Cray X1 Site Planning

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- System overview
- Typical equipment layouts
- Cabling overview
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- Power wiring
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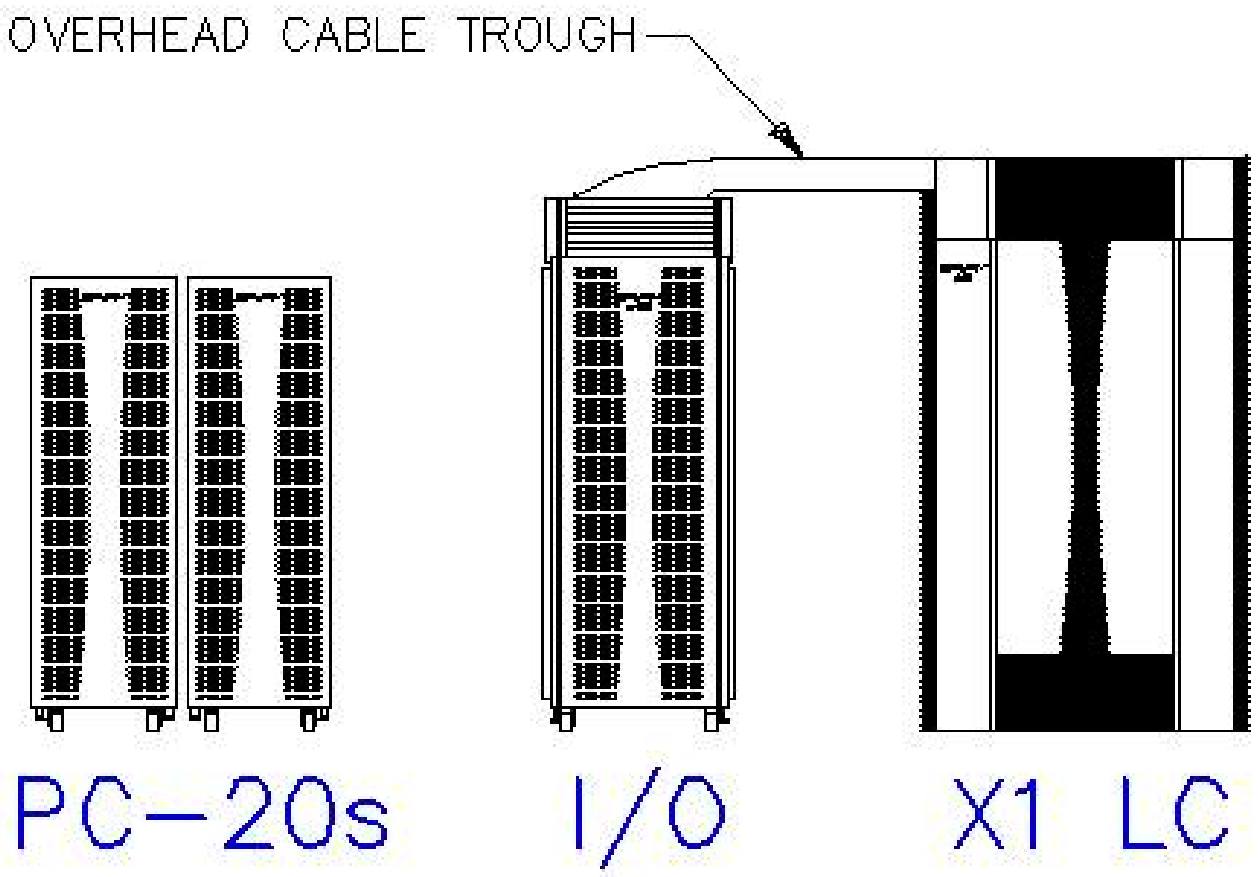
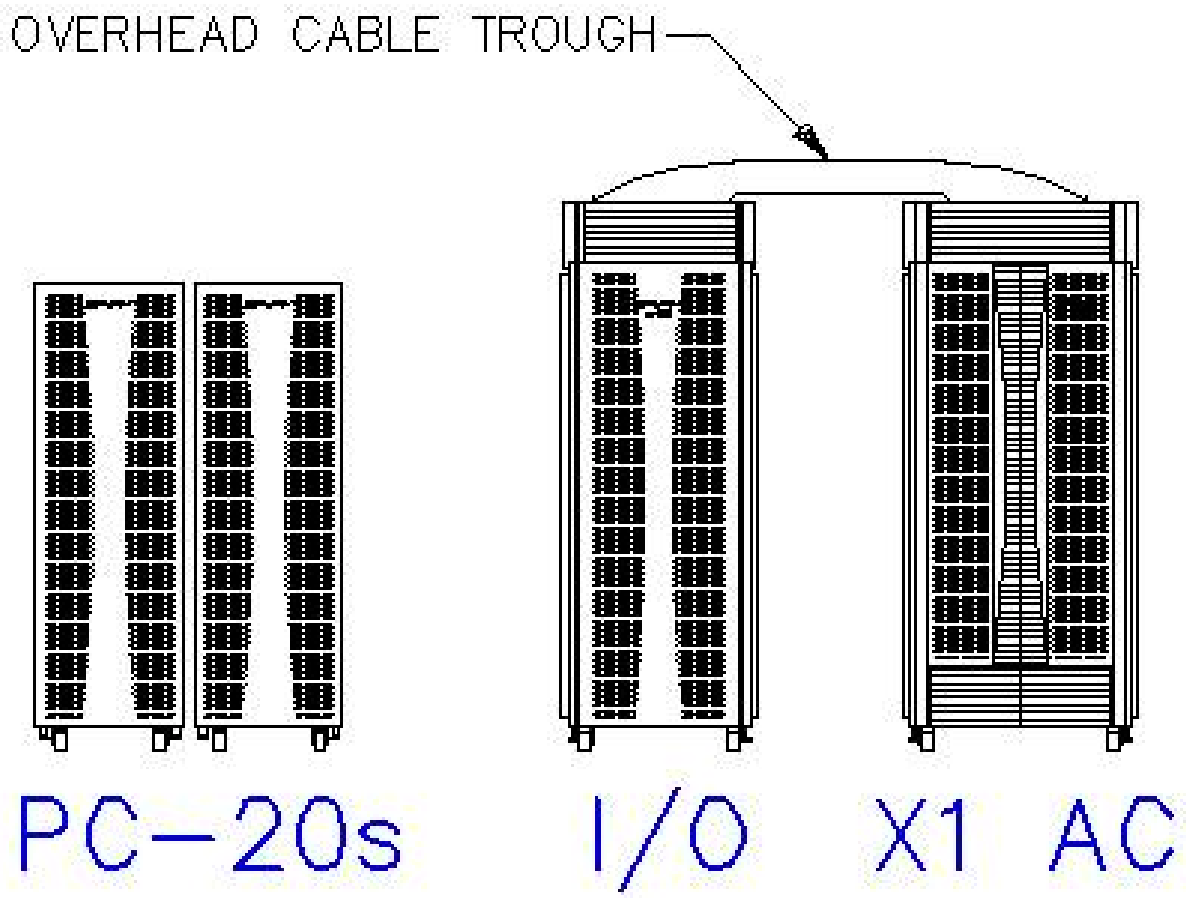
- System comparisons

Cray X1 LC System



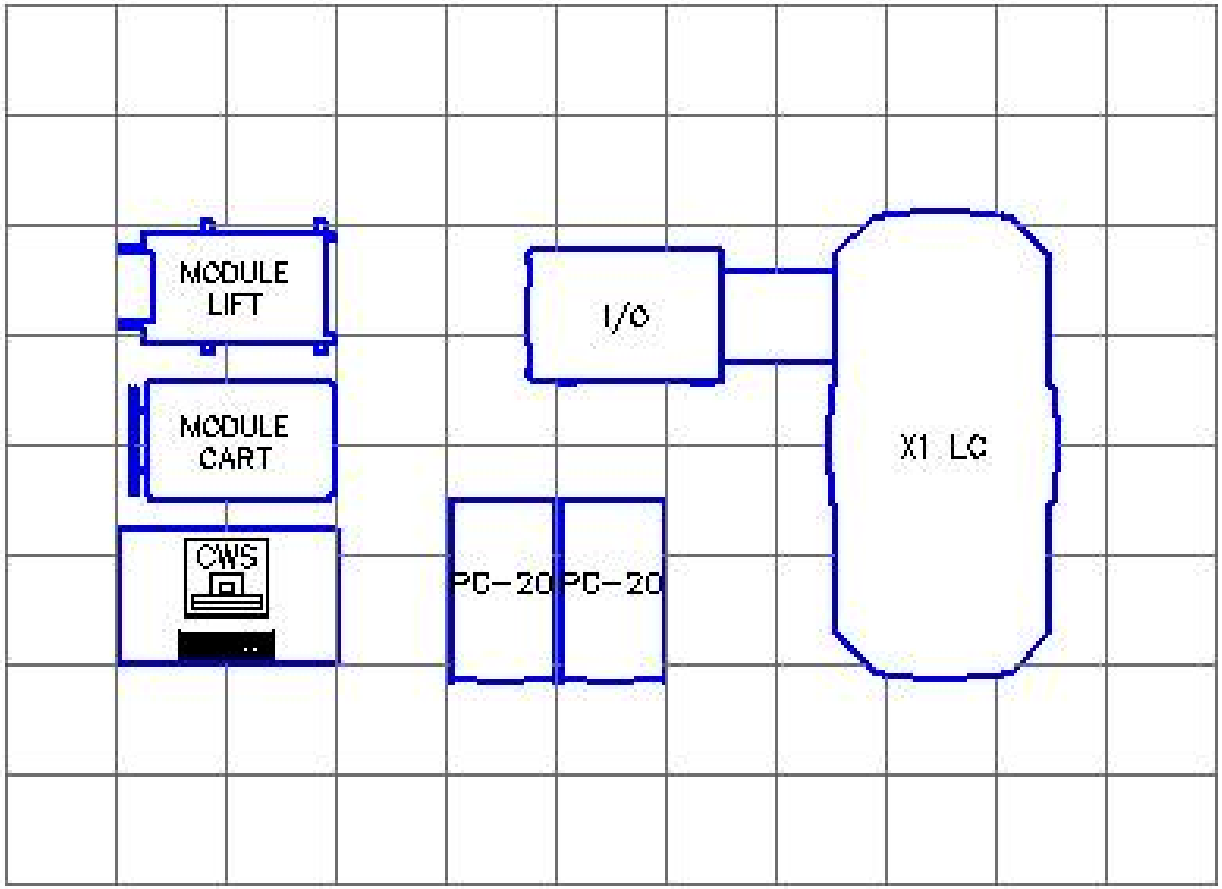
Cray X1 LC I/O and Mainframe

Cray X1 AC System

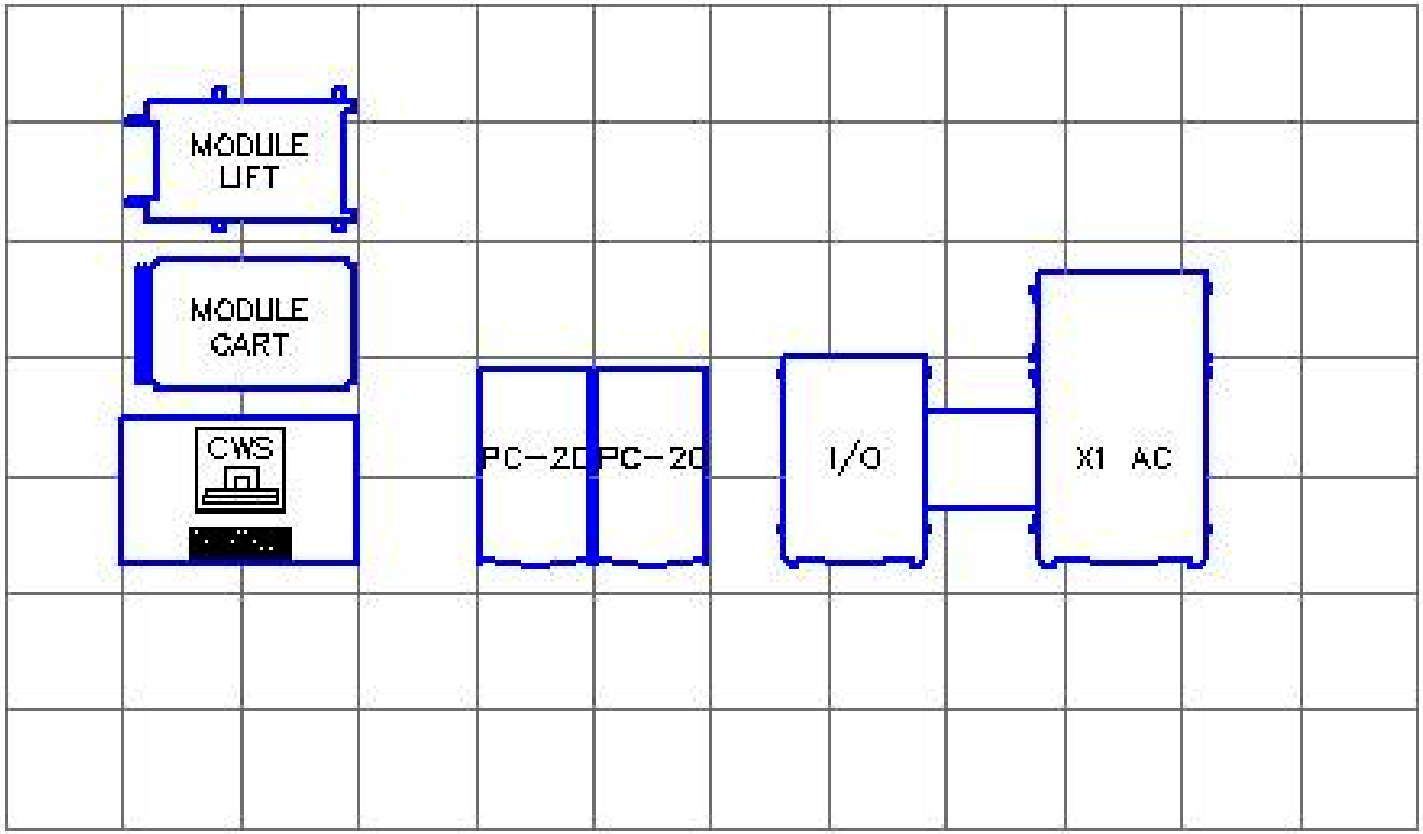


Cray X1 AC I/O and Mainframe

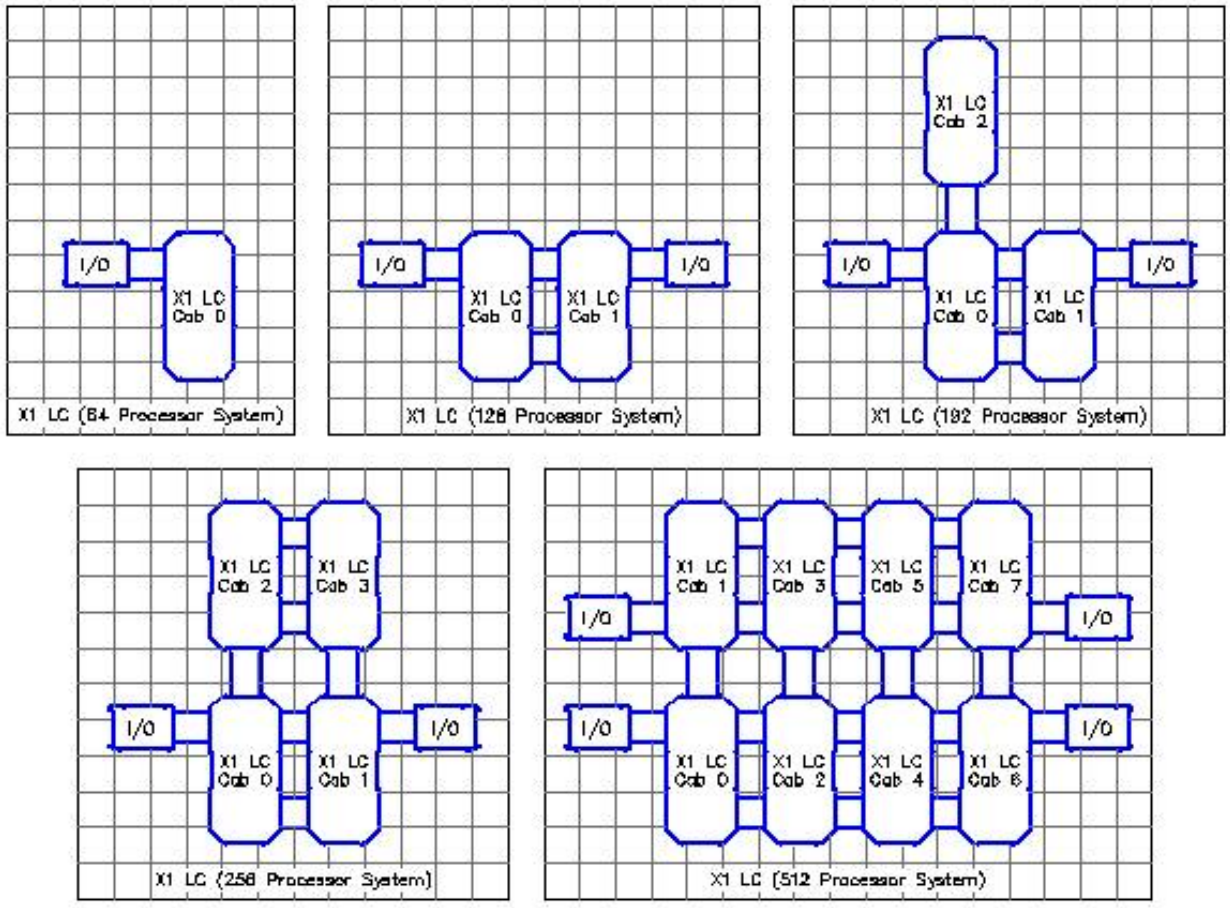
Cray X1 LC typical layout



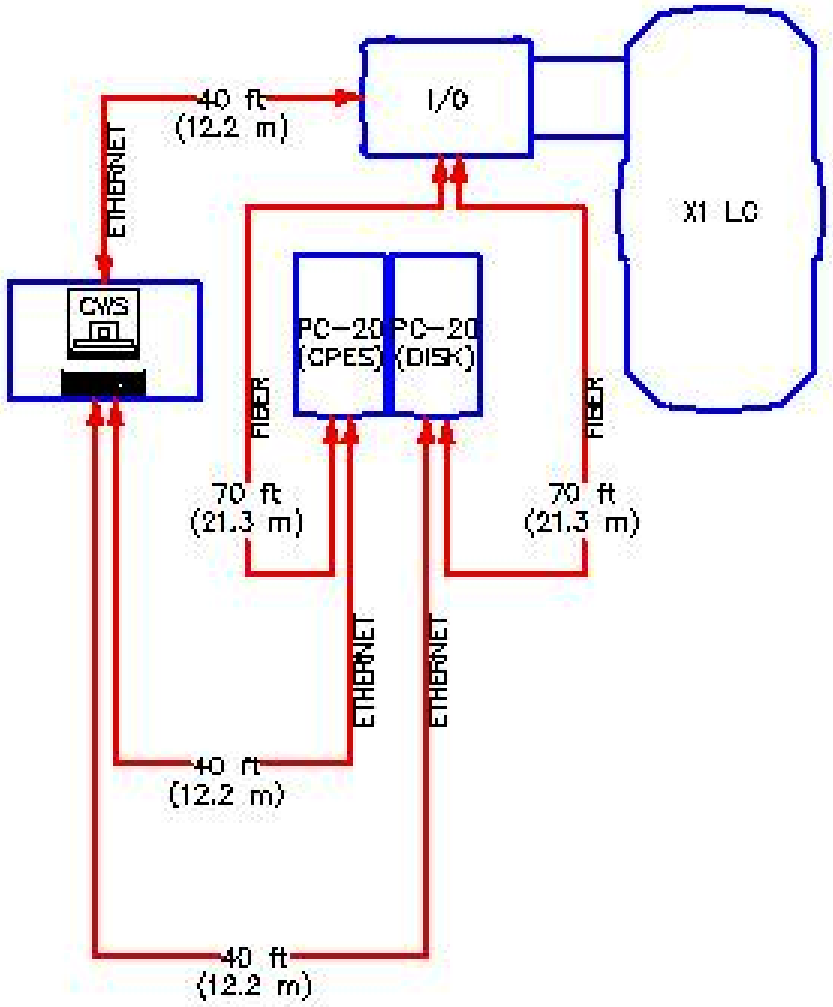
Cray X1 AC typical layout



Cray X1 LC layouts when scaling



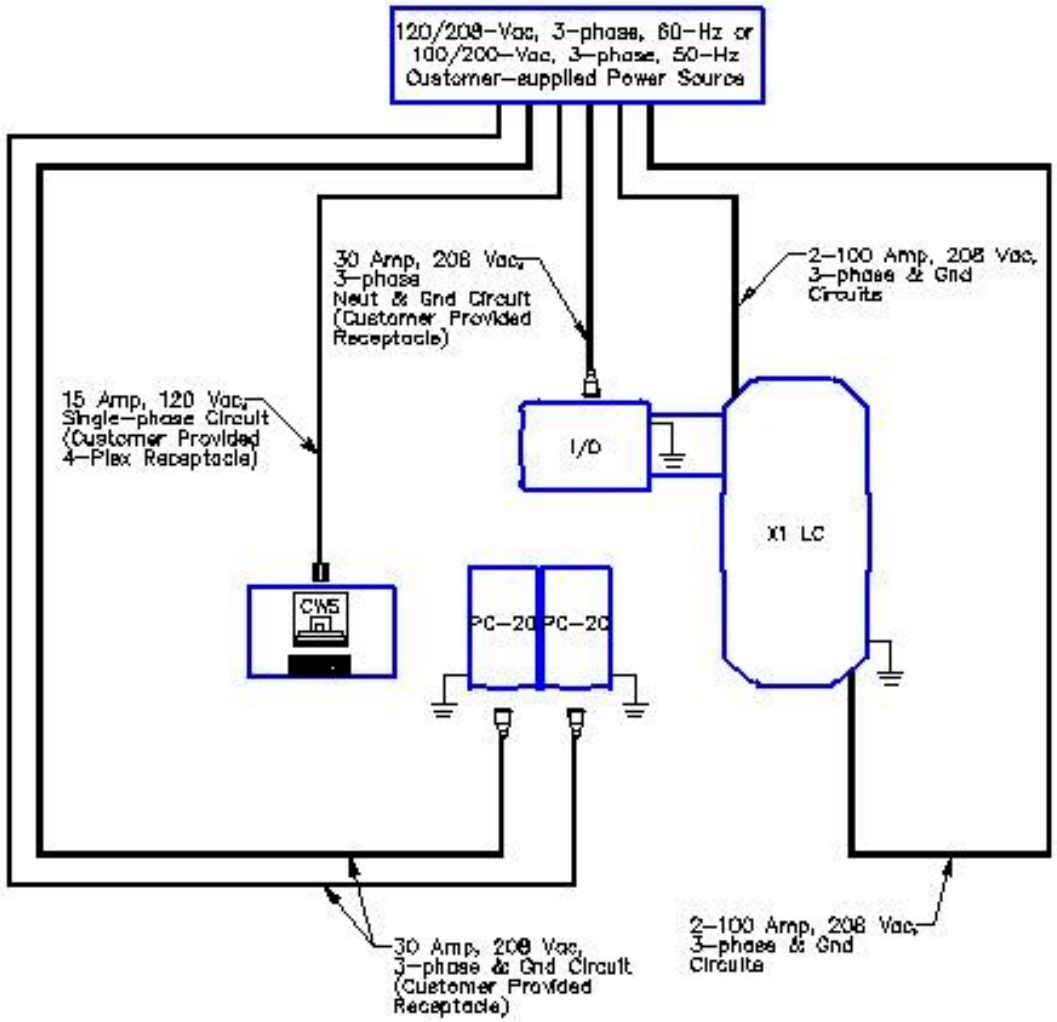
Cray X1 LC cables



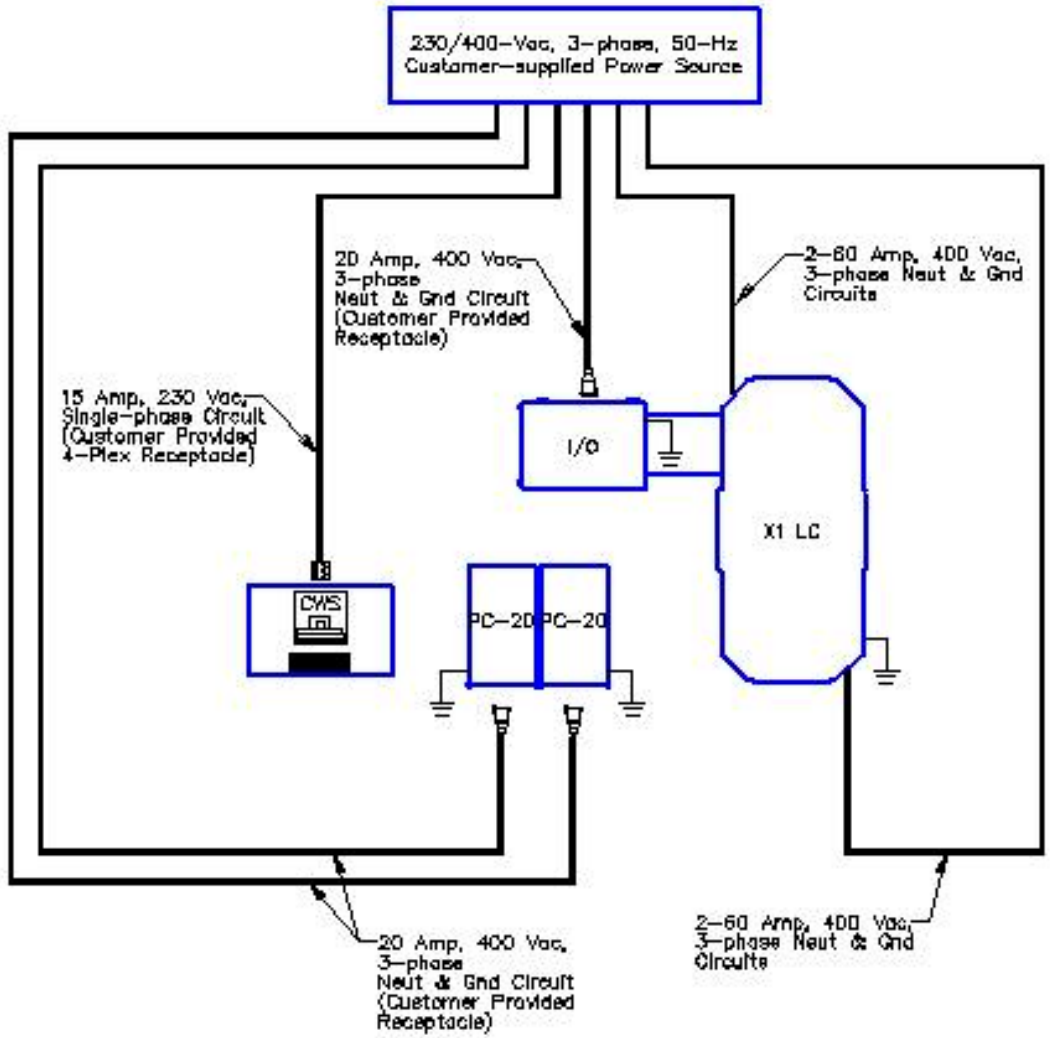
Cray X1 LC mainframe with lifts

Cray X1 AC cabinet on pallet

Cray X1 LC (100/200 or 120/208-Vac) power wiring

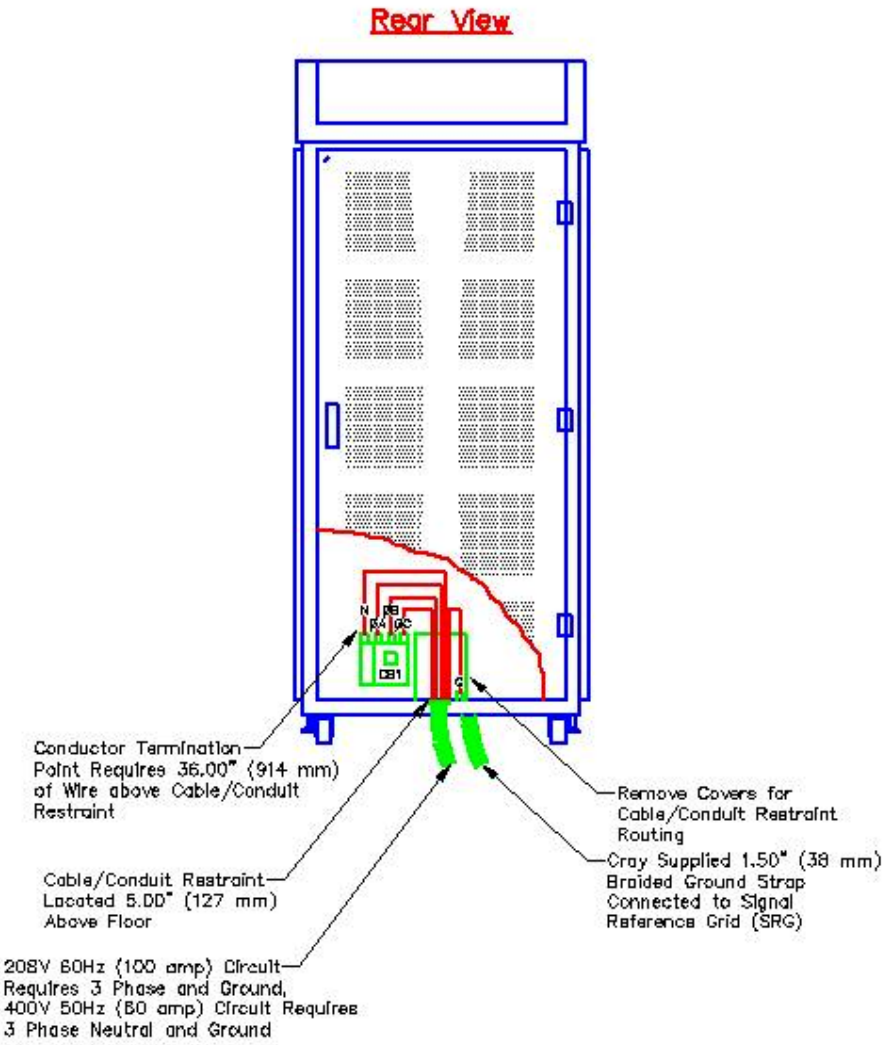


Cray X1 LC (230/400-Vac) power wiring

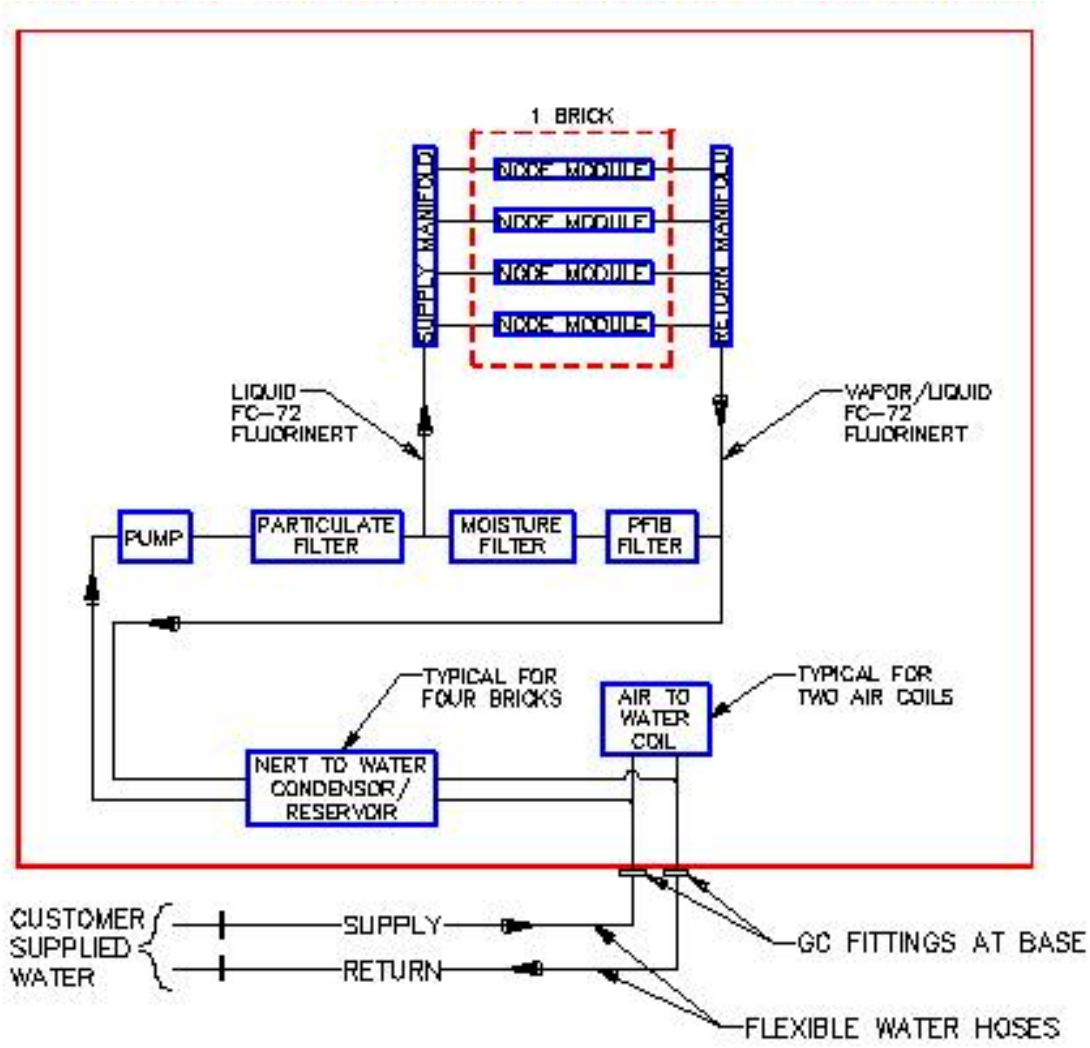


Cray X1 LC power input connections

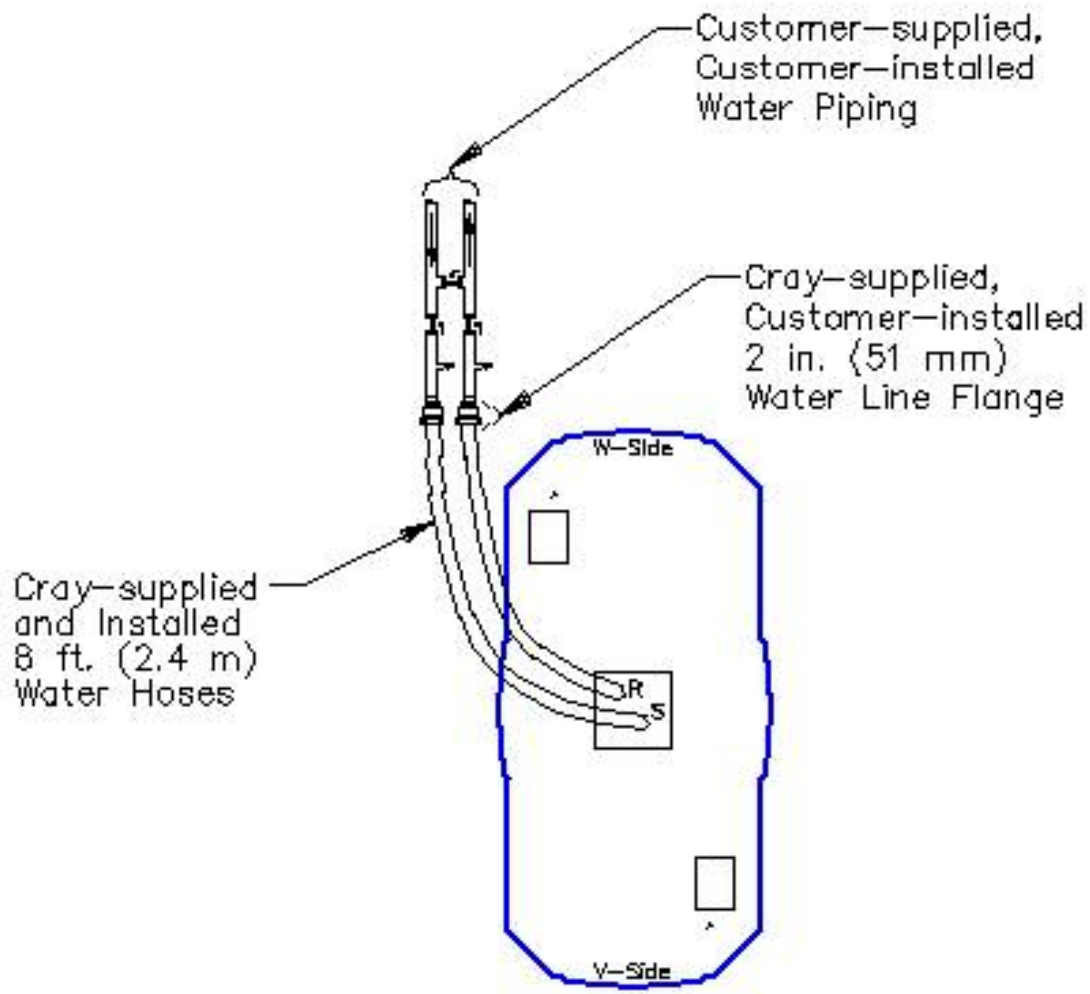
Cray X1 AC power wiring



Cray X1 LC cabinet cooling schematic

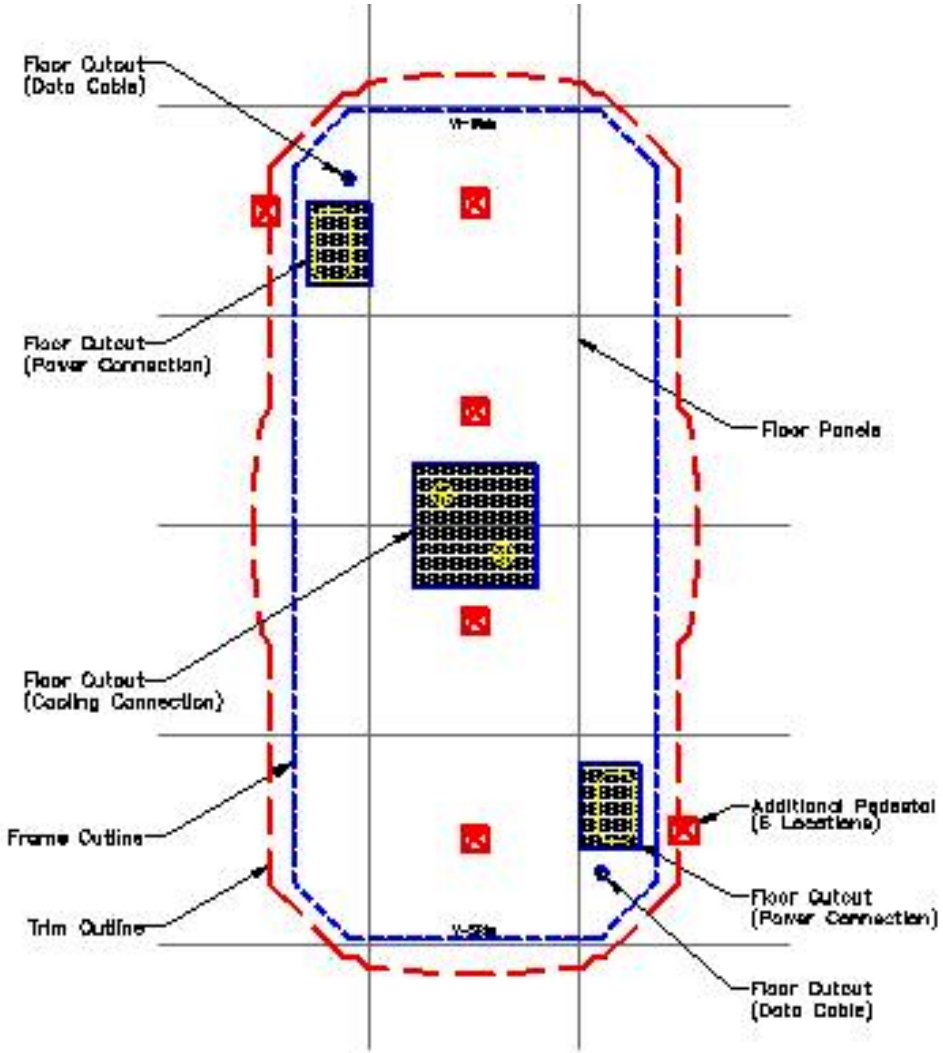


Cray X1 LC water piping

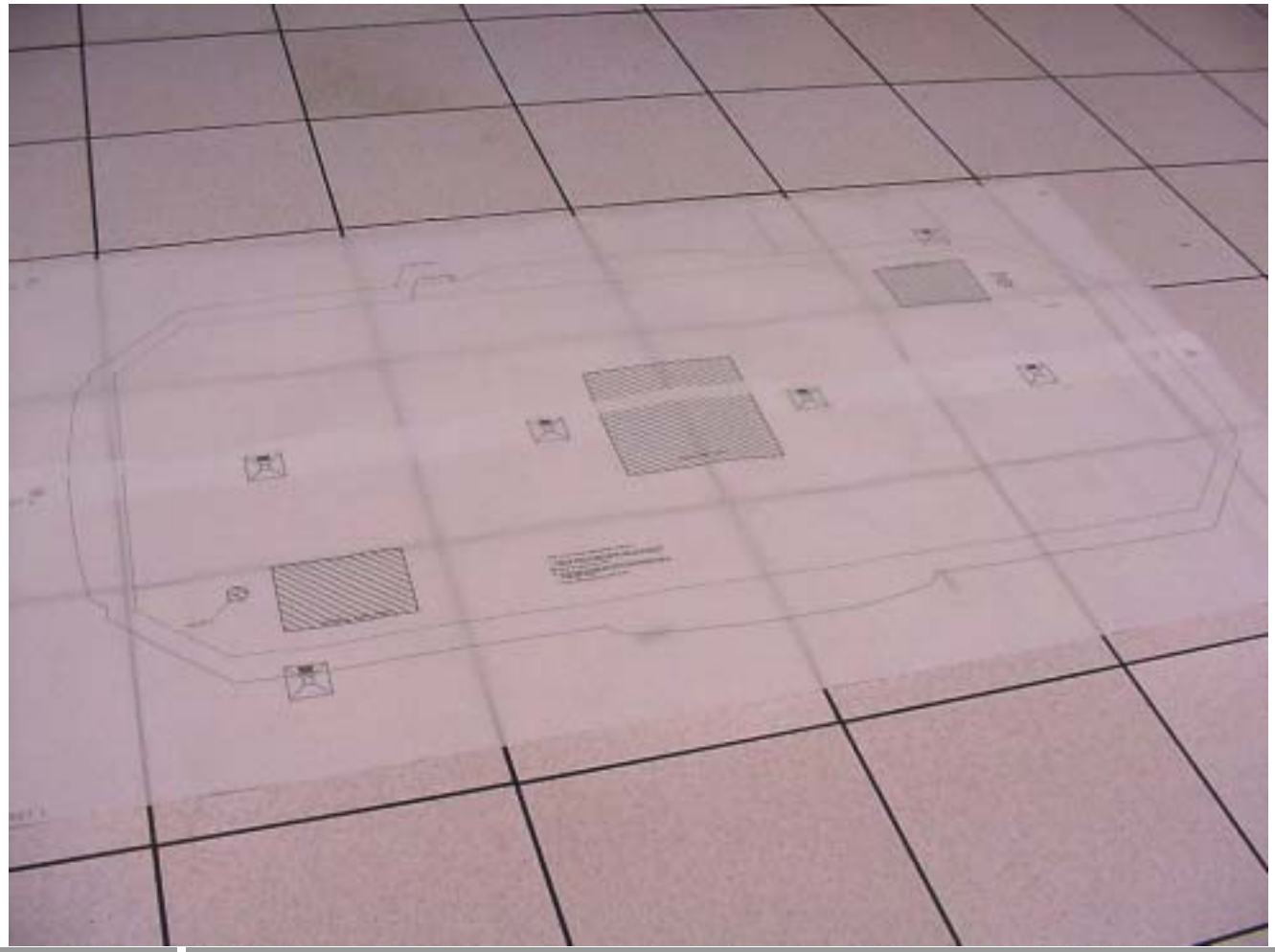


Cray X1 LC water connections

Cray X1 LC floor preparation



Cray X1 floor preparation template



Cray X1 environmental and chilled water requirements

Cray X1 LC Environmental Requirements

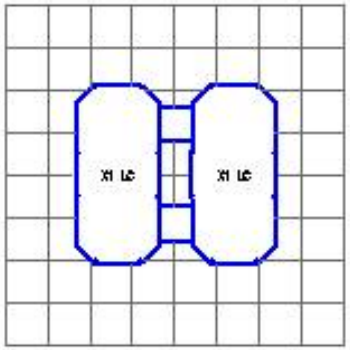
Characteristic	Specification
Temperature range:	50 to 90º F (10 to 32º C)
Relative humidity:	20% to 80% Non-condensing
Dewpoint:	60º F (16º C) Maximum
Altitude:	0 to 10,000 ft. (0 to 3048 m)

Cray X1 LC Chilled Water Requirements

Characteristic	Specification
Temperature range:	45 to 55º F (7 to 13º C)
Pressure:	100 psig (689 kpa) Maximum

Water cooled vs. Air cooled

WATER COOLED CRAY X1 MAINFRAMES

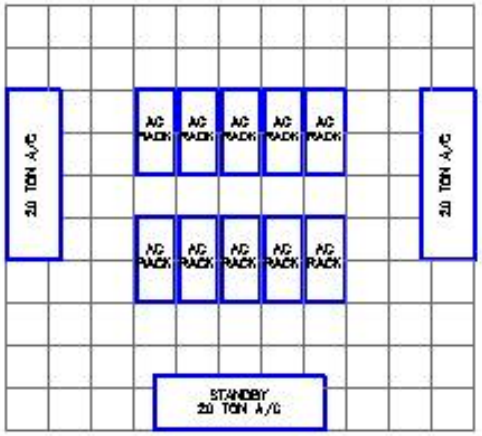


POWER REQUIREMENT
(2)X1 LC MAINFRAMES: 100.00 KW

COOLING REQUIREMENT
HEAT TO CHILLED WATER: 341 KBTU/HR (28 TONS)

FLOOR SPACE REQUIRED: 256 SQ. FT. (23.8 m2)

AIR COOLED COMPUTER SYSTEM



POWER REQUIREMENT

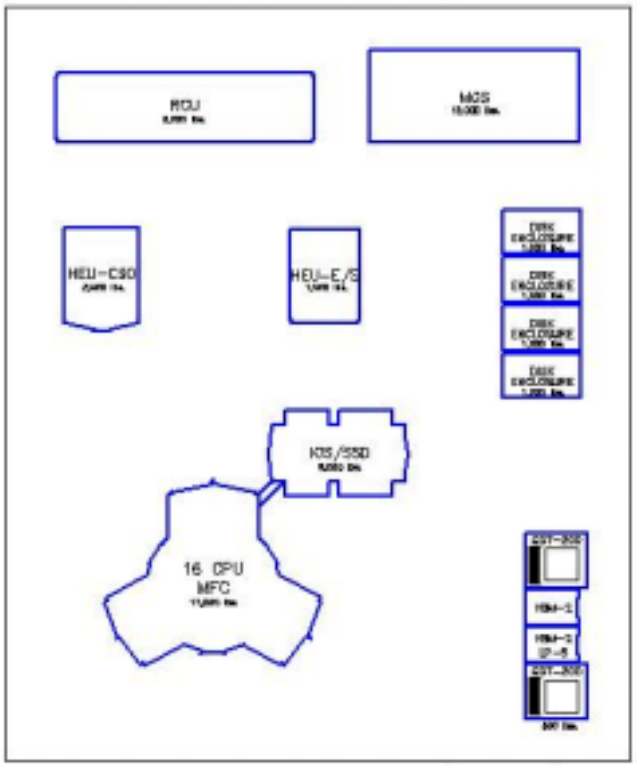
(10)AC RACKS:	100.00 KW
(2)A/C UNITS:	20.00 KW
TOTAL:	120.00 KW

COOLING REQUIREMENT
HEAT TO COMPUTER ROOM: 409 KBTU/HR (34 TONS)

FLOOR SPACE REQUIRED: 440 SQ. FT. (40.9 m2)

ADDITIONAL ISSUES:
*AIR CONDITIONER UNIT PURCHASE, INSTALLATION, AND MAINTENANCE
*EQUIPMENT OPERATING NOISE
*AIR FLOW DISTRIBUTION
*MORE ELECTRICAL CIRCUITS/PDUs

Cray system comparison



AREA REQUIRED = 952 sq. ft. (88.4 m2)
47,500 lbs. (21546 kg) OF EQUIPMENT
TOTAL INPUT POWER = 398 KW
25 KW/CPU

AREA REQUIRED = 308 sq. ft. (28.6 m2)
8,100 lbs. (3674 kg) OF EQUIPMENT
TOTAL INPUT POWER = 63 KW
1 KW/PROC.

System Comparisons: power, cooling & site prep

Mainframe Type	Power System	Cooling System	Approximate Design & Site Preparation Duration
C90 16 processors	Utility to MG set to mainframe	Chiller to RCU to HEU to mainframe	16 to 20 weeks
T90 32 processors	Utility to UPS to HVDC to mainframe	Chiller to HEU to mainframe	12 to 16 weeks
Cray X1 LC 64 processors	Utility to mainframe	Chiller to mainframe	2 to 3 weeks

System Comparisons: floor space required

System Type	Peak Performance	Floor Space Required	Peak Performance Per Unit Area
Cray C90 16 Processors	16 Gflops	952 sq. ft. 88.4 sq. m.	.017 Gflops/sq. ft. .18 Gflops/sq. m.
Cray T90 32 Processors	57.6 Gflops	612 sq. ft. 56.8 sq. m.	.094 Gflops/sq. ft. 1.01 Gflops/sq. m.
Cray X1 LC 64 Processors	819 Gflops	308 sq. ft. 28.6 sq. m.	2.66 Gflops/sq. ft. 28.64 Gflops/sq. m.
NEC Earth Simulator 5120 Processors	40,000 Gflops	21,120 sq. ft. 1962 sq. m.	1.89 Gflops/sq. ft. 20.38 Gflops/sq. m.

System Comparisons: power consumption

System Type	Peak Performance	Power Consumption	Peak Performance per KW	Peak Performance Gflops/$ of energy
Cray C90 16 Processors	16 Gflops	398 KW	0.04 Gflops/KW	1056 Gflops/$1.00
Cray T90 32 Processors	57.6 Gflops	419 KW	0.13 Gflops/KW	3612 Gflops/$1.00
Cray X1 LC 64 Processors	819 Gflops	63 KW	12.84 Gflops/KW	339,677 Gflops/$1.00
NEC Earth Simulator 5120 Processors	40,000 Gflops	5,760 KW	6.94 Gflops/KW	186,046 Gflops/$1.00

System Installation Video

Cray X1 LC system installation video, compliments of Network Computing Services, Inc. who allowed us to video tape the installation of their system earlier this year.