HMR

STRUCTURAL CALCULATION COVER SHEET

Date: 10-16-01
PAGE 1 of 23

Calculation No:3442.053.SCAL.001,
Calculation Title: LDCC 3RD LEVEL FRAMING - ANALYSIS/CAPACITY
Project ID # 100256
Project Title: CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

PAGES: 23

	Rev. A Name/Signature/Date	Rev. 0 Name/Signature/Date	Rev._ Name/Signature/Date
Originator: DAVID APPLE	10/16/01	8/29/02	
Checked By: JIM WEEKS	10/16/01	8/29/02	
Approved By: JIM WEEKS	10/16/01	8/29/02	
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number
Drawing No. C52952	CCN Chilled Water System Optimization Master Plan	T1, M1-M33 Rev. B E1-E14 Rev. A
Drawing No. C52952	CCF/LDCC Cooling Plant Modifications	Rev. 0
Drawing No. C53116	LDCC EC-1 Modifications	Rev. 0

Record of Revision

Rev.	Reason for Revision
REV A	FIRST SUBMITTAL OF CALCULATIONS
Rev. 0	All pages of this calculation 3442.053.SCAL.001 Rev. A are considered Rev. 0, approved and released based upon no technical changes to the calculation during/after formal review.

HNR Holmes & Narver | Raytheon **STRUCTURAL DESIGN CALCULATION SHEET**	Project Title: CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN Project ID #100256 Task Order #053 PAGE 2 of 23
Calculation No. 3442.053.SCAL.001	PERFORMED BY: _____ 10/16/01 DAVID APPLE
Rev. No. A	CHECKED BY: _____ 10/16/01 JIM WEEKS
Calculation Title: LDCC 3rd LEVEL FRAMING - ANALYSIS/CAPACITY	

INTRODUCTION Purpose	Perform an analysis to determine if the third level framing system has adequate capacity to carry the additional loads imposed by this project and future project piping needs, which will be hung from the existing framing system.
Scope	Determine if the third level framing system can support 2 - 12" diameter and 2 - 6" diameter steel pipes as part of the building cooling system.
DESIGN BASIS Design Inputs	The LDCC facility is considered a Performance Category (PC) 1 facility. Piping and component weights provided by Mechanical Engineer and from manufacturers printed information. Third floor loading provided by LANL Facility Mechanical Engineer.
Criteria	LANL Facility Engineering Manual, Chapter 5 (Ref. 1)
Assumptions	It is conservative to assume non-composite action between the reinforced concrete floor slab and steel framing members. The concrete deck continuously braces the compression flanges of the steel beams. Pipe hangers will be spaced at 7'-6", matching the floor beam spacing (Ref. 3442.053.SCAL.002). Future project needs are for 2 - 6" diameter pipes (maximum) to be added to the building cooling system.
REFERENCES	(1) LANL Facility Engineering Manual, Chapter 5 (2) ASCE 7-98 (3) AISC Manual of Steel Construction, 9th Edition (4) IBC 2000 (5) 3442.053.SCAL.002 (6) LDCC Building Plans, Lab Job 7050-3
METHODS	Hand calculations were used to prepare these calculations.
RESULTS AND CONCLUSIONS	The third floor framing system has adequate capacity to carry the piping loads imposed by present and future project needs.

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CALCULATION CHECKLIST

Project #: 100256
Task Order # 053
CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

Calculation Number: 3442.053.SCAL.001 PAGE 3 of 23 | Revision A

Reviewer/Checker : JIM WEEKS

Reviewer performed or supervised subject calculation.
_____NO __X__YES Justification Attachment _____, _____ pages

Alternate Verification method approved _____ Method _____

Date 10/15/01

ITEM(S) CHECKED	Accept Y/N	OBJECTIVE EVIDENCE Sheets		INITIAL/ DATE
1. Cover forms properly completed.	Y			10/15
2. Calculation Sheet headers complete with calc. no., rev., etc.	Y			10/15
3. Calculation Sheet contents complete per format.	Y			10/15
4. Listed attachments included.	Y			10/15
5. Calculation Objective clearly described.	Y			10/15
6. Criteria are suitable and properly referenced to task-specific documents.	Y			10/15
7. Assumptions and data described and attached or referenced to task documents.	Y			10/15
8. Calculation method identified and appropriate for the design activity.	Y			10/15
9. Calculation results reasonable and correctly described in Results and Conclusions.	Y			10/15
10. Computer Program identified with version and revision.	N/A			
11. Computer Program references method used, etc.	N/A			
12. Computer input/output provided.	N/A			
13. Computer run traceable to calculation.	N/A			
14. Computer input data within permissible design input range.	N/A			
15. Computer Program validation/verification addressed.	N/A			

REMARKS

Checker Print Name & Sign
JIM WEEKS

Date 10/15/01

Preparer Print Name & Sign
DAVID APPLE

Date 10-16-01

CHECKED _____ DATE 10/3/01

APPROVED _____ DATE 10/3/01

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JOB NO. 03410344 2.0053
3442.053.SCAL.001 Rev.A
SHEET 4 OF _____

TITLE LDCC 3RD Level Framing - Analysis / Capacity BY DAA DATE 9-19-01
#100256 CMN Chilled Water System Optimization Master Plan

Plans for reference: Copies made from plans provided by David F. Walker, P.E
Bridgers & Paxton, Alb. (1987?)
Copies of plans dated Aug. 24, 1967

Sheet A3.1, & S1, S10,

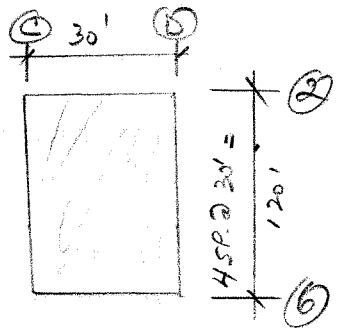
Structural Datum 100.0

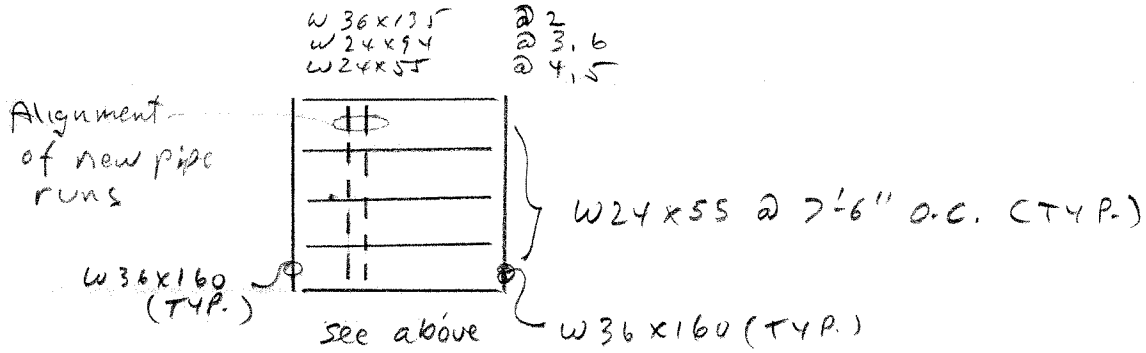
	Roof	153.0
	3rd Level Framing Plan	135.00 ← Top of Steel
	2nd Level Framing Plan	117.50 ←
FF. 7388.50 Top of Slab	Foundation Plan 1st Level	100.00

Sheet S5: Top of Steel @ elev. 135.00 UNO; End reaction = 50k (DESIGN)

∴ New Pipe Run to hang from 3rd Level Framing.

Between





∴ Tributary width of W24x55 = 7.5 ft.

FORM 8X8

CHECKED _____ DATE 10/17

APPROVED _____ DATE 10/17

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3442.053.SCAL.001 Rev A

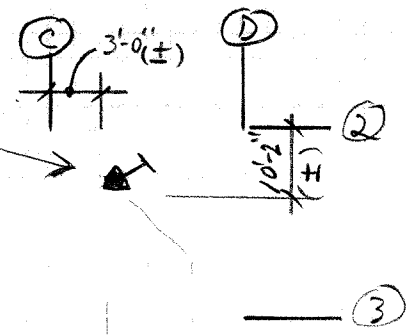
SHEET 5 OF _____

TITLE LDCC 3RD Level Framing - Analysis / Capacity
#100256 CNN Chilled Water System Optimization / Master Plan

BY DAA DATE 9-19-01

Sheet M8 : 10/15/01 90% "IN-HOUSE REVIEW", (ATTACHED)
LDCC/CCF CHILLED WATER
PLANT CONVERSION PLAN SET

EXISTING CWR VALVE @ 2nd Level (floor)



(NTS)

∴ ASSUME ℄ CWS for new 12" ∅ @ 3'-0" from C

℄ CWR for new 12" ∅ @ 5'-0" from C

Ref: Grinell Pipe Hangers Catalog PH-92, p. ph173-174, attached.

FORM 8X8

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JOB NO. 03410344 2.0253
3442.053.SCAL.001 Rev A.

SHEET 6 OF _____

TITLE LDCC 3RD LEVEL FRAMING - ANALYSIS/CAPACITY

BY DAA DATE 9-19-01

#100256 CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

Check: Shear and moment on W24x55 with computer racks fully occupying the tributary width.

ASSUME:

- Room 341 Computer Room Layout (attached) - drawing supplied by Doug Hefele @ LANL - Grid is at 2ft. spacing, computer racks drawn to scale, racks wt = 700 lbs.

  Scaled from drawing ⇒ computer rack footprint area = 3' x 2'-3" = 6.75 ft²

  → ∴ Computer rack as a uniform load = $\frac{700 \text{ lbs}}{6.75 \text{ ft}^2}$ = 104 psf.

- Beam self weight = 55 plf., simple span l = 30 ft.
- Floor dead load: t = 6" @ 150 pcf = 75 psf

  Conservative since floor pan is used w/ 1½" raised ribs, which are ignored here.

- Ceiling grid hanging system designed for 12 psf LL

  ref: Plan set dated August 24, 1967 (1987?) Sheet A4.5, Note 1. (attached)

Loading based on 7.5 ft. tributary width of W24x55:

beam self wt = 55 plf.

floor wt = 75 psf × 7.5 ft = 562.5 plf

ceiling grid wt = 12 psf × 7.5 ft = 90 plf (Plan Set - Sheet A4.5 attached)

computer rack wt = 104 psf × 7.5 ft = 780 plf

w = Σ (weights listed above)

w = 1488 lbs/ft ⇒ USE w = 1.49 kips/ft

FORM 8X8

Moment on W24x55 w/o new pipe loading: (M_1)

$M = wl^2/8$

$w = 1.49$ KIPS/FT.
$l = 30.0$ ft.

$M_1 = (1.49\ k/ft)(30.0\ ft)^2/8$

$M_1 = 167.6$ K-FT

Shear on W24x55 w/o new pipe loading: (V_1)

$V = wl/2$

$V_1 = (1.49\ k/ft)(30\ ft)/2$

$V_1 = 22.4$ K

W24x55 BEAM DATA: (Ref. AISC 9th Ed. attached)

$F_y = 36$ ksi A-36 steel - plan set Sheet S16 General Structural Steel Note 2. (attached)

$F_b = 0.66 F_y$ } AISC 9th Ed., (F1-1), p. 5-45

$F_b = 0.66(36\ ksi)$

$F_b = 23.76$ ksi

NOTE: compression flange is continuously braced by concrete deck.

$t_{web} = 0.395$ inch.
$d = 23.57$ inch.
$S_x = 114$ inch^3

Bending stress on W24x55 w/o new pipe loading: (f_{b_1})

$f_{b_1} = M_1/S_x$

$f_{b_1} = (167.6\ k\text{-}ft)(12\ in/ft)/114\ in^3$

$f_{b_1} = 17.65$ KSI $\leq F_b = 23.57$ KSI $\Rightarrow$ OK.

CHECKED J DATE 10/3

APPROVED J DATE 10/3

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JOB NO. 034103442.0053
3442.053.SCAL.001 REV. A

SHEET 8 OF

TITLE LOCC 3RD LEVEL FRAMING - ANALYSIS / CAPACITY

BY DAA DATE 9.20.01

#100256 CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

Check Shear Stress on W24x55 w/o new pipe load: (f_{v_1})

$F_v = 0.4 F_y$ AISC 9th Ed., (F4-1), p. 5-49

if $h/t_w \le 380/\sqrt{F_y}$, $t_w = 0.395$ inch

$h = d - 2t_f = 23.57 - 2(0.505) = 22.56$ inch

$h/t_w = 22.56 / 0.395 = 57.11$

$380/\sqrt{F_y} = (380)/\sqrt{36} = 63.3$ $\therefore F_v = 0.4 F_y$

$F_v = 0.4(36 ksi)$

$F_v = 14.4$ ksi

A-36 Steel

(Sheet S-16 attached Plan set)

$f_{v_1} = V_1 / [(d)(t_w)]$

$f_{v_1} = (22.4 K)/[(23.57)(0.395) in^2]$

$f_{v_1} = 2.4$ ksi $\le F_v = 14.4$ ksi $\Rightarrow$ OK.

Summary:

3rd level framing (to support new pipe runs) has excess capacity in existing conditions:

$f_{b_1} = 17.6$ KSI $\le F_b = 23.5$ KSI OK.

$f_{v_1} = 2.4$ KSI $\le F_v = 14.4$ KSI OK.

Now, consider additional loading from new pipe run and evaluate for this condition.

FORM 8X8

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APPROVED ___ DATE 10-13

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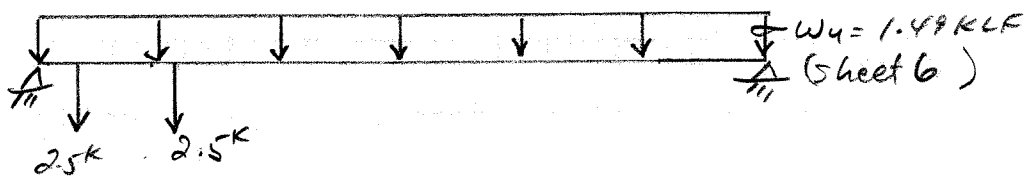
JOB NO. 03410344 2.0053
3442.053.5CAL.001 REV. A.

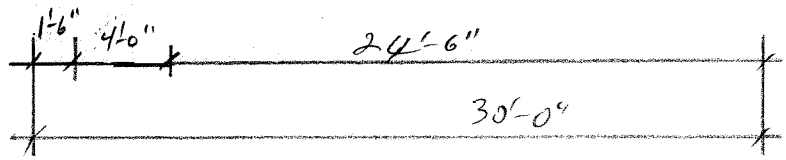
SHEET 9 OF

TITLE LDCC 3rd LEVEL FRAMING - ANALYSIS / CAPACITY BY DAA DATE 10-1-01

#100256 CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

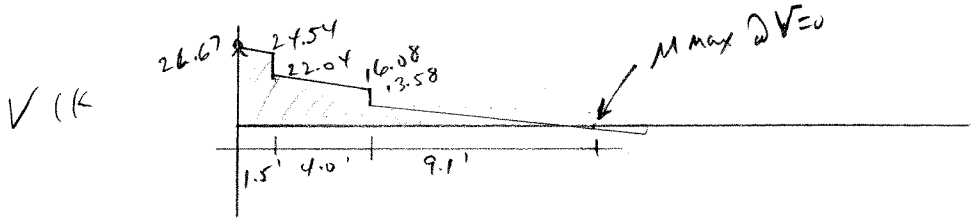
Check 3rd Floor Framing (W24x55) for additional load of piping: $W_p = 500\ lbs$ (3442.053.5CAL.002 REV. A., sheet 5





↑ 4.42K
22.35K
26.77K

↑ 0.58K
22.35
22.93



$$M = \Sigma \text{Area } V = \frac{(26.67 + 24.54)}{2}(1.5) + \frac{(22.04 + 16.08)}{2}(4) + \frac{1}{2}(9.1)(13.58)$$ k-ft

$M_{max} = 176.44$ K-FT $= 2117$ K-inch

$0.66 F_y = 0.66(36 ksi)$ (Top flg. cont. to rand)

$$f_{b_{max}} = M_{max}/S = \frac{2117 \text{ K-in}}{114 \text{ in}^3} = 18.57 \text{ ksi} \le F_b\text{all} = 23.76 \text{ ksi}$$ OK.

$$f_v = (26.77K)/[(23.57)(0.395)] = 2.44 \text{ ksi} \le F_v\text{all} = 0.4 F_y = 0.4(36) = 14.4 \text{ ksi. OK}$$

∴ 3rd level framing will support new pipe loads.

$f_b = 18.57$ ksi $\le F_b = 23.76$ ksi ✓ OK.

$f_v = 2.44$ ksi $\le F_v = 14.4$ ksi ✓ OK.

worst case if P @ ¼ = 5K

Ck $M = \frac{PL}{4} + \frac{wl^2}{8} = \frac{5K(30ft)}{4} + \frac{(1.49KLF)(30ft)^2}{8} = 205$ k-ft. $f_b = \frac{205(12)}{114} = 21.6$ ksi OK.

FORM 8X8

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CHECKED DATE 10/15/01 JOB NO. 3442.053.SCAL.001
Rev. A

APPROVED DATE 10/15/01 SHEET 1 OF 14

BY DAA DATE 10-15-01

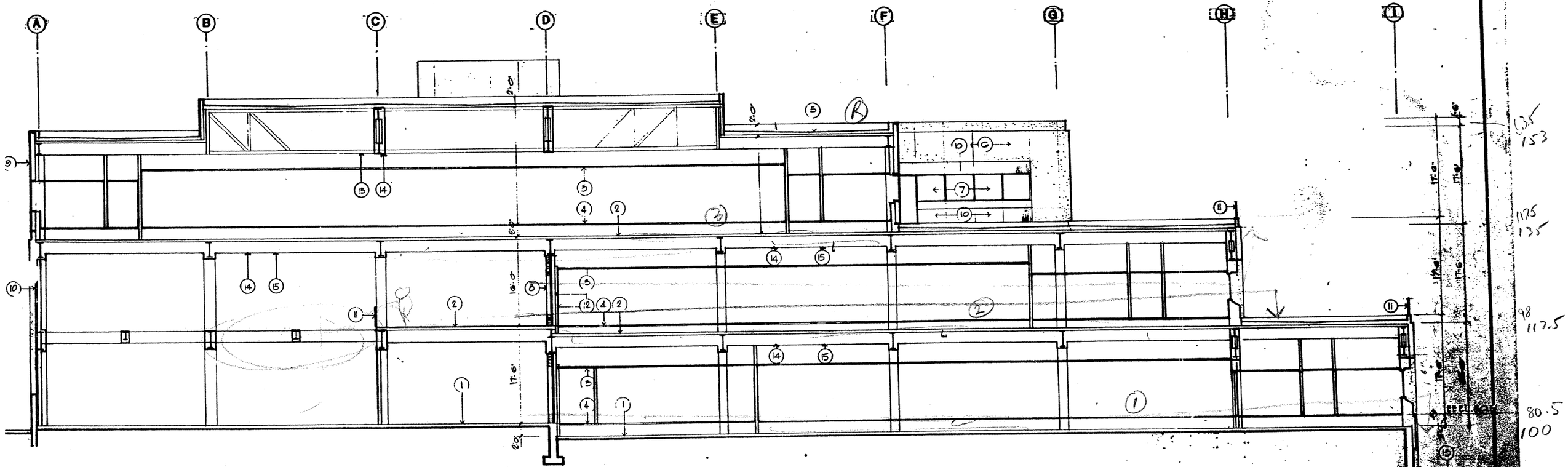
TITLE LDCC 3rd Level Framing – Analysis/Capacity
#100256 CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN

APPENDIX

Lab Job 7050-3, Eng-C-45225, LDCC Sheet A3.1	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet A4.5	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet S1	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet S10	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet S5, 1 of 2	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet S5, 2 of 2	1 page
Lab Job 7050-3, Eng-C-45225, LDCC Sheet S16	1 page
Drawing No. C52952, Sheet M8	1 page
Grinnell Catalog PH-72	2 pages
Email from Doug Hefele, LANL Facility Mechanical Engineer	1 page
Drawing SM-1498, RM 341, 3/28/00, LDCC	1 page
AISC ASD 9th Edition, p. 1-18, W Shapes	1 page

2

1. CONC. SLAB ON GRADE.
2. CONC. SLAB ON METAL DECK.
3. ACOUSTICAL LAY IN PANELS.
4. ACCESS FLOOR.
5. SINGLE PLY ROOF ON RIGID INSULATION.
6. PRE-CAST CONCRETE PANELS.
7. INSULATED GLASS IN ALUM. FRAME.
8. C.M.U.
9. EXTERIOR FLUSH GLAZING SYSTEM WITH INSULATING GLASS AND SPANDREL GLASS.
10. METAL PANELS ON MET. STUDS.
11. GUARDRAIL.
12. GYPSUM BOARD ON METAL STUDS.
13. FINISH GRADE.
14. SUSPENDED GYPSUM BOARD PARE DEMISING WALL
15. METAL HANGER SYSTEM.



ION A-A

116'-1'-0"

THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION SUPPLIED BY THE CONTRACTOR AND SHALL NOT BE CONSTRUED AS A CERTIFICATION OF ACTUAL CONDITIONS BY THE ARCHITECT.

NO	DATE	CLASS REVIEW	REVIEWER	REVISIONS

FMBSM
Flatow Moore Bryan Shaffer McCabe
Architects Planners Engineers

BERNARD JOHNSON INCORPORATED
ENGINEERS

LAB DATA COMMUNICATIONS CENTER
BUILDING SECTION
A 3.1

BLDG SH-1498 TA-3

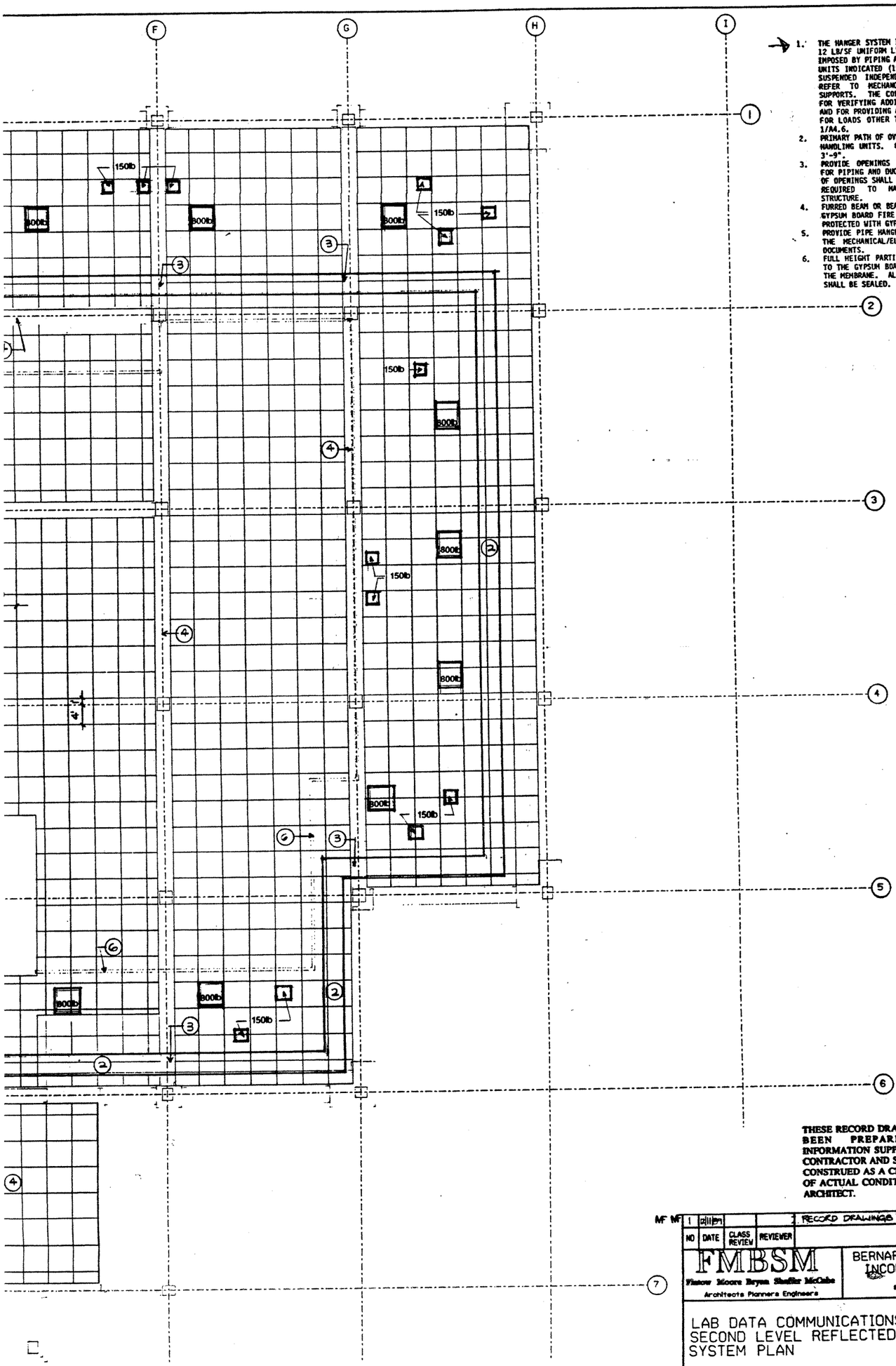
SUBMITTED
RECOMMENDED
APPROVED

UNITED STATES
Department of Energy
LOS ALAMOS AREA OFFICE - LOS ALAMOS, NEW MEXICO

AE CONTRACT NO DE- AC32-86NM33133

CLASSIFICATION Unclass. REVIEWER

LAB JOB	LAB DWG NO	DOE DWG NO
7050-3	ENG-C-45225	LA-RDT-[illegible]



1. THE HANGER SYSTEM IS REQUIRED TO CARRY A MIN. OF 12 LB/SF UNIFORM LIVE LOAD PLUS ADDITIONAL LOADS IMPOSED BY PIPING AS INDICATED. ALL AIR HANDLING UNITS INDICATED (150 LB., 800 LB, 1200 LB.) ARE SUSPENDED INDEPENDANT OF THIS HANGER SYSTEM. REFER TO MECHANCIAL DRAWINGS FOR EQUIPMENT SUPPORTS. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR VERIFYING ADDITIONAL LOADS THAN THOSE SHOWN AND FOR PROVIDING ADDITIONAL SUPPORTS AS REQUIRED FOR LOADS OTHER THAN SHOWN. REFER TO DETAIL 1/A4.6.
2. PRIMARY PATH OF OVERHEAD PIPING FOR COILS AND AIR HANDLING UNITS. MAXIMUM SPACING OF HANGER RODS 3'-9".
3. PROVIDE OPENINGS THRU BEAM TRUSSES AS REQUIRED FOR PIPING AND DUCTWORK PENETRATIONS. ALL SIDES OF OPENINGS SHALL BE COVERED WITH GYPSUM BOARD AS REQUIRED TO MAINTAIN FIRE PROTECTION OF STRUCTURE.
4. FURRED BEAM OR BEAM TRUSS BELOW THE LEVEL OF THE GYPSUM BOARD FIRE MEMBRANE. ALL SURFACES TO BE PROTECTED WITH GYPSUM BOARD.
5. PROVIDE PIPE HANGERS AND SUPPORTS AS REQUIRED BY THE MECHANICAL/ELECTRICAL PROVISIONS OF THESE DOCUMENTS.
6. FULL HEIGHT PARTITION SHALL EXTEND UNINTERRUPTED TO THE GYPSUM BOARD FIRE MEMBRANE AND SEALED TO THE MEMBRANE. ALL PENETRATIONS THRU THESE WALLS SHALL BE SEALED.

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NO	DATE	CLASS REVIEW	REVIEWER	REVISIONS	ENG D.O.	DOE PM
1	2/11/87			RECORD DRAWINGS		

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Architects Planners Engineers

BERNARD JOHNSON INCORPORATED
ENGINEERING

DESIGN	CEP
DRAWN	GR
A/E CHECK	
QA REVIEW	
MGR CHECK	DMS
DATE:	AUGUST 24, 1987

LAB DATA COMMUNICATIONS CENTER
SECOND LEVEL REFLECTED HANGER
SYSTEM PLAN

BLDG SM-1498 TA-3

SUBMITTED AE — RECOMMENDED LAB — APPROVED DOE

UNITED STATES
Department of Energy
LOS ALAMOS AREA OFFICE - LOS ALAMOS, NEW MEXICO

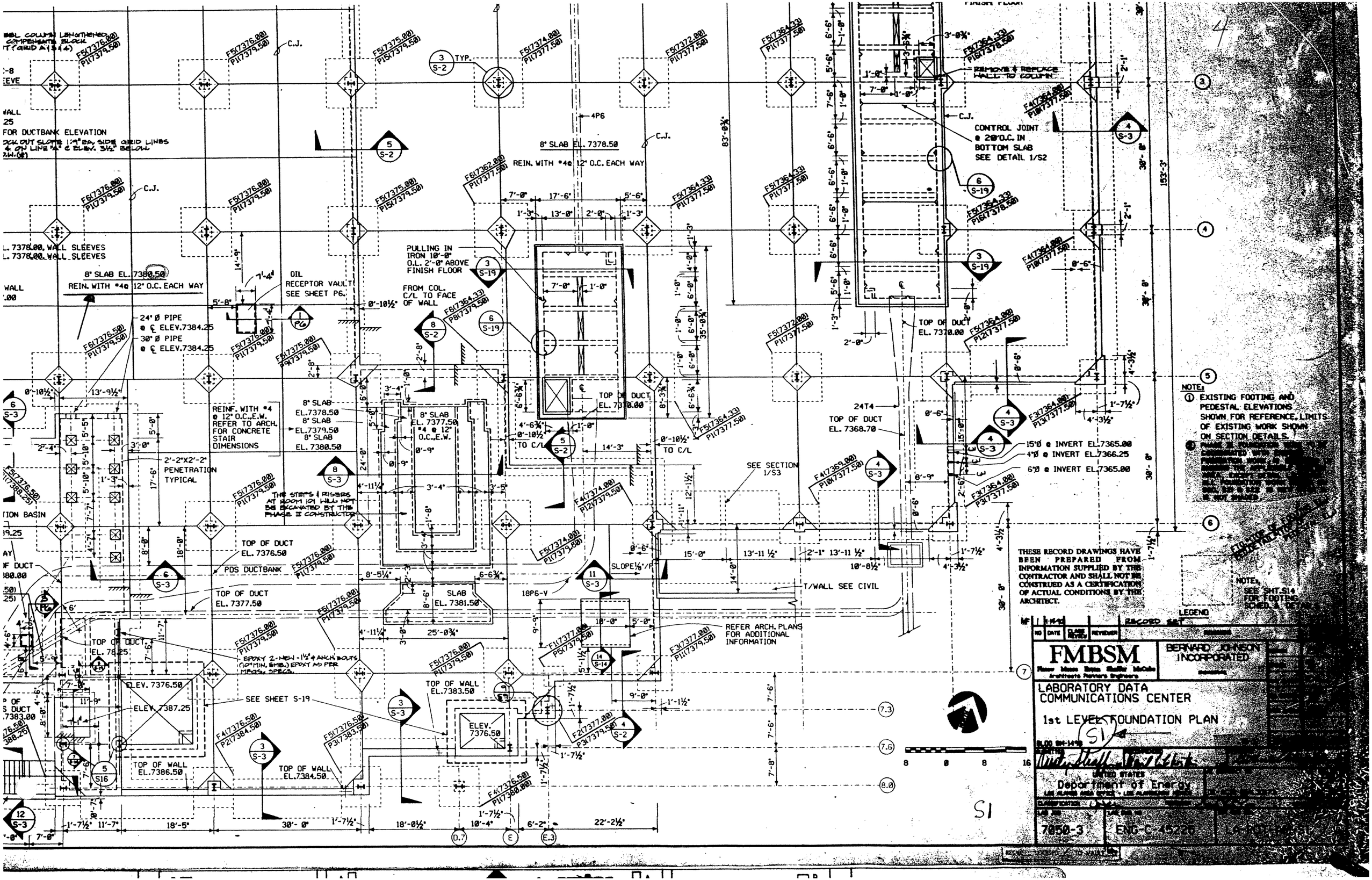
AE CONTRACT NO DE- AC32-86AL33173

32 OF 155

CLASSIFICATION UNCL. REVIEWER DATE

LAB JOB	LAB DWG NO	DOE DWG NO
7050-3	ENG-C-45225	LA-RDT-AM-A4.5

amtec


8" SLAB EL. 7378.50
REIN. WITH #4 @ 12" O.C. EACH WAY
CONTROL JOINT @ 20'O.C. IN BOTTOM SLAB SEE DETAIL 1/S2
REMOVE & REPLACE HALLC TO COLUMN
PULLING IN IRON 10'-0" O.L. 2'-0" ABOVE FINISH FLOOR
FROM COL. C/L TO FACE OF WALL
OIL RECEPTOR VAULT SEE SHEET P6.
24" Ø PIPE @ ℄ ELEV.7384.25
30" Ø PIPE @ ℄ ELEV.7384.25
TOP OF DUCT EL. 7370.00
TOP OF DUCT EL. 7368.70
15"Ø @ INVERT EL.7365.00
4"Ø @ INVERT EL.7366.25
6"Ø @ INVERT EL.7365.00
SEE SECTION 1/S3
REINF. WITH #4 @ 12" O.C.E.W. REFER TO ARCH. FOR CONCRETE STAIR DIMENSIONS
8" SLAB EL.7378.50
8" SLAB EL.7379.50
8" SLAB EL. 7380.50
8" SLAB EL. 7377.50 #4 @ 12" O.C.E.W.
2'-2"X2'-2" PENETRATION TYPICAL
THE STEPS & RISERS AT ROOM 101 WILL NOT BE EXCAVATED BY THE PHASE II CONTRACTOR
TOP OF DUCT EL. 7376.50
PDS DUCTBANK
TOP OF DUCT EL. 7377.50
SLAB EL. 7381.50
SLOPE 1/8"/F
T/WALL SEE CIVIL
REFER ARCH. PLANS FOR ADDITIONAL INFORMATION
EPOXY 2-NEW-1½" ø ANCH. BOLTS (10" MIN. EMB.) EPOXY AS PER MBSM SPECS.
SEE SHEET S-19
TOP OF WALL EL.7383.50
ELEV. 7376.50
ELEV. 7387.25
TOP OF WALL EL.7386.50
TOP OF WALL EL.7384.50
TOP OF DUCT EL. 7383.00
TOP OF DUCT EL. 7382.25
NOTE:
① EXISTING FOOTING AND PEDESTAL ELEVATIONS SHOWN FOR REFERENCE. LIMITS OF EXISTING WORK SHOWN ON SECTION DETAILS.
② [illegible]
THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION SUPPLIED BY THE CONTRACTOR AND SHALL NOT BE CONSTRUED AS A CERTIFICATION OF ACTUAL CONDITIONS BY THE ARCHITECT.
NOTE: SEE SHT.S14 FOR FOOTING DOWEL & DETAIL
LEGEND
RECORD SET
NO DATE CLASS REVIEW REVISION
FMBSM
Fluor Moore Bass Shiffler McCabe
Architects Planners Engineers
BERNARD JOHNSON INCORPORATED
LABORATORY DATA COMMUNICATIONS CENTER
1st LEVEL FOUNDATION PLAN
S1
UNITED STATES Department of Energy
7850-3
ENG-C-45226
LA-RDT-P0-S1

WL NO ON SL

UPPER ROOF PLAN @ STAIRWELL

5

NOTES:

1. TOP OF STEEL @ ELEVATION 153.00 UNLESS NOTED OTHERWISE . +( ) ABOVE OR - ( )BELOW.
2. BAR JOISTS SHALL BE 2½" ABOVE MAIN STEEL ELEVATION UNLESS OTHERWISE NOTED.
3. DASHED LINES INDICATES L-2 X 2 X ⅛ X-BRIDGING @ 7.5' ON CENTER, TYP. U.N.O.
4. ALL BT TYPE TRUSSES SHALL BE BRACED AT BOTTOM CHORD PANEL POINTS PER 4 & 12/S-11.

THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION SUPPLIED BY THE CONTRACTOR AND SHALL NOT BE CONSTRUED AS A CERTIFICATION OF ACTUAL CONDITIONS BY THE ARCHITECT.

MF 1/16/90 RECORD SET

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BERNARD JOHNSON INCORPORATED
ENGINEERING

LABORATORY DATA COMMUNICATIONS CENTER

ROOF FRAMING PLAN

TA-3

BLDG SM-1498

DESIGN	CJK
DRAWN	SP
A/E CHECK	DAM
QA REVIEW	
MOR CHECK	DMS
DATE	AUG 24, 1987

SUBMITTED DE RECOMMENDED LAB APPROVED DOE

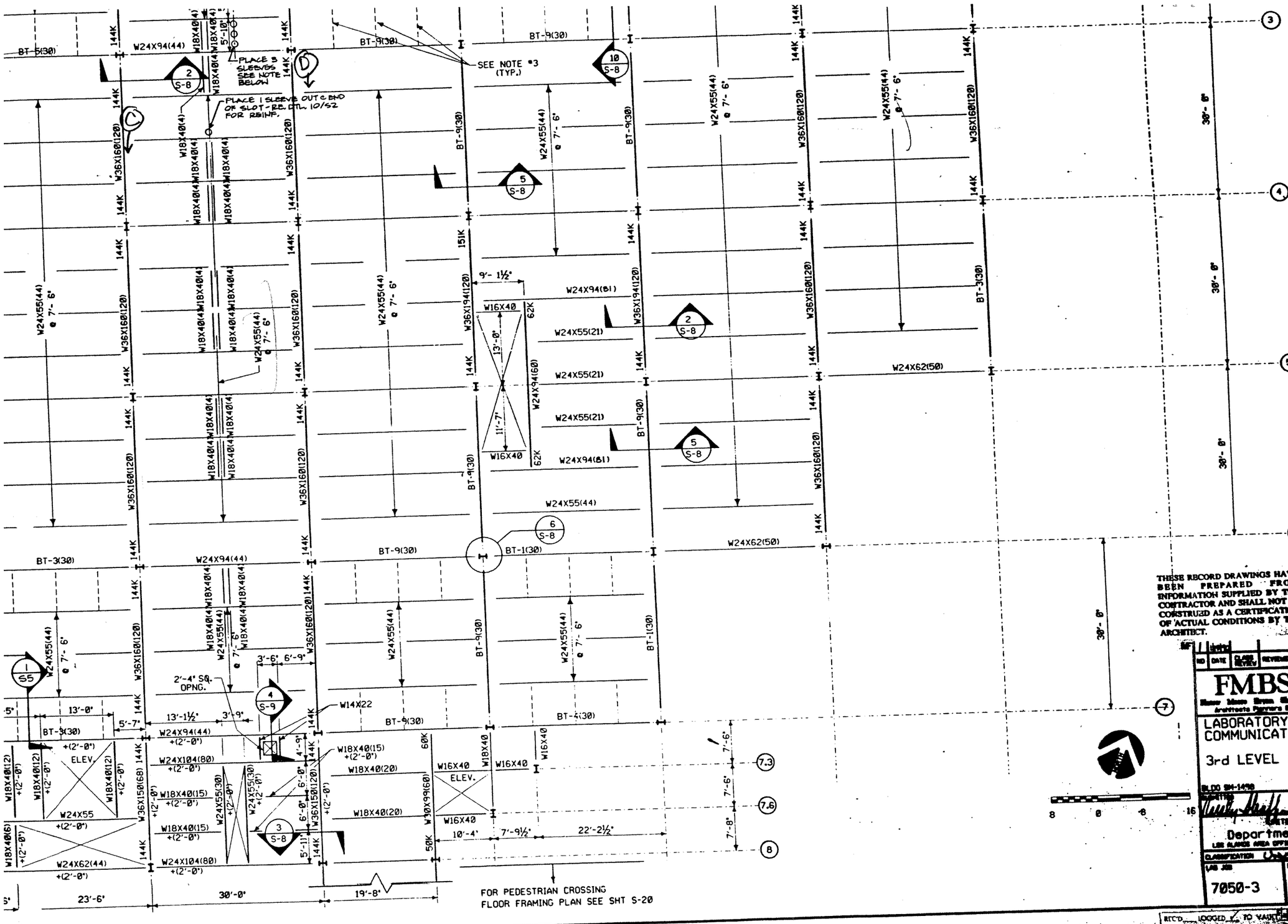
UNITED STATES
Department of Energy
LOS ALAMOS AREA OFFICE - LOS ALAMOS, NEW MEXICO

AE CONTRACT NO DE-AC32-86AL33173

81 OF 155

CLASSIFICATION REVIEWER DATE

LAB JOB	LAB DWG NO	DOE DWG NO
7050-3	ENG-C-45225	LA-RDT-AM-S10



PLAN NOTES

1. TOP OF STEEL @ ELEVATION 135.00 UNLESS NOTED OTHERWISE. +( )ABOVE OR -( )BELOW.
2. W24X55 BEAMS SHALL HAVE 50K END REACTIONS UNLESS OTHERWISE NOTED.
3. DASHED LINE INDICATES BOTTOM CHORD BRACING MEMBER SEE DETAIL 4/S-8. ALL BT TYPE TRUSSES REQUIRE BOTTOM CHORD BRACING AT EACH PANEL PT. SIMILAR TO 12/S-8 OR 4/S-8.

THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION SUPPLIED BY THE CONTRACTOR AND SHALL NOT BE CONSTRUED AS A CERTIFICATION OF ACTUAL CONDITIONS BY THE ARCHITECT.

RECORD SET

NO	DATE	CLASS REVIEW	REVISIONS

FMBSM
Mayer Mason Brown Shaffer McCabe
Architects Engineers Engineers

BERNARD JOHNSON INCORPORATED

LABORATORY DATA COMMUNICATIONS CENTER

3rd LEVEL FRAMING PLAN

BLDG 9H-1439

UNITED STATES
Department of Energy
LOS ALAMOS AREA OFFICE - LOS ALAMOS, NEW MEXICO

CLASSIFICATION UNCL

LAB JOB 7050-3

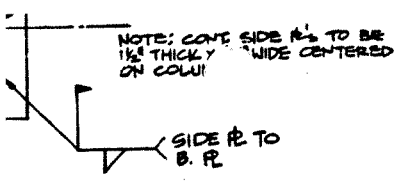
LAB DWG NO ENG-C-45225

REC'D ___ LOGGED ✓ TO VAULT ___

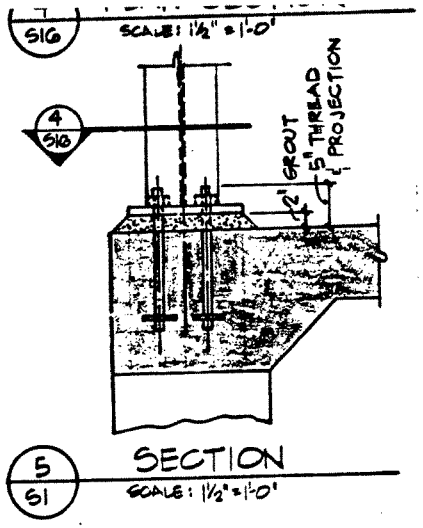
1 of 2

S5

THESE RECORD DR
BEEN PREPAR
INFORMATION SUP



DETAIL



DEAD LOADS:

A. COMMUNICATIONS LEVEL..... 250 PSF
B. NETWORKING L..... 250 PSF
C. SUPER COMP LEVEL..... 300 PSF

METAL ROOF DECK

1. DECK SHALL BE 1 1/2" DEEP - 20 GAUGE
2. DECK SHALL BE FASTENED PER S.D.I. REQUIREMENTS UNLESS OTHERWISE NOTED.
3. ROOF DECK DETAILS AND FASTENING PATTERN SHALL BE SUBMITTED TO THE ENGINEER FOR HIS APPROVAL BEFORE PROCEEDING WITH FABRICATION AND INSTALLATION.
4. DECK SPECIFIED HAS BEEN DETERMINED ON BASIS OF 3 SPAN CONDITION; DECK SUPPLIER SHALL USE HEAVIER GAUGE IF REQUIRED FOR ONE AND TWO SPAN CONDITIONS.
5. DECK FASTENING PATTERN SHALL DEVELOP AN ALLOWABLE DIAPHRAM SHEAR STRENGTH REQUIRED TO RESIST LATERAL DESIGN LOADS OF 430 lb/ft FOR HIGH ROOF AREA AND 1180 lb/ft FOR LOW ROOF AREA.
6. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, ALL ROOF DECK PENETRATIONS GREATER THAN 12" DIAMETER SHALL BE FRAMED ON 4 SIDES WITH ANGLE 4 X 4 X 3/8 AND SUPPORTED BY THE PRIMARY SUPPORTING STRUCTURE.
10. FLOOR DECK SHALL BE 1 1/2" DEEP - 20 GAUGE DECK.
11. THE DECK SUPPLIER SHALL FURNISH [illegible] STRIPS AND OTHER NECESSARY HARDWARE FOR A [illegible] WATER-TIGHT DECK INSTALLATION.

STRUCTURAL STEEL TRUSSES

1. ALL TRUSSES SHALL BE ALL SHOP WELDED CONSTRUCTION, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
2. ALL TRUSS CONNECTIONS SHALL DEVELOP EITHER THE MAXIMUM FORCE INDICATED ON THE DRAWINGS OR ONE-HALF THE ALLOWABLE TENSION FORCE IN THE MEMBER, WHICHEVER IS GREATER. (+) INDICATES TENSION; (-) INDICATES COMPRESSION.
3. WORKING LINES FOR TRUSSES SHALL BE THE NEUTRAL AXIS OF THE MEMBERS.
4. WORK POINTS FOR TRUSS END CONNECTIONS SHALL BE THE CENTER LINE OF THE COLUMN.
5. NO FIELD SPLICES OF TRUSSES SHALL BE PERMITTED, EXCEPT AS SHOWN ON THE DRAWINGS.

THESE RECORD DRAWINGS HAVE BEEN PREPARED FROM INFORMATION SUPPLIED BY THE CONTRACTOR AND SHALL NOT BE CONSTRUED AS A CERTIFICATION OF ACTUAL CONDITIONS BY THE ARCHITECT.

GENERAL STRUCTURAL STEEL NOTES

1. ALL DETAILING, FABRICATION AND ERECTION OF STRUCTURAL STEEL, SHALL CONFORM TO THE REQUIREMENTS OF THE A.I.S.C. SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS, AND WITH ALL LOCAL LAWS AND ORDINANCES. WHERE CONFLICTING REQUIREMENTS OCCUR, THE MORE STRINGENT REQUIREMENT SHALL APPLY.
2. UNLESS OTHERWISE NOTED, ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF A.S.T.M. A-36.
3. UNLESS OTHERWISE NOTED, ALL SHOP CONNECTIONS SHALL BE MADE BY WELDING OR HIGH STRENGTH BOLTS.
4. UNLESS OTHERWISE NOTED, ALL FIELD CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS CONFORMING TO A.S.T.M A-325. CONNECTIONS SHALL BE DESIGNED AS FRICTION TYPE.
5. UNLESS OTHERWISE NOTED, BOLTS SHALL BE 3/4" DIAMETER. HOLES SHALL BE 1/16" LARGER THAN BOLT SIZE, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
6. ALL WELDING SHALL CONFORM TO THE SPECIFICATION OF THE AMERICAN WELDING SOCIETY. ALL WELDS SHALL BE DONE BY CERTIFIED WELDERS USING E-70 SERIES ELECTRODES.
7. UNLESS OTHERWISE NOTED, ALL BEAM CONNECTIONS SHALL BE STANDARD FRAMED CONNECTIONS AS SHOWN IN PART 4 OF THE A.I.S.C. MANUAL OF STEEL CONSTRUCTION. UNLESS LARGER REACTIONS ARE INDICATED ON THE PLANS, CONNECTIONS SHALL DEVELOP AT LEAST ONE-HALF OF THE TOTAL UNIFORM LOAD CAPACITY TABULATED IN THE TABLES IN PART 2 OF THE MANUAL FOR THE GIVEN SHAPE AND SPAN OF THE BEAM IN QUESTION. IN NO CASE, HOWEVER, SHALL THE CONNECTION BE LESS THAN THE MINIMUM SHOWN IN THE TABLES IN PART 4 OF THE A.I.S.C. MANUAL OF STEEL CONSTRUCTION.
8. BEARING ENDS OF ALL COLUMNS SHALL BE MILLED.
9. NO OPENINGS SHALL BE CUT IN STRUCTURAL MEMBERS UNLESS SHOWN ON THE DRAWINGS.
10. ALL BRACING CONNECTIONS SHALL DEVELOP EITHER THE FORCE INDICATED ON THE DRAWINGS OR ONE-HALF THE ALLOWABLE TENSION FORCE IN THE MEMBER, WHICHEVER IS LARGER. BRACING CONNECTIONS SHALL BE DESIGNED AND DETAILED SO THAT ALL FORCE COMPONENTS WILL BE TRANSMITTED DIRECTLY TO THE CENTERLINE OF THE INTERSECTING MEMBERS. WHERE THIS IS NOT POSSIBLE CONNECTIONS SHALL BE DESIGNED FOR ALL RESULTING ECCENTRICITIES. A MINIMUM OF TWO BOLTS SHALL BE USED PER CONNECTION.
11. ANCHOR BOLTS SHALL BE A.S.T.M. A-36, UNLESS OTHERWISE NOTED.
12. ANCHOR BOLT HOLES IN BASE PLATES AND DETAIL MATERIAL SHALL BE SIZED IN ACCORDANCE WITH A.I.S.C. "STRUCTURAL STEEL DETAILING".
13. GUSSET PLATES SHALL BE 3/8" MINIMUM THICKNESS.
14. FORCES INDICATED THUS ( ) ON BEAMS ARE AXIAL TENSION (+) OR COMPRESSION FORCES (-). CONNECTIONS ARE TO BE DESIGNED FOR THESE FORCES IN ADDITION TO THE FORCES FROM VERTICAL LOAD.
15. THE FABRICATOR SHALL PROVIDE FOR FUTURE BEAM CONNECTIONS AS SHOWN ON THE PLANS. THESE CONNECTIONS SHALL BE DETAILED SO THAT FUTURE BEAMS MAY BE ERECTED WITHOUT REMOVING LOADED BOLTS OR SHORING EXISTING BEAMS FRAMING OPPOSITE.
16. STEEL FRAME IS NON-SELF-SUPPORTING. STEEL ROOF DECK, CONCRETE FLOOR SLABS ARE REQUIRED TO PROVIDE LATERAL STABILITY FOR THE FRAME AND RESISTANCE TO WIND AND SEISMIC FORCES. CONTRACTOR SHALL PROVIDE ALL TEMPORARY BRACING REQUIRED TO MAINTAIN STABILITY OF STRUCTURAL SYSTEM DURING CONSTRUCTION OF THE PROJECT.
17. SHOP DRAWINGS SHALL BE SUBMITTED PRIOR TO THE FABRICATION OF ANY STRUCTURAL STEEL.

NO	DATE	BY	REVISIONS
			RECORD SET

FMBSM
Flynn Minch Brown Shaffer McCabe
Architects Planners Engineers

BERNARD JOHNSON INCORPORATED

LABORATORY DATA COMMUNICATIONS CENTER

COLUMN SCHEDULE, DETAILS, & NOTES

BLDG 394-1490

UNITED STATES
Department of Energy

LAB JOB 7050-3 | LAB DWG NO ENG-C-45225 | LA-RDT-AN-S16

S-16

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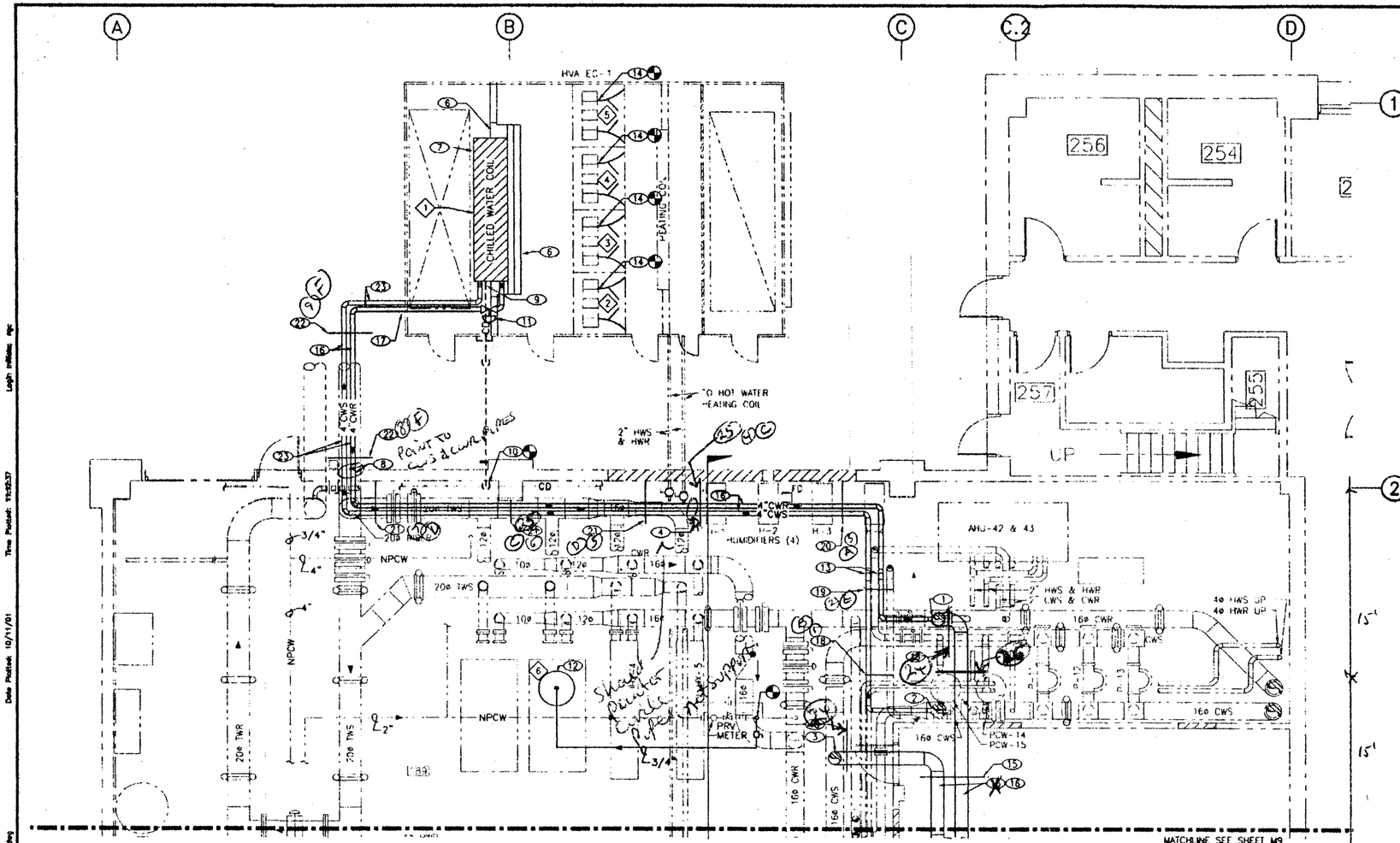
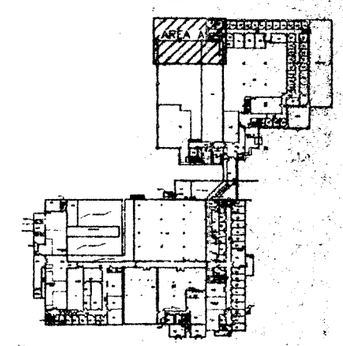


CHILLED WATER PIPING AND HVAC PLAN – AREA A
SCALE: 1/4"=1'-0"

KEYED NOTES

1. SEE DETAIL 3/M17 FOR CWR CONNECTION DETAIL.
2. SEE DETAIL 4/M17 FOR CWS CONNECTION DETAIL.
3. HOT TAP THE CWS WITH A 12"ø. INSTALL A 12"ø VALVE AND EXTEND CWS PIPING AS SHOWN. SEE DETAIL 5/M17 MEZZANINE FRAMING
4. ROUTE CWS AND CWR PIPING UP ON TOP OF STRUCTURE. SEE DETAIL 2/M16.
5. NOT USED
6. INSTALL 14GA. SHEET METAL BLANK DOWN STREAM OF INACTIVE PORTION OF COIL FACE DAMPERS.
7. INSTALL CHILLED WATER COILAND COIL CASING. SEE DETAIL 1/M17 AND 2/M17 FOR PROCEDURE.
8. CORE DRILL AND SLEEVE 4"ø CHILLED WATER SUPPLY AND RETURN PIPING THROUGH WALL. SEAL OPENING WITH LINK SEAL OR EQUIVALENT. INSTALL ESCUTIONS ON BOTH SIDES OF WALL FOR EACH PIPE.
9. ROUTE 1-1/2" CONDENSATE DRAIN FROM COIL DRAIN PAN SUMP PUMP UP TO BOTTOM OF PIPE 10'-0".
10. ROUTE CONDENSATE DRAIN UP 85" ABOVE GRADE. SLOPE DRAIN PIPE TOWARD BUILDING. SLEEVE PIPE THROUGH WALL. SEAL WALL PENETRATION WITH LINK SEAL. DROP CONDENSATE DRAIN PIPING DOWN AND CONNECT TO EXISTING 1-1/2"ø DRAIN PIPE.
11. INSTALL MODULATING TWO WAY CONTROL VALVE. SEE CONTROL DRAWINGS.
12. INSTALL CHILLED WATER EXPANSION TANK ON EXISTING CONCRETE PAD AND ANCHOR IN PLACE. SET PRESSURE AT 25 PSIG.
13. DROP PIPE DOWN TO WITHIN 12" OF TOP OF MEZZANINE LATTICE.
14. INSTALL NEW INLET CONE WITH INLET VANE DAMPERS. INSTALL IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. FURNISH AND INSTALL PNEUMATIC ADAPTER WITH EACH DAMPER.
15. SEE STRUCTURAL DETAIL 4/M15 FOR PIPE SUPPORT AND SEISMIC RESTRAINT REQUIREMENTS.



KEYPLAN
SCALE: NONE

KEYED NOTES (CONT.)

16. INSULATE PIPING. SEE SPECIFICATIONS.
17. SUPPORT PIPING AT WALL OF UNIT EC-1 USING P-1000 UNISTRUT AND CLAMPS. SEAL PIPE PENETRATIONS WITH EXTERIOR TYPE CAULKING.
18. SUPPORT PIPING ~~AT WALL~~. SEE STRUCTURAL DETAIL 1/M16 (B) FROM EXISTING STRUCTURE
19. SUPPORT PIPING ~~AT WALL~~. SEE STRUCTURAL DETAIL 4/M16 (E) FROM EXISTING STRUCTURE
20. SUPPORT PIPING ~~AT WALL~~. SEE STRUCTURAL DETAIL 2/M15 (A) OK AS IT WAS
21. SUPPORT PIPING ~~AT WALL~~. SEE STRUCTURAL DETAIL 3/M16 (D)
22. SUPPORT PIPING ~~AT WALL~~. SEE STRUCTURAL DETAIL 5/M16 (F) FROM EXISTING PIPE BRIDGE STRUCTURE
23. INSTALL HEAT CABLE ON EXTERIOR CWR AND CWS CHILLED WATER PIPING. COORDINATE WITH DIVISION 16.
24. SEE STRUCTURAL DETAIL 5/M15 FOR PIPE SUPPORT AND SEISMIC RESTRAINT REQUIREMENTS
25. SUPPORT PIPING FROM EXISTING STRUCTURE. SEE STRUCTURAL DETAIL 2/M16 (C)
26. SEE NOTE 15 except provide ONLY 1 pipe roll stand for 12" DIA PIPE.

0' 1' 2' 4' 6' 8'
1/4"=1'-0"

ENGINEER'S SEAL

NOT FOR CONSTRUCTION

REV.	DATE	CLASS REV.	REVISION	DWN	RES	CHKD	SUP	APP
B	10/5/01		90% "IN-HOUSE REVIEW"	RC	NS	DD		
A	9/18/01		60% "IN-HOUSE REVIEW"	RC	NS	DD		

HOLMES & NARVER/RAYTHEON (HNR)
HOLMES & NARVER/RAYTHEON ENGINEERS & CONSTRUCTORS
CHAVEZ-GRIEVES CONSULTING ENGINEERS
DUNCANSON & PARTNER CONSULTING ENGINEERS

CCN CHILLED WATER SYSTEM OPTIMIZATION MASTER PLAN
MECH: CHILLED WATER PIPING AND HVAC PLAN – AREA A

BLDG. 1498 & 132 TA-3

DRAWN R. COWEN
DESIGN N. SLAVIN
CHECKED N. DORSEY
DATE 10/4/01

SUBMITTED DWIGHT DORSEY
APPROVED FOR RELEASE DOUG MERRILL

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

SHEET M8 OF

CLASSIFICATION REVISION

PROJECT ID 100256
DRAWING NO. C52952
REV. B

Cad File Name: 50500R06.dwg
Date Plotted: 10/11/01
Time Plotted: 15:26:37
Login Initials: rgc
Cad File Path: H:\50500.25\cad\hvac\

10

Tables of Pipe Spacing

This chart, developed by Julius Getlan of Seelye Stevenson Value & Knecht, consulting engineers, New York City, enables one to quickly determine the centerline-to-centerline dimension between any two size pipes on a rack. Select one pipe size at top, another at the side of the table. Where the appropriate columns intersect, the dimension is given.

These factors are included in the dimension given:

A. O.D. of flanges and fittings.
B. 1″ insulation over flanges and fittings.
C. Clear space between fittings as follows:
   1. 1″ between piping 3″ and smaller.
   2. 1½″ between a pipe 3″ and smaller and a pipe 4″ or larger.
   3. 2″ between piping 4″ and larger.

All fractional dimensions less than ¼″ were increased to the next larger ¼″.

Spacing of Pipe on Racks

NOMINAL PIPE DIA. (INCHES)		NOMINAL PIPE DIAMETER, (INCHES)										
		¾		1			1¼			1½		
		T	S	T	F	S	T	F	S	T	F	S
		CENTERLINE-TO-CENTERLINE DIMENSIONS, (INCHES)										
¾	T	4¾	—	—	—	—	—	—	—	—	—	—
	S	4½	4¼	—	—	—	—	—	—	—	—	—
1	T	5	4¾	5¼	—	—	—	—	—	—	—	—
	F	6	5¾	6¼	7¼	—	—	—	—	—	—	—
	S	4¾	4½	5	6	4½	—	—	—	—	—	—
1¼	T	5¼	5	5½	6½	5	5½	—	—	—	—	—
	F	6¼	6	6½	7½	6¼	6¾	7¾	—	—	—	—
	S	4¾	4½	5	6	4½	5¼	6¼	4¾	—	—	—
1½	T	5¼	5	5½	6½	5¼	5¾	6¾	5¼	5¾	—	—
	F	6½	6¼	6¾	7¾	6¼	6¾	8	6½	7	8	—
	S	5	4¾	5¼	6¼	4¾	5¼	6	5	5½	6½	5
2	T	5¾	5½	6	7	5½	6	7¼	5¾	6¼	7¼	5¾
	F	7	6¾	7¼	8¼	6¾	7¼	8½	7	7½	8½	7
	S	5¼	5	5½	6½	5	5½	6¾	5¼	5¾	6¾	5¼
2½	T	6	5¾	6¼	7¼	6	6½	7½	6	6½	7¾	6¼
	F	7½	7¼	7¾	8¾	7¼	7¾	9	7½	8	9	7½
	S	5½	5¼	5¾	6¾	5¼	5¾	7	5½	6	7	5½
3	T	6¼	6	6½	7½	6¼	6¾	7¾	6¼	6¾	8	6½
	F	7¾	7½	8	9	7½	8	9¼	7¾	8¼	9¼	7¾
	S	5¾	5½	6	7	5½	6	7¼	5¾	6¼	7¼	5¾
4	T	7½	7¼	7¾	8¾	7¼	7¾	9	7½	8	9	7½
	F	9	8¾	9¼	10¼	8¾	9¼	10½	9	9½	10½	9
	S	6¾	6½	7	8	6½	7	8¼	6¾	7¼	8¼	6¾
5	T	8	7¾	8¼	9¼	7¾	8¼	9½	8	8½	9½	8
	F	9½	9¼	9¾	10¾	9¼	9¾	11	9½	10	11	9½
	S	7¼	7	7½	8¼	7	7½	8¾	7¼	7¾	8¾	7¼
6	T	8¾	8½	9	10	8½	9	10¼	8¾	9¼	10¼	8¾
	F	10	9¾	10¼	11¼	9¾	10¼	11½	10	10½	11½	10
	S	7¾	7½	8	9	7½	8	9¼	7¾	8¼	9¼	7¾
8	T	9¾	9½	10	11	9¾	10½	11¼	9¾	10¼	11½	10
	F	11¼	11	11½	12½	11	11½	12¾	11¼	11¾	12¾	11¼
10	T	11¼	11	11½	12½	11	11½	12¾	11¼	11¾	12¾	11¼
	F	12½	12¼	12¾	13¾	12¼	12¾	14	12½	13	14	12½
12	T	12¼	12	12½	13½	12	12½	13¾	12¼	12¾	13¾	12¼
	F	14	13¾	14¼	15¼	13¾	14¼	15½	14	14½	15½	14

T denotes threaded IPS pipe. **F** denotes flanged fittings on pipe. **S** denotes soldered or brazed tubing.

Catalog PH-72

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Spacing of Pipe on Racks

NOMINAL PIPE DIA. INCHES		NOMINAL PIPE DIAMETER, INCHES											
		2			2½			3			4		
		T	F	S	T	F	S	T	F	S	T	F	S
		CENTERLINE-TO CENTERLINE DIMENSIONS, INCHES											
2	T	6½	—	—	—	—	—	—	—	—	—	—	—
	F	7¾	9	—	—	—	—	—	—	—	—	—	—
	S	6	7¼	5½	—	—	—	—	—	—	—	—	—
2½	T	7	8¼	6½	7¼	—	—	—	—	—	—	—	—
	F	8¼	9½	7¾	8¾	10	—	—	—	—	—	—	—
	S	6¼	7½	5¾	6¾	8	6	—	—	—	—	—	—
3	T	7¼	8½	6¾	7½	9	7	7¾	—	—	—	—	—
	F	8½	9¾	8	9	10¼	8¼	9¼	10½	—	—	—	—
	S	6½	7¾	6	7	8¼	6¼	7¼	8½	6½	—	—	—
4	T	8¼	9½	7¾	8¾	10	8	9	10¼	8¼	10	—	—
	F	9¾	11	9¼	10¼	11½	9½	10½	11¾	9¾	11½	13	—
	S	7½	8¾	7	8	9¼	7¼	8¼	9½	7½	9¼	10¾	8½
5	T	8¾	10	8¼	9¼	10½	8½	9½	10¾	8¾	10¼	12	9¾
	F	10¼	11½	9¾	10¾	12	10	11	12¼	10¼	12	13½	11¼
	S	8	9¼	7½	8½	9¾	7¾	8¾	10	8	9¾	11¼	9
6	T	9½	10¾	9	10	11¼	9¼	10¼	11½	9½	11¼	12¾	10½
	F	10¾	12	10¼	11¼	12½	10½	11½	12¼	10¾	12½	14	11¾
	S	8½	9¾	8	9	10¼	8¼	9¼	10½	8½	10¼	11¾	9½
8	T	10¾	12	10½	11	12½	10½	11¼	12¾	10¾	12½	14	11¾
	F	12	13¼	11½	12½	13¾	11¾	12¾	14	12	13¾	15¼	13
10	T	12	13¼	11½	12½	13¾	11¾	12¾	14	12	13¾	15¼	13
	F	13¼	14½	12¾	13¾	15	13	14	15¼	13¼	15	16½	14¼
12	T	13	14¼	12½	13½	14¾	12¾	13¾	15	13	14¾	16¼	14
	F	14¾	16	14¼	15¼	16½	14½	15½	16¾	14¾	16½	18	15¾

NOMINAL PIPE DIA. INCHES		NOMINAL PIPE DIAMETER, INCHES											
		5			6			8		10		12	
		T	F	S	T	F	S	T	F	T	F	T	F
		CENTERLINE-TO CENTERLINE DIMENSIONS, INCHES											
5	T	11	—	—	—	—	—	—	—	—	—	—	—
	F	12½	14	—	—	—	—	—	—	—	—	—	—
	S	10¼	11¾	9½	—	—	—	—	—	—	—	—	—
6	T	11¾	13¼	11	12½	—	—	—	—	—	—	—	—
	F	13	14½	12¼	13¼	15	—	—	—	—	—	—	—
	S	10¾	12¼	10	11½	12¾	10½	—	—	—	—	—	—
8	T	13	14½	12¼	13¾	15	12¾	14¾	—	—	—	—	—
	F	14¼	15¾	13½	15	16¼	14	16¼	17½	—	—	—	—
10	T	14¼	15¾	13½	15	16¼	14	16¼	17½	17½	—	—	—
	F	15½	17	14¾	16¼	17½	15¼	17½	18¾	18¾	20	—	—
12	T	15¼	16¾	14½	16	17¼	15	17¼	18½	18½	19¾	19½	—
	F	17	18½	16¼	17¾	19	16¾	14	20¼	20¼	21½	21¼	23

T denotes threaded IPS pipe. **F** denotes flanged fittings on pipe. **S** denotes soldered or brazed tubing.

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CATALOG PH-72

12

Apple David

From: Doug Hefele [hefele@lanl.gov]
Sent: Monday, September 17, 2001 4:48 PM
To: weeks@hninc.com; appled@hninc.com; DFW@bpce.com
Cc: rrivera@lanl.gov; jaf@lanl.gov
Subject: Fwd: AUTOCAD Drawing

Here's the room 341 computer layout. Figure on a weight of 700 lbs. per rack.

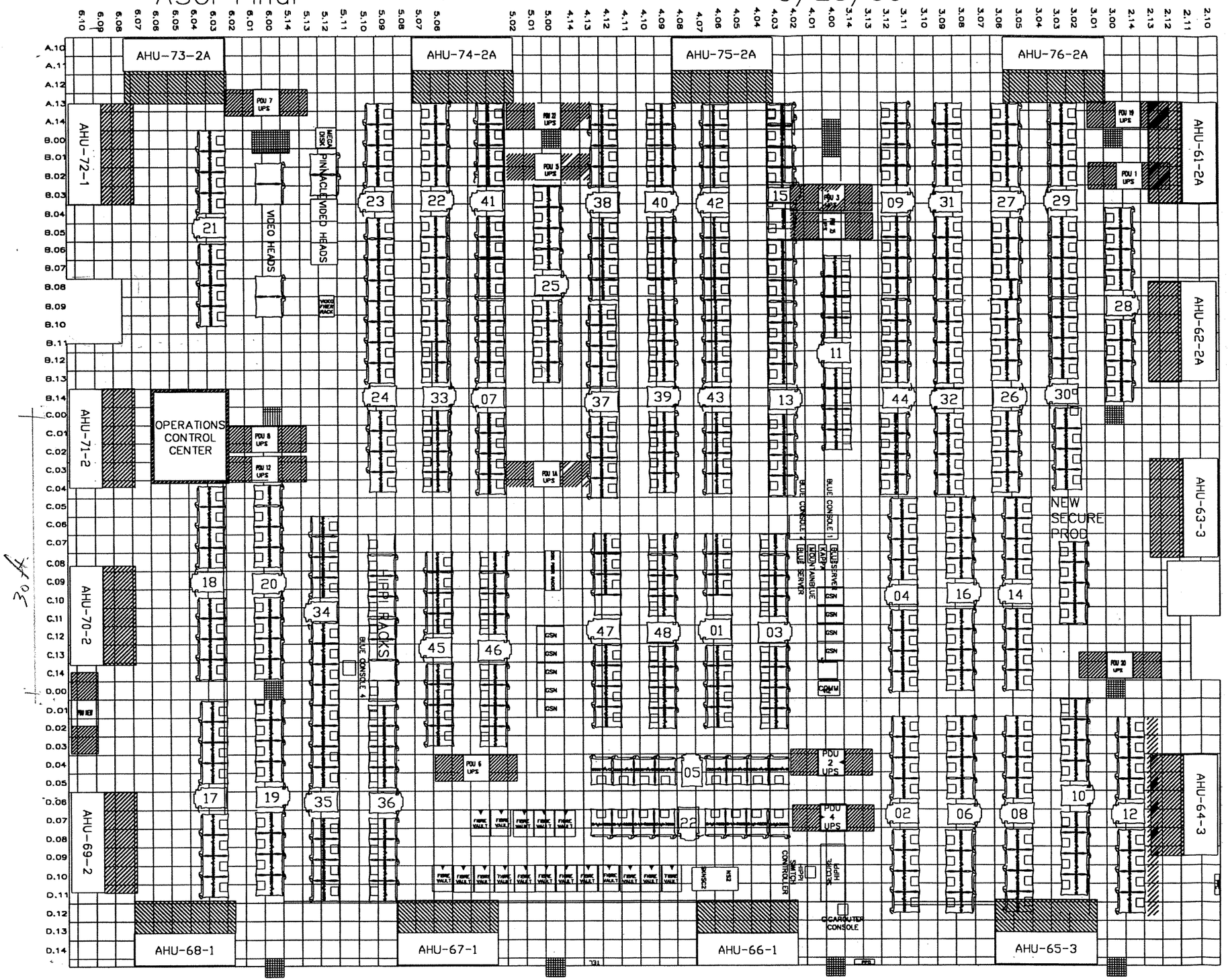
X-Sender: u078702@cic-mail.lanl.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.0
Date: Thu, 13 Sep 2001 15:39:33 -0600
To: doug hefele <hefele@lanl.gov>
From: Jimmie Frybarger <jaf@lanl.gov>
Subject: AUTOCAD Drawing

Doug,

Check this out, is this ok??

Jimmie A Frybarger
jaf@lanl.gov
CCN-18 MS B252
Phone 665-1023 - Fax 665-8816
Page 104-6481 - Digital

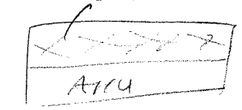
ASCI Final SM-1498 RM341 3/28/00



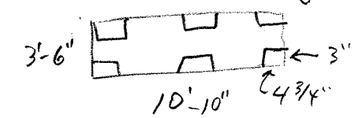
30 ft

New runs from L3
@ D
2-6

Per code
clear space



AHU @ 2500 lbs.
on 6" Isolation legs / boots

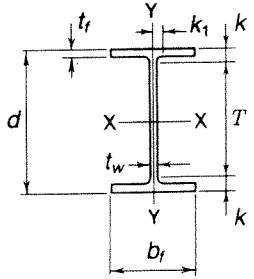


Per Day 9-18-01
Phone conv.
2ft grids
Computers & AHU's to
Grid scale.

Room 341 computer layout
700 lbs per rack
± 3' x 2'-3" per rack. = 6.75 ft²
(Origin 2000) 104 psf

rec'd 9-17-01
from LANL
Day Room 341
LDCC

asciFinal.dwg



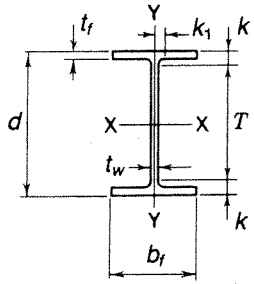
W SHAPES
Dimensions

Designation	Area A	Depth d		Web Thickness t_w		$\frac{t_w}{2}$	Flange Width b_f		Flange Thickness t_f		Distance T	k	k_1
	In.^{2}	In.		In.		In.	In.		In.		In.	In.	In.
W 24×492[a]	144.0	29.65	29 5/8	1.970	2	1	14.115	14 1/8	3.540	3 9/16	21	4 5/16	1 9/16
×450[a]	132.0	29.09	29 1/8	1.810	1 13/16	15/16	13.955	14	3.270	3 1/4	21	4 1/16	1 1/2
×408[a]	119.0	28.54	28 1/2	1.650	1 5/8	13/16	13.800	13 3/4	2.990	3	21	3 3/4	1 3/8
×370[a]	108.0	27.99	28	1.520	1 1/2	3/4	13.660	13 5/8	2.720	2 3/4	21	3 1/2	1 5/16
×335[a]	98.4	27.52	27 1/2	1.380	1 3/8	11/16	13.520	13 1/2	2.480	2 1/2	21	3 1/4	1 1/4
×306[a]	89.8	27.13	27 1/8	1.260	1 1/4	5/8	13.405	13 3/8	2.280	2 1/4	21	3 1/16	1 3/16
×279[a]	82.0	26.73	26 3/4	1.160	1 3/16	5/8	13.305	13 1/4	2.090	2 1/16	21	2 7/8	1 1/8
×250[a]	73.5	26.34	26 3/8	1.040	1 1/16	9/16	13.185	13 1/8	1.890	1 7/8	21	2 11/16	1 1/8
×229	67.2	26.02	26	0.960	1	1/2	13.110	13 1/8	1.730	1 3/4	21	2 1/2	1
×207	60.7	25.71	25 3/4	0.870	7/8	7/16	13.010	13	1.570	1 9/16	21	2 3/8	1
×192	56.3	25.47	25 1/2	0.810	13/16	7/16	12.950	13	1.460	1 7/16	21	2 1/4	1
×176	51.7	25.24	25 1/4	0.750	3/4	3/8	12.890	12 7/8	1.340	1 5/16	21	2 1/8	15/16
×162	47.7	25.00	25	0.705	11/16	3/8	12.955	13	1.220	1 1/4	21	2	1 1/16
×146	43.0	24.74	24 3/4	0.650	5/8	5/16	12.900	12 7/8	1.090	1 1/16	21	1 7/8	1 1/16
×131	38.5	24.48	24 1/2	0.605	5/8	5/16	12.855	12 7/8	0.960	15/16	21	1 3/4	1 1/16
×117	34.4	24.26	24 1/4	0.550	9/16	5/16	12.800	12 3/4	0.850	7/8	21	1 5/8	1
×104	30.6	24.06	24	0.500	1/2	1/4	12.750	12 3/4	0.750	3/4	21	1 1/2	1
W 24×103[b]	30.3	24.53	24 1/2	0.550	9/16	5/16	9.000	9	0.980	1	21	1 3/4	13/16
× 94	27.7	24.31	24 1/4	0.515	1/2	1/4	9.065	9 1/8	0.875	7/8	21	1 5/8	1
× 84	24.7	24.10	24 1/8	0.470	1/2	1/4	9.020	9	0.770	3/4	21	1 9/16	15/16
× 76	22.4	23.92	23 7/8	0.440	7/16	1/4	8.990	9	0.680	11/16	21	1 7/16	15/16
× 68	20.1	23.73	23 3/4	0.415	7/16	1/4	8.965	9	0.585	9/16	21	1 3/8	15/16
W 24× 62	18.2	23.74	23 3/4	0.430	7/16	1/4	7.040	7	0.590	9/16	21	1 3/8	15/16
× 55	16.2	23.57	23 5/8	0.395	3/8	3/16	7.005	7	0.505	1/2	21	1 5/16	15/16

[a]For application refer to Notes in Table 2.
[b]Heavier shapes in this series are available from some producers.

from: AISC ASD 9th Ed.

W SHAPES
Properties



Nominal Wt. per Ft	Compact Section Criteria $\frac{b_f}{2t_f}$	F_y'	$\frac{d}{t_w}$	F_y'''	r_T	$\frac{d}{A_f}$	Elastic Properties Axis X-X I	S	r	Axis Y-Y I	S	r	Plastic Modulus Z_x	Z_y
Lb.		Ksi		Ksi	In.		In.^{4}	In.^{3}	In.	In.^{4}	In.^{3}	In.	In.^{3}	In.^{3}
492	2.0	—	15.1	—	3.80	0.59	19100	1290	11.5	1670	237	3.41	1550	375
450	2.1	—	16.1	—	3.76	0.64	17100	1170	11.4	1490	214	3.36	1410	337
408	2.3	—	17.3	—	3.71	0.69	15100	1060	11.3	1320	191	3.33	1250	300
370	2.5	—	18.4	—	3.67	0.75	13400	957	11.1	1160	170	3.28	1120	267
335	2.7	—	19.9	—	3.63	0.82	11900	864	11.0	1030	152	3.23	1020	238
306	2.9	—	21.5	—	3.60	0.89	10700	789	10.9	919	137	3.20	922	214
279	3.2	—	23.0	—	3.57	0.96	9600	718	10.8	823	124	3.17	835	193
250	3.5	—	25.3	—	3.53	1.06	8490	644	10.7	724	110	3.14	744	171
229	3.8	—	27.1	—	3.51	1.15	7650	588	10.7	651	99.4	3.11	676	154
207	4.1	—	29.6	—	3.48	1.26	6820	531	10.6	578	88.8	3.08	606	137
192	4.4	—	31.4	—	3.46	1.35	6260	491	10.5	530	81.8	3.07	559	126
176	4.8	—	33.7	58.2	3.44	1.46	5680	450	10.5	479	74.3	3.04	511	115
162	5.3	—	35.5	52.5	3.45	1.58	5170	414	10.4	443	68.4	3.05	468	105
146	5.9	—	38.1	45.6	3.43	1.76	4580	371	10.3	391	60.5	3.01	418	93.2
131	6.7	—	40.5	40.3	3.40	1.98	4020	329	10.2	340	53.0	2.97	370	81.5
117	7.5	—	44.1	33.9	3.37	2.23	3540	291	10.1	297	46.5	2.94	327	71.4
104	8.5	58.5	48.1	28.5	3.35	2.52	3100	258	10.1	259	40.7	2.91	289	62.4
103	4.6	—	44.6	33.2	2.33	2.78	3000	245	9.96	119	26.5	1.99	280	41.5
94	5.2	—	47.2	29.6	2.33	3.06	2700	222	9.87	109	24.0	1.98	254	37.5
84	5.9	—	51.3	25.1	2.31	3.47	2370	196	9.79	94.4	20.9	1.95	224	32.6
76	6.6	—	54.4	22.3	2.29	3.91	2100	176	9.69	82.5	18.4	1.92	200	28.6
68	7.7	—	57.2	20.2	2.26	4.52	1830	154	9.55	70.4	15.7	1.87	177	24.5
62	6.0	—	55.2	21.7	1.71	5.72	1550	131	9.23	34.5	9.80	1.38	153	15.7
55	6.9	—	59.7	18.5	1.68	6.66	1350	114	9.11	29.1	8.30	1.34	134	13.3