

MATERIAL SCHEDULE													GENERAL NOTES		
PIPING SYSTEM	PIPE		TAKEDOWN JOINTS				VALVES		FLEX CONN'S	FITTINGS TYPE & MATERIAL	MAXIMUM WORKING CONDITIONS			REMARKS	
	SIZE	MATERIAL	MATERIAL	GASKETS	BOLTING	BODY	TRIM	SYSTEM			PRESSURE	TEMP			
CHILLED WATER (CLASS 2 PIPING)	2" & BELOW	COPPER TUBE SEAMLESS ASTM B-88 TYPE L DRAWN	UNION WROUGHT COPPER ANSI B16.22, SIL-BRAZED	GARLOCK BLUE GARD STYLE 3000 FULL FACE ANSI B16.21	STEEL ASTM A307 ANSI B18.2.1 GR B	MSS-SP-80, BRONZE, CL 150 MSS-SP-110, BRONZE ASTM SB 61/62, NPT	BRONZE	SEE GEN NOTE 14	WROUGHT COPPER ANSI B16.22 SIL-BRAZED	CHILLED WATER	40 PSI	120 F	FLUID ASSUMED TO BE 45% ETHYLENE GLYCOL AND CORROSION INHIBITORS. SEE GENERAL NOTE NO. 10.		
	2-1/2" & ABOVE		FLANGE COPPER SIL-BRAZED, SLIP-ON ANSI B16.24, CLASS 150		STEEL ASTM A563 ANSI B18.2.2 GR A	MSS-SP-67, LUG DUCTILE IRON, ASTM A395									

- PIPING SYSTEM DESIGN, MATERIAL, INSTALLATION, TESTING AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH USCG REGULATIONS, ABS RULES, MARPOL AND THE INTERNATIONAL CONVENTION FOR SAFETY OF LIFE AT SEA.
- THIS DRAWING PROVIDES DIAGRAMMATIC ILLUSTRATIONS OF PIPING SYSTEMS. PIPING ARRANGEMENTS WITHIN THE VESSEL SHALL BE DEVELOPED BY THE SHIPYARD.
- EQUIPMENT AND MACHINERY PERFORMANCE CHARACTERISTICS AND PIPE SIZING INFORMATION SHALL BE CONFIRMED BY THE SHIPYARD BASED ON THE SYSTEM'S PIPING ARRANGEMENT AND DETAILS AND CERTIFIED MANUFACTURER'S DATA.
- PIPING INSTALLATIONS SHALL PERMIT FREE PASSAGE ALONG WALKWAYS AND LADDERWAYS; FREE ACCESS FOR OPERATION AND ROUTINE MAINTENANCE; FREE ACCESS TO ALL DOORS, HATCHES AND OPENINGS; AND, AS MUCH AS IS PRACTICABLE, BE FREE OF INTERFERENCE TO THE READY REMOVAL OF EQUIPMENT AND SYSTEM COMPONENTS.
- SUITABLE TAKEDOWN JOINTS SHALL BE PROVIDED IN PIPING SYSTEMS FOR READY REMOVAL OF MACHINERY AND EQUIPMENT.
- GAGE PIPING ASSEMBLIES AND MATERIALS SHALL BE IN ACCORDANCE WITH ASTM F721, EXCEPT PIPING ROOT VALVES SHALL BE AT LEAST 1/2-INCH.
- PIPE WELDING SHALL COMPLY WITH THE REGULATORY BODY REQUIREMENTS AND WITH THE DETAILS GIVEN IN ASTM F722.
- BULKHEAD AND DECK PIPING PENETRATIONS SHALL MAINTAIN THE W.T. AND FIRE RATING OF THE BOUNDARY AND BE IN ACCORDANCE WITH THE REGULATORY BODY REQUIREMENTS & ASTM F682. REINFORCING PENETRATION SLEEVES SHALL BE FITTED.
- ALL PIPING SHALL BE ADEQUATELY SUPPORTED BY HANGERS IN ACCORDANCE WITH ASTM F708. PIPE SUPPORTS FOR SYSTEMS FOR VIBRATION ISOLATED SYSTEMS (AS DEFINED IN REFERENCE 1) SHALL BE MOUNTED TO STIFFENED AREAS OF THE SHIP STRUCTURE WITH AN ISOLATED PIPE CLAMP THAT INCLUDES A MINIMUM 1/2" THICK INSERT MADE OF RUBBER WITH 40 TO 45 SHORE A DUROMETER. NO PIPE CLAMPS SHALL BE MOUNTED TO THE CENTER OF BULKHEAD OR DECK PLATING.
- CHILLED WATER SHALL CONTAIN 45% ETHYLENE GLYCOL BY WEIGHT.
- PIPING TO BE INSULATED IN ACCORDANCE WITH ASTM STANDARD F683 STANDARD PRACTICE FOR SELECTION AND APPLICATION OF THERMAL INSULATION FOR PIPING AND MACHINERY.
- ALL PIPING SHALL BE ROUTED AS DIRECTLY AS POSSIBLE.
- SYSTEM DISPLAYS, INDICATORS & ALARMS SHALL BE IN ACCORDANCE WITH ABS ACCU RULES.
- FLEXIBLE PIPING CONNECTIONS SHALL BE USCG AND ABS APPROVED, AND SUITABLE FOR INTENDED SERVICE. FLEXIBLE CONNECTIONS SHALL PROVIDE FOR FULL 6 DEGREES OF FREEDOM OF RESILIENTLY MOUNTED MACHINERY, INCLUDING MAXIMUM EXCURSIONS EXPERIENCED IN A SEAWAY AND DURING ICE TRANSITS. CRITICAL AND NON-CRITICAL MACHINERY (AS PER REFERENCE 1) SHALL BE OUTFITTED WITH A MULTI-LEG (TWO AT 90° ORIENTATION) AND SINGLE-LEG FLEXIBLE CONNECTION(S), RESPECTIVELY. FLEXIBLE HOSE ASSEMBLIES CONSTRUCTED OF NON-METALLIC MATERIALS INTENDED FOR INSTALLATION IN PIPING SYSTEMS FOR FLAMMABLE MEDIA AND SEAWATER SYSTEMS WHERE FAILURE MAY RESULT IN FLOODING SHALL BE OF FIRE RESISTANT TYPE AS PER ABS REQUIREMENTS.
- SENSORS SHALL BE INSTALLED IN ACCORDANCE WITH THE SPEC (REF. 1)
- NOISE CRITICAL SYSTEMS ARE DEFINED AND LISTED IN REFERENCE 1. ISOLATION MOUNTED EQUIPMENT FOR CRITICAL AND NON-CRITICAL SYSTEMS SHALL BE MOUNTED WITH APPROPRIATE MARINE GRADE VIBRATION ISOLATORS SUCH AS CHRISTIE & GREY OR NAVY STANDARD, OR EQUAL, AND SHALL HAVE FLEXIBLE CONNECTIONS FOR FLUID, AIR AND ELECTRICAL SERVICE. CRITICAL APPLICATIONS WILL REQUIRE A 6 DEGREE OF FREEDOM ANALYSIS TO BE PERFORMED BY THE SHIPYARD TO ENSURE THAT THE CHANGE OF CAUSING EXCESS UNDERWATER RADIATED NOISE IS MINIMIZED. ALL VIBRATION ISOLATED CRITICAL EQUIPMENT SHALL HAVE EQUAL MOUNT LOADING TO WITHIN PLUS OR MINUS 10% AT EACH MOUNTING LOCATION. THE FOUNDATION DESIGN OF CRITICAL EQUIPMENT REQUIRES A TOP PLATE OF AT LEAST 3/4" AND GUSSETS TO THE SUPPORTING STRUCTURE. THE VIBRATION ISOLATORS WILL BE INSPECTED BEFORE SEA TRIALS BY AN OWNER'S REPRESENTATIVE.

NOTE: THIS SYSTEM HAS BEEN DESIGNED TO MINIMIZE THE TRANSMISSION OF UNDERWATER RADIATED NOISE BY ISOLATION OF MECHANICAL EQUIPMENT (SEE GENERAL NOTES 9, 14 AND 16 AND REFERENCE 1)

DRAWING APPROVED BY ABS, LETTER REFERENCE 350987, DATED 6/30/2008. ALL ABS TECHNICAL COMMENTS HAVE BEEN INCORPORATED IN THIS REVISION.

PUMP DATA (SEE NOTE 3)								
ITEM NO.	SERVICE	QTY	TYPE	CAPACITY (GPM)	TDH (FT)	MOTOR HP	RPM	REMARKS
1	CHILL WATER PUMP	2	CENTRIFUGAL	290	80	10	1800	GOULDS 3996 3X4X10, VERTICAL MOUNT, CLOSE COUPLED, CAST IRON, MECHANICAL SEAL, OR EQUAL

A/C CHILLER DATA (SEE NOTES 3 & 10)									
ITEM	QTY	RATED CAPACITY (TONS)	COOLING			CONDENSER			REMARKS
			FLOW	TEMP. IN	TEMP. OUT	FLOW	TEMP. IN	TEMP. OUT	
2	1	104	290	50	40	210	85	100	CARRIER MODEL 30HXS0136RY MARINIZED, OR EQUAL

SYMBOL LIST			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
▶	FLOW ARROW	⊕	GAGE, PRESSURE
●	PIPE UP/DOWN	⊕	GAGE, TEMPERATURE
◀	PIPE DOWN	⊕ ^{VP}	GAGE, VACUUM/PRESSURE
○	PIPE UP	TT	TEMPERATURE TRANSMITTER
⊘	BALL VALVE	PT	PRESSURE TRANSDUCER
⊘	GATE VALVE	LLA	LOW LEVEL ALARM
↗	SWING CHECK VALVE	↻	PUMP, CENTRIFUGAL
⊘	GLOBE VALVE	┌┐	DRIP PAN
⊘	BUTTERFLY VALVE	⊙	VENT AIR ELIMINATOR
⊘	HOSE VALVE	└┘	Y-STRAINER
⊘	RELIEF VALVE		ORIFICE
⊘	THREE-WAY TEMPERATURE CONTROL BYPASS VALVE	⊔	PLUGGED CONNECTION
⊘	CIRCUIT BALANCING VALVE	⊞	FLEX CONNECTION
⊘	VIBRATION ISOLATOR		

A/C COIL UNIT DATA	
FAN SYSTEM	GPM
AHU 1	REF. 4
AHU 2	REF. 4
AHU 3	REF. 4
AHU 4	REF. 4
AHU 5	REF. 4
AHU 6	REF. 4
FCU 1	REF. 4
FCU 2	REF. 4
FCU 3	REF. 4
FCU 4	REF. 4
FCU 5	REF. 4
FCU 6	REF. 4
FCU 7	REF. 4
FCU 8	REF. 4
FCU 10	REF. 4

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPD
3-B	A	1. UPDATED REFERENCES TO LIST THE MOST CURRENT REVISION OF EACH DRAWING AND THE CONTRACT SPECIFICATIONS.	8/12/09	SAC

REFERENCES	
1.	ALASKA REGION RESEARCH VESSEL CONTRACT SPECIFICATIONS, REV D
2.	GLOSTEN DWG. NO. 07096-070-01, REV B, GENERAL ARRANGEMENT
3.	GLOSTEN DWG. NO. 07096-200-01, REV A, MACHINERY ARRANGEMENT
4.	GLOSTEN DWG. NO. 07096-511-01, REV A, HVAC DIAGRAM - SUPPLY
5.	GLOSTEN DWG. NO. 07096-533-01, REV B, POTABLE WATER SYSTEM DIAGRAM
6.	GLOSTEN DWG. NO. 07096-537-01, REV A, WASTE HEAT RECOVERY & HOT WATER HEATING

SHEET INDEX	
SHEET NO.	DESCRIPTION
1	GENERAL NOTES, REFERENCES, REVISIONS, MATERIAL SCHEDULE, SYMBOL LIST, PUMP DATA, A/C CHILLER & COIL UNITS DATA
2	PARTIAL PLAN 14-C, 2ND PLATFORM, FRAMES 16-40 DETAIL 11-C, SYSTEM DIAGRAM OF A/C EQUIPMENT IN MSD ROOM
3	PARTIAL PLAN 23-C, 1ST PLATFORM, FRAMES 21-40
4	PARTIAL PLAN 29-C, MAIN DECK, FRAMES 22-64
5	PARTIAL PLAN 38-C, 03 LEVEL, FRAMES 22-45 DETAIL 35-B, TYPICAL COOLING COIL CONNECTION

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FAIRBANKS, ALASKA

ALASKA REGION RESEARCH VESSEL
CHILL WATER SYSTEM DIAGRAM

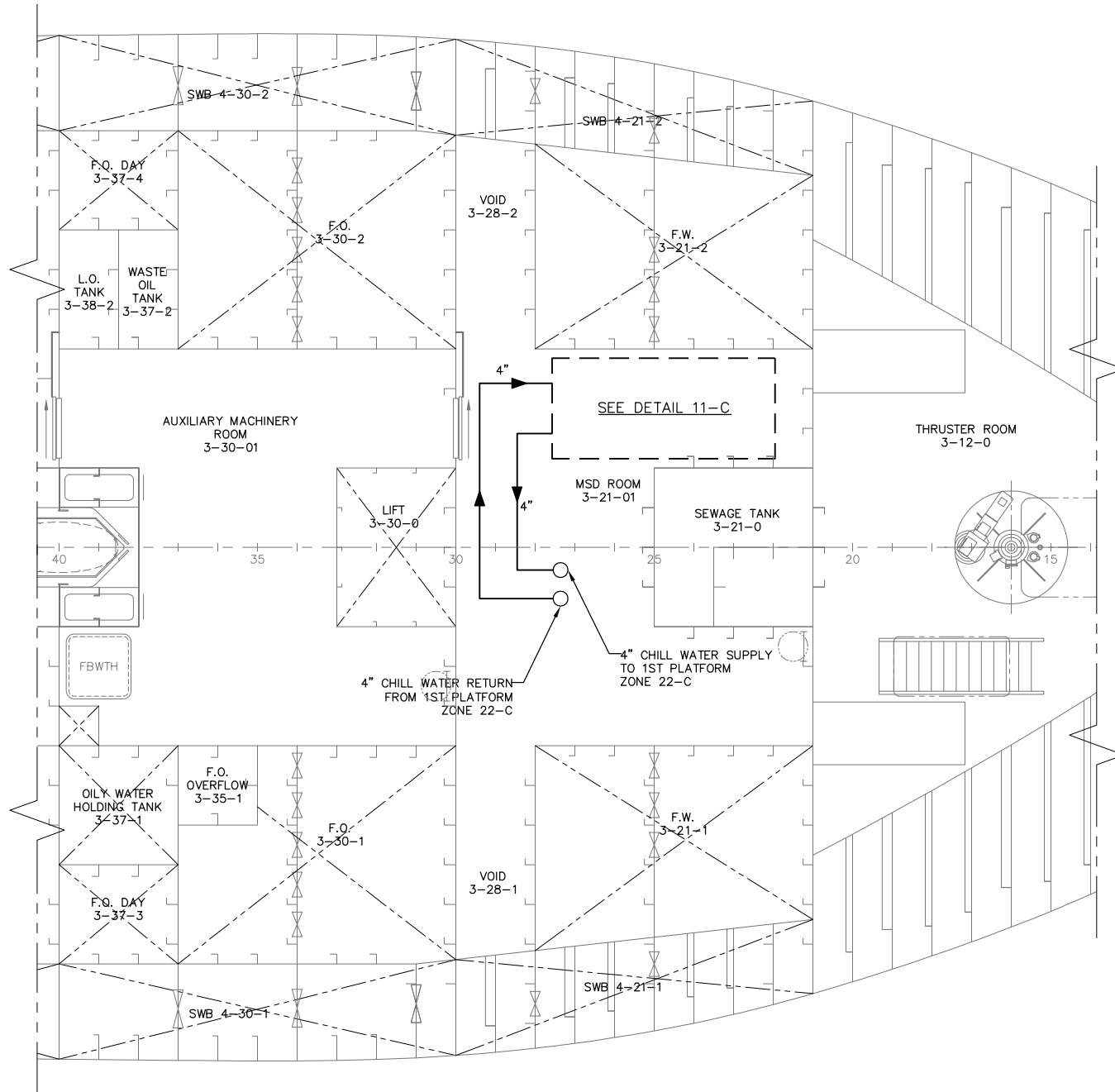
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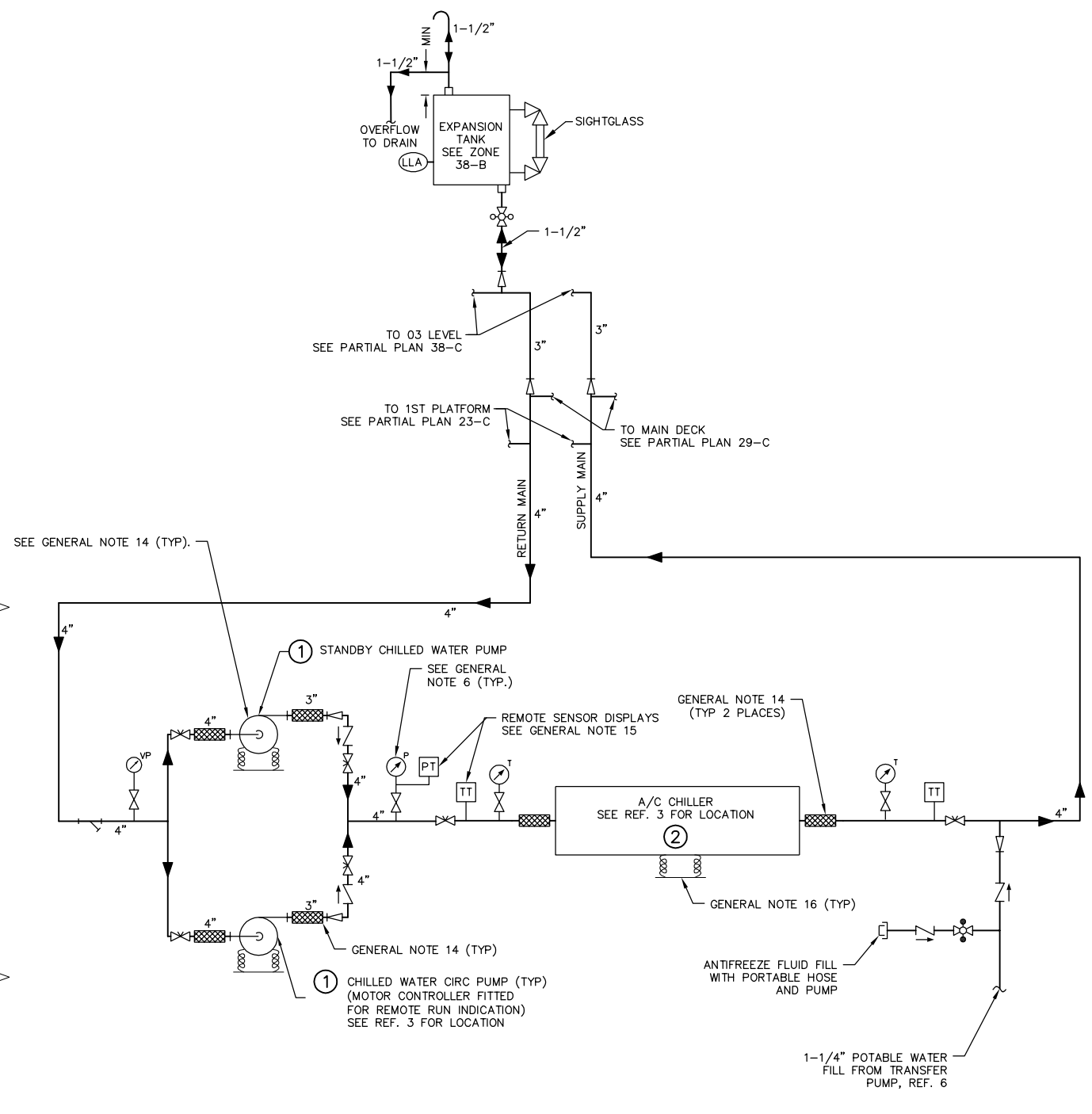
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SPR/JDC	8/12/09	SAC	8/12/09	DHK	8/12/09
Scale	Drawing Number		Rev		
NO SCALE	07096-514-01		Sheet 1 of 5		



HALF SIZE PRINT



PARTIAL PLAN 14-C
2ND PLATFORM (FRAMES 16-40)



DETAIL 11-C
SYSTEM DIAGRAM IN MSD ROOM

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	ALASKA REGION RESEARCH VESSEL CHILL WATER SYSTEM DIAGRAM		
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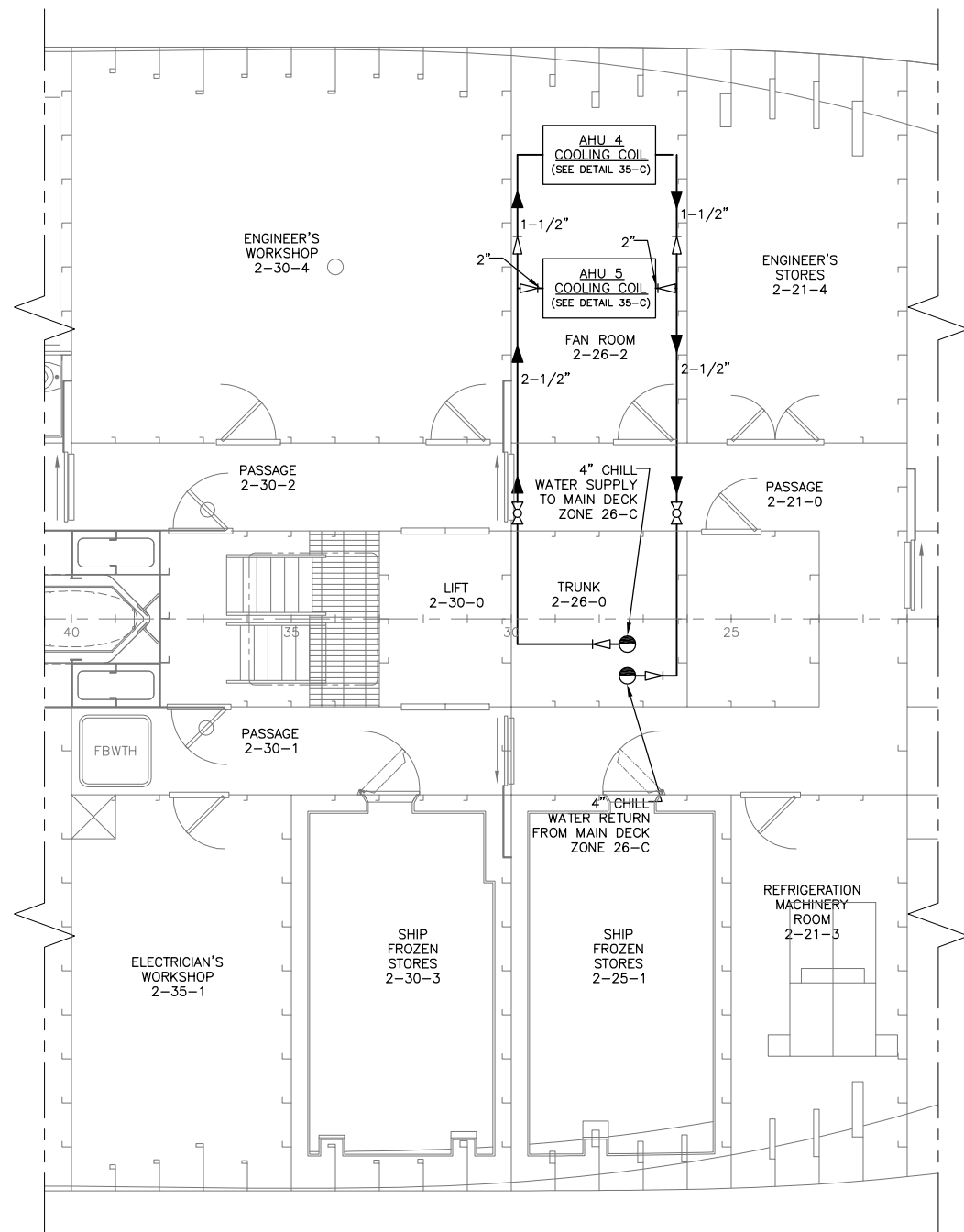
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PARTIAL PLAN 23-C
1ST PLATFORM (FRAMES 21-40)

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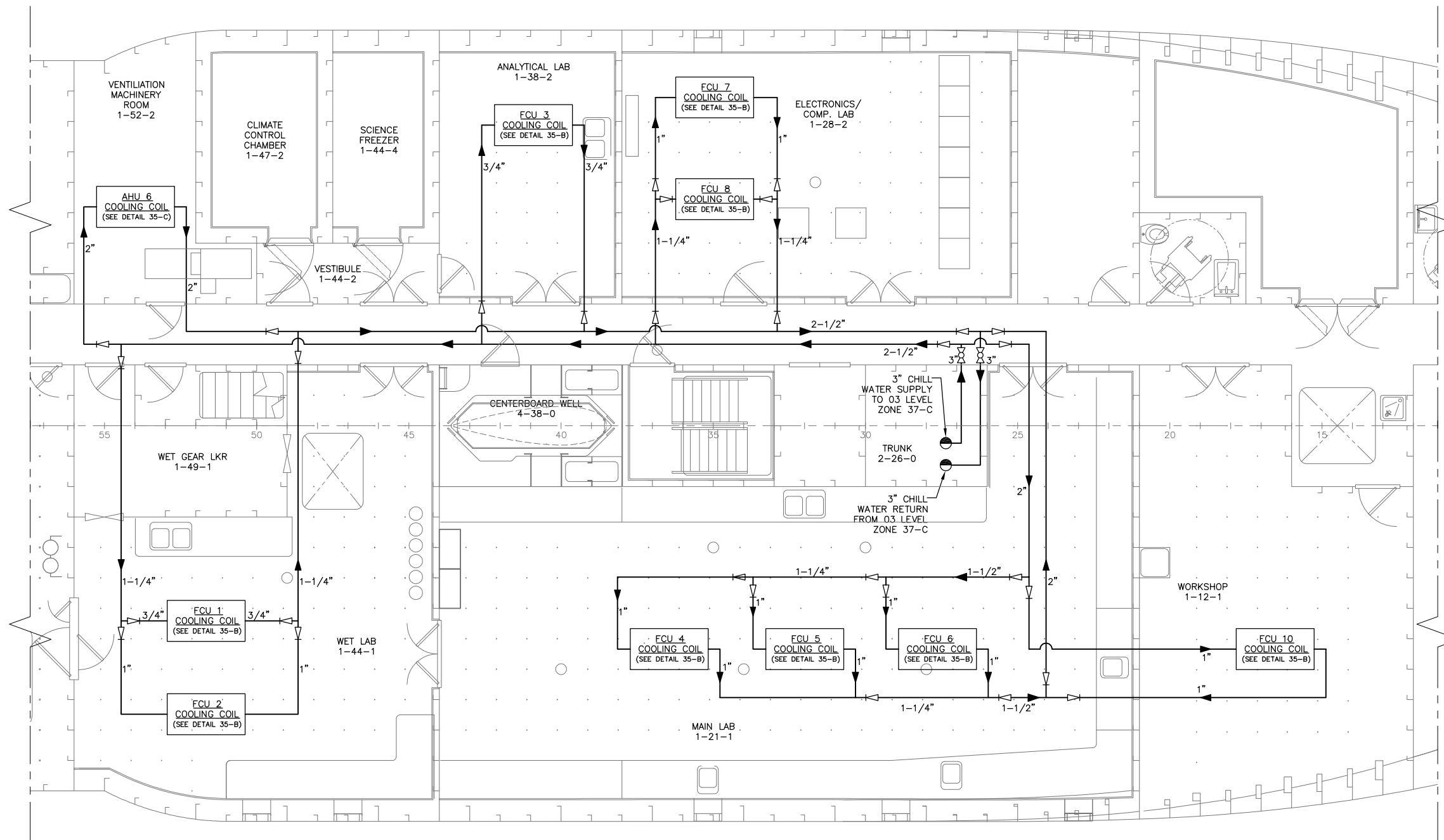
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PARTIAL PLAN 29-C
 MAIN DECK (FRAMES 22-64)



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		SAC	8/12/09
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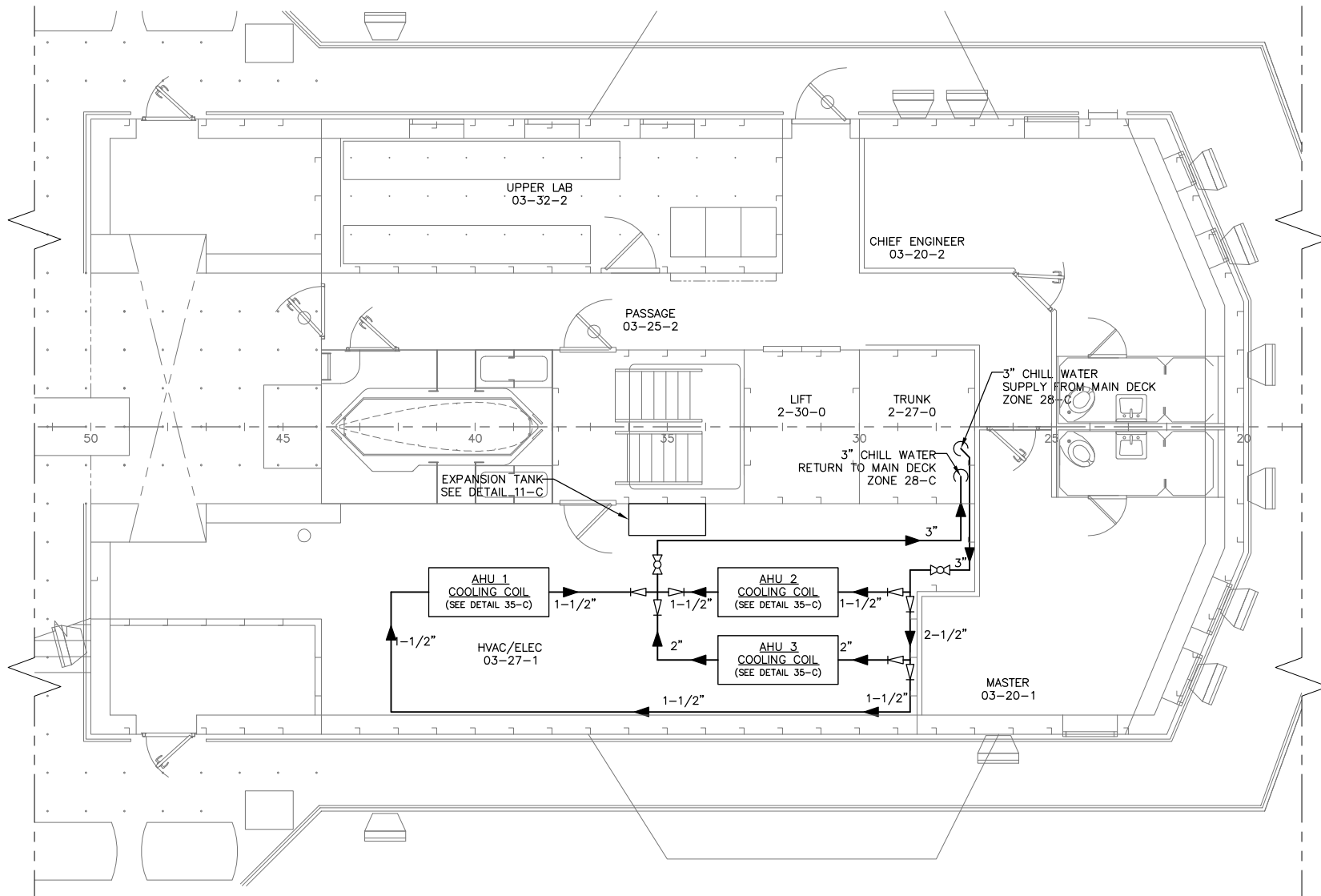
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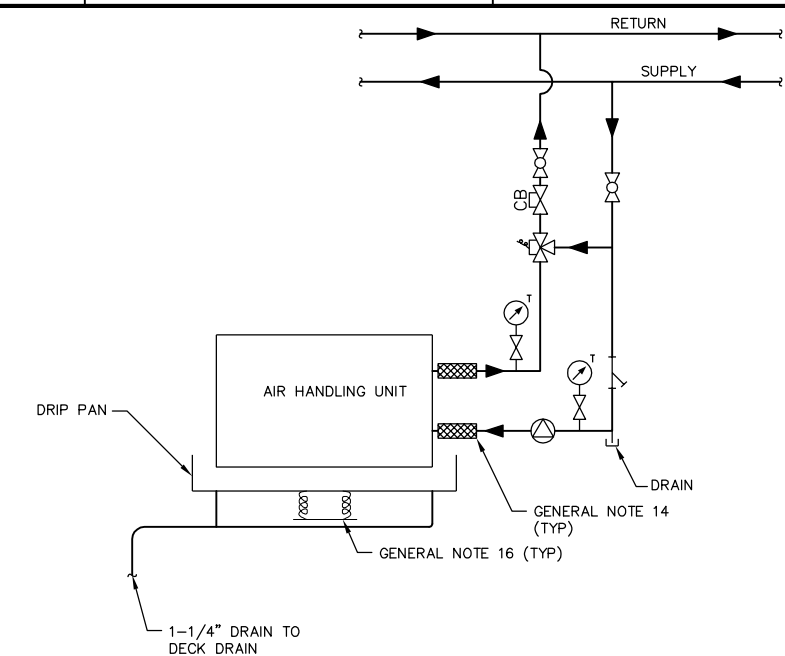
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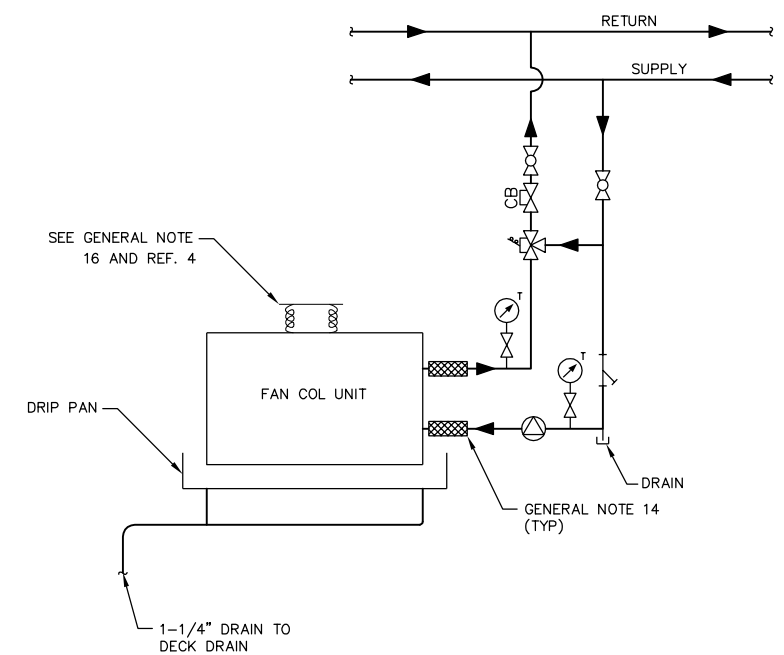
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PARTIAL PLAN 38-C
03 LEVEL (FRAMES 22-45)



DETAIL 35-C
TYPICAL AIR HANDLING UNIT CONNECTION



DETAIL 35-B
TYPICAL FAN COIL UNIT CONNECTION

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Drawing Number: 07096-514-01 Sheet 5 of 5		Rev: A