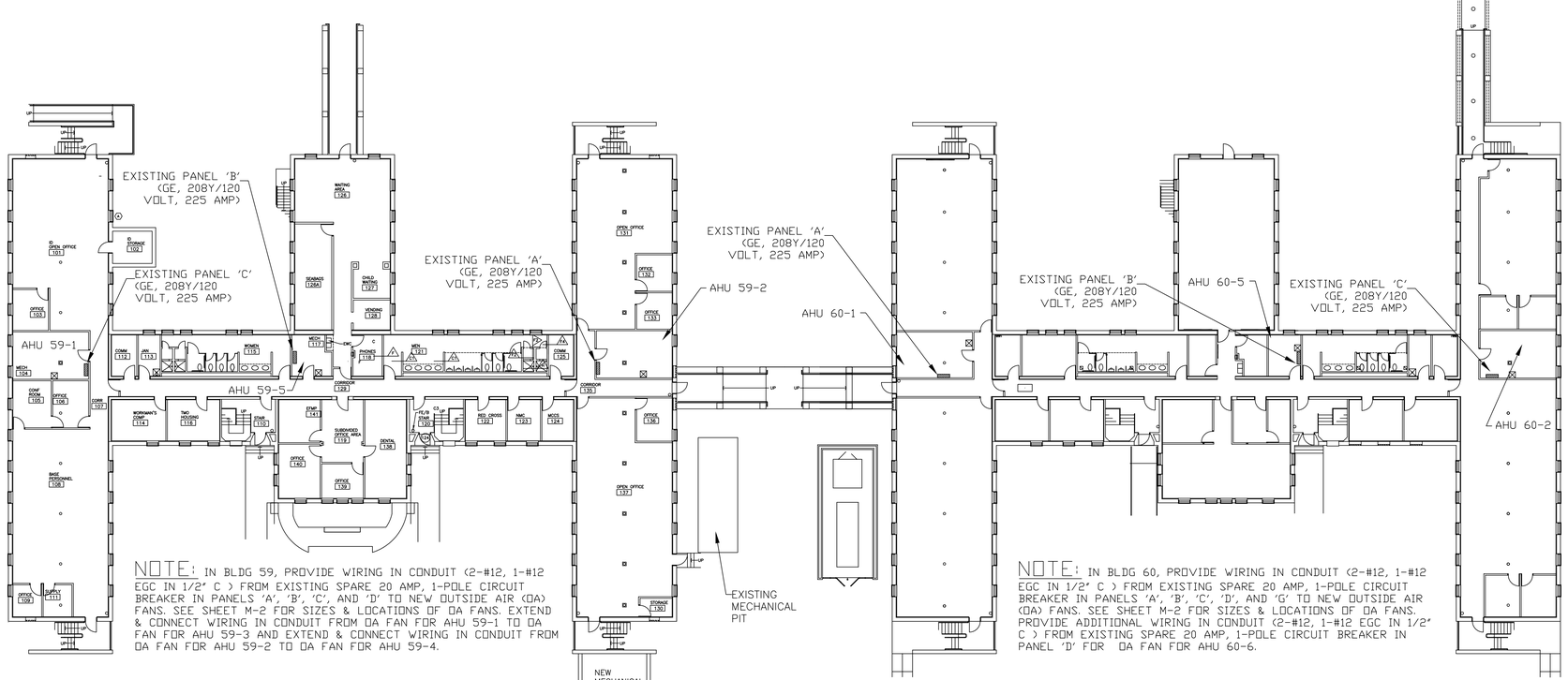
BLDG 59: 2ND FLOOR

SCALE 1/16"=1'0"



BLDG 60: 2ND FLOOR

SCALE 1/16"=1'0"



NOTE: IN BLDG 59, PROVIDE WIRING IN CONDUIT (2-#12, 1-#12 EGC IN 1/2" C) FROM EXISTING SPARE 20 AMP, 1-POLE CIRCUIT BREAKER IN PANELS 'A', 'B', 'C', AND 'D' TO NEW OUTSIDE AIR (OA) FANS. SEE SHEET M-2 FOR SIZES & LOCATIONS OF OA FANS. EXTEND & CONNECT WIRING IN CONDUIT FROM OA FAN FOR AHU 59-1 TO OA FAN FOR AHU 59-3 AND EXTEND & CONNECT WIRING IN CONDUIT FROM OA FAN FOR AHU 59-2 TO OA FAN FOR AHU 59-4.

BLDG 59: 1ST FLOOR

SCALE 1/16"=1'0"

NOTE: IN BLDG 60, PROVIDE WIRING IN CONDUIT (2-#12, 1-#12 EGC IN 1/2" C) FROM EXISTING SPARE 20 AMP, 1-POLE CIRCUIT BREAKER IN PANELS 'A', 'B', 'C', 'D', AND 'G' TO NEW OUTSIDE AIR (OA) FANS. SEE SHEET M-2 FOR SIZES & LOCATIONS OF OA FANS. PROVIDE ADDITIONAL WIRING IN CONDUIT (2-#12, 1-#12 EGC IN 1/2" C) FROM EXISTING SPARE 20 AMP, 1-POLE CIRCUIT BREAKER IN PANEL 'D' FOR OA FAN FOR AHU 60-6.

BLDG 60: 1ST FLOOR

SCALE 1/16"=1'0"

16 12 8 4 0 16 32 48 64 80

GRAPHIC SCALE 1/16"=1'0"

ELECTRICAL NOTES:

PROVIDE VARIABLE FREQUENCY DRIVES (VFD) OF THE PULSE WIDTH MODULATED (PWM) TYPE TO CONTROL THE SPEED OF LISTED INDUCTION MOTORS VIA BACNET COMMUNICATION PROTOCOL. THE VFD SHALL INCLUDE THE FOLLOWING MINIMUM FUNCTIONS, FEATURES AND RATINGS.

A. INPUT CIRCUIT BREAKER PER UL 489 WITH A MINIMUM OF 10,000 AMPS SYMMETRICAL INTERRUPTING CAPACITY AND DOOR INTERLOCKED EXTERNAL OPERATOR.
B. THE VFD SHALL BE CAPABLE OF SUPPLYING 120 PERCENT OF RATED FULL LOAD CURRENT FOR ONE MINUTE AT MAXIMUM AMBIENT TEMPERATURE.
C. THE VFD SHALL BE DESIGNED TO OPERATE FROM A 208Y/120 VOLT, + OR - 10 PERCENT, THREE PHASE, 60 HZ SUPPLY, AND CONTROL MOTORS WITH A CORRESPONDING VOLTAGE RATING.
D. ACCELERATION AND DECELERATION TIME SHALL BE INDEPENDENTLY ADJUSTABLE FROM ONE SECOND TO 60 SECONDS.
E. THE CONTROLLER EFFICIENCY AT ANY SPEED SHALL NOT BE LESS THAN 96 PERCENT.
F. THE CONTROLLERS SHALL BE CAPABLE OF BEING RESTARTED INTO A MOTOR COASTING IN THE FORWARD DIRECTION WITHOUT TRIPPING.
G. PROTECTION OF POWER SEMICONDUCTOR COMPONENTS SHALL BE ACCOMPLISHED WITHOUT THE USE OF FAST ACTING SEMICONDUCTOR OUTPUT FUSES. SUBJECTING THE CONTROLLERS TO ANY OF THE FOLLOWING CONDITIONS SHALL NOT RESULT IN COMPONENT FAILURE OR THE NEED FOR FUSE REPLACMENT:

1. SHORT CIRCUIT AT CONTROLLER OUTPUT
2. GROUND FAULT AT CONTROLLER OUTPUT
3. OPEN CIRCUIT AT CONTROLLER OUTPUT
4. INPUT UNDERVOLTAGE
5. INPUT OVERVOLTAGE
6. LOSS OF INPUT PHASE
7. AC LINE SWITCHING TRANSIENTS
8. INSTANTANEOUS OVERLOAD
9. SUSTAINED OVERLOAD EXCEEDING 115 PERCENT OF CONTROLLER RATED CURRENT
10. OVER TEMPERATURE
11. PHASE REVERSAL

H. SOLID STATE MOTOR OVERLOAD PROTECTION SHALL BE INCLUDED SUCH THAT CURRENT EXCEEDING AN ADJUSTABLE THRESHOLD SHALL ACTIVATE A 60 SECOND TIMING CIRCUIT. SHOULD CURRENT REMAIN ABOVE THE THRESHOLD CONTINUOUSLY FOR THE TIMING PERIOD, THE CONTROLLER WILL AUTOMATICALLY SHUT DOWN.
I. A SLIP COMPENSATION CIRCUIT SHALL BE INCLUDED WHICH WILL SENSE CHANGING MOTOR LOAD CONDITIONS AND ADJUST OUTPUT FREQUENCY TO PROVIDE SPEED REGULATION OF NEMA B MOTORS TO WITHIN + / - 0.5 PERCENT OF MAXIMUM SPEED WITHOUT THE NECESSITY OF A TACHOMETER GENERATOR.
J. THE VFD SHALL BE FACTORY SET FOR MANUAL RESTART AFTER THE FIRST PROTECTIVE CIRCUIT TRIP FOR MALFUNCTION (OVERCURRENT,UNDERVOLTAGE, OVERVOLTAGE OR OVERTEMPERATURE) OR AN INTERRUPTION OF POWER. THE VFD SHALL BE CAPABLE OF BEING SET FOR AUTOMATIC RESTART AFTER A SELECTED TIME DELAY. IF THE DRIVE FAULTS AGAIN WITHIN A SPECIFIED TIME PERIOD (ADJUSTABLE 0-60 SECONDS), A MANUAL RESTART WILL BE REQUIRED.
K. THE VFD SHALL INCLUDE EXTERNAL FAULT RESET CAPABILITY. ALL THE NECESSARY LOGIC TO ACCEPT AN EXTERNAL FAULT RESET CONTACT SHALL BE INCLUDED.
L. PROVIDE CRITICAL SPEED LOCKOUT CIRCUITRY TO PREVENT OPERATING AT FREQUENCIES WITH CRITICAL HARMONICS THAT CAUSE RESONANT VIBRATIONS. THE VFD SHALL HAVE A MINIMUM OF THREE USER SELECTABLE BANDWIDTHS.
M. PROVIDE THE FOLLOWING OPERATOR CONTROL AND MONITORING DEVICES MOUNTED ON THE FRONT PANEL OF THE VFD:

1. MANUAL DIGITAL SPEED CONTROL (NO POTENTIOMETER).
2. HAND-OFF-AUTO (HOA) SWITCH.
3. POWER ON LIGHT.
4. DRIVE RUN POWER LIGHT.
5. LOCAL DISPLAY.

N. ELECTRICAL AND ELECTROMECHANICAL COMPONENTS OF THE VARIABLE FREQUENCY DRIVE (VFD) SHALL NOT CAUSE ELECTROMAGNETIC INTERFERENCE TO ADJACENT ELECTRICAL OR ELECTROMECHANICAL EQUIPMENT WHILE IN OPERATION.
O. THE VFD SHALL BE WARRANTED BY THE MANUFACTURER FOR A PERIOD OF ONE YEAR, OR THE CONTRACTED PERIOD OF ANY EXTENDED WARRANTEE AGREED UPON BY THE CONTRACTOR AND THE GOVERNMENT, AFTER DEMONSTRATION OF SUCCESSFUL OPERATION. ANY COMPONENT FAILING TO PERFORM ITS FUNCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE GOVERNMENT. ITEMS REPAIRED OR REPLACED SHALL BE WARRANTED FOR AN ADDITIONAL PERIOD OF AT LEAST ONE YEAR FROM THE DATE THAT IT BECOMES FUNCTIONAL AGAIN.
P. DURING THE WARRANTY PERIOD, THE CONTRACTOR SHALL PROVIDE ON-SITE, ON-CALL MAINTENANCE SERVICES BY CONTRACTOR'S PERSONNEL ON THE FOLLOWING BASIS: THE SERVICE SHALL BE ON A PER-CALL BASIS WITH 36 HOUR RESPONSE. CONTRACTOR SHALL SUPPORT THE MAINTENANCE OF ALL HARDWARE AND SOFTWARE OF THE SYSTEM. VARIOUS PERSONNEL OF DIFFERENT EXPERTISE SHALL BE SENT ON-SITE DEPENDING ON THE NATURE OF THE MAINTENANCE SERVICE REQUIRED. COSTS SHALL INCLUDE TRAVEL, LOCAL TRANSPORTATION, LIVING EXPENSES, AND LABOR RATES OF THE SERVICE PERSONNEL WHILE RESPONDING TO THE SERVICE REQUEST.
Q. PROVIDE SERVICE AND MAINTENANCE INFORMATION INCLUDING PREVENTIVE MAINTENANCE, ASSEMBLY, AND DISASSEMBLY PROCEDURES. INCLUDE ELECTRICAL DRAWINGS FROM ELECTRICAL GENERAL SECTIONS. SUBMIT ADDITIONAL INFORMATION NECESSARY TO PROVIDE COMPLETE OPERATION, REPAIR, AND MAINTENANCE INFORMATION, DETAILED TO THE SMALLEST REPLACEABLE UNIT. INCLUDE COPIES OF AS-BUILT SUBMITTALS. PROVIDE ROUTINE PREVENTATIVE MAINTENANCE INSTRUCTIONS, AND EQUIPMENT REQUIRED. PROVIDE INSTRUCTIONS ON HOW TO MODIFY PROGRAM SETTINGS, AND MODIFY THE CONTROL PROGRAM. PROVIDE INSTRUCTIONS ON DRIVE ADJUSTMENT, TROUBLE-SHOOTING, AND CONFIGURATION. PROVIDE INSTRUCTIONS ON PROCESS TUNING AND SYSTEM CALIBRATION.
R. SHOW CIRCUITS AND DEVICE ELEMENTS FOR EACH REPLACEABLE MODULE. SCHEMATIC DIAGRAMS OF PRINTED CIRCUIT BOARDS ARE PERMITTED TO GROUP FUNCTIONAL ASSEMBLIES AS DEVICES, PROVIDED THAT SUFFICIENT INFORMATION IS PROVIDED FOR GOVERNMENT MAINTENANCE PERSONNEL TO VERIFY PROPER OPERATION OF THE FUNCTIONAL ASSEMBLIES.
S. VFD SHALL BE OF THE NEWEST DESIGN TYPE.
T. SEE SHEET M-2 FOR LIST OF MOTORS TO BE CONTROLLED

E-3

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

DES. J. TRIPP
DR. J. TRIPP
CHK. J. TRIPP
SUBMITTED BY: J A ELLIOTT
DESIGN DIR. B R MARSHBURN PE
APPROVED: PWO OR OICC DATE
B R MARSHBURN PE 8-24-07
SATISFACTORY TO: DATE

REPLACE CHILLER BUILDINGS 59 & 60
BLDG ELECTRICAL PLANS

SIZE F | CODE IDENT. NO 80091 | NAVFAC DRAWING NO. 12504 717
CONST. CONTR. N40085-07-B-0008
SCALE: NOTED | SPEC. | SHEET 10 OF 10