Attachment 4

TVA calculation EPM-LCP-072489, "Cooling and Heating Load Analysis, Main Control Room HVAC," Revision 14
(Letter Item 4, SSER 23 Appendix HH Item Number 108)

LEGIBILITY EVALUATED AND

ACCEPTED FOR ISSUE. ALL PAGES

Scott Helm 8/08/11

SIGNATURE REV 14

NPG CALCULATION COVERSHEET/CCRIS UPDATE

Page iv1

REV 0 EDMS/RIMS NO.	EDMS TYPE:	EDMS ACCESSION NO (N/A for REV. 0)
B26900730251	calculations(nuclear)	T9311082401 4

Calc Title:
Cooling and Heating Load Analysis, Main Control Room HVAC

CALC ID	TYPE	ORG	PLANT	BRANCH	NUMBER	CUR REV	NEW REV	REVISION APPLICABILITY
CURRENT	CN	NUC	WBN	MEB	EPMLCP072489	013	014	Entire calc ☒ Selected pages ☐
NEW	CN	NUC						

ACTION	NEW ☐ REVISION ☒	DELETE ☐ RENAME ☐	SUPERSEDE ☐ DUPLICATE ☐	CCRIS UPDATE ONLY ☐ (Verifier Approval Signatures Not Required)	No CCRIS Changes ☐ (For calc revision, CCRIS been reviewed and no CCRIS changes required)

UNITS	SYSTEMS	UNIDS
001,002	031	NA

DCN,EDC,N/A	APPLICABLE DESIGN DOCUMENT(S)	CLASSIFICATION
N/A	N3-30CB-4002	E

QUALITY RELATED?	SAFETY RELATED? (If yes, QR = yes)	UNVERIFIED ASSUMPTION	SPECIAL REQUIREMENTS AND/OR LIMITING CONDITIONS?	DESIGN OUTPUT ATTACHMENT?	SAR/TS and/or ISFSI SAR/CoC AFFECTED
Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

PREPARER ID	PREPARER PHONE NO	PREPARING ORG (BRANCH)	VERIFICATION METHOD	NEW METHOD OF ANALYSIS
Hchen	432-365-1962	Bechtel MEB	Design Review	☐ Yes ☒ No

PREPARER SIGNATURE	DATE	CHECKER SIGNATURE	DATE
Hchen	8/4/11	DSNaik	8/4/11
VERIFIER SIGNATURE	DATE	APPROVAL SIGNATURE	DATE
DSNaik	8/4/11	ERIC HIGGINS	8/04/11

STATEMENT OF PROBLEM/ABSTRACT

This calculation determines the cooling and heating loads and room conditions for the Control Building Main Control Room (MCR) and associated rooms located at EL. 755.0, for normal and accident (LOCA) modes of operation.

The total cooling load for a given room is calculated as a sum of the heat gained through transmission and the internal heat generated by people and electrical devices (lighting, equipment, etc.).

The total heating load for a given room is calculated as a difference of the heat generated internally and the heat lost through transmission.

The purpose of Revision 014 is to address the relative humidity in MCR during outside abnormal condition and to update the applicability of Dual Unit Operation by removing the UVAs.

MICROFICHE/EFICHE Yes ☐ No ☒ FICHE NUMBER(S)

☐ LOAD INTO EDMS AND DESTROY

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NPG CALCULATION COVERSHEET/CCRIS UPDATE

CALC ID	TYPE	ORG	PLANT	BRANCH	NUMBER	REV
	CN	NUC	WBN	MEB	EPMLCP072489	014

ALTERNATE CALCULATION IDENTIFICATION

BLDG	ROOM	ELEV	COORD/AZIM	FIRM	Print Report
05	N/A	0755	N/A	Bechtel	Yes ☐

CATEGORIES N/A

KEY NOUNS (A-add, D-delete)

ACTION (A/D)	KEY NOUN	A/D	KEY NOUN

CROSS-REFERENCES (A-add, C-change, D-delete)

ACTION (A/C/D)	XREF CODE	XREF TYPE	XREF PLANT	XREF BRANCH	XREF NUMBER	XREF REV
A	P	DW	WBN	MEB	2-47E235-36	
A	P	DW	WBN	MEB	47A373-1	
A	P	VD	WBN	MEB	WCAP8587	
A	P	IN	WBN	MEB	SOI-31.01	

CCRIS ONLY UPDATES:

Following are required only when making keyword/cross reference CCRIS updates and page 1 of form NEDP-2-1 is not included:

PREPARER SIGNATURE	DATE	CHECKER SIGNATURE	DATE
PREPARER PHONE NO.	EDMS ACCESSION NO.		

NPG CALCULATION COVERSHEET/CCRIS UPDATE

REV 0 EDMS/RIMS NO.	EDMS TYPE:	EDMS ACCESSION NO (N/A for REV. 0)
B26900730251	calculations(nuclear)	T9309111 12022

Calc Title:
Cooling and Heating Load Analysis, Main Control Room HVAC

CALC ID	TYPE	ORG	PLANT	BRANCH	NUMBER	CUR REV	NEW REV	REVISION APPLICABILITY
CURRENT	CN	NUC	WBN	MEB	EPMLCP072489	012	013	Entire calc ☒ Selected pages ☐
NEW	CN	NUC						

ACTION	NEW ☐ REVISION ☒	DELETE ☐ RENAME ☐	SUPERSEDE ☐ DUPLICATE ☐	CCRIS UPDATE ONLY ☐ (Verifier Approval Signatures Not Required)	No CCRIS Changes ☐ (For calc revision, CCRIS been reviewed and no CCRIS changes required)

UNITS	SYSTEMS	UNIDS
001,002	031	NA

DCN,EDC,N/A	APPLICABLE DESIGN DOCUMENT(S)	CLASSIFICATION
N/A	N3-30CB-4002	E

QUALITY RELATED?	SAFETY RELATED? (If yes, QR = yes)	UNVERIFIED ASSUMPTION	SPECIAL REQUIREMENTS AND/OR LIMITING CONDITIONS?	DESIGN OUTPUT ATTACHMENT?	SAR/TS and/or ISFSI SAR/CoC AFFECTED
Yes ☒ No ☐	Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

PREPARER ID	PREPARER PHONE NO	PREPARING ORG (BRANCH)	VERIFICATION METHOD	NEW METHOD OF ANALYSIS
SMYANCEY	865-632-6557	Bechtel MEB	Design Review	☐ Yes ☒ No

PREPARER SIGNATURE	DATE	CHECKER SIGNATURE	DATE
Seth M. Yancey	11-5-09	Chad M. Grennor	11/5/09
VERIFIER SIGNATURE	**DATE**	**APPROVAL SIGNATURE**	**DATE**
Chad M. Grennor	11/5/09	ROBERT J. MOLL	11/9/09

STATEMENT OF PROBLEM/ABSTRACT

The purpose of Revision 013 is to update the applicability of Dual Unit Operation and to address the issues discussed in PER 207043.

Revision 013 adds an unverified assumption for Unit 2 only. The unverified assumption is discussed in Section 4.2 on page 13B.

Additional information on the purpose/abstract is shown on the previous revision coversheets.

LEGIBILITY EVALUATED AND ACCEPTED FOR ISSUE. ALL PAGES
SIGNATURE REV 13 11/05/09 DATE

MICROFICHE/EFICHE Yes ☐ No ☒ FICHE NUMBER(S)

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NPG CALCULATION COVERSHEET/CCRIS UPDATE

CALC ID	TYPE	ORG	PLANT	BRANCH	NUMBER	REV
	CN	NUC	WBN	MEB	EPMLCP072489	013

ALTERNATE CALCULATION IDENTIFICATION

BLDG	ROOM	ELEV	COORD/AZIM	FIRM	Print Report Yes ☐
05	N/A	0755	N/A	Bechtel	

CATEGORIES N/A

KEY NOUNS (A-add, D-delete)

ACTION (A/D)	KEY NOUN	A/D	KEY NOUN

CROSS-REFERENCES (A-add, C-change, D-delete)

ACTION (A/C/D)	XREF CODE	XREF TYPE	XREF PLANT	XREF BRANCH	XREF NUMBER	XREF REV
A	P	CN	WBN	EEB	WBNEEBMSTI090022	
A	P	CN	WBN	EEB	WBNEEBMSTI090042	
A	P	CN	WBN	EEB	WBNEEBMSTI090058	
A	P	DW	WBN	EEB	55W416-3	
A	P	PE	WBN	MEB	207043	

CCRIS ONLY UPDATES:

Following are required only when making keyword/cross reference CCRIS updates and page 1 of form NEDP-2-1 is not included:

PREPARER SIGNATURE	DATE	CHECKER SIGNATURE	DATE
PREPARER PHONE NO.	EDMS ACCESSION NO.		

TVAN CALCULATION COVERSHEET/CCRIS UPDATE

REV 0 EDMS/RIMS NO.	EDMS TYPE:	EDMS ACCESSION NO (N/A for REV. 0)
900807F0012 / B26 900730 251	calculations(nuclear)	T71 020412 802

Calc Title: **COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC**

CALC ID	TYPE	ORG	PLANT	BRANCH	NUMBER	CUR REV	NEW REV	REVISION APPLICABILITY
CURRENT	CN	NUC	WBN	MEB	EPM-LCP-072489	11	12	Entire calc ☒ Selected pages ☐
NEW								

ACTION							
	NEW ☐ REVISION ☒	DELETE ☐ RENAME ☐	SUPERSEDE ☐ DUPLICATE ☐	CCRIS UPDATE ONLY ☒ (Verifier Approval Signature Not Required)	No CCRIS Changes ☐ (For calc revision, CCRIS been reviewed and no CCRIS changes required)

UNITS	SYSTEMS	UNIDS
1 & 2	N/A	N/A

DCN,EDC,N/A	APPLICABLE DESIGN DOCUMENT(S)	CLASSIFICATION
N / A	N3-30CB-4002	E

QUALITY RELATED?	SAFETY RELATED?	UNVERIFIED ASSUMPTION	SPECIAL REQUIREMENTS AND/OR LIMITING CONDITIONS?	DESIGN OUTPUT ATTACHMENT?	SAR/TS AFFECTED
Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

PREPARER ID	PREPARER PHONE NO	PREPARING ORG (BRANCH)	VERIFICATION METHOD	NEW METHOD OF ANALYSIS
[redacted]	423-365-3625	WBN / MEB	DESIGN REVIEW	Yes ☐ No ☒

PREPARER SIGNATURE	DATE	CHECKER SIGNATURE	DATE
L. NICHOLSON / L Nicholson	3/27/02	R. CAMPBELL /	4/11/02
VERIFIER SIGNATURE	**DATE**	**APPROVAL SIGNATURE**	**DATE**
R. CAMPBELL /	4/11/02	for CPA	4/11/02

STATEMENT OF PROBLEM/ABSTRACT

THIS CALCULATION DETERMINES THE COOLING AND HEATING LOADS AND ROOM CONDITIONS FOR THE CONTROL BUILDING MAIN CONTROL ROOM (MCR) AND ASSOCIATED ROOMS LOCATED AT EL. 755.0, FOR NORMAL AND ACCIDENT (LOCA) MODES OF OPERATION.

THE TOTAL COOLING LOAD FOR A GIVEN ROOM IS CALCULATED AS A SUM OF THE HEAT GAINED TROUGH TRANSMISSION AND THE INTERNAL HEAT GENERATED BY PEOPLE AND ELECTRICAL DEVICES (LIGHTING, EQUIPMENT, ETC.).

THE TOTAL HEATING LOAD FOR A GIVEN ROOM IS CALCULATED AS A DIFFERENCE OF THE HEAT GENERATED INTERNALLY AND THE HEAT LOST TROUGH TRANSMISSION.

AS IT STATED IN THE CONCLUSION, SECTION 9.0, ALL ROOMS SERVED BY THE MCR AIR HANDLING UNIT ARE MAINTAINED AT OR BELOW THE DESIGN TEMPERATURE LIMITS SPECIFIED IN THE ENVIRONMENTAL DATA DRAWINGS 47E235-SERIES. MCR ROOMS COOLING CAN BE MAINTAINED AT 70% AND 78% DESIGN FLOW RATE FOR NORMAL AND LOCA OPERATING CONDITIONS, RESPECTIVELY.

MICROFICHE/FICHE Yes ☐ No ☒ FICHE NUMBER(S)

☐ LOAD INTO EDMS AND DESTROY
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TVA

Title: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC.

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	Initial Issue	7-26-90
1	REVISED PAGES: 1, 11, 72, 113, 114, 117, 3, 20, 21, 51, 53, ~~12~~ 15, 56, 59, 62, 65, 68, 76, 87, ~~50, 52, 55~~, May 3-21-91 ~~TO REFLECT NEW ELECTRICAL LOADS AS IDENTIFIED IN~~ Added the following revised calcs to Section 6.3 3/21/91 WBN-EEB-MS-TI09-0022 REV 2 WBN-EEB-MS-TI09-0042 REV 2 WBN-EEB-MS-TI09-0058 REV 2 REVISED PAGES: 12, 15, 50, 52, 55, 58, 61, 64, 67, 71, 75, 86. TO REFLECT NEW TRANSMISSION LOADS BASED ON ~~WBNP~~ EPM-0SG4-145 R0. PAGES ADDED: ~~NONE~~ Design Verification Form. PAGES DELETED: NONE	4-19-91

R1 computed May 3-21-91 date 3-21-91

R1 checked KFT date 4/17/91

PROJECT No.: 8573-05
CALC. NO.: EPM-LCP-072489, REV. 0
Page 2 of ~~118~~ 58
Prepared: _____ Date: 1/18/90
Reviewed: _____ Date: 1-18-90

TVA 10534 (EN DES-4-78)

BRANCH / PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

TITLE: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC		REV LOG
REVISION NUMBER	DESCRIPTION OF REVISION	DATE APPROVED
2	REVISE CALCULATION TO ADDRESS DEFICIENCIES LISTED IN ATTACHMENT 3 FROM THE SERT REVIEW. UPDATED CALCULATION USING REVISED ELECTRICAL LOAD FROM CALCULATIONS WBN-EEB-MS-T109-0022 R3, WBN-EEB-MS-T109-0042 R3 AND WBN-EEB-MS-T109-0058 R2. ROOM CONDITIONS (TEMPERATURE AND RELATIVE HUMIDITY) ARE INCLUDED IN THIS REVISION. PAGES ADDED: 1A, 2A, ~~4~~ 4 10/29/92, 7 THROUGH 157, ATTACHMENT A, 157A PAGES DELETED: 3, 6 THROUGH 143 PAGES REVISED: 1, 2, 3, 5, 6, 4 DCCM AND CCRIS WERE REVIEWED ON 8/12/92 AND NO OUTSTANDING CHANGES AFFECT THIS CALCULATION BJ for RV 10/29/92 PE 10/22/92	10/29/92

TVA 10534 (EN DES-4-78)

THIS Sheet Added by Rev. 2

TITLE: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

Revision Log

REVISION NUMBER	DESCRIPTION OF REVISION	DATE APPROVED
3	Revised to incorporate changes made by DCN M-11410-A. Equipments located at 755.0-C12 and 755.0-C14 are replaced. This revision calculates the new heat load and temperature for those rooms. Pages Added: 2b, 6a Pages Revised: 1a, 7, 9, 15, 16, 40, 69, 70, 152, 153 Pages Deleted: None DCCM and CCRIS were reviewed on 6-17-93 and no DCNs or other changes which impact this calculation were found. ~~Number of pages submitted for microfilming is 10.~~ VK 6-17-93 Prepared By _____ Date 6-17-93 Checked By MAG Date 6-17-93	6/17/93

BRANCH PROJECT IDENTIFIERS: EPM-LCP-072489, WBN-31-DO53, MEB-WBN-31

TITLE: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM		REV LOG
REVISION NUMBER	DESCRIPTION OF REVISION	DATE APPROVED
4	REVISE CALCULATION TO CHANGE OUTSIDE WINTER DESIGN TEMPERATURE TO 13 °F AND UPDATE EQUIPMENT LOADS TO REFLECT REVISED ELECTRICAL LOADS. THIS REVISION ALSO USES A 25% LOAD FACTOR FOR DETERMINING TEMPERATURES DURING HEATING MODE *(EXCEPT WHERE NOTED)*. DUE TO THE EXTENSIVE REVISIONS IN THIS CALCULATION REV BARS HAVE BEEN OMMITTED AND PAGINATION CHANGED. DCN ~~S-25075-A~~ S-35455-A WER 6/6/95 WILL REVISE ENVIRONMENTAL DRAWING TO CORRESPOND WITH THE RESULTS OF THIS CALCULATION. PAGES REVISED: 1A,1,2,2A,3-6,7-118 PAGES ADDED: 1B,2C,6B PAGES DELETED: 119-157 A DCCM AND CCRIS REVIEW WAS PERFORMED ON 11/29/93 AND NO OUTSTANDING CHANGES AFFECT THIS CALCULATION. BY R.VARANO R Varano DATE 11/29/93 CHKD BY A.STEPANIAN AStep DATE 12/2/93	12/9/93
5	REVISED TO CHANGE THE EMERGENCY PRESSURIZATION AIR FLOW FROM 325 TO 711 CFM TO REFLECT THE CHANGES MADE IN CALCULATION TI-RPS-198 REVISION 11 AND DCN S-36737-A. ALSO, REVISED THE DCN S-25075-A IN REVISION LOG 4 ABOVE AND THROUGHOUT THIS CALCULATION TO S-35455-A. ALSO, UPDATED CALC TO REFLECT CHANGES FROM DCN S-23688-A. PAGES REVISED: 1B, 2C, 7, 9, 11, 14, 16, 22, 23, ~~24~~, 31, 67, 71, 107, 111, 113, 115, 116, 117, 118 WER 6/6/95 PAGES ADDED: 6C PAGES DELETED: NONE DCCM AND CCRIS WERE REVIEWED ON 6/4/95 AND NO CHANGES WERE FOUND WHICH IMPACT THE CHANGES MADE BY THIS REVISION.	6-7-95

TITLE: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

Revision Log

REVISION NUMBER	DESCRIPTION OF REVISION	DATE APPROVED
6	REVISED DESIGN INPUT DATA SECTION TO REFLECT CURRENT TEMPERATURE CONDITIONS AND REVISED THE CALCULATION IN SECTION 7 TO SUIT THIS NEW DATA. THIS IS PART OF THE EFFORT UNDER DCNS-35455-A TO UPDATE THE 47E 235 SERIES ENVIRONMENTAL DATA DRAWING MILD ENVIRONMENT SPACES. PAGES REVISED: 1B, 7, 9, 14, 17 32, 35, 37, 39, 42, 43, 81, 87, 101, 107, 112, 114, 115, 116 PAGES ADDED: 2D, 6D PAGES DELETED: NONE DCCM AND CCRIS WERE REVIEWED ON 7/30/95 AND NO CHANGES WHICH IMPACT THIS CALCULATION WERE FOUND PREPARED BY: J.K. BACALAKIS JKB DATE 7/30/95 CHECKED BY: [signature] DATE 7/30/95	7/31/95

TVAN CALCULATION RECORD OF REVISION

Title Cooling And Heating load analysis , Main Control Room HVAC

Revision No.	DESCRIPTION OF REVISION	Date Approved
7	Revision 7 of this calculation documents the Heat load analysis and establish room temperature condition due to replacement of the Emergency Response Facilities Data System (ERFDS) workstations in the Unit 1 Main Control Room (MCR) as well as the ERFDS workstations in the Technical Support Center (TSC) in support of DCN M39931-A. The resultant room temperature changes in these areas due to sensible load changes are insignificant and do not impact the environmental drawings. The main control room HVAC system has adequate capacity to handle these load changes. Pages Added : 1C (cover sheet) , 2E(revision log), 6E(IR Form). Pages Deleted : None Pages Changed: 7, 8, 9, 14, 15, 18, 42, 44, 62, 64, 82, 102, 104, 112, 113, 114, 115, and 118. This Revision log contains 22 pages.	8/27/98
8	Resolved a discrepancy, with regards to normal MCR pressurization flowrate, which was discovered during the FSAR re-verification review. Pages Added: 6F, 7A, and Attachment B (7 pages) Pages Deleted: None. Pages Changed: 1C, 2E, 9, 14, 15, 22, and 30. PREP. BY B.L. Engelke 11/6/98 CHKD. BY K.B. Ware 11/9/98 Number of pages to be microfilmed: 16 Total.	11/12/98

TVAN CALCULATION RECORD OF REVISION

EPN-LCP-072489 RD

Title Cooling And Heating load Analysis , Control Building- Electrical Board Rooms.

Revision No.	DESCRIPTION OF REVISION	Date Approved
9	This Revision is a page replacement type revision. This Revision , Revision 9 is as described below. Revision 9 of this calculation documents the Heat load analysis and establishes room temperature condition due to the replacement of Unit 1 Westinghouse Plant Process Computer with an integrated Computer System (ICS) in support of DCN M39911-A. The resultant room temperature (NORMAL /LOCA) in MCR C-12 due to sensible load changes is not affected and do not impact the environmental drawings and main control room HVAC system has adequate capacity to handle these load changes. Pages Added : 2F (Revision log), 6G (IR Form). Pages Deleted : None Pages Changed: 1c, 7, 8, 9, 14, 15, 18, 42, 62, 82, 102, 112, 113, 114, 115 and 118. This Revision log contains 18 pages. Prepared by _____ date 11-16-98 Checked by _____ date 11-17-98	12/7/98

TVAN CALCULATION RECORD OF REVISION		
CALCULATION IDENTIFIER EPM-LCP-072489		Page 2g
Title	COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC	

Revision No.	DESCRIPTION OF REVISION
10	This calculation has been revised to reflect the changes in the electrical equipment load presented in WBN EEB-MS-TI09-0042, Revision 11 affecting the Main Control Room. The degree of change in the electrical loads for the above mentioned area was found to be less than 1 percent. The previous electrical load for El. 755.0-C12 during normal and LOCA operation was 100,931 watts. The present calculated electrical load is 101,003 watts. Therefore, the increase in load will have no impact on the results presented in this calculation. Consequently, the numerical values in Revision 10 of this calculation do not reflect the changes in the electrical loads presented in WBN EEB-MS-TI09-0042, Revision 11. The supporting DCN is D50301A. Pages added: 1d, 2g, 6h Pages Revised: 9, 14, 15 Pages deleted: None Successor calculations were not reviewed as no input data changes were made to this calculation. Prepared By _____ Date 4/26/00 Checked By _____ Date 4/26/00 4/27/2000

TVAN CALCULATION RECORD OF REVISION		
CALCULATION IDENTIFIER: EPM-LCP-072489		Page 2h
Title: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC		

Revision No.	DESCRIPTION OF REVISION
11	This calculation is performed in accordance with the requirements of NEDP-2 as a result of the corrective action program PER 98-016345. This revision corrects errors in the previous revisions of this calculation such as rooms' dimensions, coefficients of heat transfer, adjacent rooms' temperatures, etc. As a result of the numerous corrections, new cooling and heating loads for normal and accident (LOCA) operating conditions are generated and evaluated. • SAR Sections have been reviewed by L Nicholson Changes associated with this revision do not affect the SAR (Section 6.4). Pages deleted: 5, 6, 6A to 6H, 7, 7A, 8, 11B Pages added: 1e, 2h, 13A, 16A, 18A, 23A, 26A, 34A, 38A, 41A, 43A, 44A, 50A, 52A, 54A, 58A, 61A, 63A, 70A, 81A, 83A, 90A, 94A, 101A, 110A, Attachment C (4 pages) Pages revised: 19 to 22, 27, 28, 29 Pages replaced: 3, 4, 9, 11, 13 to 18, 23, 24, 30 to 116, 117 Total number of pages in Rev.11: 164 Prepared by: L Nicholson Date: 1-17-01 L. Nicholson Checked by: M Matani Date: 1/17/01 M. Matani THIS PAGE ADDED BY REV. 11

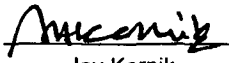
01/22/01

TVAN CALCULATION RECORD OF REVISION		
CALCULATION IDENTIFIER: EPM-LCP-072489		Page 2i
Title: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC		
Revision No.	DESCRIPTION OF REVISION	
12	This revision incorporates the actual electrical load from calculation M-D-Q-000-031-2001-0065 which is based on the walkdown measured data. As a result of the utilizing these reduced internal loads, new room cooling and heating loads and steady state temperatures are generated for Normal and LOCA operating condition. Air flows were revised in this calculation to reflect measured plant values along with use of the flow diagram. This revision also evaluates at what minimum air flow MCR AHU can operate to maintain room steady state temperatures below the design limits specified at the Environmental Data Drawings 47E235-Series. • SAR Sections have been reviewed by L Nicholson Changes associated with this revision do not affect the SAR (Section 9.4). • Tech Specs have been reviewed and determined not to be affected. Pages deleted: 1a to 1e, 52A, 83A, 94A Pages added: 2i, 29A, 42A, 62A, 118, Appendix A (28 pages), Appendix B (27 pages), Attachment D (2 pages) Pages revised: 10, 16A, 20, 21, 27 Pages replaced: 1, 3, 4, 9, 13, 13A, 15, 18, 18A, 22, 28, 29, 29A to 117 Total number of pages in Rev.12: 218 (1, 2, 2a to 2i, 3, 4, 9 to 118 including 13A, 16A, 18A, 23A, 26A, 29A, 34A, 38A, 41A, 42A, 43A, 44A, 50A, 54A, 58A, 61A, 62A, 63A, 70A, 81A, 90A, 101A and 110A; Appendixes (55 pages), Attachments (17 pages) Prepared by: L. Nicholson Date: 3/27/02 Checked by: R. Campbell Date: 4/11/02 THIS PAGE ADDED BY REV. 12	

4/11/02

NPG CALCULATION RECORD OF REVISION		
CALCULATION IDENTIFIER EPMLCP072489		Page 2j
Title	COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC	
Revision No.	DESCRIPTION OF REVISION	
013	Revision 013 of this calculation was created to update Unit 2 applicability and to address issues presented in PER 207043. This calculation is applicable to Unit 2 based on the following: • Appendix C of this calculation was added to present calculation results for dual unit operation. • An unverified assumption has been added as part of this revision. The unverified assumption only applies to the Unit 2 portions of this calculation. Refer to section 4.2 of this calculation for further information. When review of Revision 12 was performed for Unit 2 applicability, the following needed to be changed for support of both Units 1 and 2: • Revision 12 utilizes calculation MDQ00003120010065 for electrical heat load values. The results of calculation MDQ00003120010065 are applicable only for single unit operation. Calculation MDQ00003120010065 is not being revised for dual unit operation. Revision 13 of EPMLCP072489 directly utilizes design inputs to calculation MDQ00003120010065 for electrical heat load values. The design inputs are specifically dual unit operation applicable revisions of calculations WBNEEBMSTI090022, WBNEEBMSTI090058 and UVA 4.2.1. A review of DCNs listed in the revision log prior to Revision 013 revealed no DCNs of impact to dual unit operation. This revision also makes a correction to the heat loads used for Room 755-C1 for the purposes of the Single Unit Operation heating load analysis. Previous revisions had erroneously transposed the heat loads for this room and had also not corrected the heat loads for equipment that is mounted in the duct work. This had resulted in non-conservative results for minimum room temperatures for this room. This issue is documented in PER 207043. Both the Single Unit Operation (Section 9.4) and Dual Unit Operation (Appendix C) summaries conclude that the Environmental Data Drawing for Room 755-C1 (Ref. 5.3.7) warrant revision. This revision concludes that the Environmental Data Drawing for Room 755-C3 (ref. 5.3.4) needs to be revised to reflect higher temperatures in this room during Dual Unit Operation. Affected engineering judgments and assumptions were reviewed and were revised as necessary to ensure adequacy. Ultimate heat sink (UHS) temperature was not used as an input to the calculation analyses. Therefore, existing calculation results will not be affected by changing the UHS technical specification temperature. FSAR AND TECHNICAL SPECIFICATIONS HAVE BEEN REVIEWED AND ARE NOT AFFECTED BY THIS REVISION OF THE CALCULATION. Reviewer: Lien Nguyen Lien K Nguyen 11/5/09 Pages Added: ii1, i1, 2j, 3a, 4a, 13B, 118A, Appendix C – Dual Unit Operation Analysis Pages Revised: 9, 10, 14, 15, 18, 112, 116, 117, 118 Pages Replaced: 18A, 72 – 111, 114, 115 Pages Deleted: none Total number of pages in this revision including Attachments: 153 + 28 (Appendix A) + 27 (Appendix B) + 103 (Appendix C) + 4 (Attachment A) + 7 (Attachment B) + 4 (Attachment C) + 2 (Attachment D) = 328 Pages This page added by Revision 013	

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER EPMLCP072489	Page 2K
Title COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC	

Revision No.	DESCRIPTION OF REVISION
014	Revision 014 of this calculation was created to update the applicability of Dual Unit Operation by removing the UVAs and to address the relative humidity in MCR during outside abnormal condition (See Appendix D). The predecessor electrical heat load calculation WBNEEBMSTI090042 R20 was issued. The total heat load for MCR (EL.755 - C12) is 136,598 watts, which is bounded by the value (148,032 watts) used in Revision 013. The results in this calculation are conservative. Thus, no change needs to be made in this revision and the UVA listed in Section 4.2.1 of Revision 013 was removed. Existing design margins are not adversely affected by this revision; therefore, existing design inputs and previously made engineering judgments and assumptions are not invalidated. The effect of Unit 2/dual unit operation on Unit 1 margins has been reviewed with no impact. Successor calculations have been reviewed and the successor calculation WBNAPS4004 needs to be revised to reflect the minimum relative humidity for abnormal condition. Ultimate heat sink (UHS) temperature was not used as an input to the calculation analyses. Therefore, existing calculation results will not be affected by changing the UHS technical specification temperature. FSAR AND TECHNICAL SPECIFICATIONS HAVE BEEN REVIEWED AND ARE NOT AFFECTED BY THIS REVISION OF THE CALCULATION. Reviewer:  8/8/2011 Jay Karnik Pages Added: iv1, iii1, 2K, 3b, Appendix D (2 pages) Pages Revised: 9 Pages Replaced: None Pages Deleted: 13B Total number of pages in this revision including Attachments: 156 + 28 (Appendix A) + 27 (Appendix B) + 103 (Appendix C) + 3 (Appendix D) + 4 (Attachment A) + 7 (Attachment B) + 4 (Attachment C) + 2 (Attachment D) = 334 Pages This page added by Revision 014

TVAN CALCULATION VERIFICATION FORM

Calculation Identifier	EPM-LCP-072489	Revision 12

Method of design verification used:

1. Design Review ☑
2. Alternate Calculation ☐
3. Qualification Test ☐

Verifier : _____ Date: 4/11/02

Comments:

This calculation has been reviewed for the changes described in the Revision Log for Rev.12. The subject calculation at the revision level noted above has been found to be technically adequate in that computations, judgments, assumptions and logic are in accordance with generally accepted methodologies.

This calculation is technically adequate for this revision in its format and content.

Design Verification Form associated with the previous revision can be retrieved from RIMS.

The review has been done in accordance with the Appendix G of NEDP-2..

THIS PAGE REPLACED BY REV. 12

NPG CALCULATION VERIFICATION FORM

Calculation Identifier EPMLCP072489 Revision 013

Method of verification used:

1. Design Review ☒
2. Alternate Calculation ☐
3. Qualification Test ☐

Verifier Chad M. Grennor Date 11/5/09

Comments:

The justification and explanations of Unit 2 applicability were reviewed and determined to be adequate.
The resolution of PER 207043 is adequately discussed and is technically accurate.
References were added as necessary in Section 5.0.
CCRIS is current and correct with the changes made by this revision.

Revision 013 of this calculation adequately addresses Unit 2 applicability and PER 207043. Appendix C, added by Revision 013, adequately presents a detailed dual unit operation room temperature analysis.

This page added by Revision 013.

NPG CALCULATION VERIFICATION FORM

Calculation Identifier	EPMLCP072489	Revision 014

Method of verification used:

1. Design Review ☒
2. Alternate Calculation ☐
3. Qualification Test ☐

Verifier Dinesh Naik Date 8/4/2011

Dinesh Naik 8/4/11

Comments:

Add summary review and conclusions from EDPI 25402-3DP-G04G-00027 Exhibit B

The purpose of this Revision 014 is to address the relative humidity in MCR during outside abnormal condition and to update the applicability of Dual Unit Operation by removing the UVAs.

All references within the scope of this revision were reviewed and determined to be both current and appropriate.

The calculation revision was reviewed for inputs. All inputs were found to be correct. Administrative details were reviewed and no errors were identified.

This calculation contains no unverified assumptions.

No successor calculations were impacted by the changes made by this revision.

This page was added by Revision 014

Computer Input File
Storage Information Sheet

Document: EPM-LCP-072489 Rev: 12 Plant: WBN Page 4

Subject: Prepared by: RAS Date 3/27/02

Checked by: [signature] Date 4/4/02

_____ Electronic storage of the input files for this calculation is not required.

Comments: _____

_____

✓ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires reverification of its contents prior to use)

File Keeper Storage / Retrieval System

File Name	EPMLCP072489REV12.xls
User Name	rasulfri
Group Name	
Keyword/Problem Number	hvac
Creation Date	
Modification Date	2002-03-27 07:08
Owner Name	r. a. sulfridge
Owner Address	eqb 2n-wbn
Hardcopy Number	epm-lcp-072489, rev.12
Source Hardware	ultra-enterprise
Source OS System	sunos 5.8
Application	excel
Access Class	public
Plant Name	watts_bar
File Size	1327104
File Type	file
Reference ID	304070
Backup ID	/farm/rasulfri/s29265d0227102t071146

Description: excel spreadssheet

NPG COMPUTER INPUT FILE
STORAGE INFORMATION SHEET

Document EPMLCP072489	Rev. 013	Plant: WBN	

Subject:
Cooling and Heating Load Analysis, Main Control Room HVAC, Dual Unit Operation Only

☐ Electronic storage of the input files for this calculation is not required. Comments:

☒ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires re-verification of its contents before use.)

File Keeper Storage / Retrieval System

File Name	EPMLCP072489Rev13_U1&U2.XLS
Keyword/Problem Number	cooling loads
Modification Date	20091105
Application	excel
Plant Name	watts_bar
Document Identifier	313149
Description:	MCR HVAC System dual unit cooling/heating load analysis

File Name	EPMLCP072489Rev13_U1Only.XLS
Keyword/Problem Number	cooling loads
Modification Date	20091105
Application	excel
Plant Name	watts_bar
Document Identifier	313150
Description:	MCR HVAC System U1 only fixed PER 207043

☐ Microfiche/eFiche

TVAN CALCULATION SHEET

Calculation Identifier: EPM-LCP-072489	Rev.: 12	Plant: WBN / 1 & 2	Page: 9
Subject: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC		Prepared By: LRH Date: 3/8/02 Checked By: [illegible] Date: 4/4/02	

THIS PAGE PRECEEDED BY PAGE 4a R013

TABLE OF CONTENTS

R4 BY R.VARANO RV DATE 11/29/93 SHEET 10

R4 CHKD. BY A.STEPANIAN [signature] DATE 11/30/93

CLIENT: TENNESSEE VALLEY AUTHORITY, WATTS BAR NUCLEAR PLANT

BRANCH/PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

SUBJECT: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

R.12 BY [signature] DATE 12/4/02
CHECKED: [signature] DATE 3/8/02 R013

1.0 PURPOSE

single unit operation

THE PURPOSE OF THIS CALCULATION IS TO DETERMINE THE COOLING AND HEATING LOAD IN THE MAIN CONTROL ROOM AND ASSOCIATED ROOMS OF THE CONTROL BUILDING EL 755.0. THE ROOM CONDITIONS FOR EACH INDIVIDUAL ROOM OF EL 755.0 OF THE CONTROL BUILDING WILL ALSO BE DETERMINED. THE RESULTS WILL BE USED TO ANALYZE THE HVAC EQUIPMENT PERFORMANCE AND ADEQUACY.

IN ADDITION, THIS CALCULATION ALSO DEFINES MINIMUM OPERATING AIR FLOW RATES AT WHICH MCR AHU WILL MAINTAIN ROOM TEMPERATURES BELOW THE REQUIRED LIMITS SPECIFIED IN REF. 5.3.3, 5.3.4 AND 5.3.7 DURING NORMAL AND ACCIDENT (LOCA) OPERATING CONDITIONS (COOLING MODE ONLY). R12

See Appendix C for analyses applicable to dual unit operation R013

2.0 CRITERIA

THE CONTROL BUILDING HVAC SYSTEM IS DESIGNED TO MAINTAIN THE TEMPERATURE AND HUMIDITY IN THE BUILDING FOR PERSONNEL COMFORT, FOR PROTECTION AND OPERATION OF PLANT CONTROLS, AND TO PROVIDE SAFE, UNINTERRUPTED OCCUPANCY OF THE MAIN CONTROL ROOM HABITABILITY ZONE. ALL SPACES OF THE MAIN CONTROL ROOM HABITABILITY ZONE MUST BE MAINTAINED BETWEEN THE TEMPERATURES LISTED BELOW. RELATIVE HUMIDITY OF THE MAIN CONTROL BUILDING HABITABILITY ZONE SHOULD BE MAINTAINED WITHIN THE GUIDLINES LISTED BELOW, REF. 5.3.3, 5.3.4 & 5.3.7.

ROOM		REF.	NORMAL		LOCA	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	64 to 86	29 to 70	63 to 91	NA
CORRIDOR	755 - C3	5.3.4	65 to 93	27 to 60	57 to 98	↓
LOCKER ROOM	755 - C6	5.3.4	65 to 93	27 to 60	58 to 98	↓
MAIN CNTRL RM	755 - C12	5.3.3	75 to 80	40 to 60	75 to 82	↓
RELAY ROOM	755 - C13	5.3.3	75 to 80	40 to 60	67 to 79	↓
CORRIDOR	755 - C15	5.3.4	65 to 93	27 to 60	58 to 96	↓

R11

3.0 APPLICABLE CODES AND STANDARDS

THERE ARE NO APPLICABLE CODES OR STANDARDS

4.0 ASSUMPTIONS

4.1 Justified Assumptions

4.1.1 Infiltration load will not be considered.

TECHNICAL JUSTIFICATION: Control Building Rooms are pressurized to prevent infiltration of contaminated air from surrounding rooms. Therefore, the possibilities of infiltration is minimal and it will not be considered.

4.1.2 For calculation purposes the latitude used for the Watts Bar Nuclear (WBNP) Plant will be 32°.

TECHNICAL JUSTIFICATION: Per reference 5.7, page 24.13 the latitudes of cities in TN is 35°. However, per ASHRAE Handbook of Fundamentals (Ref. 5.7) closest latitude is 32° for data on solar effects. Use of 32° latitude is conservative (i.e. provides more heat). **R12**

4.1.3 AHU flow rates

TECHNICAL JUSTIFICATION: The design air flow data specified per ref. 5.2.1 have ±10% margin as stated in General Engineering Specification G-37.

For conservatism, a (-10%) margin, i.e. 90% flow rate, was analyzed to obtain AHUs' total cooling loads, and a (+10%) margin, i.e. 110% flow rate, was analyzed to obtain total heating loads.

Measured flow rates for rooms C4 to C10 (data in parentheses per ref. 5.2.1) are higher than design flow rates. These rates were not considered for the heating (normal & LOCA) conditions since they'll generate less conservative results in relation to the projected rooms' temperatures.

100% design flow rates are depicted at DIAGRAM 1 to 4 on pg. 30 & 31. Notes on pg. 30 & 31 provide an additional information how the balanced flow rates have been used in this calculation. **R12**

4.1.4 Not Used

4.0 ASSUMPTIONS

4.1 Justified Assumptions (cont'd)

4.1.5 Heating & Cooling Load Evaluation.

TECHNICAL JUSTIFICATION: Non-safety related equipment is not considered operational during LOCA. Thus, duct heaters will not be operable during LOCA heating, and steam humidifiers also are not operable during LOCA heating and cooling. Also conservatively, during winter condition (normal & LOCA heating operations), heat load from people and lighting is not considered, and only 25%[1] of the generated equipment heat is taken into account.

Also see Notes on pages 18 & 18A. **R12**

4.1.6 LOCA Temperature in Turbine Building

TECHNICAL JUSTIFICATION: Equipment in the Turbine Building is non-safety related, thus LOCA temperature is not specified in the Turbine Building rooms (ref. 5.3.5 & 5.3.6). Conservatively, used abnormal temperatures for LOCA cooling & heating conditions.

4.1.7 G - Line Wall between Auxiliary Building & Control Building (North wall)

TECHNICAL JUSTIFICATION: G - Line wall is 36" thick up to elevation 765.17" and then gradually increases to 60" thickness (ref. 5.1.15). For the calculation purposes the entire wall height was considered as 36" thick. It is conservative for the establishing transmission cooling loads. The impact on the transmission heating load is insignificant; use of the lower U-factor (for the thicker wall) can reduce room temperature by less than 0.2°F.

4.1.8 LOCA Minimum Temperature

TECHNICAL JUSTIFICATION: For adjacent auxiliary and turbine building rooms use normal minimum temperatures when LOCA minimum temperatures were not identified in EDD 47E235-Series drawings. **R12**

[1] Except mechanical equipment, main control and relay rooms; see Note in *italic font* on pg. 19

5.0 REFERENCES

5.1 TVA CIVIL DRAWING (ARCHITECHTURAL, CONCRETE, etc.)

Rev 3 SmV 9-11-09 Cmg 10/9/09

- 5.1.1 46W402 - 2 RK
- 5.1.2 46W402 - 3 ~~RD~~ RE
- 5.1.3 46W404 - 7 RF
- 5.1.4 46W411 RF
- 5.1.5 46W404 - 6 RC
- 5.1.6 46W402 - 9 RB
- 5.1.7 46W404 - 8 RD
- 5.1.8 46W454 - 4 RW
- 5.1.9 46W454 - 5 RU
- 5.1.10 46W405 - 4 RC
- 5.1.11 46W405 - 5 RC
- 5.1.12 41N483 - 3 RF
- 5.1.13 48N1322 - 1 RE
- 5.1.14 41N481 - 1 RC
- 5.1.15 41N473 - 1 RF
- 5.1.16 55W416-3 RL

R11

5.2 TVA FLOW DIAGRAMS

Rev 3 SmV 9-11-09 Cmg 10/9/09

- 5.2.1 1-47W866 - 4 ~~R36~~ R39

R11

5.3 TVA ENVIRONMENTAL DATA

- 5.3.1 47E235 - 00 R5
- 5.3.2 47E235 - 07 R5
- 5.3.3 47E235 - 16 R4
- 5.3.4 47E235 - 18 R6
- 5.3.5 47E235 - 21 R4
- 5.3.6 47E235 - 22 R4
- 5.3.7 47E235 - 24 R5
- 5.3.8 47E235 - 25 R4
- 5.3.9 47E235 - 36 R4

R11

5.4 TVA DUCT LAYOUT DRAWINGS

- 5.4.1 47W930 - 2 RP
- 5.4.2 47W930 - 3 RP

5.0 REFERENCES (cont'd)

5.5 TVA DCNs

5.5.1 P-02641-B, "Plaster Ceilings in the Control Building Operators' Quarters"

5.5.2 Not used

5.5.3 P-04907-B, "Kitchen and Locker Room Revised Area"

5.5.4 M-11410-A, "Upgrade Technical Support Center Data System"

5.6 TVA SYSTEM DESCRIPTION N3-30CB-4002 ~~R9~~ R15, "CONTROL BUILDING HVAC SYSTEM" | R12

Rev 13 SLY 6-11-09 Cmg 10/1/09

5.7 ASHRAE FUNDAMENTALS, 1985 Edition.

5.8 CALCULATIONS

5.8.1 EPM-JTB-061289 R1, "Heat Transmission Coefficients"

5.8.2 WBN-EEB-MS-TI09-0022 R10, "Electrical Heat Generation in the Control ..."

5.8.3 WBN-EEB-MS-TI09-0042 R11, "Electrical Heat Generation in the Control..."

5.8.4 WBN-EEB-MS-TI09-0058 R6, "Electrical Heat Generation in the Control..."

5.8.5 EPM-LCP-090889 R7, "HVAC Performance Adequacy for the MCR"

5.8.6 EPM-GDU-041593 R15, " Brake Horsepower Analysis for Safety-Related..."

5.8.7 EPM-WVC-101089 R23, " WBN Instrument Safety Limits HVAC Systems..."

* 5.8.8 WBN-EEB-MS-TI09-0022 R13, Electrical Heat Generation in the Control Building on El 692.0, 708.0, and 755.0 | Rev 13

5.9 VENDOR DRAWINGS

5.9.1 DWG. A-75-197 "Damper", Contract 76K35-83153-2

5.9.2 DWG. 6966-1741 "Steam Generator", Contract 75K35-83121

5.9.3 DWG. T-75-144 "Air Handling Unit", Contract 76K35-83153-2

5.10 M-D-Q-000-031-2001-0065 R0, "Cooling Load Analysis for Rooms Served by Main Control Room and Electrical Board Room HVAC System" (for Unit 1 operation only purposes) | R12

5.11 IE NOTICE 92-032 WITH TVA RESPONSE (ATTACHMENT A)

5.12 AIR BALANCE TEST PROCEDURE AB-031P-01 (ATTACHMENT B)

* 5.8.9 WBN-EEB-MS-TI09-0058 R9, Electrical Heat Generation in the Control Building on El. 692 (C11, C12), 708.0 (C2), 755.0 (C2, C3, C5, C7, C8, C10, C14, C16, C17, C18, C19, C20)

* Revision 10 of WBN-EEB-MS-TI09-0022 is retained for Unit 1 operation only purposes.
Revision 13 of WBN-EEB-MS-TI09-0022 is added for dual unit operation purposes.
Revision 6 of WBN-EEB-MS-TI09-0058 is retained for Unit 1 operation only purposes.
Revision 9 of WBN-EEB-MS-TI09-0058 is added for dual unit operation purposes.

6.0 DESIGN INPUT DATA

6.1 AMBIENT ENVIRONMENTAL DESIGN CONDITIONS

SUMMER 95°F DB, 74°F WB (Ref. 5.7, Chapter 24, Table 1)

WINTER 13°F DB (Ref. 5.3.8)

6.2 "U" FACTORS ARE TAKEN FROM REF. 5.8.1 EXCEPT AS NOTED.

The following abbreviations for the wall / floor surfaces are used in Section 7.0 of this calculation:

C	- concrete	GB	- gypsum board
CI	- concrete internal	CRP	- carpet
CE	- concrete external	PL	- plaster
TC	- tiled concrete	RMW	- reinforced masonry wall

The Table below provides section numbers for U-factors extracted from reference 5.8.1 or page numbers for U-factors (suspended ceiling, plaster walls, etc.) calculated in Section 7.0 of this calculation.

COOLING LOAD

ROOM	WALL			FLOOR			CEILING		
	TYPE	U	REF.	TYPE	U	REF.	TYPE	U	REF.
C1	METAL	0.735	6.3						
C2				18" TC	0.369	PG.25	SINGLE GB	0.417 /0.562	6.12.2
C3	8" RMW	0.455	6.7	18" TC	0.369	PG.25	SAND PLASTER	0.730	6.12.1
				8" TC	0.524	6.9			
C4, C6	8" RMW	0.455	6.7	18" TC	0.369	PG.25	FIRE RATED GB	0.338 /0.427	6.12.8
				8" TC	0.524	6.9			
C5	8" RMW	0.455	6.7	8" TC	0.524	PG.25	FIRE RATED GB	0.338	6.12.8
C9, C10	8" RMW	0.455	6.7	8" CRP	0.324	6.8.1	SAND PLASTER	0.503	6.12.1
C12				8" CRP	0.324	6.8.1	PLASTIC	0.800	*
C13	2 - 5/8" GB	0.403	PG. 26A	18" TC	0.369	PG.25	SECOND TIER		
	8" RMW	0.455	6.7	8" TC	0.524	6.9	½" & 5/8" GB	0.448	PG. 26
MCR Plen.				LUMIN. PLASTIC	0.800	*			
C14	GLASS**	0.810	6.13	18" CRP	0.257	6.8.2	ACOUSTIC TILE	0.330	6.12.3
C15				8" TC	0.524	6.9	SAND PLASTER	0.730	6.12.1
C16, C18	2 - 5/8" GB	0.403	PG. 26A	18" CRP	0.257	6.8.2			
C19	2 - 5/8" GB	0.403	PG. 26A	18" TC	0.369	PG.25	½" & 5/8" GB	0.448	PG. 26
				8" TC	0.524	6.9			
W. Stair							SAND PLASTER	0.730	6.12.1
E. Stair	8" RMW	0.455	6.7				SAND PLASTER	0.730	6.12.1
							½" & 5/8" GB	0.448	PG. 26
E. Attic 1				ACOUSTIC TILE	0.330	6.12.3			
E. Attic 2				SAND PLASTER	0.730	6.12.1			
E. Attic 3				SAND PLASTER	0.730	6.12.1			
W. Attic 1	METAL	0.735	6.3	SAND PLASTER	0.503 /0.730	6.12.1			
				FIRE RATED GB	0.338 /0.427	6.12.8			
W. Attic 2				SINGLE GB	0.417	6.12.2			
W. Attic 3				SAND PLASTER	0.730	6.12.1			

* & ** - see next page

TVAN CALCULATION SHEET

Calculation Identifier: EPM-LCP-072489	Rev.: 11	Plant: WBN / 1 & 2	Page: 16A
Subject: COOLING AND HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC		Prepared By: LRN Date: 1/12/01 Checked By: MJM Date: 1-16-01	

6.0 DESIGN INPUT DATA (cont'd)

R. 12 BY [signature] DATE 12/21/01
CHECKED: [signature] DATE 2/6/02

6.2 "U" FACTORS (cont'd)

HEATING LOAD

ROOM	WALL			FLOOR			CEILING		
	TYPE	U	REF.	TYPE	U	REF.	TYPE	U	REF.
C1	METAL	0.735	6.3						
C2				18" TC	0.300	PG.25	SINGLE GB	0.562	6.12.2
C3	8" RMW	0.455	6.7	18" TC	0.300	PG.25	SAND PLASTER	0.730	6.12.1
				8" TC	0.395	6.9			
C4, C6	8" RMW	0.455	6.7	18" TC	0.300	PG.25	FIRE RATED GB	0.427	6.12.8
				8" TC	0.395	6.9			
C5	8" RMW	0.455	6.7	8" TC	0.395	PG.25	FIRE RATED GB	0.427	6.12.8
C9, C10	8" RMW	0.455	6.7	8" CRP	0.270	6.8.1	SAND PLASTER	0.730	6.12.1
C12				8" CRP	0.270	6.8.1	PLASTIC	0.800	*
C13	2 - 5/8" GB	0.403	PG. 26A	18" TC	0.300	PG.25	SECOND TIER		
	8" RMW	0.455	6.7	8" TC	0.395	6.9	½" & 5/8" GB	0.351	PG. 26
MCR Plen.				LUMIN. PLASTIC	0.800	*			
C14	GLASS**	0.810	6.13	18" CRP	0.222	6.8.2	ACOUSTIC TILE	0.415	6.12.3
C15				8" TC	0.395	6.9	SAND PLASTER	0.730	6.12.1
C16, C18	2 - 5/8" GB	0.403	PG. 26A	18" CRP	0.222	6.8.2			
C19	2 - 5/8" GB	0.403	PG. 26A	18" TC	0.300	PG.25	½" & 5/8" GB	0.351	PG. 26
				8" TC	0.395	6.9			
W. Stair							SAND PLASTER	0.730	6.12.1
E. Stair	8" RMW	0.455	6.7				SAND PLASTER	0.730	6.12.1
							½" & 5/8" GB	0.351	PG. 26
E. Attic 1				ACOUSTIC TILE	0.415	6.12.3			
E. Attic 2				SAND PLASTER	0.730	6.12.1			
E. Attic 3				SAND PLASTER	0.730	6.12.1			
W. Attic 1	METAL	0.735	6.3	SAND PLASTER	0.730	6.12.1			
				FIRE RATED GB	0.427	6.12.8			
W. Attic 2				SINGLE GB	0.562	6.12.2			
W. Attic 3				SAND PLASTER	0.730	6.12.1			

* Conservatively, used U-factor for plastic dome; Ref. 5.7, Chapter 27, Table 13 Part B & Table 42
** For room C18 also

6.3 ROOF, CEILING, WALL AND FLOOR AREAS ARE TAKEN FROM REF. 5.1.1 THROUGH 5.1.14.

6.4 FLOW RATES ARE TAKEN FROM REF. 5.2.1 AND SHOWN SCHEMATICALLY ON PAGES 30 AND 31.

6.5 ELECTRICAL LOADS FROM EQUIPMENT AND LIGHTING ARE TAKEN FROM REF. 5.8.2, 5.8.3, ~~AND~~ 5.8.4 AND SUMMARIZED ON PG. 18 & 18A. (& 5.10) | R12

6.6 HEAT GAIN FROM PEOPLE (PER PERSON) PER REF. 5.7 AND 5.11:
FOR ALL ROOMS (EXCEPT TECHNICAL SUPPORT CENTER):
250 BTU/HR (SENSIBLE) 200 BTU/HR (LATENT)
FOR TECHNICAL SUPPORT CENTER; NRC OFFICE AND CONF. ROOM (C16): | R12
315 BTU/HR (SENSIBLE) 325 BTU/HR (LATENT)

6.7 2 WATTS/FT^2 IS USED FOR STAIRWELL LIGHTING.

THIS PAGE ADDED BY REV.11

6.0 DESIGN INPUT DATA (cont'd)

6.8 COOLING

DESIGN ROOM TEMPERATURE IN THE ADJAICENT ROOMS

ROOM		TEMPERATURE, °F DB		REFERENCE
NAME	EL. & No.	NORMAL	LOCA	
SPREADING ROOM	729.0 - C1	95	116	5.3.8
TURBINE ROOM	755.0 - T1	110	120*	5.3.5
TURBINE ROOM	708.0 - T1	110	120*	5.3.6
SHUTDOWN BR 1B & 2A	757.0 - A5 & A21	85	104	5.3.2
BATTERY ROOMS	757.0 - A25 & A27	80	104	5.3.2
AUX. INSTR. ROOMS	757.0 - A3, A4 & A22	85	104	5.3.2
AUX. INSTR. ROOM	757.0 - A23	89	104	5.3.2
MECH. EQUIP. ROOM	757.0 - A1	85	104	5.3.2

* See Assumption 4.1.6.

6.9 HEATING

DESIGN ROOM TEMPERATURE IN THE ADJAICENT ROOMS

ROOM		TEMPERATURE, °F DB		REFERENCE
NAME	EL. & No.	NORMAL	LOCA	
SPREADING ROOM	729.0 - C1	60	60	5.3.8
TURBINE ROOM	755.0 - T1	50	40*	5.3.5
TURBINE ROOM	708.0 - T1	50	40*	5.3.6
SHUTDOWN BR 1B & 2A	757.0 - A5 & A21	75	75	5.3.2
BATTERY ROOMS	757.0 - A25 & A27	75	75	5.3.2
AUX. INSTR. ROOMS	757.0 - A3, A4 & A22	75	75	5.3.2
AUX. INSTR. ROOM	757.0 - A23	75	75	5.3.2
MECH. EQUIP. ROOM	757.0 - A1	75	75	5.3.2

* See Assumption 4.1.6.

6.0 **DESIGN INPUT DATA (CONT'D)**

6.10 **ELECTRICAL LOAD - COOLING** See Appendix C for dual unit operation electrical heat loads R013

ROOM NUMBER & DESCRIPTION	NUMBER of PEOPLE		ELECTRICAL LOAD (BTU/HR) (Ref. 5.10) [4]	
	NORMAL	LOCA	NORMAL	LOCA
MECHANICAL EQUIPMENT ROOM (C1)			32,002	32,002
WOMEN'S TOILET (C 2)			992	992
CORRIDOR (C 3)			1,757	1,757
KITCHEN (C 4)	10	10	8,787	8,787
MEN'S TOILET (C 5)			1,994	1,994
LOCKER RM & SHOWERS (C 6, C7 & C8)			464	464
CONFERENCE ROOM (C 9)			1,829	1,829
SHIFT ENGINEER'S OFFICE (C 10)	2	2	4,502	4,502
MAIN CONTROL ROOM (C 12)	8	8	316,241	334,003
RELAY ROOM and DPSO SHOP (C 13 & C20)			39,255	39,255
TECHNICAL SUPPORT CENTER (C 14) [3]		34	8,007	8,007
CORRIDOR (C 15) [2]				
CONF. RM & TELEPHONE (C 16 & C17) [3]		4	2,597	2,597
NRC OFFICES (C 18) [3]		2	1,222	1,222
CORRIDOR (C 19)			2,361	2,361
WEST STAIR C1 [1]				
EAST STAIR C2 [1]				

NOTES:

[1] SEE SECTION 6.7 FOR STAIR ELECTRICAL LOAD.

[2] FOR CORRIDOR (ROOM C15) ELECTRICAL LOAD IS TAKEN FROM REF. 5.8.2: 86 WATTS (LIGHTING) AND 17.2 WATTS (EQUIPMENT).

[3] TOTAL 40 PEOPLE IN THESE THREE ROOMS. SEE ATTACHMENT 1 AND SECTION 6.6.

[4] ELECTRICAL LOAD FROM REF. 5.10 IS THE ACTUAL INTERNAL (LIGHTING, EQUIPMENT, ETC.) ELECTRICAL LOAD BASED ON THE MEASURED DATA. (applicable to single unit operation only) R013

THIS PAGE REPLACED BY REV. 12

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 18A
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

6.0 DESIGN INPUT DATA (CONT'D)

6.11 ELECTRICAL LOAD - HEATING (See Appendix C for Dual Unit Operation Electrical Heat Loads)

ROOM NUMBER & DESCRIPTION / ELECTRICAL LOAD	DESIGN LIGHTING [1] (WATTS)	DESIGN EQUIPMENT (WATTS)	DESIGN EQUIPMENT [2] (BTU/HR)	REF.	ACTUAL [6] (Ref. 5.10) (BTU/HR)	ELECTRICAL LOAD TO BE USED NORMAL (BTU/HR)	ELECTRICAL LOAD TO BE USED LOCA (BTU/HR)	
MECHANICAL EQUIPMENT ROOM (C1)	1,462	4,377	14,940	5.8.2	32,002	14,940	13,453	(Note 3)
WOMEN'S TOILET (C 2)	133	26	22	5.8.4		0	0	(Note 5)
CORRIDOR (C 3)	1,180	236	201	5.8.4	1,757	201	0	(Note 3 & 4)
KITCHEN (C 4)	627	125	107	5.8.4	8,787	107	0	
MEN'S TOILET (C 5)	487	97	83	5.8.4	1,994	83	0	
LOCKER RM & SHOWERS (C 6, C7 & C8)	560	112	96	5.8.2	464	96	0	
CONFERENCE ROOM (C 9)	564	113	96	5.8.4	1,829	96	0	
SHIFT ENGINEER'S OFFICE (C 10)	1,099	220	188	5.8.4	4,502	188	0	
MAIN CONTROL ROOM (C 12)	54,621	101,003	172,362	5.8.3	316,241	172,362	172,362	(Note 3)
RELAY ROOM and DPSO SHOP (C 13 & C20)	3,658	20,332	34,697	5.8.2	39,255	34,697	34,697	(Note 3)
TECHNICAL SUPPORT CENTER (C 14)	2,433	2,627	2,241	5.8.4	8,007	2,241	2,241	(Note 3)
CORRIDOR (C 15)	86	0	0	5.8.2		0	0	(Note 5)
CONFERENCE RM & TELEPHONE (C 16 & C17)	634	127	108	5.8.4	2,597	108	0	(Note 3 & 4)
NRC OFFICES (C 18)	396	79	67	5.8.4	1,222	67	0	
CORRIDOR (C 19)	1,155	1,031	880	5.8.4	2,361	880	0	
WEST STAIR C1	-	-	-	Sect. 6.7		0	0	(Note 5)
EAST STAIR C2	-	-	-	Sect. 6.7		0	0	(Note 5)

NOTES:

(1) LIGHTING LOAD IS NOT CONSIDERED; SEE ASSUMPTION 4.1.5.

(2) TOTAL LOAD FOR ROOM C1, 50% OF EQUIPMENT LOAD FOR ROOMS C12 & C13, AND 25% OF EQUIPMENT LOAD FOR REMAINING ROOMS AS STATED IN ASSUMPTION 4.1.5.

(3) LOAD COMPARISON BETWEEN DESIGN (THEORETICAL) EQUIPMENT LOAD AND ACTUAL LOAD INDICATED THAT DESIGN EQUIPMENT LOAD IS SMALLER FOR ALL ROOMS. THEREFORE, USE OF DESIGN EQUIPMENT LOAD FOR IS CONSERVATIVE FOR NORMAL AND LOCA MODES FOR ALL ROOMS

(4) MISC. EQUIPMENT LOAD WAS CONSIDERED AS 20% OF THE LIGHTING LOAD. SINCE LIGHTING LOAD IS "0", EQUIPMENT LOAD = "0" ALSO; CONSERVATIVE.

(5) CONSERVATIVELY, ELECTRICAL LOAD WAS CONSIDERED AS "0" FOR THIS ROOM.

(6) SEE NOTE 4, PG. 18.

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RA BY R.VARANO RV DATE 11/29/93 SHEET 19

RA CHKD. BY A.STEPANIAN [signature] DATE 11/30/93

CLIENT: TENNESSEE VALLEY AUTHORITY, WATTS BAR NUCLEAR PLANT

BRANCH/PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

SUBJECT: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

R 11 BY [signature] DATE 1/12/01
mjm 1/12/01

CALC ID EPM-LCP-072489
SHEET 19

7.0 CALCULATION

THE HEATING AND COOLING LOAD FOR THE MAIN CONTROL ROOM AND ASSOCIATED ROOMS OF THE CONTROL BUILDING EL 755.0 WILL BE CALCULATED FOR BOTH NORMAL AND ACCIDENT (LOCA) MODES OF OPERATION.

EL 755.0 OF THE CONTROL BUILDING CONSISTS OF ~~NINETEEN~~ TWENTY ROOMS, AND TWO STAIRWELLS. THE MAJORITY OF THE NORTH WALL BORDERS AGAINST THE AUXILIARY BUILDING, THE SOUTH WALL BORDERS AGAINST THE TURBINE BUILDING. THE EAST AND WEST WALLS ALONG WITH THE ROOF ARE EXPOSED TO OUTSIDE AMBIENT CONDITIONS. BELOW EL 755.0 IS THE SPREADING ROOM* ~~WITH TWO ADJACENT PIPE CHASES~~. EXCEPT FOR THE RELAY ROOM (755.0-C13) AND THE MECHANICAL EQUIPMENT ROOM (755.0-C1), A SUSPENDED CEILING IS INSTALLED AT VARIOUS ELEVATIONS THROUGHOUT EL 755.0. THIS DROP CEILING IS USED AS A RETURN AIR PLENUM FOR THE MAIN CONTROL ROOM AND OTHER ROOMS ON EL 755.0. REF 5.1.2, 5.1.3, 5.1.5 | R11

TO DETERMINE THE TOTAL HEATING OR COOLING LOAD FOR A ROOM, THE HEAT LOST/GAINED THROUGH TRANSMISSION AND THE HEAT GAINED BY INTERNAL SOURCES MUST BE INCLUDED. BOTH SENSIBLE AND LATENT HEAT WILL BE CONSIDERED. SOURCES THAT EMIT HEAT WILL ADD TO THE TOTAL COOLING LOAD. THE TOTAL COOLING LOAD IS THE HEAT GAINED THROUGH TRANSMISSION PLUS THE INTERNAL HEAT GAIN. THE TOTAL HEATING LOAD IS THE INTERNAL HEAT GAIN LESS THE LOSSES THROUGH TRANSMISSION. IF THE INTERNAL HEAT GAIN IS LARGER THAN THE TRANSMISSION LOSSES A POSITIVE HEATING LOAD WILL RESULT. WHEN DETERMINING THE HEATING LOAD 25 % OF THE INTERNAL HEAT GENERATED BY EQUIPMENT WILL BE TAKEN CREDIT FOR DURING NORMAL AND ACCIDENT (LOCA) MODE. *(EXCEPT FOR THE RELAY ROOM AND MAIN CONTROL ROOM WHERE 50% IS USED AND THE MECHANICAL EQUIPMENT ROOM WHERE 100% IS USED).* ALL NEEDED EQUIPMENT IN THE MECHANICAL EQUIPMENT ROOM MUST BE RUNNING DURING ITS ASSOCIATED MODE OF OPERATION. HEAT GENERATED BY PEOPLE AND LIGHTING WILL BE NEGLECTED IN THE HEATING LOAD ANALYSIS (SEE ASSUMPTION 4.1.5) | R11

THE CALCULATION METHOD FOR THE TRANSMISSION THROUGH THE ADJACENT WALLS, FLOOR AND CEILING (ROOF) WILL BE TAKEN FROM ASHRAE, CHAPTERS 25 AND 26 REF 5.7.

$$Q = U \times A \times \Delta T$$
$$\Delta T = T_N - T_R$$
$$Q = U \times A \times CLTD$$

WHERE:

Q = HEAT FLOW RATE, BTU/HR
U = HEAT TRANSFER COEFFICIENT, BTU/HR FT^2 °F
A = AREA, FT^2
ΔT = TEMPERATURE DIFFERENCE, °F
T_N = ADJACENT ROOM TEMPERATURE, °F $T_N = T_S$ IN SECTION 7.0 | R11
T_R = ROOM TEMPERATURE, °F
CLTD = COOLING LOAD TEMPERATURE DIFFERENCE

NOTE: THE CLTD IS USED WHEN DETERMINING THE COOLING LOAD DUE TO TRANSMISSION THROUGH A WALL, FLOOR OR CEILING THAT HAS ONE SURFACE EXPOSED TO OUTSIDE CONDITIONS.

* AND TURBINE BUILDING ROOM T1, EL. 708.0' | R11

CLIENT: TENNESSEE VALLEY AUTHORITY, WATTS BAR NUCLEAR PLANT

BRANCH/PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

SUBJECT: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

R11 BY [illegible] DATE 1/12/01
[illegible] 1/17/01

7.0 CALCULATION (CONT'D)

R12 THEORETICAL, INTERNAL SENSIBLE ~~AND LATENT~~ HEAT GENERATION FROM EQUIPMENT AND LIGHTING IS ~~TAKEN FROM~~ PROVIDED IN REFs 5.8.2 THROUGH 5.8.4. (SEE pg. 18 & 18.A) | R11

ELECTRICAL LOADS ARE CONVERTED FROM WATTS TO BTU/HR

[1 WATT = 3.413 BTU/HR] IN CALCULATION SHEETS.

R12 CALCULATION M-D-Q-000-031-2001-0065 (REF. 5.10) SPECIFIES ACTUAL INTERNAL LOAD BASED ON THE MEASURED DATA. SEE pp. 18 & 18A FOR ELECTRICAL LOAD APPLICATION.

ONCE THE TOTAL SENSIBLE AND LATENT, HEATING AND COOLING LOADS ARE CALCULATED FOR BOTH MODES OF OPERATION THE ROOM CONDITIONS WILL BE DETERMINED.

FROM ASHRAE CHAPTER 26: (REF. 5.7)

SENSIBLE HEAT $Q_S = (1.08)(CFM)(\blacktriangle T)^*$

LATENT HEAT $Q_L = (4840)(CFM)(\blacktriangle W)^*$ | R11

THEREFORE:

$$T_R = T_S + Q_S / (1.08)(CFM)^*$$

$$W_R = W_S + Q_L / (4840)(CFM)^*$$

WHERE:

Q_S = SENSIBLE HEAT FLOW RATE, BTU/HR
Q_L = LATENT HEAT FLOW RATE, BTU/HR
CFM^* = SUPPLY AIR FLOW RATE, FT^3/MIN
$\blacktriangle T$ = TEMPERATURE DIFFERENCE, °F
$\blacktriangle W$ = HUMIDITY RATIO DIFFERENCE, # MOIST / # DRY AIR
T_R = ROOM TEMPERATURE, °F
T_S = SUPPLY AIR TEMPERATURE, °F
W_R = ROOM HUMIDITY RATIO, # MOIST / # DRY AIR
W_S = SUPPLY AIR HUMIDITY RATIO, # MOIST / # DRY AIR
1.08 = DENSITY FACTOR @ 70°F; $(60 \frac{MIN}{HOUR} \times \rho \frac{LB}{FT^3} \times Cp \frac{BTU}{LB})$ | R11

DURING WINTER CONDITIONS THERE IS NO ADDITION OF LATENT HEAT SINCE THE HEAT LOAD FROM PEOPLE IS NOT CONSIDERED. IF THERE IS NO ADDITION OF LATENT HEAT, THE ROOM HUMIDITY RATIO WILL BE EQUAL TO THE SUPPLY AIR HUMIDITY RATIO. *(SEE SUPPLY AIR CONDITIONS PAGE 29).*

** FOR THIS CALCULATION 90% OR 110% OF THE TOTAL FLOW RATE WILL BE USED BECAUSE OF THE 10 % ALLOWANCE FOR BALANCING (SEE Assumption 4.1.3)* | R11

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R4 BY R.VARANO RV DATE 11/29/93 SHEET 21

R4 CHKD. BY A.STEPANIAN AStep DATE 11/29/93

CLIENT: TENNESSEE VALLEY AUTHORITY, WATTS BAR NUCLEAR PLANT

BRANCH/PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

SUBJECT: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

R 12 BY	DATE 2/21/01	R 11 BY	DATE 1/12/01
CHECKED:	DATE 3/8/02	CHECKED: mjm	DATE 1/12/01

7.0 CALCULATION (CONT'D)

WHEN CALCULATING ROOM TEMPERATURES, IF THE CALCULATED TEMPERATURE (T_R) IS EQUAL TO THE ROOM TEMPERATURE WHICH THE TRANSMISSION LOAD WAS CALCULATED AT, THE CORRECT TEMPERATURE HAS BEEN DETERMINED. THIS WILL PRODUCE AN ACCURATE ROOM TEMPERATURE (T_R) AND LOAD ANALYSIS.

THE TEMPERATURES T_R WERE CALCULATED BY PERFORMING A HEAT BALANCE ON THE MAIN CONTROL BUILDING ELEVATION 755.0. TEMPERATURE VALUES WERE DETERMINED FOR ALL ROOMS AND THEN VERIFIED BY SUBSTITUING THE CALCULATED VALUE FOR T_R *(AS SHOWN IN THE CALCULATION ON THE EXCEL SPREADSHEETS, P.P. 32 THROUGH 111). SEE NOTE BELOW.* | R11

HEATING LOAD CONDITIONS

SUPPLY AIR IS HEATED BY INDEPENDENT DUCT HEATERS *(SEE PAGES 24 ~~30 AND 31~~).* WHEN CALCULATING ROOM CONDITIONS DURING THE NORMAL MODE OF OPERATION, THE HEAT CAPACITY INCREASE NEEDED TO MAINTAIN THE ROOM TEMPERATURE AT 75°F WILL BE DETERMINED. THIS WILL BE COMPARED TO THE CAPACITY INCREASE THE HEATER CAN PROVIDE. IF THE HEATER CAN PROVIDE AN INCREASE EQUAL TO OR GREATER THAN WHAT IS NEEDED, THE HEATER WILL BE ABLE TO MAINTAIN THE ROOM TEMPERATURE AT 75°F. SINCE THE DUCT HEATERS AND STEAM HUMIDIFIERS ARE NOT SAFETY RELATED THEY WILL NOT BE OPERABLE DURING ACCIDENT CONDITIONS (LOCA). *(SEE ASSUMPTION 4.1.5)* | R12

THE TEMPERATURE IN THE MAIN CONTROL ROOM IS CONTROLLED BY A THERMOSTAT *(SET AT 75°F)* LOCATED IN THE MCR. THIS ADJUSTS THE FACE AND BYPASS DAMPERS IN THE AHUs AND CHANGES THE SUPPLY AIR TEMPERATURE LEAVING THE AHU. IF THE CALCULATED ROOM TEMPERATURE (T_R) IS LOWER THAN THAT CALLED FOR BY THE MCR THERMOSTAT FOR NORMAL AND LOCA MODES, THE AHU's FACE AND BYPASS DAMPERS WILL ADJUST TO BRING THE ROOM TEMPERATURE UP TO THE SETPOINT TEMPERATURE. THE DAMPERS BYPASS AIR AROUND THE COILING COIL WHICH THEN MIXES WITH THE COOLED AIR AND SUPPLIES AIR WHICH IS WARMER UNTIL THE DESIRED TEMPERATURE IS REACHED.* THIS RAISES THE SUPPLY AIR TEMPERATURE TO ALL ROOMS SERVED BY THE MCR AHUs. ~~THIS CHANGE IN TEMPERATURE (ΔT_{MCR}) IS CALCULATED, FOR NORMAL AND LOCA MODES, AND ADDED TO THE SUPPLY AIR TEMPERATURE LEAVING THE AHUs.~~ | R11

** SEE p. 91 & 111 FOR DETAILS*

R11

Note

The equilibrium is reached when the final room mixed(1) temperature equals the initial room temperature used to determine the transmission loads. This is an iterative process whereby the transmission room temperatures are systematically adjusted to meet the previous run's final room mixed room air temperature. This process is continued until the transmission and final mixed room air temperatures are within 0.1°F of each other.

(1) When room receives air from more than one source

7.0 CALCULATION (CONT'D)

HEATING CONDITIONS (cont'd)

THE RETURN AIR TEMPERATURE CONDITIONS Te CAN BE DETERMINED BY CALCULATING THE MIXED AIR TEMPERATURE OF THE AIR ENTERING THE AIR HANDLING UNIT. THE SUPPLY AIR TEMPERATURE WILL BE SUCH THAT THE MAIN CONTROL ROOM IS MAINTAINED AT 75 °F WHILE THE SUPPLY AIR TEMPERATURE Ts IS LESS THAN OR EQUAL TO THE SUM OF THE RETURN AIR TEMPERATURE AND THE AIR HANDLING UNIT HEAT. THE DEVIATIONS OF THE RETURN AIR TEMPERATURE FOR NORMAL AND LOCA MODES ARE SHOWN ON PAGE 23A.

SUPPLY AND RETURN AIR

SEE PAGES 30 AND 31 FOR THE DIAGRAMS 1 TO 4 WHICH SPECIFY AIR FLOW PASSES AND RATES BASED ON THE 100% DESIGN FLOW (REF. 5.2.1). **R12**

HEAT GAIN FROM MOTORS

EMERGENCY PRESSURIZATION FAN:
(1 HP, DIRECT DRIVE VANE AXIAL, MOTOR AND EQUIPMENT ARE LOCATED IN THE AIR STREAM

$Q_{FAN\ AHU}$ = 3,390 BTU/HR - REF. 5.6, 5.7, Chapter 26, Table 24)

Air flow rate = 711 cfm (ref. 5.2.1)

$\Delta T_{FAN\ AHU}$ = 3,390 / 711 / 0.9 / 1.08 = 4.9 °F (cooling condition @ 90% capacity)

$\Delta T_{FAN\ AHU}$ = 3,390 / 711 / 1.1 / 1.08 = 4.0 °F (heating condition @ 110% capacity)

7.0 CALCULATION (CONT'D)

HEAT GAIN FROM MOTORS (cont'd)

AHU UNIT FAN:
(60 HP[1], MOTOR AND EQUIPMENT ARE LOCATED IN THE AIR STREAM;
$Q_{FAN\ AHU}$ = 172000 BTU/HR - REF. 5.6, 5.7, Chapter 26, Table 24)

Air flow rate = 36,000 cfm (ref. 5.2.1)

$\Delta T_{FAN\ AHU}$ = 172000 / 36000 / 0.9 / 1.08 = 4.9 °F (cooling condition @ 90% capacity)

$\Delta T_{FAN\ AHU}$ = 172000 / 36000 / 1.1 / 1.08 = 4.0 °F (heating condition @ 110% capacity)

EMERGENCY AIR CLEANUP UNIT FAN:
(10 HP, DIRECT DRIVEN VANE AXIAL, MOTOR AND EQUIPMENT ARE LOCATED IN THE AIR STREAM;
$Q_{FAN\ CU}$ = 29900 BTU/HR - REF. 5.6, 5.7, Chapter 26, Table 24)

Air flow rate = 4000 cfm (ref. 5.2.1)

$\Delta T_{FAN\ CU}$ = 29900 / 4000 / 0.9 / 1.08 = 7.7 °F (cooling condition @ 90% capacity)

$\Delta T_{FAN\ CU}$ = 29900 / 4000 / 1.1 / 1.08 = 6.3 °F (heating condition @ 110% capacity)

[1] PER REF. 5.8.6, THE ACTUAL (TESTED) HORSEPOWER = 62.63 HP VERSA 69 BHP (60 HP MOTOR WITH 1.15 SERVICE FACTOR)

$Q_{FAN\ AHU}$ = 62.63 X 2545 = 159343 BTU/HR < 172000 BTU/HR

7.0 CALCULATION (CONT'D)

RETURN AIR TEMPERATURE (T_{RETURN})
& TEMPERATURE ENTERING AIR HANDLING UNIT (T_E)

COOLING / NORMAL:
TO OBTAIN T_E, THE RETURN AIR FLOWS / TEMPERATURES ARE SUMMED AND DIVIDED BY THE TOTAL FLOW (See Table, pg. 22):

$$T_{RETURN} = [(T_{MCR\ PLENUM} \times 21290) + (T_{C9} \times 270) + (T_{C10} \times 110) + (T_{EAST\ ATTIC\ 1} \times 2580) + (T_{C19} \times 260) + (T_{C13} \times 7490) + (T_{WEST\ ATTIC\ 1} \times 800)] / (32800)$$

$$T_E = [(T_{OA} \times 3200) + (T_{RETURN} \times 32800)] / 36{,}000$$

$T_{SUPPLY\ AHU}$ → see page 29

HEATING / NORMAL:
TO OBTAIN T_E, THE RETURN AIR FLOWS / TEMPERATURES ARE SUMMED AND DIVIDED BY THE TOTAL FLOW (See Table, pg. 22):

$$T_{RETURN} = [(T_{MCR\ PLENUM} \times 21290) + (T_{C9} \times 270) + (T_{C10} \times 110) + (T_{EAST\ ATTIC\ 1} \times 2580) + (T_{C19} \times 260) + (T_{C13} \times 7490) + (T_{WEST\ ATTIC\ 1} \times 800)] / (32800)$$

$$T_E = [(T_{OAH}{}^{*} \times 3200) + (T_{RETURN} \times 32800)] / 36{,}000$$

$T_{SUPPLY\ AHU} \leq T_E + \Delta T_{FAN\ AHU}$

* T_{OAH} is an outside air @ 60°F after the heater 0-HTR-31-421

HEATING & COOLING / LOCA:
THE RETURN AIR DURING LOCA WILL BE ANALYZED BY COMBINING THE RETURN AIR FROM THE EMERGENCY CLEANUP UNIT WITH THE RETURN AIR FROM THE ROOMS.

AT THE FIRST STEP, THE OUTSIDE (PRESSURIZED) IS COMBINED WITH AIR IN MECHANICAL EQUIPMENT ROOM AND THEN PASSES THROUGH THE EMERGENCY CLEANUP UNIT. HEAT ADDED BY THE FAN MOTORS IS ACCOUNTED FOR (Ref. 5.2.1):

$$T_{CU} = [(T_{OA} + \Delta T_{PRESS\ FAN}) \times 711) + (T_{C1} \times 3289)] / 4000 + \Delta T_{CU\ FAN}$$

AT THE SECOND STEP, THE RETURN AIR FLOWS / TEMPERATURES FROM THE EMERGENCY CLEANUP UNIT AND THE ROOMS (See Table, pg. 22) ARE SUMMED AND DIVIDED BY THE TOTAL FLOW:

7.0 CALCULATION (CONT'D)

RETURN AIR TEMPERATURE (T_{RETURN})
& TEMPERATURE ENTERING AIR HANDLING UNIT (T_E) (cont'd)

$T_{RETURN} = [(T_{MCR\ PLENUM} \times 21290) + (T_{C9} \times 270) + (T_{C10} \times 110) + (T_{EAST\ ATTIC\ 1} \times 2580) + (T_{C19} \times 260) + (T_{C13} \times 7490)] / (32000)$

$T_E = [(T_{CU} \times 4000) + (T_{RETURN} \times 32000)] / 36{,}000$

Heating LOCA: $T_{SUPPLY\ AHU} \leq T_E + \Delta T_{FAN\ AHU}$

Cooling LOCA: $T_{SUPPLY\ AHU}$ → see page 29

DUCT HEATERS

THERE ARE FIVE (5) DUCT HEATERS THAT SUPPLY THE ROOMS OF THE CONTROL BUILDING, EL. 755.0 (REF. 5.2.1).

BASED ON THEIR RATED CAPACITIES (REF. 5.2.1), THE TEMPERATURE INCREASE OF THE AIR PASSING THROUGH THESE HEATERS CALCULATED AS FOLLOWS:

$$\Delta T_{DUCT\ HEATER} = (Q_{HEATER} \times 3413) / CFM / 1.08 / 1.1 \text{ (REF. 5.7)}$$

where $\Delta T_{DUCT\ HEATER}$ = temperature rise, °F
Q_{HEATER} = heat supplied by heater, kWatts
CFM = air flow rate, cfm
3413 = conversion factor from kWatts to Btu/hr
1.08 = density factor
1.1 = 110% design flow

ROOM #	HEATER CAPACITY, kW	THERMOSTAT SETTING (°F) / ROOM #	TOTAL HEATER FLOW, CFM	$\Delta T_{DUCT\ HEATER}$, °F
①	②	③	④	(② X 3.413) / (④ / 1.08 / 1.1)
C13, C17, C17, C18, C20	25	75 / C13	8230	8.7
C4*,C5, C6, C7, C8	10	75 / C6	265	108.2
C9, C10	5	75 / C10	600	24.0
C4*	5	75 / C4	330	43.5
C14	10	75 / C14	1840	15.6
OUTSIDE AIR	144	60	8200	50.5

* 330 cfm through heater 0-HTR-031-099 and 110 cfm through heater 0-HTR-031-097.

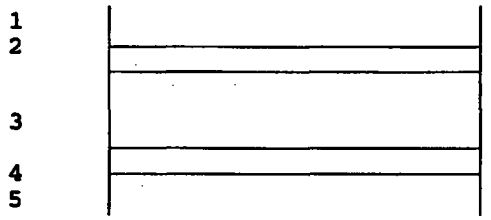
THE SUPPLY AIR TEMPERATURE HEATED BY THE DUCT HEATER:

$$T_{ROOM\ SUPPLY} = T_{SUPPLY\ AHU} + \Delta T_{HEATER}$$

7.0 CALCULATION (CONT'D)

ADDITIONAL "U" FACTORS

18" CONCRETE WITH FLOOR TILE



[REF 5.1.1, 5.1.5 & 5.7]

UPWARD HEAT FLOW

(1) SURFACE RESISTANCE, R=0.61
(2) FLOOR TILE, R=0.05
(3) 18" CONCRETE, R=1.44
(4) METAL DECK, NEGLECT
(5) SURFACE RESISTANCE, R=0.61

R_{TOTAL} = 2.71 U = 1 / R_{TOTAL} = 1 / 2.71 = 0.369 BTU/HR/FT^2/°F

DOWNWARD HEAT FLOW

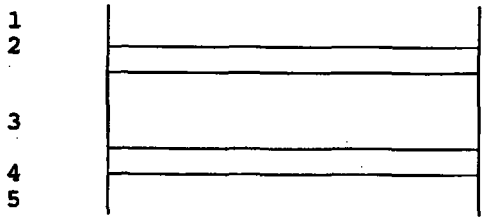
(1) SURFACE RESISTANCE, R=0.92
(2) FLOOR TILE, R=0.05
(3) 18" CONCRETE, R=1.44
(4) METAL DECK, NEGLECT
(5) SURFACE RESISTANCE, R=0.92

R_{TOTAL} = 3.33 U = 1 / R_{TOTAL} = 1 / 3.33 = 0.300 BTU/HR/FT^2/°F

7.0 CALCULATION (CONT'D)

ADDITIONAL "U" FACTORS

(1/2)" + (5/8)" FIRE RATED GYPSUM BOARD



[REF 5.1.1, 5.1.5 & 5.7]

UPWARD HEAT FLOW

(1) SURFACE RESISTANCE, R=0.61
(2) (5/8)" GYPSUM BOARD, R=0.56
(3) (5 1/2)" METAL JOINT, NEGLECT
(4) (1/2)" GYPSUM BOARD, R=0.45
(5) SURFACE RESISTANCE, R=0.61

R_{TOTAL} = 2.23 U = 1 / R_{TOTAL} = 1 / 2.23 = 0.448 BTU/HR/FT^2/°F

DOWNWARD HEAT FLOW

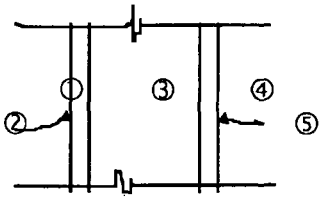
(1) SURFACE RESISTANCE, R=0.92
(2) (5/8)" GYPSUM BOARD, R=0.56
(3) (5 1/2)" METAL JOINT, NEGLECT
(4) (1/2)" GYPSUM BOARD, R=0.45
(5) SURFACE RESISTANCE, R=0.92

R_{TOTAL} = 2.85 U = 1 / R_{TOTAL} = 1 / 2.85 = 0.351 BTU/HR/FT^2/°F

7.0 CALCULATIONS (CONT'D)

ADDITIONAL "U" FACTORS

INTERIOR WALL - 2 (5/8") GYPSUM BOARDS



Ref. 5.1.1, 5.1.6, 5.7

① R = 0.68 (surface)
② R = 0.56 (5/8" gypsum board)
③ R = negligible (5 ½" metal joint)
④ R = 0.56 (5/8" gypsum board)
⑤ R = 0.68 (surface)

R_{TOTAL} = 2.48

U = 1 / R = 0.403 BTU/HR/FT^2/°F

R 12 BY [illegible] DATE 12/21/01
CHECKED: [illegible] DATE 3/8/02

EBASCO SERVICES INCORPORATED

R4 BY R.VARANO RV DATE 11/29/93 SHEET 27

R4 CHKD. BY A.STEPANIAN [illegible] DATE 11/30/93

CLIENT: TENNESSEE VALLEY AUTHORITY, WATTS BAR NUCLEAR PLANT

BRANCH/PROJECT IDENTIFIERS: WBN-31-D053, EMP-LCP-072489, MEB-WBN-31

SUBJECT: COOLING & HEATING LOAD ANALYSIS, MAIN CONTROL ROOM HVAC

R 11 BY [illegible] DATE 11/2/01
CHECKED: mjm DATE 1/17/01

7.0 CALCULATION (CONT'D)

COOLING LOAD TEMPERATURE DIFFERENCES (CLTD)

(A) CONCRETE ROOF WITH OR WITHOUT A SUSPENDED CEILING [REF 5.1 & 5.7]

$CLTD_{CORR} = [(CLTD + LM)K + (78-T_R) + (T_O - 85)]F$

CLTD = 29 °F (FOOTNOTE 4 OF TABLE 29 OF CHAPTER 26 REF 5.7)

LM = LATITUDE MONTH CORRECTION AT 35 °F LATITUDE IN JULY FOR HORIZONTAL SURFACES (VALUE FOR 32° LATITUDE IS USED) → ASSUMPTION 4.1.2

LM = 2 (REF. 5.7, SECTION 26, TABLE 9) | R12

K = COLOR ADJUSTMENT FACTOR = (1 + 0.5) / 2 = 0.75 FOR MEDIUM COLOR

T_R = INDOOR DESIGN TEMPERATURE (°F)

T_O = AVERAGE OUTDOOR DESIGN TEMPERATURE
= MAX TEMP - 1/2 DAILY RANGE = ~~106~~ 95 - (1/2)(22) = ~~85~~ 84 °F | R12

F = CORRECTION FACTOR FOR ATTIC = 1.0 (NO ATTIC OR POSITIVE VENTILATION IN AREAS WITH ATTIC IN THE MCRHZ)

~~CONCRETE ROOFS WITH OR WITHOUT A SUSPENDED CEILING~~

MAX O.A TEMP (°F)	CLTD (°F)	LM CORRECTION (°F)	K COLOR CORRECTION	T_R (°F)	T_O (°F)	F	$CLTD_{CORR}$ (°F)
106	29	2	0.75	68	95	1.0	48
106	29	2	0.75	70	95	1.0	41
106	29	2	0.75	75	95	1.0	36
106	29	2	0.75	80	95	1.0	31
106	29	2	0.75	85	95	1.0	26
106	29	2	0.75	90	95	1.0	21
106	29	2	0.75	104	95	1.0	7
106	29	2	0.75	108	95	1.0	3
106	29	2	0.75	110	95	1.0	1

R11 R12

7.0 CALCULATION (CONT'D)

COOLING LOAD TEMPERATURE DIFFERENCES (CLTD) (cont'd)

(B) CONCRETE WALLS - Wall Grade B

$CLTD_{CORR} = [(CLTD + LM) K + (78 - Tr) + (T_o - 85)] f$

where

$CLTD_{CORR}$ = Cooling load temperature difference, °F

LM = Latitude - month correction, °F (see Table below)

K = Color adjustment, K = 0.83 (for medium color wall, Ref. 5.7, page 26.10, Note 2b)

t_o = the average outside temperature on design day: (95°F - daily range / 2) = 95° - 22°/2 = 84°F, (Ref. 5.7, pg. 26.11)

(78 - Tr) = Indoor design temperature correction where Tr = indoor design temperature, i.e. room temperature, °F

(t_o - 85) = Outdoor design temperature correction where t_o = average outside temperature of design day, °F (t_o = 84°F , see above)

f = 1, no attic or duct (Ref. 5.7, page 26.8, Table 5, Note e)

Surface	CLTD (Max) @ 32° latitude [1]	LM (month June)
	Ref. 5.7, Section 26, Table 7 (wall) [2]	Ref. 5.7, Section 26,Table 9
	36" thick [2]	
North wall	11.7	1
East wall	21.5	0
West wall	21.6	0

Notes:

[1] See Assumption 4.1.2.

[2] The review of data in the Attachment D and Table 7 of ASHRAE (Ref. 5.7, Chapter 26) concluded that in order to generate more realistic CLTD corrections, 24 hour average (mean) CLTD values will be used for 36" thick walls.

7.0 CALCULATIONS (CONT'D)

SUPPLY AIR TEMPERATURE AND HUMIDITY RATIO ESTIMATE

During normal operation in summer, the mixture of return air and outside air enters the AHU cooling coil @:

Air leaves the cooling coil @: T_{COIL} = 50.8 FDB (Attachment C, sh. 1)
49.0 FWB

From the Psychrometric Chart, it will corresponds to:

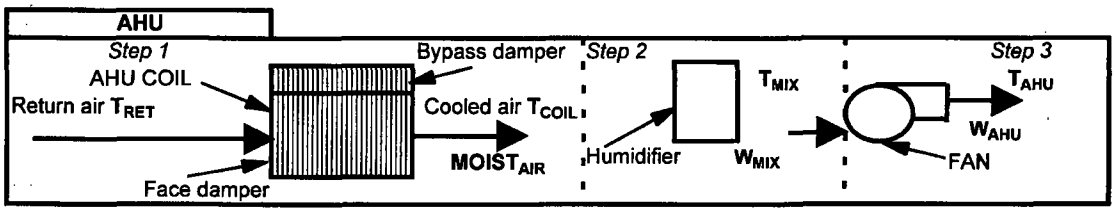
Humidity ratio (HR) =	0.0070 # moisture / # dry air
Humidity ratio (W_{COIL}) =	48.76 gr / #
Specific volume (v) =	13.01 ft^3 / #

The steam generator produces 226 pounds of saturated steam per hour at 12 psi (Ref. 5.9.2)

The saturation temperature of steam at 12 psi (Tsteam) is approximately: 243.0 °F (Ref. 5.7, pg. 6.11)

Consider that full steam load produced by the steam generator is injected into the AHU airsteam just after the cooling coil.

$$\frac{226.0 \text{ \#(steam) / hr}}{60 \text{ min / hr}} \longrightarrow \text{MOISTsteam} = 3.77 \text{ \#(steam)/min}$$



Step 1: Cooling of the return air

None of the return air is directed through the bypass around the cooling coil since the AHU is under the full load.

As shown above, T_{COIL} = 50.8 FDB
49.0 FWB

100 % flow rate = 36,000 cfm (Ref. 5.2.1)

Thus air qualities prior to the humidification are as follows:

90% Flow rate, (CFM_{TOTAL})	Specific volume (v), ft^3 / #	Humidity ratio (HR), # moisture / # dry air	Mass flow rate MR = (CFM_{TOTAL} / v), # dry air / min
32,400	13.01	0.007 (see *)	2490.4

* This humidity ratio to be used during accident (LOCA) when humidifier is "OFF" (See Assumption 4.1.5).

The moisture content in the air prior to mixing with steam:

$MOIST_{AIR}$ = MR x HR = 2490.4 x 0.007 ⟶ 17.4 # (water) / min

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7.0 CALCULATIONS (CONT'D)

SUPPLY AIR TEMPERATURE AND HUMIDITY RATIO ESTIMATE (CONT'D)

Step 2: Humidification of the cooled air (determination of the temperature rise)

Adding 3.77 # (steam)/min to the air results in total moisture of:

$MOIST_{TOTAL}$ = (3.77 + 17.4) ⟶ 21.2 # (water) / min

Converting back to humidity ratio:

$MOIST_{TOTAL}$ / MR =	21.2	/	2490.4 ⟶	0.0085 # moisture / # dry air

This corresponds to humidity ratio $W_{MIX} = W_{AHU}$ = 60.9 gr / #

The air and steam mix as follows:

To calculate moisture (water) temperature of the mixture T_W, steam @ 3.77 #/min and 243 °F mixes with water in the air @ 50.8 °F and 17.4 # / min:

$T_W = (MOIST_{AIR} \times T_{COIL} + MOISTsteam \times Tsteam) / MOIST_{TOTAL}$:

(17.4 x 50.8) + (3.77 x 243) /
21.2 ⟶ T_W = 84.9 °F

To calculate air / water mixture temperature T_{MIX} (after the humidification), this total moisture is contained in 32,400 cfm of air @ 50.8 °F and v = 13.01 ft^3 / min:

$(MOIST_{TOTAL} \times T_W + MR \times T_{COIL}) = T_{MIX} \times (MOIST_{TOTAL} + MR)$

$T_{MIX} = (MOIST_{TOTAL} \times T_W + MR \times T_{COIL}) / (MOIST_{TOTAL} + MR)$:

(21.2 x 84.9) + (2490.4 x 50.8) /
(21.2 + 2490.4 ⟶ T_{MIX} = 51.1 °F

Step 3: Adding of the fan heat to the cooled & humidified air

Heat added by the fan motor ΔT_{MOTOR} = 4.9 °F (cooling, see pg. 23)

AHU supply air temperature (after the humidification):

$T_{AHU} = T_{MIX} + \Delta T_{MOTOR}$ = (51.1 + 4.9) ⟶ 56.0 °F

	T_{AHU}	W_{AHU}
Therefore, the AHU will supply air to MCR @:	**56.0 °F**	60.9 gr / #

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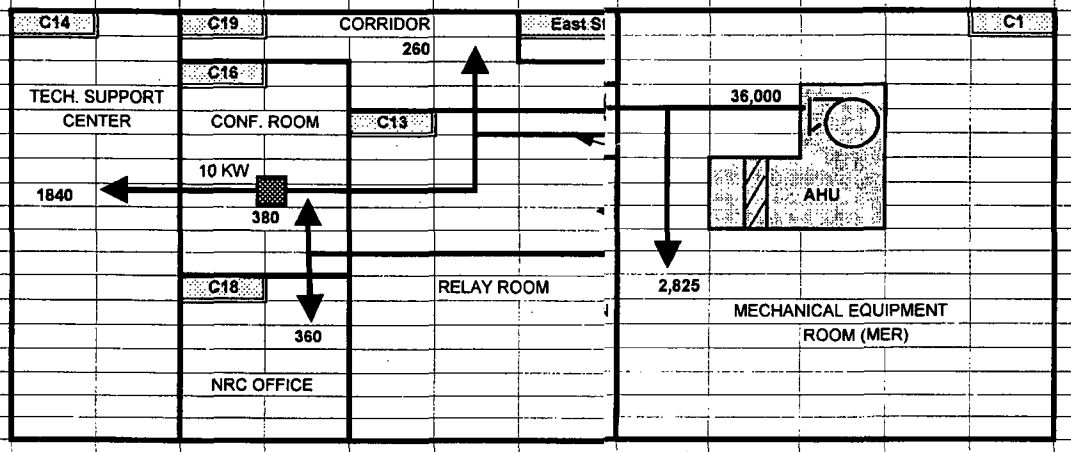
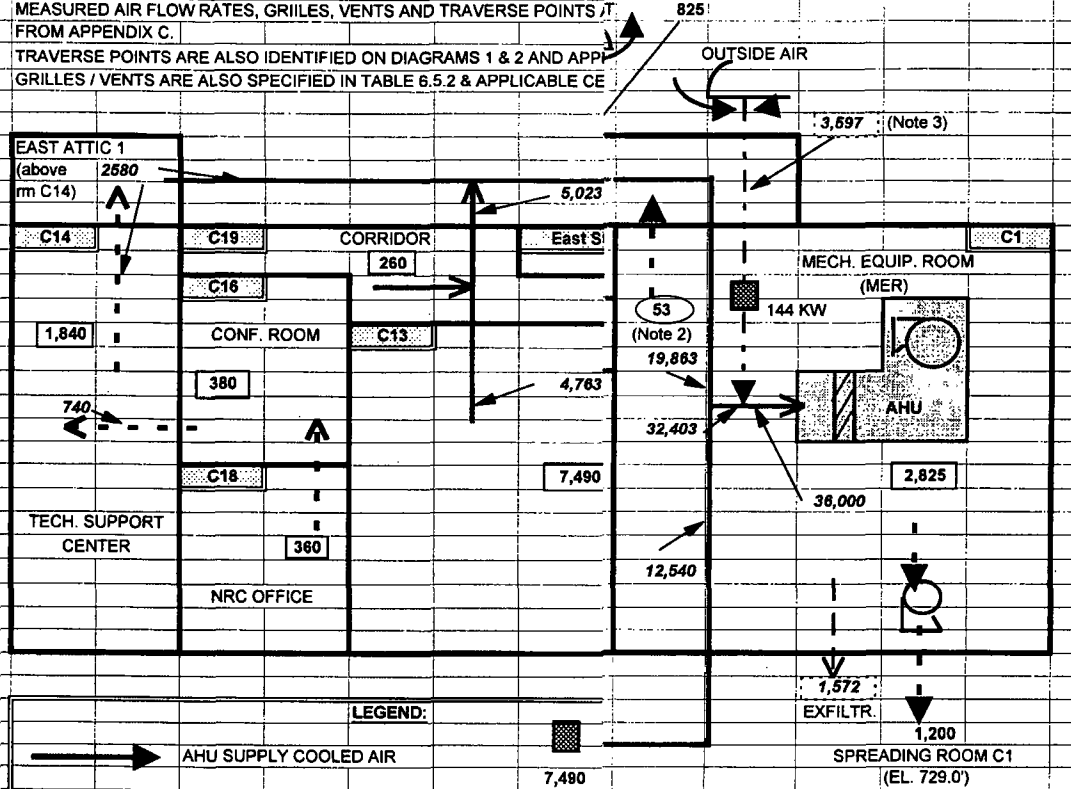
Prepared by: LRM Date: 12/18/01

Checked by: RRC Date: 03/08/02



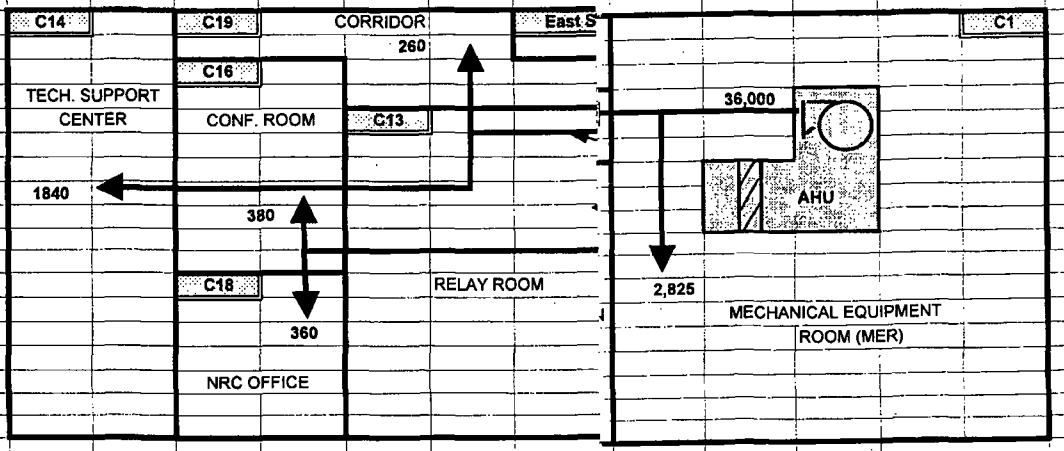
NOTE:
MEASURED AIR FLOW RATES, GRILLES, VENTS AND TRAVERSE POINTS /T
FROM APPENDIX C.
TRAVERSE POINTS ARE ALSO IDENTIFIED ON DIAGRAMS 1 & 2 AND APP
GRILLES / VENTS ARE ALSO SPECIFIED IN TABLE 6.5.2 & APPLICABLE CE



...y value for this flow pass. Measured flow rate of 2485 cfm
...e a ratio between measured flow rate @ Traverse point
...iesign flow rate of 10,330 cfm (see cell M14).
...endix C since flow diagram (Ref. 5.2.1) does not provide
...onservative. See Ref. 5.2.1, Note 13 and Ref. 5.12, which
...aintain +1/8" w.g. was measured to be 2802 cfm for Train A

Prepared by: LRM Date: 12/18/01

Checked by: RRC Date: 03/08/02



NOTE:
MEASURED AIR FLOW RATES, GRILLES, VENTS AND TRAVERSE POINTS /
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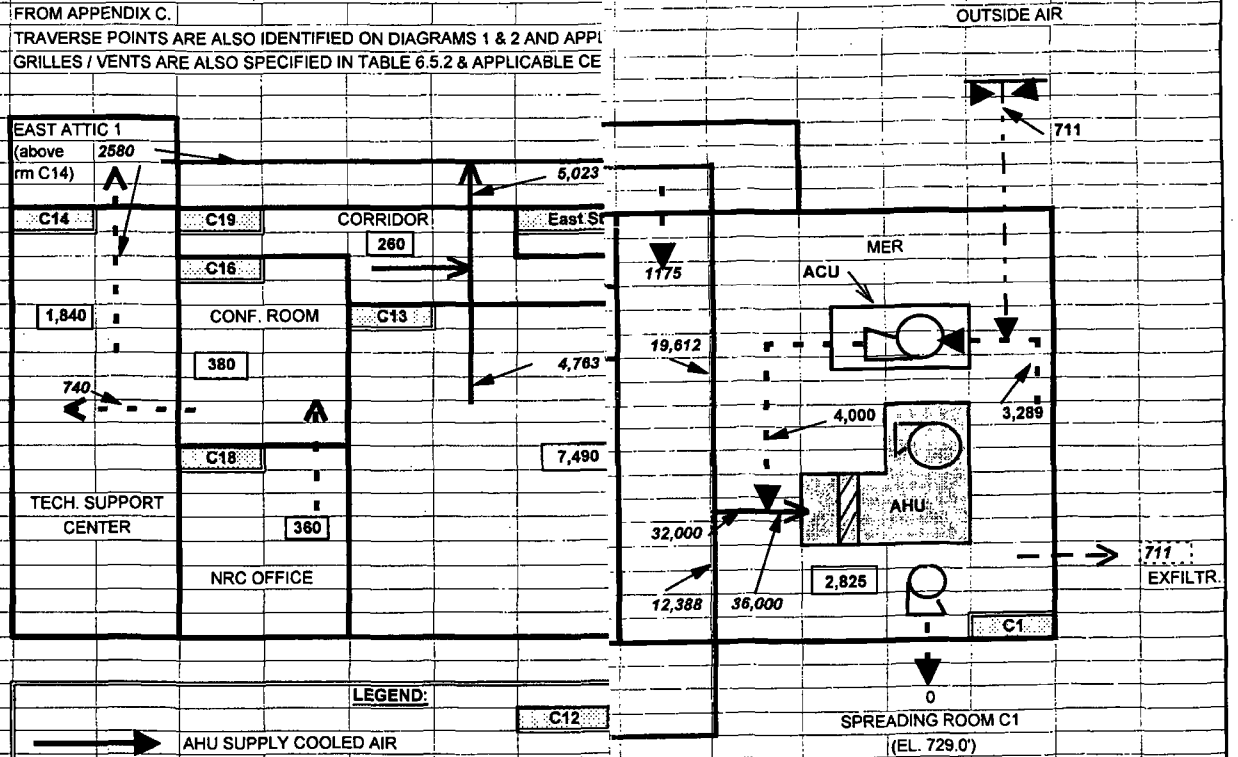
GRILLES / VENTS ARE ALSO SPECIFIED IN TABLE 6.5.2 & APPLICABLE CE



hy value for this flow pass. Measured flow rate of 2485 cfm
e a ratio between measured flow rate @ Traverse point
esign flow rate of 10,330 cfm (see cell M14).

7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)

ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 2,825 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 81.5 °F Design Room Temperature: 86°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			13.4	2,623
SOUTH	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	110.0	81.5	28.5	4,673
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			6.0	660
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	85.0	81.5	3.5	229
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	94.3	81.5	12.8	205
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	89.2	81.5	7.7	40
EAST	Door C39	7.17	6.00	43.0	0.448	89.2	81.5	7.7	148
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	86.5	81.5	5.0	588
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	88.5	81.5	7.0	1,859
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	93.6	81.5	12.1	236
FLOOR	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	110.0	81.5	28.5	17,616
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			18.8	9,247
							TOTAL TRANSMISSION LOAD =		38,124

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.

Area (excluding floor) = 4502

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 18.8 °F
CLTDcorr(west) = [(21.6+0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 13.4 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 6.0 °F

LOAD SUMMARY:

PEOPLE (pg. 18): 0 X 250 = 0
ELECTRICAL LOAD (pg. 18): = 32,002
TOTAL ROOM SENSIBLE LOAD: **70,126**

ROOM TEMPERATURE (Tr) = Tr | Q | CFM
56.0 + 70,126 / (1.08 x 0.9 x 2,825) = 81.5 °F

LATENT LOAD: Q latent
PEOPLE (pg. 18): 0 X 200 0
TOTAL ROOM LATENT LOAD: **0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (0.9 x 4840 x 2825) = **0.0085**

CALCULATED ROOM CONDITIONS: **81.5 °F dry bulb 37% RH**

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: WOMEN'S TOILET

			Reference
Design air flow:	230 cfm	(Transfer from room C3)**	pg. 30
Supply Air Temp:	89.2 °F	(Transfer from room C3)	pg. 34A
Supply Air Humidity Ratio:	0.0088 lbW/lb dry air	(Transfer from room C3)	pg. 34A
Steady State Temperature:	94.3 °F		

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	81.5	94.3	-12.8	-205
SOUTH	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	110.0	94.3	15.7	282
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	89.2	94.3	-5.1	-140
NORTH	Door C38	7.17	3.00	21.5	0.448	89.2	94.3	-5.1	-49
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	97.9	94.3	3.6	58
FLOOR	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	110.0	94.3	15.7	221
CEILING	W. Attic 2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	93.6	94.3	-0.7	-11
					TOTAL TRANSMISSION LOAD =				156

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 255

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**1,148**

ROOM TEMPERATURE (Tr) = (Ts 89.2) + (Q 1,148 / (1.08 x 0.9 x CFM 230) = 94.3 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) = 0.0088 + 0 / (0.9 x 4840 x 230) = **0.0088**

CALCULATED ROOM CONDITIONS: 94.3 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: CORRIDOR

				Reference
Design air flow:	320	cfm	(Transfer from room C10)	pg. 30
Supply Air Temp:	80.4	°F	(Transfer from room C10)	pg. 40
Supply Air Humidity Ratio:	0.0088	lbW/lb dry air	(Transfer from room C10)	pg. 40
Steady State Temperature:	89.2	°F	Design Room Temperature: 93°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	94.3	89.2	5.1	140
SOUTH	Door C38	7.17	3.00	21.5	0.448	94.3	89.2	5.1	49
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	97.9	89.2	8.7	621
SOUTH	Door C37	7.17	3.00	21.5	0.448	97.9	89.2	8.7	84
SOUTH*	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	110.0	89.2	20.8	312
SOUTH	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	110.0	89.2	20.8	268
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	86.5	89.2	-2.7	-111
NORTH	Door C40	7.17	3.00	21.5	0.448	86.5	89.2	-2.7	-26
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	80.4	89.2	-8.8	-350
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	80.4	89.2	-8.8	-177
NORTH	Door C46	7.17	3.00	21.5	0.448	80.4	89.2	-8.8	-85
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	85.6	89.2	-3.7	-101
NORTH	Door C42	7.17	3.00	21.5	0.448	85.6	89.2	-3.7	-35
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	73.6	89.2	-15.6	-456
EAST	Door C56	7.17	4.50	32.3	0.448	73.6	89.2	-15.6	-225
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	81.5	89.2	-7.7	-40
WEST	Door C39	7.17	6.00	43.0	0.448	81.5	89.2	-7.7	-148
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	97.9	89.2	8.7	139
FLOOR	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	110.0	89.2	20.8	479
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	95.0	89.2	5.8	673
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	95.0	89.2	5.8	151
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	88.5	89.2	-0.8	-158
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	88.5	89.2	-0.8	-27
					TOTAL TRANSMISSION LOAD =				977

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8".

Area (excluding floor) = 1175

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,757
TOTAL ROOM SENSIBLE LOAD:					**2,734**

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7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C3 (cont'd)
ROOM NAME: CORRIDOR

7.1 COOLING LOAD - NORMAL OPERATION

	Ts		Q	1.08 x 0.9	CFM		
ROOM TEMPERATURE (Tr) =	(80.4)	+	(2,734	/(.972 x	320)	=	89.2 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0088 + 0 / (0.9 x 4840 x 320) = **0.0088**

CALCULATED ROOM CONDITIONS: 89.2 °F dry bulb 30% RH

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: KITCHEN

		Reference
Design air flow:	440 cfm**	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	86.5 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	81.5	86.5	-5.0	-588
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	89.2	86.5	2.7	111
SOUTH	Door C40	7.17	3.00	21.5	0.448	89.2	86.5	2.7	26
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	85.6	86.5	-1.0	-46
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	81.7	86.5	-4.8	-280
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	86.5	-1.5	-40
FLOOR	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	110.0	86.5	23.5	1,009
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	95.0	86.5	8.5	1,317
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	88.5	86.5	2.0	272
					TOTAL TRANSMISSION LOAD =				1,783

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 1107

LOAD SUMMARY:

PEOPLE (pg. 18) :	10	X	250		=	2,500
ELECTRICAL LOAD (pg. 18) :						8,787
TOTAL ROOM SENSIBLE LOAD:						**13,070**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 13,070 / (1.08 x 0.9 x 440) = 86.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	10	X	200	2000
TOTAL ROOM LATENT LOAD:				**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 2,000 / (4840 x 0.9 x 440) = **0.0096**

CALCULATED ROOM CONDITIONS: 86.5 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: MEN'S TOILET

		Reference
Design air flow:	90 cfm***	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	85.6 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	86.5	85.6	1.0	46
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	89.2	85.6	3.7	101
SOUTH	Door C42	7.17	3.00	21.5	0.448	89.2	85.6	3.7	35
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	81.7	85.6	-3.8	-107
NORTH	Door C45	7.17	3.00	21.5	0.448	81.7	85.6	-3.8	-37
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	80.4	85.6	-5.1	-251
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	95.0	85.6	9.5	683
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	88.5	85.6	2.9	135
					TOTAL TRANSMISSION LOAD =				606

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 517

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,994
TOTAL ROOM SENSIBLE LOAD:					**2,600**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 2,600 / (1.08 x 0.9 x 90) = 85.7 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 85.6 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: LOCKER ROOM AND SHOWERS

		Reference
Design air flow:	65 cfm***	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	81.7 °F Design Room Temperature: 93°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	85.6	81.7	3.8	107
SOUTH	Door C45	7.17	3.00	21.5	0.448	85.6	81.7	3.8	37
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	85.0	81.7	3.3	64
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	74.9	81.7	-6.8	-248
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	80.4	81.7	-1.3	-25
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	81.5	81.7	-0.2	-13
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	95.0	81.7	13.3	684
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	95.0	81.7	13.3	180
CEILING	W. Attic 1 - 5/8" GB (Dn)	16.02	10.31	165.2	0.338	88.5	81.7	6.8	377
					TOTAL TRANSMISSION LOAD =				1,162

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 581

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	464
TOTAL ROOM SENSIBLE LOAD:					**1,626**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	1,626	/ (1.08 x 0.9 x	65	) =	81.7 °F	

LATENT LOAD: Q latent

PEOPLE (pg. 18) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0	/ (4840 x 0.9 x	65)	=	**0.0085**

CALCULATED ROOM CONDITIONS: 81.7 °F dry bulb, 37% RH

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)

ROOM NAME: WEST STAIRWELL

Reference pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 97.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	94.3	97.9	-3.6	-58
SOUTH	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	110.0	97.9	12.1	469
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	89.2	97.9	-8.7	-621
NORTH	Door C37	7.17	3.00	21.5	0.448	89.2	97.9	-8.7	-84
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	89.2	97.9	-8.7	-139
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	95.7	97.9	-2.2	-132
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-565

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (Note 1, pg.18)	164.3	X	3.413	X	100%	=	561
TOTAL ROOM SENSIBLE LOAD:							0

CALCULATED ROOM CONDITIONS: 97.9 °F dry bulb

THIS PAGE REPLACED BY REV. 12

7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)

ROOM NAME: EAST STAIRWELL

Reference pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 86.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	87.2	86.4	0.8	12
WEST	Door C53	7.17	3.00	21.5	0.448	87.2	86.4	0.8	8
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	69.9	86.4	-16.5	-151
SOUTH	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	110.0	86.4	23.6	982
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	77.2	86.4	-9.2	-569
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	69.9	86.4	-16.5	-394
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	77.2	86.4	-9.2	-138
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	77.2	86.4	-9.2	-69
EAST	Door C60	7.17	3.00	21.5	0.448	77.2	86.4	-9.2	-89
CEILING	E.Attic 3 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	84.6	86.4	-1.8	-107
CEILING	C13-1/2" & 5/8" GB (Up)	4.39	6.00	26.3	0.448	69.9	86.4	-16.5	-195
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-710

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (Note 1, pg.18)	215.3	X	3.413	X	100%	=	735
TOTAL ROOM SENSIBLE LOAD:							**25**

CALCULATED ROOM CONDITIONS: 86.4 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C9 (Ref. 5.1.4)

ROOM NAME: CONFERENCE ROOM

		Reference
Design air flow:	270 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	74.9 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	81.7	74.9	6.8	248
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	80.4	74.9	5.5	281
SOUTH	Door C48	7.17	3.00	21.5	0.448	80.4	74.9	5.5	53
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	85.0	74.9	10.1	359
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	73.6	74.9	-1.3	-52
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	95.0	74.9	20.1	1,091
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	88.5	74.9	13.6	1,142
					TOTAL TRANSMISSION LOAD =				**3,121**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 595

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,829
TOTAL ROOM SENSIBLE LOAD:					**4,950**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 4,950 / (1.08 x 0.9 x 270) = 74.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 270) = **0.0085**

CALCULATED ROOM CONDITIONS: 74.9 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C10 (Ref. 5.1.4)

ROOM NAME: SHIFT ENGINEERS OFFICE

		Reference
Design air flow:	330 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	80.4 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	85.6	80.4	5.1	251
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	81.7	80.4	1.3	25
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	89.2	80.4	8.8	350
SOUTH	Door C46	7.17	3.00	21.5	0.448	89.2	80.4	8.8	85
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	89.2	80.4	8.8	177
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	74.9	80.4	-5.5	-281
NORTH	Door C48	7.17	3.00	21.5	0.448	74.9	80.4	-5.5	-53
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	73.6	80.4	-6.8	-527
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	95.0	80.4	14.6	1,529
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	88.5	80.4	8.1	1,309
								TOTAL TRANSMISSION LOAD =	**2,866**

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

Area (excluding floor) = 895

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	250		=	500
ELECTRICAL LOAD (pg. 18) :					=	4,502
TOTAL ROOM SENSIBLE LOAD:						**7,868**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	7,868	/ (1.08 x 0.9 x	330	) =	80.5 °F	

LATENT LOAD: Q latent

PEOPLE (pg. 18) :	2	X	200		400
TOTAL ROOM LATENT LOAD:					**400**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	400	/ (4840	x 0.9 x	330	) =	**0.0088**

CALCULATED ROOM CONDITIONS: 80.4 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 30
pg. 44
pg. 44A

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 68.2 °F (Transfer from room C14)
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air (Transfer from room C14)
Steady State Temperature: 71.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	69.9	71.8	-1.9	-286
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			23.0	1,965
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			15.7	693
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	110.0	71.8	38.2	1,515
FLOOR	C14 Ceiling (Ac.tile) (Dn)	16.80	42.00	705.6	0.330	68.2	71.8	-3.6	-838
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			28.5	6,022
					TOTAL TRANSMISSION LOAD =				9,070

Area (excluding floor) = 1693

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 23.0 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 15.7 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 28.5 °F

ROOM TEMPERATURE (Tr) = (Ts 68.2) + (Q 9,070 / (1.08 x 0.9 .972 x CFM 2,580) = 71.8 °F

CALCULATED ROOM CONDITIONS: 71.8 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 84.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	76.1	84.7	-8.6	-203
SOUTH	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	110.0	84.7	25.3	721
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	69.9	84.7	-14.8	-893
EAST	E. Attic 3, 8" CI	9.08	4.00	36.3	0.500	84.6	84.7	-0.1	-2
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	69.9	84.7	-14.8	-137
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	87.2	84.7	2.5	146
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			15.6	374
					TOTAL TRANSMISSION LOAD =				6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 15.6 °F

CALCULATED ROOM CONDITIONS: 84.7 °F dry bulb

ROOM NO. N/A

ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 84.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	84.7	84.6	0.1	2
SOUTH	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	110.0	84.6	25.4	1,107
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	69.9	84.6	-14.7	-1,357
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	69.9	84.6	-14.7	-230
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	86.4	84.6	1.8	107
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			15.7	382
					TOTAL TRANSMISSION LOAD =				10

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 15.7 °F

CALCULATED ROOM CONDITIONS: 84.6 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)

ROOM NAME: MAIN CONTROL ROOM

		Reference
Design air flow:	21,650 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	73.6 °F	

Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	89.2	73.6	15.6	456
WEST	Door C56	7.17	4.50	32.3	0.448	89.2	73.6	15.6	225
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	80.4	73.6	6.8	527
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	74.9	73.6	1.3	52
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	88.6	73.6	14.9	624
SOUTH	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	110.0	73.6	36.4	12,946
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	85.0	73.6	11.4	718
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	80.0	73.6	6.4	211
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	85.0	73.6	11.4	1,291
NORTH	Door C49	6.50	3.00	19.5	0.448	85.0	73.6	11.4	100
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	80.0	73.6	6.4	211
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	89.0	73.6	15.4	727
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	85.0	73.6	11.4	701
NORTH	Door C50	6.50	3.00	19.5	0.448	85.0	73.6	11.4	100
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	87.2	73.6	13.6	118
EAST	Door C55	7.17	4.50	32.3	0.448	87.2	73.6	13.6	197
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	84.7	73.6	11.1	38
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	69.9	73.6	-3.7	-563
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	95.0	73.6	21.4	43,886
CEILING**	MCR Plenum	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	62,565

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic)

LOAD SUMMARY:

Area (excl. floor/ceiling) = 3857

PEOPLE (pg. 18) :	8	X	250	=		2,000
ELECTRICAL LOAD (pg. 18) :				=		316,241
TOTAL ROOM SENSIBLE LOAD:						**380,806**

	CFM					Ts	Tr	
Transfer - Air (C 13) - pg. 30 & 43A	2727	X	1.08	X	0.9	69.9	73.6	-9,806
Transfer - Air (West Attic 1) - pg. 30 & 50	143	X	1.08	X	0.9	88.5	73.6	2,064
NET ROOM SENSIBLE LOAD:								**373,064**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 373,064 / (1.08 x 0.9 x 21,650) = 73.7 °F

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)

ROOM NAME: MAIN CONTROL ROOM (cont'd)

LATENT LOAD:									Q latent
PEOPLE (pg. 18) :	8	X	200						1600
Transfer - Air (C 13) - pg. 30 & 43A		2,727	X	4840	X	0.9	0.0085	-0.0085	0
Transfer - Air (West Attic 1) - pg. 30 & 50		143	X	4840	X	0.9	0.0087	-0.0085	109
TOTAL ROOM LATENT LOAD:									**1,709**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 1709 / (4840 x 0.9 x 21,650) = **0.0085**

CALCULATED ROOM CONDITIONS:	**73.6 °F dry bulb** **48% RH**

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)

ROOM NAME: RELAY ROOM and DPSO SHOP

		Reference
Design air flow:	7,490 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	69.9 °F	

Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	73.6	69.9	3.7	563
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	76.1	69.9	6.2	731
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	84.6	69.9	14.7	230
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	84.7	69.9	14.8	137
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	86.4	69.9	16.5	394
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	77.2	69.9	7.3	961
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	87.2	69.9	17.3	563
SOUTH	Door C52	7.17	7.00	50.2	0.448	87.2	69.9	17.3	389
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	84.7	69.9	14.8	893
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	84.6	69.9	14.7	1,357
SOUTH(Second tier)	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	110.0	69.9	40.1	2,066
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	85.0	69.9	15.1	3,647
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	68.2	69.9	-1.7	-107
EAST	Door C63	7.17	3.00	21.5	0.448	68.2	69.9	-1.7	-16
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	66.3	69.9	-3.6	-192
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	86.4	69.9	16.5	151
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	71.8	69.9	1.9	286
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	68.2	69.9	-1.7	-44
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	95.0	69.9	25.1	16,364
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	95.0	69.9	25.1	406
FLOOR	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	110.0	69.9	40.1	9,430
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	68.2	69.9	-1.7	-123
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	66.3	69.9	-3.6	-164
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	77.2	69.9	7.3	212
FLOOR (Sec. tier)	C19 (1/2"& 5/8" GB)(Up)			282.2	0.448	77.2	69.9	7.3	923
FLOOR (Sec. tier)	E.Stair(1/2"/5/8"GB)(Up)			26.3	0.448	86.4	69.9	16.5	195
ROOF (CLTD)	27", uninsulated (Down)			2567.7	0.300			30.4	23,379
					TOTAL TRANSMISSION LOAD =				62,628

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
** Ceiling for this room is 8" concrete slab

Area (excluding floor) =	5970

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 30.4 °F

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)

ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	39,255
TOTAL ROOM SENSIBLE LOAD:					**101,883**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 101,883 / (1.08 x 0.9 x 7,490) = 70.0 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 7,490) = **0.0085**

CALCULATED ROOM CONDITIONS: 69.9 °F dry bulb, 55% RH

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)

ROOM NAME: TECHNICAL SUPPORT CENTER

		Reference
Design air flow:	1,840 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	68.2 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	77.2	68.2	9.0	107
WEST	Door C51	6.80	3.92	26.7	0.448	77.2	68.2	9.0	107
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	68.2	68.2	0.0	0
WEST	Door C62	7.17	3.00	21.5	0.448	68.2	68.2	0.0	0
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	66.3	68.2	-1.9	-92
WEST	Window	4.00	3.30	13.2	0.810	66.3	68.2	-1.9	-20
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	69.9	68.2	1.7	44
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	110.0	68.2	41.8	1,657
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			19.3	851
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			26.6	2,932
FLOOR	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	110.0	68.2	41.8	7,580
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	71.8	68.2	3.6	838
								TOTAL TRANSMISSION LOAD =	14,005

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) =	1874

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0

CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 26.6 °F

CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 19.3 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	315				=	0
ELECTRICAL LOAD (pg. 18) :							=	8,007
TOTAL ROOM SENSIBLE LOAD:								**22,012**

	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 30 & 47	740	X	1.08	X	0.9	68.2	-68.2	0
NET ROOM SENSIBLE LOAD:								**22,012**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 22,012 / (1.08 x 0.9 x 1,840) = 68.3 °F

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C14 (cont'd)

ROOM NAME: TECHNICAL SUPPORT CENTER

LATENT LOAD:								Q latent
PEOPLE (pg. 18) :	0	X	325					0
Transfer - Air (C 16) - pg. 30 & 47	740	X	4840	X	0.9	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 1,840) = **0.0085**

CALCULATED ROOM CONDITIONS: 65.2 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)

ROOM NAME: CORRIDOR

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 87.2 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	73.6	87.2	-13.6	-118
WEST	Door C55	7.17	4.50	32.3	0.448	73.6	87.2	-13.6	-197
SOUTH*	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	110.0	87.2	22.8	469
SOUTH	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	110.0	87.2	22.8	289
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	69.9	87.2	-17.3	-563
NORTH	Door C52	7.17	7.00	50.2	0.448	69.9	87.2	-17.3	-389
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	86.4	87.2	-0.8	-4
EAST	Door C53	7.17	6.04	43.3	0.448	86.4	87.2	-0.8	-16
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	95.0	87.2	7.8	328
CEILING	E. Attic 2 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	84.7	87.2	-2.5	-146
							TOTAL TRANSMISSION LOAD =		-345

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 415

LOAD SUMMARY:

ELECTRICAL:

PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (pg. 18, Note 2) :	86.0	X	3.413	X	100%	=	294
EQUIPMENT (pg. 18, Note 2) :	17.2	X	3.413	X	100%	=	59
TOTAL ROOM SENSIBLE LOAD:							7

CALCULATED ROOM CONDITIONS: 87.2 °F dry bulb 31% RH

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: M C R RETURN AIR PLENUM (above room C12)

		Reference
Design air flow:	24,520 cfm (Transfer from room C12)	pg. 30
Supply Air Temp:	73.6 °F (Transfer from room C12)	pg. 42A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air (Transfer from room C12)	pg. 42A
Steady State Temperature:	76.1 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH	T1 - 36" CI	7.75	150.70	1167.93	0.236	110.0	76.1	33.9	9,344
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	85.0	76.1	8.9	435
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	80.0	76.1	3.9	100
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	85.0	76.1	8.9	781
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	80.0	76.1	3.9	100
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	89.0	76.1	12.9	472
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	85.0	76.1	8.9	456
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	69.9	76.1	-6.2	-731
EAST	E.Attic 2, 12" CI	7.75	6.04	46.8	0.431	84.7	76.1	8.6	174
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	88.5	76.1	12.4	2,010
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			24.2	45,857
					TOTAL TRANSMISSION LOAD =				58,996

(*) Luminious ceiling panel (plastic)

Area (excluding floor) = 9311

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 24.2 °F

$$\text{ROOM TEMPERATURE (Tr)} = \frac{\text{Ts}}{(\ 73.6\ )} + \frac{\text{Q}}{(\ 58{,}996\ /(\ .972 \times\ 24{,}520\ )} = 76.1\ ^\circ\text{F}$$

CALCULATED ROOM CONDITIONS: 76.1 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C16 and C 17

ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

		Reference
Design air flow:	380 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	68.2 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	69.9	68.2	1.7	107
WEST	Door C63	7.17	3.00	21.5	0.448	69.9	68.2	1.7	16
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	77.2	68.2	9.0	109
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	77.2	68.2	9.0	297
SOUTH	Door C57	7.17	3.00	21.5	0.448	77.2	68.2	9.0	87
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	66.3	68.2	-1.9	-41
NORTH	Door C64	7.17	2.67	19.1	0.448	66.3	68.2	-1.9	-16
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	68.2	68.2	0.0	0
EAST	Door C62	7.17	3.00	21.5	0.448	68.2	68.2	0.0	0
FLOOR	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	110.0	68.2	41.8	1,931
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	69.9	68.2	1.7	123
						TOTAL TRANSMISSION LOAD =			2,614

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 720

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 18) :					=	2,597
TOTAL ROOM SENSIBLE LOAD:						**5,211**

	CFM				Ts	(-Tr)	
Transfer - Air (C 18) - pg. 30 & 48	360	X	1.08	X	0.9	66.3	-68.2	-665
NET ROOM SENSIBLE LOAD:								**4,546**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	4,546 / (1.08 x 0.9 x	380)	=	68.3 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	0	X	315					0
Transfer - Air (C 18) - pg. 30 & 48		360	X	4840	X	0.9	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:									**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 380) = **0.0085**

CALCULATED ROOM CONDITIONS: 68.2 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)

ROOM NAME: NRC OFFICES

		Reference
Design air flow:	360 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	66.3 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	69.9	66.3	3.6	192
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	68.2	66.3	1.9	41
SOUTH	Door C64	7.17	2.67	19.1	0.448	68.2	66.3	1.9	16
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	85.0	66.3	18.7	320
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			21.2	284
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	68.2	66.3	1.9	92
EAST	Window	4.00	3.30	13.2	0.820	68.2	66.3	1.9	21
FLOOR	708' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	110.0	66.3	43.7	1,271
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	69.9	66.3	3.6	164
					TOTAL TRANSMISSION LOAD =				2,401

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 544

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 21.2 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	315		=	0
ELECTRICAL LOAD (pg. 18) :					=	1,222
TOTAL ROOM SENSIBLE LOAD:						**3,623**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	3,623	/ (1.08 x 0.9 x	360	) =	66.3 °F	

LATENT LOAD: Q latent

PEOPLE (pg. 18) :	0	X	325			0
TOTAL ROOM LATENT LOAD:						**0**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0 / (4840	x 0.9 x	360	) =	**0.0085**

CALCULATED ROOM CONDITIONS: 66.3 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C19

ROOM NAME: CORRIDOR

		Reference
Design air flow:	260 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	77.2 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	86.4	77.2	9.2	138
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	86.4	77.2	9.2	69
WEST	Door C60	7.17	3.00	21.5	0.448	86.4	77.2	9.2	89
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	69.9	77.2	-7.3	-175
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	69.9	77.2	-7.3	-961
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	68.2	77.2	-9.0	-209
NORTH	Door C57	7.17	3.00	21.5	0.448	68.2	77.2	-9.0	-87
SOUTH	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	110.0	77.2	32.8	2,174
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	69.9	77.2	-7.3	-452
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	68.2	77.2	-9.0	-109
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	68.2	77.2	-9.0	-106
EAST	Door C51	6.83	3.92	26.8	0.448	68.2	77.2	-9.0	-108
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	95.0	77.2	17.8	646
FLOOR	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	110.0	77.2	32.8	654
FLOOR	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	110.0	77.2	32.8	2,577
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	69.9	77.2	-7.3	-212
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	69.9	77.2	-7.3	-696
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	69.9	77.2	-7.3	-226
							TOTAL TRANSMISSION LOAD =		3,006

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY: Area (excluding floor) = 1344

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	2,361
TOTAL ROOM SENSIBLE LOAD:					**5,367**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	5,367	/ (1.08 x 0.9 x	260	) =	77.2 °F	

LATENT LOAD: Q latent

PEOPLE (pg. 18) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**
ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0 / (4840 x 0.9 x	260) =	**0.0085**

CALCULATED ROOM CONDITIONS: 77.2 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 88.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	110.0	88.5	21.6	1,091
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	95.7	88.5	7.3	726
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	93.6	88.5	5.1	239
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	81.5	88.5	-7.0	-1,859
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	95.7	88.5	7.3	165
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	85.0	88.5	-3.5	-339
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	76.1	88.5	-12.4	-2,010
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	73.6	88.5	-14.9	-624
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	89.2	88.5	0.8	185
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	86.5	88.5	-2.0	-272
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	86.6	88.5	-2.9	-135
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.338	81.7	88.5	-6.8	-377
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	74.9	88.5	-13.6	-1,142
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	80.4	88.5	-8.1	-1,309
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			11.8	5,643
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			11.8	158
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			11.8	184
							TOTAL TRANSMISSION LOAD =		324

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.

Area (excluding floor) = 3433

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 11.8 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 1) - pg. 30 & 32	53	X	1.08	X	0.9	81.5	-88.5	-358
Transfer - Air (C 3) - pg. 30 & 34A	90	X	1.08	X	0.9	89.2	-88.5	66
TOTAL ROOM SENSIBLE LOAD:								**31**

ROOM HUMIDITY RATIO (Wr):

(ROOM C1) - pg. 30 & 32	53	@	0.0085
(ROOM C3) pg. 30 & 34A	90	@	0.0088
			Wr = **0.0087**

CALCULATED ROOM CONDITIONS: 88.5 °F dry bulb 29% RH

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7.0 CALCULATIONS (CONT.) 7.1 COOLING LOAD - NORMAL OPERATION

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 93.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	81.5	93.6	-12.1	-236
SOUTH	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	110.0	93.6	16.4	360
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	88.5	93.6	-5.1	-239
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	95.7	93.6	2.1	41
FLOOR	755.0'-C2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	94.3	93.6	0.7	11
ROOF (CLTD)	27", uninsulated (Down)	9.53	4.00	38.1	0.300			6.7	76
							TOTAL TRANSMISSION LOAD =		13

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 6.7 °F

CALCULATED ROOM CONDITIONS: 84 °F dry bulb

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 95.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	93.6	95.7	-2.1	-41
SOUTH	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	110.0	95.7	14.3	676
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	88.5	95.7	-7.3	-726
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	88.5	95.7	-7.3	-141
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	97.9	95.7	2.2	132
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			4.6	124
							TOTAL TRANSMISSION LOAD =		23

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 4.6 °F

CALCULATED ROOM CONDITIONS: 96 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.1 COOLING LOAD - NORMAL OPERATION**

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 30, Diagram 2)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. page	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	71.8	0.0085	41	22.0	185,244
CORRIDOR (C 19)	260	77.2	0.0085	49	2.2	199,176
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	69.9	0.0085	44	40.5	18,174
SHIFT ENGINEERS OFFICE (C10)	10	80.4	0.0088	40	0.1	804
CONFERENCE ROOM (C 9)	270	74.9	0.0085	39	2.3	20,223
MCR RETURN AIR PLENUM	24,520	76.1	0.0085	46	209.2	1,865,934
TOTAL	**Vreturn = 32,403**				**276.3**	**2,289,555**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn = Treturn: **70.7 °F**

Return Air Humidity from MCR spaces: SUM (cfm X HUM.) / Vreturn = Wret: **0.0085 # MOIST / # DRY AIR**

Outside Air Flow: Voa = 3,597 cfm (pg. 30, Diagram 2)
Outside Air Temperature: Toa = 95 °F DB, 74 °F WB (Section 6.1)
Outside Air Humidity Ratio: Woa = 0.0133 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT: Te = [(Vreturn x Treturn) +(Voa x Toa)] / (Vreturn + Voa)

Te = 73 °F DB, 61.5 °F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT: We = [(Vreturn x Wreturn) +(Voa x Woa)] / (Vreturn + Voa)

Humidity ratio = 0.0090 # MOIST / # DRY AIR
Relative humidity = 52%

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**
ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 2,825 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 85.4 °F Design Room Temperature: 91°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			9.6	1,871
SOUTH***	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	120.0	85.4	34.7	5,681
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			2.2	239
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	104.0	85.4	18.7	1,222
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	110.0	85.4	24.7	394
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	95.8	85.4	10.4	54
EAST	Door C39	7.17	6.00	43.0	0.448	95.8	85.4	10.4	200
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	92.4	85.4	7.0	823
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	92.0	85.4	6.6	1,771
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	99.6	85.4	14.3	278
FLOOR***	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	120.0	85.4	34.7	21,417
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			14.9	7,348
							TOTAL TRANSMISSION LOAD =		**41,299**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 14.9 °F
CLTDcorr(west) = [(21.6 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 9.6 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 2.2 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 18) :					=	32,002
TOTAL ROOM SENSIBLE LOAD:						**73,301**

TRANSFER AIR	CFM		FACTOR		Ts	Tr	Delta T	
(W. Attic 1) - pg. 31	1,175	X	0.972		92.0	85.4	6.6	7,561
NET ROOM SENSIBLE LOAD:								**80,861**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	80,861	/ (1.08 x 0.9 x	2,825)	=	85.4 °F

LATENT LOAD:

									Q latent
PEOPLE (pg. 18) :	0	X	200						0
Transfer - Air (West Attic 1) - pg. 31 & 70	1,175	X	4840	X	0.9	0.0074	(0.0070)		2,267
TOTAL ROOM LATENT LOAD:									**2267**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,267 / (4840 x 0.9 x 2,825) = **0.0072**

CALCULATED ROOM CONDITIONS: 85.4 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: WOMEN'S TOILET

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 110.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	85.4	110.0	-24.7	-394
SOUTH**	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	120.0	110.0	10.0	180
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	95.8	110.0	-14.3	-390
NORTH	Door C38	7.17	3.00	21.5	0.448	95.8	110.0	-14.3	-137
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	102.3	110.0	-7.7	-123
FLOOR**	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	120.0	110.0	10.0	141
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	99.6	110.0	-10.4	-223
					TOTAL TRANSMISSION LOAD =				-947

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**45**

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 110.0 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: CORRIDOR

Reference pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 95.8 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	110.0	95.8	14.3	390
SOUTH	Door C38	7.17	3.00	21.5	0.448	110.0	95.8	14.3	137
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	102.3	95.8	6.6	468
SOUTH	Door C37	7.17	3.00	21.5	0.448	102.3	95.8	6.6	63
SOUTH* ***	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	120.0	95.8	24.3	364
SOUTH***	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	120.0	95.8	24.3	313
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	92.4	95.8	-3.4	-140
NORTH	Door C40	7.17	3.00	21.5	0.448	92.4	95.8	-3.4	-33
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	85.4	95.8	-10.4	-411
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	85.4	95.8	-10.4	-208
NORTH	Door C46	7.17	3.00	21.5	0.448	85.4	95.8	-10.4	-100
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	93.5	95.8	-2.3	-62
NORTH	Door C42	7.17	3.00	21.5	0.448	93.5	95.8	-2.3	-22
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	76.5	95.8	-19.3	-563
EAST	Door C56	7.17	4.50	32.3	0.448	76.5	95.8	-19.3	-278
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	85.4	95.8	-10.4	-54
WEST	Door C39	7.17	6.00	43.0	0.448	85.4	95.8	-10.4	-200
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	102.3	95.8	6.6	105
FLOOR***	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	120.0	95.8	24.3	559
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	116.0	95.8	20.3	2,350
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	116.0	95.8	20.3	527
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	92.0	95.8	-3.8	-795
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	92.0	95.8	-3.8	-137
					TOTAL TRANSMISSION LOAD =				2,273

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8". (***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,757
TOTAL ROOM SENSIBLE LOAD:					**4,030**

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C3

ROOM NAME: CORRIDOR (cont'd)

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(ROOM C4) - pg. 31 & 55	440	X	0.972	92.4	95.8	-3.4	-1,454
(ROOM C5) - pg. 31 & 56	155	X	0.972	93.5	95.8	-2.3	-339
(ROOM C10) - pg. 31 & 60	220	X	0.972	85.4	95.8	-10.4	-2,213
NET ROOM SENSIBLE LOAD:							**23**

ROOM HUMIDITY RATIO (Wr):

(ROOM C4) - pg. 31 & 55	440	@	0.0080
(ROOM C5) - pg. 31 & 56	155	@	0.0070
(ROOM C10) - pg. 31 & 60	220	@	0.0073

Wr = 0.0076

CALCULATED ROOM CONDITIONS: 55.8 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: KITCHEN

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 440 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 92.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	13.38	107.0	0.500	85.4	92.4	-7.0	-375
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	95.8	92.4	3.4	140
SOUTH	Door C40	7.17	3.00	21.5	0.448	95.8	92.4	3.4	33
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	93.5	92.4	1.2	56
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	89.4	92.4	-2.9	-170
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	92.4	-7.3	-195
FLOOR**	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	120.0	92.4	27.7	1,188
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	116.0	92.4	23.7	3,666
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	92.0	92.4	-0.4	-53
					TOTAL TRANSMISSION LOAD =				4,290

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	10	X	250	=	2,500
ELECTRICAL LOAD (pg. 18) :				=	8,787
TOTAL ROOM SENSIBLE LOAD:					**15,577**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 15,577 / (1.08 x 0.9 x 440) = 92.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	10	X	200	2000
TOTAL ROOM LATENT LOAD:				**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,000 / (4840 x 0.9 x 440) = **0.0080**

CALCULATED ROOM CONDITIONS: 92.4 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**
ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 90 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 93.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	92.4	93.5	-1.2	-56
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	95.8	93.5	2.3	62
SOUTH	Door C42	7.17	3.00	21.5	0.448	95.8	93.5	2.3	22
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	89.4	93.5	-4.1	-113
NORTH	Door C45	7.17	3.00	21.5	0.448	89.4	93.5	-4.1	-39
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	85.4	93.5	-8.1	-394
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	116.0	93.5	22.5	1,626
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	92.0	93.5	-1.5	-71
					TOTAL TRANSMISSION LOAD =				1,037

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 18) .					=	1,994
TOTAL ROOM SENSIBLE LOAD:						**3,031**

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(Room C6) - pg. 31 & 57	65	X	0.972	93.5	89.4	4.1	257
NET ROOM SENSIBLE LOAD:							**3,288**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	3,288	/ (1.08 x 0.9 x	90	) =	93.6 °F	

LATENT LOAD:

									Q latent
PEOPLE (pg. 18) :	0	X	200						0
Transfer - Air (Room C6) - pg. 31 & 57		65	X	4840	X	0.9	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:									**0**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 0 / (4840 x 0.9 x 90) = **0.0070**

CALCULATED ROOM CONDITIONS: 93.5 °F dry bulb

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7.0 CALCULATIONS (CONT.) **COOLING LOAD - LOCA**
ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 65 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 89.4 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	93.5	89.4	4.1	113
SOUTH	Door C45	7.17	3.00	21.5	0.448	93.5	89.4	4.1	39
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	104.0	89.4	14.6	284
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	79.8	89.4	-9.7	-353
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	85.4	89.4	-4.0	-78
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	85.4	89.4	-4.1	-261
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	116.0	89.4	26.6	1,366
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	116.0	89.4	26.6	359
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	92.0	89.4	2.5	179
					TOTAL TRANSMISSION LOAD =				1,647

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	464
TOTAL ROOM SENSIBLE LOAD:					**2,111**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	2,111 / (1.08 x 0.9 x	65)	=	89.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) =	0.0070 +	0 / (4840 x 0.9 x	65)	=	**0.0070**

CALCULATED ROOM CONDITIONS **89.4 °F dry bulb**

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7.0 CALCULATIONS (CONT.)

7.2 COOLING LOAD - LOCA

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)

ROOM NAME: WEST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 102.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	110.0	102.3	7.7	123
SOUTH**	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	120.0	102.3	17.7	686
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	95.8	102.3	-6.6	-468
NORTH	Door C37	7.17	3.00	21.5	0.448	95.8	102.3	-6.6	-63
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	95.8	102.3	-6.6	-105
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	100.3	102.3	-2.0	-120
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				54

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 102.3 °F dry bulb

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7.0 CALCULATIONS (CONT.) 7.2 COOLING LOAD - LOCA
ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 89.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	93.1	89.0	4.1	63
WEST	Door C53	7.17	3.00	21.5	0.448	93.1	89.0	4.1	40
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	72.5	89.0	-16.5	-151
SOUTH**	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	120.0	89.0	31.0	1,290
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	82.6	89.0	-6.4	-396
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	72.5	89.0	-16.5	-394
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	82.6	89.0	-6.4	-96
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	82.6	89.0	-6.4	-48
EAST	Door C60	7.17	3.00	21.5	0.448	82.6	89.0	-6.4	-62
CEILING	E.Attic 3 - 3/4" PL, (Up)	4.00	20.33	81.3	0.730	88.3	89.0	-0.7	-42
CEILING	C13 (1/2" & 5/8" GB) (Up)	4.39	6.00	26.3	0.448	72.5	89.0	-16.5	-195
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				9

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 89.0 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C9 (Ref. 5.1.4)

ROOM NAME: CONFERENCE ROOM

		Reference
Design air flow:	270 cfm	pg. 31
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0070 lbW/lb dry air	pg. 29
Steady State Temperature:	79.8 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	89.4	79.8	9.7	353
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	85.4	79.8	5.7	288
SOUTH	Door C48	7.17	3.00	21.5	0.448	85.4	79.8	5.7	54
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	104.0	79.8	24.3	862
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	76.5	79.8	-3.3	-130
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	116.0	79.8	36.3	1,967
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	92.0	79.8	12.2	1,030
							TOTAL TRANSMISSION LOAD =		**4,424**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,829
TOTAL ROOM SENSIBLE LOAD:					**6,253**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 79.8 °F

56.0 + 6,253 / (1.08 x 0.9 x 270) = 79.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 79.8 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C10 (Ref. 5.1.4)

ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 330 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 85.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	93.5	85.4	8.1	394
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	89.4	85.4	4.0	78
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	95.8	85.4	10.4	411
SOUTH	Door C46	7.17	3.00	21.5	0.448	95.8	85.4	10.4	100
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	95.8	85.4	10.4	208
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	79.8	85.4	-5.7	-288
NORTH	Door C48	7.17	3.00	21.5	0.448	79.8	85.4	-5.7	-54
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	76.5	85.4	-8.9	-689
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	116.0	85.4	30.6	3,205
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	92.0	85.4	6.6	1,068
						TOTAL TRANSMISSION LOAD =			4,433

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	250	=	500
ELECTRICAL LOAD (pg. 18) :				=	4,502
TOTAL ROOM SENSIBLE LOAD:					**9,435**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = Tr

56.0 + 9,435 / (1.08 x 0.9 x 330) = 85.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	2	X	200	400
TOTAL ROOM LATENT LOAD:				**400**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 400 / (4840 x 0.9 x 330) = **0.0073**

CALCULATED ROOM CONDITIONS: 85.4 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 31
pg. 64
pg. 64

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 77.2 °F (Transfer from room C14)
Supply Air Humidity Ratio: 0.0089 lbW/lb dry air (Transfer from room C14)
Steady State Temperature: 79.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	72.5	79.5	-7.0	-1,055
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			15.3	1,309
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			8.0	354
SOUTH*	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	79.5	40.5	1,606
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	77.2	79.5	-2.3	-673
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			20.8	4,392
							TOTAL TRANSMISSION LOAD =		5,932

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 15.3 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 8.0 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 20.8 °F

$$\text{ROOM TEMPERATURE (Tr)} = \left(\frac{\text{Ts}}{77.2} \right) + \left(\frac{\text{Q}}{5{,}932 \,/\, (.972 \times 2{,}580)} \right) = \underline{79.6}\ ^\circ\text{F}$$

CALCULATED ROOM CONDITIONS: 79.5 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Steady State Temperature: 88.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	79.0	88.9	-9.9	-234
SOUTH*	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	120.0	88.9	31.1	886
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	72.5	88.9	-16.4	-990
EAST	E. Attic 3, 8"CI	9.08	4.00	36.3	0.500	88.3	88.9	-0.6	-11
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	72.5	88.9	-16.4	-152
FLOOR	C15 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	93.1	88.9	4.2	246
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			11.4	273
							TOTAL TRANSMISSION LOAD =		19

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 11.4 °F

CALCULATED ROOM CONDITIONS: 88.9 °F dry bulb

ROOM NO. N/A

ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Steady State Temperature: 88.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E.Attic 2, 8" CI	9.08	4.00	36.3	0.500	88.9	88.3	0.6	11
SOUTH*	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	120.0	88.3	31.7	1,381
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	72.5	88.3	-15.8	-1,458
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	72.5	88.3	-15.8	-247
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	89.0	88.3	0.7	42
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			12.0	292
							TOTAL TRANSMISSION LOAD =		19

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 12.0 °F

CALCULATED ROOM CONDITIONS: 88.3 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**
ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 21,650 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 76.5 °F Design Room Temperature: 82°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	95.8	76.5	19.3	563
WEST	Door C56	7.17	4.50	32.3	0.448	95.8	76.5	19.3	278
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	85.4	76.5	8.9	689
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	79.8	76.5	3.3	130
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	92.0	76.5	15.5	650
SOUTH ***	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	120.0	76.5	43.5	15,471
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	104.0	76.5	27.5	1,733
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	104.0	76.5	27.5	909
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	104.0	76.5	27.5	3,115
NORTH	Door C49	6.50	3.00	19.5	0.448	104.0	76.5	27.5	240
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	104.0	76.5	27.5	909
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	104.0	76.5	27.5	1,298
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	104.0	76.5	27.5	1,691
NORTH	Door C50	6.50	3.00	19.5	0.448	104.0	76.5	27.5	240
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	93.1	76.5	16.6	144
EAST	Door C55	7.17	4.50	32.3	0.448	93.1	76.5	16.6	240
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	88.9	76.5	12.4	43
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	72.5	76.5	-4.0	-608
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	116.0	76.5	39.5	81,004
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	**108,737**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic) (***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	8	X	250				=	2,000
ELECTRICAL LOAD (pg. 18) :							=	334,003
TOTAL ROOM SENSIBLE LOAD:								**444,740**
	CFM					Ts	(-Tr)	
Transfer - Air (C 13) - pg.31 & 63A	2727	X	1.08	X	0.9	72.5	-76.5	-10,601
NET ROOM SENSIBLE LOAD:								**434,140**

ROOM TEMPERATURE (Tr) = $\frac{Ts \mid Q \mid CFM}{56.0 + 434{,}140 / (1.08 \times 0.9 \times 21{,}650)} = \underline{76.6}$ °F

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)

ROOM NAME: MAIN CONTROL ROOM (cont'd)

LATENT LOAD:									Q latent
PEOPLE (pg. 18) :	8	X	200						1600
Transfer - Air (C 13) - pg. 31 & 63A		2,727	X	4840	X	0.9	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:									**1,600**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,600 / (4840 x 0.9 x 21,650) = **0.0070**

CALCULATED ROOM CONDITIONS: 76.5 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)

ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 7,490 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 72.5 °F Design Room Temperature: 79°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	76.5	72.5	4.0	608
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	79.0	72.5	6.5	766
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	88.3	72.5	15.8	247
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	88.9	72.5	16.4	152
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	89.0	72.5	16.5	394
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	82.6	72.5	10.1	1,329
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	93.1	72.5	20.6	670
SOUTH	Door C52	7.17	7.00	50.2	0.448	93.1	72.5	20.6	463
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	88.9	72.5	16.4	990
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	88.3	72.5	15.8	1,458
SOUTH(Sec. tier)***	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	120.0	72.5	47.5	2,447
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	104.0	72.5	31.5	7,608
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	74.6	72.5	2.1	133
EAST	Door C63	7.17	3.00	21.5	0.448	74.6	72.5	2.1	20
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	70.0	72.5	-2.5	-134
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	89.0	72.5	16.5	151
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	79.5	72.5	7.0	1,055
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	77.2	72.5	4.7	122
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	116.0	72.5	43.5	28,360
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	116.0	72.5	43.5	703
FLOOR***	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	120.0	72.5	47.5	11,170
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	74.6	72.5	2.1	152
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	70.0	72.5	-2.5	-114
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	82.6	72.5	10.1	293
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Up)			282.2	0.448	82.6	72.5	10.1	1,277
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Up)			26.3	0.448	89.0	72.5	16.5	195
ROOF (CLTD)	27", uninsulated (Down)			2541.4	0.300			27.8	21,157
					TOTAL TRANSMISSION LOAD =				81,673

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling for this room is 8" concrete slab
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 27.8 °F

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7.0 CALCULATIONS (CONT.) 7.2 COOLING LOAD - LOCA

ROOM NO. 755.0-C13

ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	39,255
TOTAL ROOM SENSIBLE LOAD:					**120,928**

	Ts		Q		CFM		
ROOM TEMPERATURE (Tr) =	56.0	+	120,928	/ (1.08 x 0.9 x	7,490	) =	72.6 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 72.5 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**
ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

		Reference
Design air flow:	1,840 cfm	pg. 31
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0070 lbW/lb dry air	pg. 29
Steady State Temperature:	77.2 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	82.6	77.2	5.4	64
WEST	Door C51	6.80	3.92	26.7	0.448	82.6	77.2	5.4	64
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	74.6	77.2	-2.6	-199
WEST	Door C62	7.17	3.00	21.5	0.448	74.6	77.2	-2.6	-25
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	70.0	77.2	-7.2	-347
WEST	Window	4.00	3.30	13.2	0.810	70.0	77.2	-7.2	-77
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	72.5	77.2	-4.7	-122
SOUTH**	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	77.2	42.8	1,697
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			10.3	455
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			17.6	1,942
FLOOR**	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	120.0	77.2	42.8	7,761
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	79.5	77.2	2.3	536
								TOTAL TRANSMISSION LOAD =	**11,750**

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 17.6 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 10.3 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	34	X	250				=	8,500
ELECTRICAL LOAD (pg. 18) :							=	8,007
TOTAL ROOM SENSIBLE LOAD:								**40,007**

	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 31 & 67	740	X	1.08	X	0.9	74.6	-77.2	-1,870
NET ROOM SENSIBLE LOAD								**38,136**

ROOM TEMPERATURE (Tr) = 56.0 + 38,136 / (1.08 x 0.9 x 1,840) = 77.3 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	34	X	325					11,050
Transfer - Air (C 16) - pg. 31 & 67	740	X	4840	X	0.9	0.0082	(0.0070)	3,797
TOTAL ROOM LATENT LOAD:								**14,847**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 14,847 / (4840 x 0.9 x 1,840) = **0.0089**
CALCULATED ROOM CONDITIONS: 77.2 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)

ROOM NAME: CORRIDOR

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 93.1 °F Design Room Temperature: 96°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	76.5	93.1	-16.6	-144
WEST	Door C55	7.17	4.50	32.3	0.448	76.5	93.1	-16.6	-240
SOUTH* **	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	120.0	93.1	26.9	553
SOUTH**	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	120.0	93.1	26.9	341
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	72.5	93.1	-20.6	-670
NORTH	Door C52	7.17	7.00	50.2	0.448	72.5	93.1	-20.6	-463
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	89.0	93.1	-4.1	-19
EAST	Door C53	7.17	6.04	43.3	0.448	89.0	93.1	-4.1	-80
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	116.0	93.1	22.9	963
CEILING	E. Attic 2 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	88.9	93.1	-4.2	-246
								TOTAL TRANSMISSION LOAD =	-3

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) See Assumption 4.1.6

LOAD SUMMARY:

INTERNAL:							
PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (pg.18, Note 2) :	86.0	X	3.413	X	0%	=	0
EQUIPMENT (pg. 18, Note 2) :	17.2	X	3.413	X	0%	=	0
TOTAL ROOM SENSIBLE LOAD:							**0**

CALCULATED ROOM CONDITIONS: 93.1 °F dry bulb

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7.0 CALCULATIONS (CONT.)

7.2 COOLING LOAD - LOCA

ROOM NO. - N/A

ROOM NAME: M C R RETURN AIR PLENUM

			Reference
Design air flow:	24,017	cfm (Transfer from C12)	pg. 31
Supply Air Temp:	76.5	°F (Transfer from C12)	pg. 62
Supply Air Humidity Ratio:	0.0070	lbW/lb dry air (Transfer from C12)	pg. 62
Steady State Temperature:	79.0	°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH**	T1 - 36" CI	7.75	150.70	1167.9	0.236	120.0	79.0	41.0	11,301
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	104.0	79.0	25.0	1,221
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	104.0	79.0	25.0	640
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	104.0	79.0	25.0	2,195
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	104.0	79.0	25.0	640
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	104.0	79.0	25.0	915
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	104.0	79.0	25.0	1,280
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	72.5	79.0	-6.5	-766
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	88.9	79.0	9.9	200
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	92.0	79.0	13.0	2,111
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			21.3	40,350
					TOTAL TRANSMISSION LOAD =				60,086

(*) Luminious ceiling panel (plastic)

(**) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 21.3 °F

	Ts		Q	1.08 x 0.9	CFM		
ROOM TEMPERATURE (Tr) =	(76.5)	+	(60,086	/(.972 x	24,017)	=	79.1 °F

CALCULATED ROOM CONDITIONS: 79.1 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C16 and C 17

ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 380 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 74.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	72.5	74.6	-2.1	-133
WEST	Door C63	7.17	3.00	21.5	0.448	72.5	74.6	-2.1	-20
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	82.6	74.6	8.0	97
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	82.6	74.6	8.0	264
SOUTH	Door C57	7.17	3.00	21.5	0.448	82.6	74.6	8.0	77
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	70.0	74.6	-4.6	-99
NORTH	Door C64	7.17	2.67	19.1	0.448	70.0	74.6	-4.6	-39
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	77.2	74.6	2.6	199
EAST	Door C62	7.17	3.00	21.5	0.448	77.2	74.6	2.6	25
FLOOR***	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	120.0	74.6	45.4	2,097
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	72.5	74.6	-2.1	-152
					TOTAL TRANSMISSION LOAD =				2,315

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	4	X	315				=	1,260
ELECTRICAL LOAD (pg. 18) :							=	2,597
TOTAL ROOM SENSIBLE LOAD:								**8,488**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 31 & 68	360	X	1.08	X	0.9	70.0	-74.6	-1,610
NET ROOM SENSIBLE LOAD								**6,878**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	6,878	/ (1.08 x 0.9 x	380	)	=	74.6 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	4	X	325					1300
Transfer - Air (C 18) - pg. 31 & 68	360	X	4840	X	0.9	0.0074	(0.0070)	650
TOTAL ROOM LATENT LOAD:								**1,950**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,950 / (4840 x 0.9 x 380) = **0.0082**

CALCULATED ROOM CONDITIONS: 74.6 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**
ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 360 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 70.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	72.5	70.0	2.5	134
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	74.6	70.0	4.6	99
SOUTH	Door C64	7.17	2.67	19.1	0.448	74.6	70.0	4.6	39
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	104.0	70.0	34.0	582
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			17.5	234
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	77.2	70.0	7.2	347
EAST	Window	4.00	3.30	13.2	0.820	77.2	70.0	7.2	78
FLOOR***	708.0' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	120.0	70.0	50.0	1,455
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	72.5	70.0	2.5	114
					TOTAL TRANSMISSION LOAD =				3,082

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 17.5 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	315		=	630
ELECTRICAL LOAD (pg. 18) :					=	1,222
TOTAL ROOM SENSIBLE LOAD:						**4,934**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM)

Ts	+	Q	/ (1.08 x 0.9 x	CFM	)	=	
56.0	+	4,934		360		=	70.1 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	2	X	325		650
TOTAL ROOM LATENT LOAD:					**650**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 650 / (4840 x 0.9 x 360) = **0.0074**

CALCULATED ROOM CONDITIONS: 70.0 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 260 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 82.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	89.0	82.6	6.4	96
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	89.0	82.6	6.4	48
WEST	Door C60	7.17	3.00	21.5	0.448	89.0	82.6	6.4	62
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	72.5	82.6	-10.1	-241
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	72.5	82.6	-10.1	-1,329
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	74.6	82.6	-8.0	-186
NORTH	Door C57	7.17	3.00	21.5	0.448	74.6	82.6	-8.0	-77
SOUTH^	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	120.0	82.6	37.4	2,479
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	89.0	82.6	6.4	396
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	74.6	82.6	-8.0	-97
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	77.2	82.6	-5.4	-64
EAST	Door C51	6.83	3.92	26.8	0.448	77.2	82.6	-5.4	-65
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	116.0	82.6	33.4	1,212
FLOOR ***	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	120.0	82.6	37.4	745
FLOOR ***	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	120.0	82.6	37.4	2,939
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	72.5	82.6	-10.1	-293
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	72.5	82.6	-10.1	-964
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	72.5	82.6	-10.1	-313
							TOTAL TRANSMISSION LOAD =		4,347

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	2,361
TOTAL ROOM SENSIBLE LOAD:					**6,708**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 6,708 / (1.08 x 0.9 x 260) = 82.5 °F

CALCULATED ROOM CONDITIONS: 82.6 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 92.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)*	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	120.0	92.0	28.0	1,419
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	100.3	92.0	8.3	834
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	99.6	92.0	7.6	354
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	85.4	92.0	-6.6	-1,771
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	100.3	92.0	8.3	190
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	104.0	92.0	12.0	1,182
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	79.0	92.0	-13.0	-2,111
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	76.5	92.0	-15.5	-650
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	95.8	92.0	3.8	932
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	92.4	92.0	0.4	53
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	93.5	92.0	1.5	71
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.427	89.4	92.0	-2.5	-179
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	79.8	92.0	-12.2	-1,030
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	85.4	92.0	-6.6	-1,068
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			8.3	3,959
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			8.3	111
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			8.3	129
							TOTAL TRANSMISSION LOAD =		2,426

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.
(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 8.3 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 12) - pg. 31 & 62	360	X	1.08	X	0.9	76.5	-92.0	-5,413
Transfer - Air (C 3) - pg. 31 & 54A	815	X	1.08	X	0.9	95.8	-92.0	2,994
TOTAL ROOM SENSIBLE LOAD:								7

ROOM HUMIDITY RATIO (Wr):

(Room C12) - pg. 31 & 62	360	@	0.0070
(Room C3) - pg. 31 & 54A	815	@	0.0076

Wr = 0.0074

CALCULATED ROOM CONDITIONS: 92.0 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Steady State Temperature: 99.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	85.4	99.6	-14.3	-278
SOUTH*	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	120.0	99.6	20.4	447
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	92.0	99.6	-7.6	-354
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	100.3	99.6	0.7	14
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	110.0	99.6	10.4	223
ROOF (CLTD)	27", uninsulated (Up)	9.53	4.00	38.1	0.331			0.7	8
							TOTAL TRANSMISSION LOAD =		60

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 0.7 °F

CALCULATED ROOM CONDITIONS: 99.6 °F dry bulb

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Steady State Temperature: 100.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	99.6	100.3	-0.7	-14
SOUTH*	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	120.0	100.3	19.7	931
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	92.0	100.3	-8.3	-834
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	92.0	100.3	-8.3	-162
FLOOR	Stair C1 - 3/4" PL, (Up)	20.54	4.00	82.2	0.730	102.3	100.3	2.0	120
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			0.0	-1
							TOTAL TRANSMISSION LOAD =		39

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 0.0 °F

CALCULATED ROOM CONDITIONS: 100.3 °F dry bulb

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7.0 CALCULATIONS (CONT.) **7.2 COOLING LOAD - LOCA**

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 30, Diagram 2)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. page	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	79.5	0.0089	61	22.8	205,110
CORRIDOR (C 19)	260	82.6	0.0070	69	1.8	21,476
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	72.5	0.0070	64	33.3	345,353
SHIFT ENGINEERS OFFICE (C10)	110	85.4	0.0073	60	0.8	9,394
CONFERENCE ROOM (C 9)	270	79.8	0.0070	59	1.9	21,533
MCR RETURN AIR PLENUM	24,017	79.0	0.0070	66	168.1	1,897,304
TOTAL	Vreturn = 32,000				228.8	2,500,170

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn: Treturn = 78.1 °F
Return Air Humidity Ratio from MCR spaces: Wreturn = 0.0072 # MOIST / # DRY AIR

Mechanical equipment room flow (Vmer) = 3289 cfm (pg. 31, Diagram 4)
Mechanical equip. room temperature (Tmer) = 85.4 °F (pg. 52)
Mech. equip. room humidity ratio (Wmer) = 0.0072 # MOIST / # DRY AIR (pg. 52)

Outside Air Flow (Voa) = 711 cfm (pg. 31, Diagram 4)
Outside Air Temperature (Toa) = 95 °F DB, 74 °F WB (Section 6.1)
Δ T pressurizing fan (Δ Tpr) = 4.9 °F (Fan Heat Gain @ pg.22)
Outside Air Humidity Ratio (Woa) = 0.0133 # MOIST / # DRY AIR

Δ T air cleaning unit (Δ Tcu) = 7.7 °F (Fan Heat Gain @ pg.23)
Air cleaning unit flow (Vcu) = 4000 cfm (pg. 31, Diagram 4)

AIR CLEANING UNIT DISCHARGE TEMPERATURE:

Tcu = Δ Tcu + [(Vmer x Tmer) + Voa x (Toa + Δ Tpr)] / Vcu

Tcu = 95.6 °F

AIR CLEANING UNIT HUMIDITY RATIO:

Wcu = [(Voa x Woa) + (Wmer x Vmer)] / Vcu

Wcu = 0.0083 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT (Te) :

Te = [(Vreturn x Treturn) +(Vcu x Tcu)] / (Vreturn + Vcu)

Te = 80 °F DB, 61 °F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT (We) : We = [(Vreturn x Wreturn) +(Vcu x Wcu)] / (Vreturn + Vcu)

We = 0.0073 # MOIST / # DRY AIR
Relative humidity = 43%

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Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 72
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)

ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 30
pg. 91

013

Design air flow: 2,825 cfm

Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air

Steady State Temperature: 60.5 °F Design Room Temperature: 64°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	36" CE	17.75	42.00	745.5	0.268	13.0	60.5	-47.5	-9,480
SOUTH	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	50.0	60.5	-10.5	-1,713
NORTH	36" CE	17.75	23.50	417.1	0.268	13.0	60.5	-47.5	-5,304
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	75.0	60.5	14.6	953
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	63.4	60.5	2.9	47
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	65.8	60.5	5.4	28
EAST	Door C39	7.17	6.00	43.0	0.448	65.8	60.5	5.4	104
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	70.9	60.5	10.5	1,228
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	54.5	60.5	-6.0	-1,592
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	51.6	60.5	-8.9	-173
FLOOR	708.0' - T1, 18" C (Dn)	39.14	42.00	1643.9	0.305	50.0	60.5	-10.5	-5,239
ROOF	27", uninsulated (winter)	39.14	42.00	1643.9	0.340	13.0	60.5	-47.5	-26,521
					TOTAL TRANSMISSION LOAD =				-47,662

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 14,940

TOTAL ROOM SENSIBLE LOAD: **-32,722**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	-32,722	/ (1.08 x 1.1 x	2,825)	=	60.4 °F

CALCULATED ROOM CONDITIONS: 60.5 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 73
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: WOMEN'S TOILET

Reference
pg. 30
pg. 74

R013

Design air flow: 230 cfm (Transfer from room C3)

Supply Air Temp: 65.8 °F (Transfer from room C3)

Steady State Temperature: 63.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	60.5	63.4	-2.9	-47
SOUTH	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	50.0	63.4	-13.4	-241
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	65.8	63.4	2.5	67
NORTH	Door C38	7.17	3.00	21.5	0.448	65.8	63.4	2.5	24
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	58.3	63.4	-5.1	-81
FLOOR	708.0' - T1, 18" TC (Dn)	9.53	4.00	38.1	0.300	50.0	63.4	-13.4	-153
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	51.6	63.4	-11.8	-252
					TOTAL TRANSMISSION LOAD =				-683

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 0

TOTAL ROOM SENSIBLE LOAD: -683

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	65.8	-683	/ (1.08 x 1.1 x	230	) =	63.3 °F

CALCULATED ROOM CONDITIONS: 63.4 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 74
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.1.5)

ROOM NAME: CORRIDOR

Reference
pg. 30
pg. 80

R013

Design air flow: 320 cfm (Transfer from room C10)

Supply Air Temp: 74.1 °F @ 0.0085 lbW/lb dry air (Transfer from room C10)

Steady State Temperature: 65.8 °F Design Room Temperature: 65°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	63.4	65.8	-2.5	-67
SOUTH	Door C38	7.17	3.00	21.5	0.448	63.4	65.8	-2.5	-24
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	58.3	65.8	-7.5	-538
SOUTH	Door C37	7.17	3.00	21.5	0.448	58.3	65.8	-7.5	-73
SOUTH*	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	50.0	65.8	-15.8	-238
SOUTH	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	50.0	65.8	-15.8	-204
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	70.9	65.8	5.1	209
NORTH	Door C40	7.17	3.00	21.5	0.448	70.9	65.8	5.1	49
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	74.1	65.8	8.3	330
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	74.1	65.8	8.3	167
NORTH	Door C46	7.17	3.00	21.5	0.448	74.1	65.8	8.3	80
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	79.4	65.8	13.5	376
NORTH	Door C42	7.17	3.00	21.5	0.448	79.4	65.8	13.5	130
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	75.3	65.8	9.4	275
EAST	Door C56	7.17	4.50	32.3	0.448	75.3	65.8	9.4	136
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	60.5	65.8	-5.4	-28
WEST	Door C39	7.17	6.00	43.0	0.448	60.5	65.8	-5.4	-104
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	58.3	65.8	-7.5	-121
FLOOR	708.0' - T1, 18" TC (Dn)	6.67	9.36	62.4	0.300	50.0	65.8	-15.8	-297
FLOOR	729.0' - C1, 8" TC (Dn)	6.67	33.21	221.5	0.395	60.0	65.8	-5.8	-511
FLOOR	729.0' - C1, 8" TC (Dn)	4.67	10.63	49.6	0.395	60.0	65.8	-5.8	-115
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	54.5	65.8	-11.3	-2,385
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	54.5	65.8	-11.3	-411
						TOTAL TRANSMISSION LOAD =			-3,364

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Ceiling raised to el. 763'-8".

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	201
TOTAL ROOM SENSIBLE LOAD:		**-3,163**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	74.1	-3,163	/ (1.08 x 1.1 x	320	) =	65.8 °F

CALCULATED ROOM CONDITIONS: 65.8 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 75
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C4
ROOM NAME: KITCHEN

7.3 HEATING LOAD - NORMAL OPERATION

(Ref. 5.1.4 & 5.5.1)

013

Reference
pg. 30
pg. 91
pg. 24

Design air flow: 440 cfm (through two heaters - see below)
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 0.0 °F (Heater 0-HTR-31-099)
Duct Heater Supply: 70.2 °F
Steady State Temperature: 70.9 °F

							Thermostat setting @ 75°F		
WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	60.5	70.9	-10.5	-1,228
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	65.8	70.9	-5.1	-209
SOUTH	Door C40	7.17	3.00	21.5	0.448	65.8	70.9	-5.1	-49
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	79.4	70.9	8.5	413
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	75.6	70.9	4.6	271
NORTH	757.0' - A5, 36" CI	8.00	16.00	128.0	0.236	75.0	70.9	4.1	124
FLOOR	708.0' - T1, 18" TC (Dn)	8.70	13.38	116.4	0.300	50.0	70.9	-20.9	-730
FLOOR	729.0' - C1, 8" TC (Dn)			295.8	0.395	60.0	70.9	-10.9	-1,274
CEILING	W. Attic 1 - 5/8" GB (Up)	29.38	14.03	412.2	0.427	54.5	70.9	-16.4	-2,887
					TOTAL TRANSMISSION LOAD =				-5,568

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :								=	107
TOTAL ROOM SENSIBLE LOAD:									**-5,461**

	CFM					Ts	(-Tr)	
110 cfm via heater 0-HTR-31-097 (pg. 77)	110	X	1.08	X	1.1	114.5	-70.9	5,698
330 cfm via heater 0-HTR-31-099	330	X	1.08	X	1.1	70.2	-70.9	-274
NET ROOM SENSIBLE LOAD:								**-38**

	CFM						ΔT Duct Heater	
DUCT HEATER:	330	X	1.08	X	1.1	X	0.0	**0**

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw (Heater 0-HTR-31-099)
DUCT HEATER CALCULATED CAPACITY: 0.0 Kw
HEATER % OPERATION: 0 %

CALCULATED ROOM CONDITIONS: 70.9 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 76
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: MEN'S TOILET

Reference
pg. 30
pg. 91
pg. 77

R13

Design air flow: 90 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 44.3 °F
Duct Heater Supply: 114.5 °F
Steady State Temperature: 79.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	70.9	79.4	-8.5	-413
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	65.8	79.4	-13.5	-376
SOUTH	Door C42	7.17	3.00	21.5	0.448	65.8	79.4	-13.5	-130
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	75.6	79.4	-3.8	-106
NORTH	Door C45	7.17	3.00	21.5	0.448	75.6	79.4	-3.8	-37
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	74.1	79.4	-5.2	-255
FLOOR	729.0' - C1, 8" TC (Dn)	10.31	13.38	137.9	0.395	60.0	79.4	-19.4	-1,056
CEILING	W. Attic 1 - 5/8" GB (Up)	10.31	13.38	137.9	0.427	54.5	79.4	-24.9	-1,466
					TOTAL TRANSMISSION LOAD =				-3,839

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 83

TOTAL ROOM SENSIBLE LOAD: **-3,756**

DUCT HEATER NOMINAL CAPACITY: 10.0 Kw
DUCT HEATER CALCULATED CAPACITY: 4.1 Kw (See pg. 77)
HEATER % OPERATION: 41 % (See pg. 77)

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	114.5	-3,756 / (1.08 x 1.1 x		90	) =	79.4 °F

CALCULATED ROOM CONDITIONS: **79.4 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 77
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 30
pg. 91
pg. 24

Rev 13

Design air flow: 65 cfm

Supply Air Temp: 70.2 °F

ΔT Duct Heater: 44.3 °F (Estimated; < 108.4°F calculated)

Duct Heater Supply: 114.5 °F

Steady State Temperature: 75.6 °F Design Room Temperature: 65°F

Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	79.4	75.6	3.8	106
SOUTH	Door C45	7.17	3.00	21.5	0.448	79.4	75.6	3.8	37
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	75.0	75.6	-0.5	-11
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	76.9	75.6	1.4	51
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	74.1	75.6	-1.4	-27
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	60.5	75.6	-15.1	-968
FLOOR	729.0' - C1, 18" TC (Dn)	16.02	8.70	139.4	0.300	60.0	75.6	-15.6	-650
FLOOR	729.0' - C1, 8" TC (Dn)			25.8	0.395	60.0	75.6	-15.6	-158
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	54.5	75.6	-21.1	-1,485
						TOTAL TRANSMISSION LOAD =			-3,105

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	96
TOTAL ROOM SENSIBLE LOAD:		**-3,009**

	CFM						ΔT Duct Heater	
DUCT HEATER:	265	X	1.08	X	1.1	X	44.3	13,947

DUCT HEATER NOMINAL CAPACITY: 10.0 Kw

DUCT HEATER CALCULATED CAPACITY: 4.1 Kw

HEATER % OPERATION: 41 %

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	114.5	-3,009 / (1.08 x 1.1 x		65	) =	75.5 °F

CALCULATED ROOM CONDITIONS: 75.6 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 78
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)

7.3 HEATING LOAD - NORMAL OPERATION

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

R013

Design air flow: - cfm
Steady State Temperature: 58.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	63.4	58.3	5.1	81
SOUTH	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	50.0	58.3	-8.3	-322
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	65.8	58.3	7.5	538
NORTH	Door C37	7.17	3.00	21.5	0.448	65.8	58.3	7.5	73
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	65.8	58.3	7.5	121
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	50.1	58.3	-8.2	-492
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-1

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

CALCULATED ROOM CONDITIONS:	58.3 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Design air flow: - cfm
Steady State Temperature: 64.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	64.1	64.4	-0.3	-5
WEST	Door C53	7.17	3.00	21.5	0.448	64.1	64.4	-0.3	-3
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	74.6	64.4	10.2	94
SOUTH	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	50.0	64.4	-14.4	-599
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	68.8	64.4	4.3	269
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	64.4	10.2	245
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	68.8	64.4	4.3	65
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	68.8	64.4	4.3	33
EAST	Door C60	7.17	3.00	21.5	0.448	68.8	64.4	4.3	42
CEILING	E.Attic 3 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	60.4	64.4	-4.0	-237
CEILING	C13 (1/2" & 5/8" GB) (Dn)	4.39	6.00	26.3	0.351	74.6	64.4	10.2	95
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-2

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

CALCULATED ROOM CONDITIONS:	64.4 °F dry bulb

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 79
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C9 (Ref. 5.1.4)

ROOM NAME: CONFERENCE ROOM

Reference
pg. 30
pg. 91
pg. 24

R013

Design air flow: 270 cfm

Supply Air Temp: 70.2 °F

ΔT Duct Heater: 18.5 °F (Estimated; < 24°F calculated)

Duct Heater Supply: 88.7 °F

Steady State Temperature: 76.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	75.6	76.9	-1.4	-51
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	74.1	76.9	-2.8	-143
SOUTH	Door C48	7.17	3.00	21.5	0.448	74.1	76.9	-2.8	-27
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	75.0	76.9	-1.9	-69
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	75.3	76.9	-1.7	-68
FLOOR	729.0' - C1, 8" CRP (Dn)	10.03	16.70	167.5	0.270	60.0	76.9	-16.9	-766
CEILING	W. Attic 1 - 3/4" PL (Up)	10.03	16.70	167.5	0.730	64.5	76.9	-22.4	-2,744
					TOTAL TRANSMISSION LOAD =				-3,867

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 96

TOTAL ROOM SENSIBLE LOAD: -3,771

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	88.7	-3,771	/ (1.08 x 1.1 x	270	) =	76.9 °F

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw

DUCT HEATER CALCULATED CAPACITY: 3.9 Kw (see pg. 80)

HEATER % OPERATION: 77 % (see pg. 80)

CALCULATED ROOM CONDITIONS: 76.9 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 80
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C10 (Ref. 5.1.4)

ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 30
pg. 91
pg. 24

Rev 13

Design air flow: 330 cfm

Supply Air Temp: 70.2 °F

ΔT Duct Heater: 18.5 °F (Estimated; < 24°F calculated)

Duct Heater Supply: 88.7 °F

Steady State Temperature: 74.1 °F

Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	79.4	74.1	5.2	255
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	75.6	74.1	1.4	27
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	65.8	74.1	-8.3	-330
SOUTH	Door C46	7.17	3.00	21.5	0.448	65.8	74.1	-8.3	-80
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	65.8	74.1	-8.3	-167
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	76.9	74.1	2.8	143
NORTH	Door C48	7.17	3.00	21.5	0.448	76.9	74.1	2.8	27
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	75.3	74.1	1.1	86
FLOOR	729.0' - C1, 8" CRP (Dn)	16.70	19.36	323.3	0.270	60.0	74.1	-14.1	-1,234
CEILING	W. Attic 1 - 3/4" PL (Up)	16.70	19.36	323.3	0.730	54.5	74.1	-19.6	-4,635
						TOTAL TRANSMISSION LOAD =			-5,908

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 188

TOTAL ROOM SENSIBLE LOAD: **-5,720**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	88.7	-5,720 / (1.08 x 1.1 x		330	) =	74.1 °F

	CFM						ΔT Duct Heater	
DUCT HEATER:	600	X	1.08	X	1.1	X	18.5	13,187

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw

DUCT HEATER CALCULATED CAPACITY: 3.9 Kw

HEATER % OPERATION: 77 %

CALCULATED ROOM CONDITIONS: **74.1 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 81
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14)

7.3 HEATING LOAD - NORMAL OPERATION

(Ref. 5.1.1 & 5.1.6)

Reference
pg. 30
pg. 91

R013

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 74.6 °F

Steady State Temperature: 68.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	74.6	68.5	6.1	919
EAST	36" CE	7.75	42.00	325.5	0.268	13.0	68.5	-55.5	-4,845
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	68.5	-55.5	-2,501
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	50.0	68.5	-18.5	-735
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	74.6	68.5	6.1	1,786
ROOF	27", uninsulated (winter)	16.80	42.00	705.6	0.340	13.0	68.5	-55.5	-13,324
							TOTAL TRANSMISSION LOAD =		-18,699

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	74.6	-18,699	/ (1.08 x 1.1 x	2580	) =	68.5 °F

CALCULATED ROOM CONDITIONS: 68.5 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 81A
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 2 (above C15)

Rol 3

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 59.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	70.7	59.8	10.9	259
SOUTH	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	50.0	59.8	-9.8	-279
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	74.6	59.8	14.8	895
EAST	E. Attic 3, 8" CI	9.08	4.00	36.3	0.500	60.4	59.8	0.6	11
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	74.6	59.8	14.8	137
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	64.1	59.8	4.3	252
ROOF	27", uninsulated (winter)	13.29	6.04	80.3	0.340	13.0	59.8	-46.8	-1,277
						TOTAL TRANSMISSION LOAD =			-2

CALCULATED ROOM CONDITIONS: 59.8 °F dry bulb

ROOM NO. N/A

ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 60.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	59.8	60.4	-0.6	-11
SOUTH	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	50.0	60.4	-10.4	-453
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	74.6	60.4	14.2	1,314
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	74.6	60.4	14.2	223
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	64.4	60.4	4.0	237
ROOF	27", uninsulated (winter)	4.00	20.33	81.3	0.340	13.0	60.4	-47.4	-1,311
						TOTAL TRANSMISSION LOAD =			0

CALCULATED ROOM CONDITIONS: 60.4 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 82
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)

ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 30
pg. 91

R013

Design air flow: 21650 cfm

Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air

Steady State Temperature: 75.3 °F Design Room Temperature: 75 °F Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	65.8	75.3	-9.4	-275
WEST	Door C56	7.17	4.50	32.3	0.448	65.8	75.3	-9.4	-136
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	74.1	75.3	-1.1	-86
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	76.9	75.3	1.7	68
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	64.5	75.3	-20.8	-872
SOUTH	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	50.0	75.3	-25.3	-8,980
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	75.0	75.3	-0.3	-16
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	75.0	75.3	-0.3	-8
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	75.0	75.3	-0.3	-28
NORTH	Door C49	6.50	3.00	19.5	0.448	75.0	75.3	-0.3	-2
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	75.0	75.3	-0.3	-8
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	75.0	75.3	-0.3	-12
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	75.0	75.3	-0.3	-15
NORTH	Door C50	6.50	3.00	19.5	0.448	75.0	75.3	-0.3	-2
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	64.1	75.3	-11.2	-97
EAST	Door C55	7.17	4.50	32.3	0.448	64.1	75.3	-11.2	-161
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	59.8	75.3	-15.5	-53
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	74.6	75.3	-0.6	-93
FLOOR	729.0' -C1, 8" CRP (Dn)	42.00	150.70	6329.4	0.270	60.0	75.3	-15.3	-26,081
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	-36,838

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Luminious ceiling panel (plastic)

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :							=	172,362
TOTAL ROOM SENSIBLE LOAD:								**135,523**
	CFM					Ts	Tr	
Transfer - Air (C 13) - pg. 30 & 83	2727	X	1.08	X	1.1	74.6	75.3	-1,976
Transfer - Air (West Attic 1) - pg. 30 & 90	143	X	1.08	X	1.1	54.5	75.3	-3,525
NET ROOM SENSIBLE LOAD:								**130,022**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	130,022 / (1.08 x 1.1 x		21,650)	=	75.3 °F

CALCULATED ROOM CONDITIONS: 75 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 83
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)

ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 30
pg. 91
pg. 24

R013

Design air flow: 7490 cfm

Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air

ΔT Duct Heater: 8.7 °F (100% capacity)

Duct Heater Supply: 78.9 °F

Steady State Temperature: 74.6 °F Design Room Temperature: 75°F

Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	75.3	74.6	0.6	93
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	70.7	74.6	-3.9	-460
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	60.4	74.6	-14.2	-223
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	59.8	74.6	-14.8	-137
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	64.4	74.6	-10.2	-245
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	68.8	74.6	-5.9	-775
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	64.1	74.6	-10.5	-343
SOUTH	Door C52	7.17	7.00	50.2	0.448	64.1	74.6	-10.5	-237
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	59.8	74.6	-14.8	-895
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	60.4	74.6	-14.2	-1,314
SOUTH(Second tier)	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	50.0	74.6	-24.6	-1,269
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	75.0	74.6	0.4	87
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	75.5	74.6	0.9	57
EAST	Door C63	7.17	3.00	21.5	0.448	75.5	74.6	0.9	9
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	75.3	74.6	0.7	37
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	64.4	74.6	-10.2	-94
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	68.5	74.6	-6.1	-919
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	74.6	74.6	0.0	0
FLOOR	729.0' - C1, 8" TC (Dn)	32.63	38.13	1244.2	0.395	60.0	74.6	-14.6	-7,195
FLOOR	729.0' - C1, 8" TC (Dn)	2.32	13.29	30.8	0.395	60.0	74.6	-14.6	-178
FLOOR	708.0' - T1, 18" TC (Dn)	32.63	19.53	637.3	0.300	50.0	74.6	-24.6	-4,711
FLOOR (Sec. tier)**	C16 (Area above) (Up)			179.7	0.538	75.5	74.6	0.9	87
FLOOR (Sec. tier)**	C18 (Area above) (Up)			113.2	0.538	75.3	74.6	0.7	43
FLOOR (Sec. tier)**	C19 (Near C16) (Dn)			54.0	0.403	68.8	74.6	-5.9	-128
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Dn)			282.2	0.351	68.8	74.6	-5.9	-583
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Dn)			26.3	0.351	64.4	74.6	-10.2	-95
ROOF	27", uninsulated (winter)			2541.4	0.340	13.0	74.6	-61.6	-53,261
							TOTAL TRANSMISSION LOAD =		-72,651

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

** Ceiling for this room is 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 34,697

TOTAL ROOM SENSIBLE LOAD: **-37,954**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	78.9	-37,954	/ (1.08 x 1.1 x	7,490	) =	74.6 °F

CALCULATED ROOM CONDITIONS: **74.6 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 84
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)

ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 30
pg. 91
pg. 24

R013

Design air flow: 1,840 cfm

Supply Air Temp: 70.2 °F

ΔT Duct Heater: 10.5 °F (Estimated; < 15.6°F calculated)

Duct Heater Supply: 80.7 °F

Steady State Temperature: 74.6 °F

							Thermostat setting @ 75°F		
WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	68.8	74.6	-5.9	-70
WEST	Door C51	6.80	3.92	26.7	0.448	68.8	74.6	-5.9	-70
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	75.5	74.6	0.9	69
WEST	Door C62	7.17	3.00	21.5	0.448	75.5	74.6	0.9	9
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	75.3	74.6	0.7	34
WEST	Window	4.00	3.30	13.2	0.810	75.3	74.6	0.7	7
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	74.6	74.6	0.0	0
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	50.0	74.6	-24.6	-977
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	74.6	-61.6	-2,775
EAST	36" CE	10.00	42.00	420.0	0.268	13.0	74.6	-61.6	-6,938
FLOOR	708 - T1, 18" CRP (Dn)	16.80	42.00	705.6	0.222	50.0	74.6	-24.6	-3,860
CEILING	E. Attic 1 (Ac. tile) (Up)	16.80	42.00	705.6	0.415	68.5	74.6	-6.1	-1,786
					TOTAL TRANSMISSION LOAD =				-16,358

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :							=	2,241
TOTAL ROOM SENSIBLE LOAD:								**-14,116**
	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 30 & 87	740	X	1.08	X	1.1	75.5	-74.6	791
NET ROOM SENSIBLE LOAD								**-13,325**

	CFM						ΔT Duct Heater	
DUCT HEATER:	1,840	X	1.08	X	1.1	X	10.5	22,952

DUCT HEATER NOMINAL CAPACITY: 10.0 Kw

DUCT HEATER CALCULATED CAPACITY: 6.7 Kw

HEATER % OPERATION: 67 %

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	80.7	-13,325	/ (1.08 x 1.1 x	1,840)	=	74.6 °F

CALCULATED ROOM CONDITIONS: **74.6 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 85
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)

ROOM NAME: CORRIDOR

R013

Reference
pg. 30

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 64.1 °F Design Room Temperature: 65°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	75.3	64.1	11.2	97
WEST	Door C55	7.17	4.50	32.3	0.448	75.3	64.1	11.2	161
SOUTH*	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	50.0	64.1	-14.1	-290
SOUTH	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	50.0	64.1	-14.1	-179
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	74.6	64.1	10.5	343
NORTH	Door C52	7.17	7.00	50.2	0.448	74.6	64.1	10.5	237
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	64.4	64.1	0.3	1
EAST	Door C53	7.17	6.04	43.3	0.448	64.4	64.1	0.3	6
FLOOR	729.0' - C1, 8" TC (Dn)	13.29	6.04	80.3	0.395	60.0	64.1	-4.1	-130
CEILING	E. Attic 2 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	59.8	64.1	-4.3	-252
						TOTAL TRANSMISSION LOAD =			-6

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 0

TOTAL ROOM SENSIBLE LOAD: -6

CALCULATED ROOM CONDITIONS: 64.1 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 86
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: M C R RETURN AIR PLENUM

R013

Reference
pg. 30
pg. 82

Design air flow: 24,520 cfm (Transfer from room C12)

Supply Air Temp: 75.3 °F @ 0.0085 lbW/lb dry air (Transfer from room C12)

Steady State Temperature: 70.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH	T1 - 36" CI	7.75	150.70	1167.9	0.236	50.0	70.7	-20.7	-5,717
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	75.0	70.7	4.3	208
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	75.0	70.7	4.3	109
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	75.0	70.7	4.3	374
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	75.0	70.7	4.3	109
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	75.0	70.7	4.3	156
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	75.0	70.7	4.3	218
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	74.6	70.7	3.9	460
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	59.8	70.7	-10.9	-221
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	54.5	70.7	-16.2	-2,643
FLOOR*	C12 (Susp. ceiling)	The return air is directed from the room to the plenum.							
ROOF	27", uninsulated (winter)			6329.4	0.340	13.0	70.7	-57.7	-124,256
					TOTAL TRANSMISSION LOAD =				-131,203

(*) Luminious ceiling panel (plastic)

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	75.3	-131,203	/ (1.08 x 1.1 x	24,520)	=	70.7 °F

CALCULATED ROOM CONDITIONS:	70.7 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 87
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

7.3 HEATING LOAD - NORMAL OPERATION

Reference
pg. 30
pg. 91
pg. 83

R013

Design air flow: 380 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 8.7 °F
Duct Heater Supply: 78.9 °F
Steady State Temperature: 75.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	74.6	75.5	-0.9	-57
WEST	Door C63	7.17	3.00	21.5	0.448	74.6	75.5	-0.9	-9
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	68.8	75.5	-6.8	-82
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	68.8	75.5	-6.8	-224
SOUTH	Door C57	7.17	3.00	21.5	0.448	68.8	75.5	-6.8	-65
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	75.3	75.5	-0.2	-4
NORTH	Door C64	7.17	2.67	19.1	0.448	75.3	75.5	-0.2	-2
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	74.6	75.5	-0.9	-69
EAST	Door C62	7.17	3.00	21.5	0.448	74.6	75.5	-0.9	-9
FLOOR	708' - T1, 18" CRP (Dn)	21.50	8.36	179.7	0.222	50.0	75.5	-25.5	-1,019
CEILING**	C13 (Second tier) (Up)	21.50	8.36	179.7	0.538	74.6	75.5	-0.9	-87
					TOTAL TRANSMISSION LOAD =				-1,627

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 108
TOTAL ROOM SENSIBLE LOAD: **-1,519**

	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 30 & 88	360	X	1.08	X	1.1	75.3	-75.5	-86
NET ROOM SENSIBLE LOAD								**-1,604**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	78.9	-1,519 / (1.08 x 1.1 x		380	) =	75.5 °F

CALCULATED ROOM CONDITIONS: **75.5 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 88
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C18
ROOM NAME: NRC OFFICES

7.3 HEATING LOAD - NORMAL OPERATION
(Ref. 5.1.1, 5.1.6, 5.1.10)

Reference
pg. 30
pg. 91
pg. 83

0013

Design air flow: 360 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 8.7 °F
Duct Heater Supply: 78.9 °F
Steady State Temperature: 75.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	74.6	75.3	-0.7	-37
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	75.5	75.3	0.2	4
SOUTH	Door C64	7.17	2.67	19.1	0.448	75.5	75.3	0.2	2
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	75.0	75.3	-0.3	-6
NORTH	36" CE	8.67	5.88	51.0	0.262	13.0	75.3	-62.3	-833
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	74.6	75.3	-0.7	-34
EAST	Window	4.00	3.30	13.2	0.820	74.6	75.3	-0.7	-8
FLOOR	708.0' - T1, 18" CRP (Dn)	13.54	8.36	113.2	0.222	50.0	75.3	-25.3	-637
CEILING**	C13 (Second tier) (Up)	13.54	8.36	113.2	0.538	74.6	75.3	-0.7	-43
					TOTAL TRANSMISSION LOAD =				-1,591

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	67
TOTAL ROOM SENSIBLE LOAD:		**-1,523**

ROOM TEMPERATURE (Tr) = Ts 78.9 − Q -1,523 / (1.08 x 1.1 x CFM 360) = 75.3 °F

CALCULATED ROOM CONDITIONS: 75.3 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 89
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

7.3 HEATING LOAD - NORMAL OPERATION

Rev 013

Reference
pg. 30
pg. 91

Design air flow: 260 cfm
Supply Air Temp: 70.2 °F

Steady State Temperature: 68.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	64.4	68.8	-4.3	-65
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	64.4	68.8	-4.3	-33
WEST	Door C60	7.17	3.00	21.5	0.448	64.4	68.8	-4.3	-42
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	68.8	5.9	141
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	74.6	68.8	5.9	775
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	75.5	68.8	6.8	157
NORTH	Door C57	7.17	3.00	21.5	0.448	75.5	68.8	6.8	65
SOUTH	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	50.0	68.8	-18.8	-1,243
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	64.4	68.8	-4.3	-269
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	75.5	68.8	6.8	82
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	74.6	68.8	5.9	70
EAST	Door C51	6.83	3.92	26.8	0.448	74.6	68.8	5.9	71
FLOOR	729.0' - C1, 8" TC (Dn)	4.39	15.77	69.2	0.395	60.0	68.8	-8.8	-239
FLOOR	708.0' - T1, 18" TC (Dn)	9.00	6.00	54.0	0.300	50.0	68.8	-18.8	-304
FLOOR	708.0' - T1, 18" TC (Dn)	23.40	9.10	212.9	0.300	50.0	68.8	-18.8	-1,198
CEILING (Sec. tier)**	C13 (Near C16) (Dn)	9.00	6.00	54.0	0.403	74.6	68.8	5.9	128
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	23.40	9.10	212.9	0.351	74.6	68.8	5.9	440
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	4.39	15.77	69.2	0.351	74.6	68.8	5.9	143
					TOTAL TRANSMISSION LOAD =				-1,319

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 880

TOTAL ROOM SENSIBLE LOAD: -440

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	-440 / (1.08 x 1.1 x		260	) =	68.8 °F

CALCULATED ROOM CONDITIONS: 68.8 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 90
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

013

Reference
pg. 30

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 54.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	50.0	54.5	-4.5	-228
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	50.1	54.5	-4.4	-441
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	51.6	54.5	-2.9	-135
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	60.5	54.5	6.0	1,592
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	50.1	54.5	-4.4	-100
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	75.0	54.5	20.5	2,014
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	70.7	54.5	16.2	2,643
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	75.3	54.5	20.8	872
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	65.8	54.5	11.3	2,796
FLOOR	755.0' - C4, 5/8" GB (Up)			412.2	0.427	70.9	54.5	16.4	2,887
FLOOR	755.0' - C5, 5/8" GB (Up)			137.9	0.427	79.4	54.5	24.9	1,466
FLOOR	755.0 - C6, 5/8" GB (Up)			165.2	0.427	75.6	54.5	21.1	1,485
FLOOR	755.0 - C9, 3/4" PL (Up)			167.5	0.730	76.9	54.5	22.4	2,744
FLOOR	755.0'-C10, 3/4" PL (Up)			323.3	0.730	74.1	54.5	19.6	4,635
ROOF	27" (uninsulated) (winter)	37.33	42.70	1594.0	0.340	13.0	54.5	-41.5	-22,491
ROOF	27" (uninsulated) (winter)	4.67	9.53	44.5	0.340	13.0	54.5	-41.5	-628
ROOF	27" (uninsulated) (winter)	4.67	11.12	51.9	0.340	13.0	54.5	-41.5	-733
					TOTAL TRANSMISSION LOAD =				-1,623

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.

	CFM					Ts	(-Tr)	
Transfer - Air (C3) - pg 30 & 74	90	X	1.08	X	1.1	65.8	-54.5	1,212
Transfer - Air (C1) - pg. 30 & 72	53	X	1.08	X	1.1	60.5	-54.5	375
NET ROOM SENSIBLE LOAD:								-35

CALCULATED ROOM CONDITIONS:	54.5 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 90A
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 2 (above C2)

R013

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 51.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	60.6	51.6	8.9	173
SOUTH	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	50.0	51.6	-1.6	-35
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	54.5	51.6	2.9	135
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	50.1	51.6	-1.5	-29
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	63.4	51.6	11.8	252
ROOF	27", uninsulated (winter)	9.53	4.00	38.1	0.340	13.0	51.6	-38.6	-500
							TOTAL TRANSMISSION LOAD =		-5

CALCULATED ROOM CONDITIONS: 51.6 °F dry bulb

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 50.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	51.6	50.1	1.5	29
SOUTH	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	50.0	50.1	-0.1	-5
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	54.5	50.1	4.4	441
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	54.5	50.1	4.4	86
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	58.3	50.1	8.2	492
ROOF	27", uninsulated (winter)	20.54	4.00	82.2	0.340	13.0	50.1	-37.1	-1,036
							TOTAL TRANSMISSION LOAD =		6

CALCULATED ROOM CONDITIONS: 50.1 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 91
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.3 HEATING LOAD - NORMAL OPERATION**

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR			
	FLOW (cfm) (pg.30, Diagram 2)	TEMPERATURE (°F)	Ref. page	cfm X °F
EAST ATTIC 1	2,580	68.5	81	176,833
CORRIDOR (C 19)	260	68.8	89	17,875
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	74.6	84	355,547
SHIFT ENGINEERS OFFICE (C10)	10	74.1	80	741
CONFERENCE ROOM (C 9)	270	76.9	89	20,774
MCR RETURN AIR PLENUM	24,520	70.7	86	1,734,510
TOTAL	Vreturn = **32,403**			**2,306,280**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / SUM (cfm) = (Treturn)= **71.2 °F**

Outside Air Flow	Voa =	3,597 cfm	(pg. 30, Diagram 2)
Outside Air Temperature	Toa =	13 °F	(Section 6.1)
Heater Discharge Temperature	Toah =	60 °F (Set point)	

RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT (Te) :

Te = (Vreturn x Treturn + Voa x Toah) / (Voa + Vreturn) = **70.1 °F DB**

Δ T fan =	4.0 °F (AHU Fan Heat Gain @ pg.23)
Estimated air temp. entering the fan Tes(1) =	**66.2 °F** (minimum temperature to meet 75 °F thermostat setting)
Ts(2) =	**70.2 °F** (Supply Air Temperature at Fan Discharge)

If (Te + Δ T fan) = Ts: 100 % coil bypass is required

If (Te + Δ T fan) > Ts: % bypass = (Tes - 50.8*) / (Te - 50.8*)

(Te + Δ T fan) = **74.1 °F** > Ts = **70.2 °F**

% bypass = 80.0 %

Percent of the returning air going through the coil face damper and cooling to 50.8°F:	**20.0 %**
Percent of the remaining returning air going through the coil bypass damper :	**80.0 %**

*50.8 °F is a temperature of air leaving cooling coil (T_{COIL}); see pg. 29.

NOTES:

(1) This temperature is also identified as T_{MIX} on AHU schematic (pg. 29).

(2) This temperature is also identified as T_{AHU} on AHU schematic (pg. 29).

(3) For normal heating mode consider W_{AHU} to be @ the same humidity level 0.0085 # moisture / # dry air (see pg. 29A).

R013

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 92
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)

ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 31
pg. 111

R013

Design air flow: 2,825 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 59.7 °F Design Room Temperature: 63°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	36" CE	17.75	42.00	745.5	0.268	13.0	59.7	-46.7	-9,338
SOUTH***	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	40.0	59.7	-19.7	-3,237
NORTH	36" CE	17.75	23.50	417.1	0.268	13.0	59.7	-46.7	-5,225
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	75.0	59.7	15.3	1,000
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	52.9	59.7	-6.8	-109
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	62.1	59.7	2.4	12
EAST	Door C39	7.17	6.00	43.0	0.448	62.1	59.7	2.4	45
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	64.8	59.7	5.1	599
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	56.3	59.7	-3.4	-920
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	48.7	59.7	-11.0	-215
FLOOR***	708.0' - T1, 18" C (Dn)	39.14	42.00	1643.9	0.305	50.0	59.7	-9.7	-4,883
ROOF	27", uninsulated (winter)	39.14	42.00	1643.9	0.340	13.0	59.7	-46.7	-26,124
						TOTAL TRANSMISSION LOAD =			-48,395

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative
(***) Use normal minimum temperature to remove conservatism postulated in Assumprion 4.1.6.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :						=	13,453
TOTAL ROOM SENSIBLE LOAD:							**-34,942**
TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(W. Attic 1) - pg. 31 & 110	1,175	X	1.188	56.3	59.7	-3.4	-4,802
NET ROOM SENSIBLE LOAD:							**-39,744**

ROOM TEMPERATURE (Tr) = Ts 71.5 − Q -39,744 / (1.08 x 1.1 x CFM 2,825) = 59.7 °F

CALCULATED ROOM CONDITIONS: 59.7 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 93
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.)
ROOM NO. 755.0-C2
ROOM NAME: WOMEN'S TOILET

7.4 HEATING LOAD - LOCA
(Ref. 5.1.1, 5.1.4 & 5.5.1)

Reference
pg. 31

Rol 3

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 52.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	59.7	52.9	6.8	109
SOUTH**	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	40.0	52.9	-12.9	-232
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	62.1	52.9	9.2	252
NORTH	Door C38	7.17	3.00	21.5	0.448	62.1	52.9	9.2	89
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	53.4	52.9	0.5	8
FLOOR**	708.0' - T1, 18" TC (Dn)	9.53	4.00	38.1	0.300	40.0	52.9	-12.9	-148
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	48.7	52.9	-4.2	-90
					TOTAL TRANSMISSION LOAD =				-12

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-12**

CALCULATED ROOM CONDITIONS: 52.9 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 94
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: CORRIDOR

R13

Reference
pg. 31

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 62.1 °F Design Room Temperature: 57°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	52.9	62.1	-9.2	-252
SOUTH	Door C38	7.17	3.00	21.5	0.448	52.9	62.1	-9.2	-89
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	53.4	62.1	-8.7	-621
SOUTH	Door C37	7.17	3.00	21.5	0.448	53.4	62.1	-8.7	-84
SOUTH* ***	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	40.0	62.1	-22.1	-332
SOUTH***	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	40.0	62.1	-22.1	-285
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	64.8	62.1	2.7	113
NORTH	Door C40	7.17	3.00	21.5	0.448	64.8	62.1	2.7	26
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	65.8	62.1	3.7	145
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	65.8	62.1	3.7	73
NORTH	Door C46	7.17	3.00	21.5	0.448	65.8	62.1	3.7	35
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	64.4	62.1	2.2	62
NORTH	Door C42	7.17	3.00	21.5	0.448	64.4	62.1	2.2	22
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	75.3	62.1	13.2	384
EAST	Door C56	7.17	4.50	32.3	0.448	75.3	62.1	13.2	190
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	59.7	62.1	-2.4	-12
WEST	Door C39	7.17	6.00	43.0	0.448	59.7	62.1	-2.4	-45
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	53.4	62.1	-8.7	-139
FLOOR***	708.0' - T1, 18" TC (Dn)	6.67	9.36	62.4	0.300	40.0	62.1	-22.1	-414
FLOOR	729.0' - C1, 8" TC (Dn)	6.67	33.21	221.5	0.395	60.0	62.1	-2.1	-184
FLOOR	729.0' - C1, 8" TC (Dn)	4.67	10.63	49.6	0.395	60.0	62.1	-2.1	-41
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	56.3	62.1	-5.8	-1,220
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	56.3	62.1	-5.8	-210
						TOTAL TRANSMISSION LOAD =			-2,877

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Ceiling raised to el. 763'-8". (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :						=	0
TOTAL ROOM SENSIBLE LOAD:							**-2,877**
TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(ROOM C4) - pg. 31 & 95	440	X	1.188	64.8	62.1	2.7	1,432
(ROOM C5) - pg. 31 & 96	155	X	1.188	64.4	62.1	2.2	414
(ROOM C10) - pg. 31 & 100	220	X	1.188	65.8	62.1	3.7	954
NET ROOM SENSIBLE LOAD:							**-76**

CALCULATED ROOM CONDITIONS: 62.1 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 95
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: KITCHEN

Reference
pg. 31
pg. 111

Rev 13

Design air flow: 440 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 64.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	59.7	64.8	-5.1	-599
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	62.1	64.8	-2.7	-113
SOUTH	Door C40	7.17	3.00	21.5	0.448	62.1	64.8	-2.7	-26
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	64.4	64.8	-0.5	-24
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	63.8	64.8	-1.0	-58
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	75.0	64.8	10.2	269
FLOOR**	708.0' - T1, 18" TC (Dn)	8.70	13.38	116.4	0.300	40.0	64.8	-24.8	-867
FLOOR	729.0' - C1, 8" TC (Dn)			295.8	0.395	60.0	64.8	-4.8	-566
CEILING	W. Attic 1 - 5/8" GB (Up)	29.38	14.03	412.2	0.427	56.3	64.8	-8.5	-1,503
					TOTAL TRANSMISSION LOAD =				-3,488

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-3,488**

ROOM TEMPERATURE (Tr) = Ts / (Q / (1.08 x 1.1 x CFM)) = 71.5 / (-3,488 / (1.08 x 1.1 x 440)) = 64.8 °F

CALCULATED ROOM CONDITIONS: 64.8 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 96
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: MEN'S TOILET

R013

Reference
pg. 31
pg. 111

Design air flow: 90 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 64.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	64.8	64.4	0.5	24
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	62.1	64.4	-2.2	-62
SOUTH	Door C42	7.17	3.00	21.5	0.448	62.1	64.4	-2.2	-22
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	63.8	64.4	-0.5	-14
NORTH	Door C45	7.17	3.00	21.5	0.448	63.8	64.4	-0.5	-5
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	65.8	64.4	1.4	68
FLOOR	729.0' - C1, 8" TC (Dn)	10.31	13.38	137.9	0.395	60.0	64.4	-4.3	-237
CEILING	W. Attic 1 - 5/8" GB (Up)	10.31	13.38	137.9	0.427	56.3	64.4	-8.1	-474
						TOTAL TRANSMISSION LOAD =			-722

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :						=	0
TOTAL ROOM SENSIBLE LOAD:							**-722**
TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(Room C6) - pg. 31 & 97	65	X	1.188	63.8	64.4	-0.5	-39
NET ROOM SENSIBLE LOAD:							**-762**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-762 / (1.08 x 1.1 x		90	) =	64.4 °F

CALCULATED ROOM CONDITIONS: 64.4 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 97
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)

ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 31
pg. 111

R013

Design air flow: 65 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 63.8 °F Design Room Temperature: 58°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	64.4	63.8	0.5	14
SOUTH	Door C45	7.17	3.00	21.5	0.448	64.4	63.8	0.5	5
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	75.0	63.8	11.2	217
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	67.4	63.8	3.5	128
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	65.8	63.8	1.9	37
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	59.7	63.8	-4.1	-263
FLOOR	729.0' - C1, 18" TC (Dn)	16.02	8.70	139.4	0.300	60.0	63.8	-3.8	-161
FLOOR	729.0' - C1, 8" TC (Dn)			25.8	0.395	60.0	63.8	-3.8	-39
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	56.3	63.8	-7.5	-532
					TOTAL TRANSMISSION LOAD =				-593

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 0

TOTAL ROOM SENSIBLE LOAD: **-593**

ROOM TEMPERATURE (Tr) = Ts / Q / CFM

71.5 -593 / (1.08 x 1.1 x 65) = 63.8 °F

CALCULATED ROOM CONDITIONS: 63.8 °F dry bulb

This page replaced by Revision 013

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL
Design air flow: - cfm
Steady State Temperature: 53.4 °F

Reference
pg. 31

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	52.9	53.4	-0.5	-8
SOUTH**	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	40.0	53.4	-13.4	-520
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	62.1	53.4	8.7	621
NORTH	Door C37	7.17	3.00	21.5	0.448	62.1	53.4	8.7	84
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	62.1	53.4	8.7	139
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	47.9	53.4	-5.5	-330
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-13

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 53.4 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL
Design air flow: - cfm
Steady State Temperature: 58.0 °F

Reference
pg. 31

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	59.0	58.0	1.0	15
WEST	Door C53	7.17	3.00	21.5	0.448	59.0	58.0	1.0	10
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	68.2	58.0	10.2	94
SOUTH**	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	40.0	58.0	-18.0	-749
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	63.5	58.0	5.5	340
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	68.2	58.0	10.2	245
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	63.5	58.0	5.5	82
EAST*	755.0' - C19, 8" RMW	8.00	4.39	13.6	0.455	63.5	58.0	5.5	34
EAST	Door C60	7.17	3.00	21.5	0.448	63.5	58.0	5.5	53
CEILING	E.Attic 3 - 3/4" PL, (Up)	4.00	20.33	81.3	0.730	54.2	58.0	-3.8	-226
CEILING	C13 (1/2" & 5/8" GB) (Dn)	4.39	6.00	26.3	0.351	68.2	58.0	10.2	95
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-7

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 58.0 °F dry bulb

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 99
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C9 (Ref. 5.1.4)

ROOM NAME: CONFERENCE ROOM

Reference
pg. 31
pg. 111

R013

Design air flow: 270 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 67.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	63.8	67.4	-3.5	-128
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	65.8	67.4	-1.6	-82
SOUTH	Door C48	7.17	3.00	21.5	0.448	65.8	67.4	-1.6	-15
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	75.0	67.4	7.7	272
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	75.3	67.4	7.9	317
FLOOR	729.0' - C1, 8" CRP (Dn)	10.03	16.70	167.5	0.270	60.0	67.4	-7.3	-332
CEILING	W. Attic 1 - 3/4" PL (Up)	10.03	16.70	167.5	0.730	56.3	67.4	-11.1	-1,351
						TOTAL TRANSMISSION LOAD =			-1,320

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-1,320**

	Ts	Q		CFM			
ROOM TEMPERATURE (Tr) =	71.5	-1,320	/ (1.08 x 1.1 x	270	)	=	67.4 °F

CALCULATED ROOM CONDITIONS: 67.4 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 100
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

R013

Reference
pg. 31
pg. 111

Design air flow: 330 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 65.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	64.4	65.8	-1.4	-68
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	63.8	65.8	-1.9	-37
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	62.1	65.8	-3.7	-145
SOUTH	Door C46	7.17	3.00	21.5	0.448	62.1	65.8	-3.7	-35
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	62.1	65.8	-3.7	-73
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	67.4	65.8	1.6	82
NORTH	Door C48	7.17	3.00	21.5	0.448	67.4	65.8	1.6	15
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	75.3	65.8	9.5	736
FLOOR	729.0' - C1, 8" CRP (Dn)	16.70	19.36	323.3	0.270	60.0	65.8	-5.8	-502
CEILING	W. Attic 1 - 3/4" PL (Up)	16.70	19.36	323.3	0.730	56.3	65.8	-9.5	-2,230
						TOTAL TRANSMISSION LOAD =			-2,258

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-2,258**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-2,258	/ (1.08 x 1.1 x	330	) =	65.7 °F

CALCULATED ROOM CONDITIONS: **65.8 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 101
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 31
pg. 104

Rev 13

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 66.2 °F (Transfer from room C14)
Steady State Temperature: 60.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	68.2	60.9	7.4	1,114
EAST	36" CE	7.75	42.00	325.5	0.268	13.0	60.9	-47.9	-4,174
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	60.9	-47.9	-2,154
SOUTH*	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	40.0	60.9	-20.9	-827
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	66.2	60.9	5.3	1,552
ROOF	27", uninsulated (winter)	16.80	42.00	705.6	0.340	13.0	60.9	-47.9	-11,479
						TOTAL TRANSMISSION LOAD =			-15,969

(*) See Assumption 4.1.6

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	66.2	-15,969	/ (1.08 x 1.1 x	2580	) =	60.9 °F

CALCULATED ROOM CONDITIONS: 60.9 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 101A
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: EAST ATTIC 2 (above C15)

Rev 3

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 54.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	70.6	54.7	15.9	375
SOUTH*	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	40.0	54.7	-14.7	-416
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	68.2	54.7	13.5	817
EAST	E. Attic 3, 8"CI	9.08	4.00	36.3	0.500	54.2	54.7	-0.5	-9
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	68.2	54.7	13.5	125
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	59.0	54.7	4.3	252
ROOF	27", uninsulated (winter)	13.29	6.04	80.3	0.340	13.0	54.7	-41.7	-1,138
					TOTAL TRANSMISSION LOAD =				3

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 54.7 °F dry bulb

ROOM NO. N/A

ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 54.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	54.7	54.2	0.5	9
SOUTH*	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	40.0	54.2	-14.2	-619
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	68.2	54.2	14.0	1,296
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	68.2	54.2	14.0	220
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	58.0	54.2	3.8	226
ROOF	27", uninsulated (winter)	4.00	20.33	81.3	0.340	13.0	54.2	-41.2	-1,139
					TOTAL TRANSMISSION LOAD =				-7

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 54.2 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 102
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)

ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 31
pg. 111

Design air flow: 21650 cfm

Supply Air Temp: 71.5 °F

Steady State Temperature: 75.3 °F Design Room Temperature: 75 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	62.1	75.3	-13.2	-384
WEST	Door C56	7.17	4.50	32.3	0.448	62.1	75.3	-13.2	-190
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	65.8	75.3	-9.5	-736
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	67.4	75.3	-7.9	-317
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	56.3	75.3	-19.0	-796
SOUTH***	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	40.0	75.3	-35.3	-12,537
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	75.0	75.3	-0.25	-16
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	75.0	75.3	-0.25	-8
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	75.0	75.3	-0.25	-28
NORTH	Door C49	6.50	3.00	19.5	0.448	75.0	75.3	-0.25	-2
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	75.0	75.3	-0.25	-8
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	75.0	75.3	-0.25	-12
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	75.0	75.3	-0.25	-15
NORTH	Door C50	6.50	3.00	19.5	0.448	75.0	75.3	-0.25	-2
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	59.0	75.3	-16.3	-141
EAST	Door C55	7.17	4.50	32.3	0.448	59.0	75.3	-16.3	-235
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	54.7	75.3	-20.6	-71
EAST	755.0' - C13, 12" CI	10.00	35.28	352.9	0.431	68.2	75.3	-7.0	-1,066
FLOOR	729.0' -C1, 8" CRP (Dn)	42.00	150.70	6329.4	0.270	60.0	75.3	-15.3	-26,061
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	-42,626

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Luminious ceiling panel (plastic) (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :							=	172,362
TOTAL ROOM SENSIBLE LOAD:								**129,735**
	CFM					Ts	(-Tr)	
Transfer - Air (C 13) - pg. 31 & 103	2727	X	1.08	X	1.1	68.2	-75.3	-22,706
NET ROOM SENSIBLE LOAD:								**107,029**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	107,029 / (1.08 x 1.1 x		24,017	) =	75.3 °F

CALCULATED ROOM CONDITIONS: **75.3 °F dry bulb**

2013

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 103
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)

ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 31
pg. 111

Rev 13

Design air flow: 7490 cfm

Supply Air Temp: 71.5 °F

Steady State Temperature: 68.2 °F Design Room Temperature: 67°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	75.3	68.2	7.0	1,066
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	70.6	68.2	2.3	272
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	54.2	68.2	-14.0	-220
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	54.7	68.2	-13.5	-125
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	58.0	68.2	-10.2	-245
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	63.5	68.2	-4.7	-624
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	59.0	68.2	-9.2	-300
SOUTH	Door C52	7.17	7.00	50.2	0.448	59.0	68.2	-9.2	-208
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	54.7	68.2	-13.5	-817
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	54.2	68.2	-14.0	-1,296
SOUTH(Sec. tier)***	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	40.0	68.2	-28.2	-1,455
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	75.0	68.2	6.8	1,633
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	68.1	68.2	-0.1	-6
EAST	Door C63	7.17	3.00	21.5	0.448	68.1	68.2	-0.1	-1
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	68.2	68.2	-0.1	-5
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	58.0	68.2	-10.2	-94
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	60.9	68.2	-7.4	-1,114
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	66.2	68.2	-2.1	-54
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	60.0	68.2	-8.2	-5,372
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	60.0	68.2	-8.2	-133
FLOOR***	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	40.0	68.2	-28.2	-6,641
FLOOR (Sec. tier)**	C16 (Area above) (Up)			179.7	0.538	68.1	68.2	-0.1	-10
FLOOR (Sec. tier)**	C18 (Area above) (Up)			113.2	0.538	68.2	68.2	-0.1	-5
FLOOR (Sec. tier)**	C19 (Near C16) (Dn)			54.0	0.403	63.5	68.2	-4.7	-103
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Dn)			282.2	0.351	63.5	68.2	-4.7	-466
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Dn)			26.3	0.351	58.0	68.2	-10.2	-95
ROOF	27", uninsulated (winter)			2541.4	0.340	13.0	68.2	-55.2	-47,731
							TOTAL TRANSMISSION LOAD =		-64,151

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) Ceiling for this room is 8" concrete slab (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 34,697

TOTAL ROOM SENSIBLE LOAD: **-29,455**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-29,455 / (1.08	x 1.1 x	7,490	) =	68.2 °F

CALCULATED ROOM CONDITIONS: **68.2 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 104
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)

ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 31
pg. 111

R013

Design air flow: 1,840 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 66.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	63.5	66.2	-2.7	-31
WEST	Door C51	6.80	3.92	26.7	0.448	63.5	66.2	-2.7	-32
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	68.1	66.2	2.0	152
WEST	Door C62	7.17	3.00	21.5	0.448	68.1	66.2	2.0	19
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	68.2	66.2	2.0	96
WEST	Window	4.00	3.30	13.2	0.810	68.2	66.2	2.0	21
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	68.2	66.2	2.1	54
SOUTH**	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	40.0	66.2	-26.2	-1,037
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	66.2	-53.2	-2,393
EAST	36" CE	10.00	42.00	420.0	0.268	13.0	66.2	-53.2	-5,983
FLOOR**	708 - T1, 18" CRP (Dn)	16.80	42.00	705.6	0.222	40.0	66.2	-26.2	-4,096
CEILING	E. Attic 1 (Ac. tile) (Up)	16.80	42.00	705.6	0.415	60.9	66.2	-5.3	-1,552
					TOTAL TRANSMISSION LOAD =				-14,781

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :							=	2,241
TOTAL ROOM SENSIBLE LOAD:								**-12,539**
	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 31 & 107	360	X	1.08	X	1.1	68.2	-66.2	855
NET ROOM SENSIBLE LOAD								**-11,684**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-11,684 / (1.08 x 1.1 x		1,840	) =	66.2 °F

CALCULATED ROOM CONDITIONS:	66.2 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 105
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)

ROOM NAME: CORRIDOR

Reference
pg. 31

Rev 13

Design air flow: - cfm

Supply Air Temp: - °F

Steady State Temperature: 59.0 °F Design Room Temperature: 58°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	75.3	59.0	16.3	141
WEST	Door C55	7.17	4.50	32.3	0.448	75.3	59.0	16.3	235
SOUTH* **	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	40.0	59.0	-19.0	-391
SOUTH**	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	40.0	59.0	-19.0	-241
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	68.2	59.0	9.2	300
NORTH	Door C52	7.17	7.00	50.2	0.448	68.2	59.0	9.2	208
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	58.0	59.0	-1.0	-5
EAST	Door C53	7.17	6.04	43.3	0.448	58.0	59.0	-1.0	-19
FLOOR	729.0' - C1, 8" TC (Dn)	13.29	6.04	80.3	0.395	60.0	59.0	1.0	32
CEILING	E. Attic 2 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	54.7	59.0	-4.3	-252
						TOTAL TRANSMISSION LOAD =			8

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) See Assumption 4.1.4

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**8**

CALCULATED ROOM CONDITIONS:	59.0 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 106
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: M C R RETURN AIR PLENUM

R13

Reference
pg. 31
pg. 102

Design air flow: 24017 cfm (Transfer from room C12)

Supply Air Temp: 75.3 °F (Transfer from room C12)

Steady State Temperature: 70.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH**	T1 - 36" CI	7.75	150.70	1167.9	0.236	40.0	70.6	-30.6	-8,421
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	75.0	70.6	4.5	217
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	75.0	70.6	4.5	114
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	75.0	70.6	4.5	391
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	75.0	70.6	4.5	114
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	75.0	70.6	4.5	163
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	75.0	70.6	4.5	228
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	68.2	70.6	-2.3	-272
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	54.7	70.6	-15.9	-320
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	56.3	70.6	-14.3	-2,319
FLOOR*	C12 (Susp. ceiling)	The return air is directed from the room to the plenum.							
ROOF	27", uninsulated (winter)			6329.4	0.340	13.0	70.6	-57.6	-123,847
					TOTAL TRANSMISSION LOAD =				-133,953

(*) Luminious ceiling panel (plastic)

(**) See Assumption 4.1.6

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	75.3	-133,953	/ (1.08 x 1.1 x	24,017)	=	70.6 °F

CALCULATED ROOM CONDITIONS:	70.6 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 107
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C16 and C 17

ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 31
pg. 111

R013

Design air flow: 380 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 68.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	68.2	68.1	0.1	6
WEST	Door C63	7.17	3.00	21.5	0.448	68.2	68.1	0.1	1
WEST	755.0' - C19, 8" RMW	8.67	3.03	26.3	0.455	63.6	68.1	-4.6	-55
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	63.6	68.1	-4.6	-153
SOUTH	Door C57	7.17	3.00	21.5	0.448	63.5	68.1	-4.6	-45
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	68.2	68.1	0.0	0
NORTH	Door C64	7.17	2.67	19.1	0.448	68.2	68.1	0.0	0
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	66.2	68.1	-2.0	-152
EAST	Door C62	7.17	3.00	21.5	0.448	66.2	68.1	-2.0	-19
FLOOR***	708' - T1, 18" CRP (Dn)	21.50	8.36	179.7	0.222	40.0	68.1	-28.1	-1,123
CEILING**	C13 (Second tier) (Up)	21.50	8.36	179.7	0.538	68.2	68.1	0.1	10
						TOTAL TRANSMISSION LOAD =			-1,530

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) :							=	0
TOTAL ROOM SENSIBLE LOAD:								**-1,530**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 31 & 108	360	X	1.08	X	1.1	68.2	-68.1	4
NET ROOM SENSIBLE LOAD								**-1,526**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	71.5	-1,526 / (1.08 x 1.1 x	380	) =	68.1 °F

CALCULATED ROOM CONDITIONS:	68.1 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 108
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)

ROOM NAME: NRC OFFICES

Rev 13

Reference
pg. 31
pg. 111

Design air flow: 360 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 68.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	68.2	68.2	0.1	5
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	68.1	68.2	0.0	0
SOUTH	Door C64	7.17	2.67	19.1	0.448	68.1	68.2	0.0	0
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	75.0	68.2	6.8	117
NORTH	36" CE	8.67	5.88	51.0	0.262	13.0	68.2	-55.2	-737
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	66.2	68.2	-2.0	-96
EAST	Window	4.00	3.30	13.2	0.820	66.2	68.2	-2.0	-22
FLOOR***	708.0' - T1, 18" CRP (Dn)	13.54	8.36	113.2	0.222	40.0	68.2	-28.2	-707
CEILING**	C13 (Second tier) (Up)	13.54	8.36	113.2	0.538	68.2	68.2	0.1	5
					TOTAL TRANSMISSION LOAD =				-1,435

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 0

TOTAL ROOM SENSIBLE LOAD: **-1,435**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	71.5	-1,435 / (1.08 x 1.1 x	360	) =	68.1 °F

CALCULATED ROOM CONDITIONS: **68.2 °F dry bulb**

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 109
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. 755.0-C19

ROOM NAME: CORRIDOR

Reference
pg. 31
pg. 111

R013

Design air flow: 260 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 63.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	58.0	63.5	-5.5	-82
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	58.0	63.5	-5.5	-41
WEST	Door C60	7.17	3.00	21.5	0.448	58.0	63.5	-5.5	-53
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	68.2	63.5	4.7	113
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	68.2	63.5	4.7	624
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	68.1	63.5	4.6	108
NORTH	Door C57	7.17	3.00	21.5	0.448	68.1	63.5	4.6	45
SOUTH ***	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	40.0	63.5	-23.5	-1,558
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	58.0	63.5	-5.5	-340
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	68.1	63.5	4.6	56
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	66.2	63.5	2.7	31
EAST	Door C51	6.83	3.92	26.8	0.448	66.2	63.5	2.7	32
FLOOR	729.0' - C1, 8" TC (Dn)	4.39	15.77	69.2	0.395	60.0	63.5	-3.5	-96
FLOOR^	708.0' - T1, 18" TC (Dn)	9.00	6.00	54.0	0.300	40.0	63.5	-23.5	-381
FLOOR^	708.0' - T1, 18" TC (Dn)	23.40	9.10	212.9	0.300	40.0	63.5	-23.5	-1,501
CEILING (Sec. tier)**	C13 (Near C16) (Dn)	9.00	6.00	54.0	0.403	68.2	63.5	4.7	103
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	23.40	9.10	212.9	0.351	68.2	63.5	4.7	354
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	4.39	15.77	69.2	0.351	68.2	63.5	4.7	115
					TOTAL TRANSMISSION LOAD =				-2,471

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 18A) : = 0

TOTAL ROOM SENSIBLE LOAD: **-2,471**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-2,471 / (1.08 x 1.1 x		260	) =	63.5 °F

CALCULATED ROOM CONDITIONS: **63.5 °F dry bulb**

This page replaced by Revision 013

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

R013

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 56.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)*	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	40.0	56.3	-16.3	-825
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	47.9	56.3	-8.4	-841
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	48.7	56.3	-7.6	-353
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	59.7	56.3	3.4	920
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	47.9	56.3	-8.4	-191
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	75.0	56.3	18.7	1,837
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	70.6	56.3	14.3	2,319
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	75.3	56.3	19.0	796
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	62.1	56.3	5.8	1,430
FLOOR	755.0' - C4, 5/8" GB (Up)			412.2	0.427	64.8	56.3	8.5	1,503
FLOOR	755.0' - C5, 5/8" GB (Up)			137.9	0.427	64.4	56.3	8.1	474
FLOOR	755.0 - C6, 5/8" GB (Up)			165.2	0.427	63.8	56.3	7.5	532
FLOOR	755.0 - C9, 3/4" PL (Up)			167.5	0.730	67.4	56.3	11.1	1,351
FLOOR	755.0'-C10, 3/4" PL (Up)			323.3	0.730	65.8	56.3	9.5	2,230
ROOF	27" (uninsulated) (winter)	37.33	42.70	1594.0	0.340	13.0	56.3	-43.3	-23,467
ROOF	27" (uninsulated) (winter)	4.67	9.53	44.5	0.340	13.0	56.3	-43.3	-655
ROOF	27" (uninsulated) (winter)	4.67	11.12	51.9	0.340	13.0	56.3	-43.3	-765
						TOTAL TRANSMISSION LOAD =			-13,704

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.
(*) See Assumption 4.1.6

	CFM					Ts	(-Tr)	
Transfer - Air (C 12) - pg. 31 & 101	360	X	1.08	X	1.1	75.3	-56.3	8,105
Transfer - Air (C 3) - pg. 31 & 94	815	X	1.08	X	1.1	62.1	-56.3	5,616
TOTAL ROOM SENSIBLE LOAD:								17

CALCULATED ROOM CONDITIONS:	56.3 °F dry bulb

This page replaced by Revision 013

Calculation sheet

Document: EPMLCP072489	Rev.: 013	Plant: WBN / Units 1,2	Page: 110A
Subject: Cooling and Heating Load Analysis, Main Control Room HVAC			

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 48.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	59.7	48.7	11.0	215
SOUTH*	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	40.0	48.7	-8.7	-191
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	56.3	48.7	7.6	353
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	47.9	48.7	-0.8	-16
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	52.9	48.7	4.2	90
ROOF	27" (uninsulated) (winter)	9.53	4.00	38.1	0.340	13.0	48.7	-35.7	-463
					TOTAL TRANSMISSION LOAD =				-11

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 48.7 °F dry bulb

ROOM NO. - N/A

ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 47.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	48.7	47.9	0.8	16
SOUTH*	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	40.0	47.9	-7.9	-373
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	56.3	47.9	8.4	841
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	56.3	47.9	8.4	164
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	53.4	47.9	5.5	330
ROOF	27" (uninsulated) (winter)	20.54	4.00	82.2	0.340	13.0	47.9	-34.9	-975
					TOTAL TRANSMISSION LOAD =				2

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 47.9 °F dry bulb

Rol3

This page replaced by Revision 013

7.0 CALCULATIONS (CONT.) **7.4 HEATING LOAD - LOCA**

R013

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR FLOW (cfm) (pg.31, Diagram 4)	RETURN AIR TEMPERATURE (°F)	Ref. page	cfm X °F
EAST ATTIC 1	2,580	60.9	101	156,993
CORRIDOR (C 19)	260	63.5	109	16,510
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	68.2	104	325,061
SHIFT ENGINEERS OFFICE (C10)	110	65.8	100	7,233
CONFERENCE ROOM (C 9)	270	67.4	109	18,185
MCR RETURN AIR PLENUM	24,017	70.6	106	1,694,364
TOTAL	Vreturn = **32,000**			**2,218,345**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / SUM (cfm) = (Treturn)= **69.3 °F**

Outside Air Flow (Voa) = 711 cfm (pg. 31, Diagram 4)
Outside Air Temperature (Toa) = 13 °F (Section 6.1)
Δ T pressurizing fan (Δ Tpr) = 4.0 °F (Fan Heat Gain @ pg.22)

Mechanical equipment room flow (Vmer) = 3289 cfm (pg. 31, Diagram 4)
Mechanical equip. room temperature (Tmer) = 59.7 °F (pg. 92)

Air cleaning unit flow (Vcu) = 4000 cfm (pg. 31, Diagram 4)
Δ T air cleaning unit (Δ Tcu) = 6.3 °F (Fan Heat Gain @ pg.23)

AIR CLEANING UNIT DISCHARGE TEMPERATURE: $Tcu = \Delta Tcu + [(Vmer \times Tmer) + Voa \times (Toa + \Delta Tpr)] / Vcu$

Tcu = 58.4 °F

RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT (Te) = $[(Vreturn \times Treturn) + (Vcu \times Tcu)] / (Vcu + Vreturn)$

Te = 67.8 °F

Δ T fan =	4.0 °F (AHU Fan Heat Gain @ pg.23)
Estimated air temp. entering the fan Tes[1] =	**67.5 °F** (minimum temperature to meet 75 °F thermostat setting)
Ts[4] =	**71.5 °F** (Supply Air Temperature at Fan Discharge)

If (Te + Δ T fan) = Ts: 100 % coil bypass is required
If (Te + Δ T fan) > Ts: % bypass = (Tes - 50.8*) / (Te - 50.8*)

Te + Δ T fan = **71.8 °F** > Ts = **71.5 °F**

% bypass = 98.4 %

Percent of the returning air going through the coil face damper and cooling to 50.8°F:	**1.6 %**
Percent of the remaining returning air going through the coil bypass damper :	**98.4 %**

*50.8 °F is a temperature of air leaving cooling coil (T_{COIL}); see pg. 29.

NOTES:
(1) This temperature is also identified as T_{MIX} on AHU schematic (pg. 29).
(4) This temperature is also identified as T_{AHU} on AHU schematic (pg. 29).

R013

8.0 SUMMARY (single unit operation only, See Appendix C for dual unit operation summary)

TABLE 8.1
COOLING LOAD - NORMAL OPERATION

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB		RELATIVE HUMIDITY	
	SENSIBLE	LATENT	DESIGN	ST. STATE	DESIGN	ST.STATE
MECHANICAL EQUIPMENT ROOM (C1)	70,126		86	81.5	29-70%	37%
WOMEN'S TOILET (C 2)	1,148			94.3		
CORRIDOR (C 3)	2,734		93	89.2	27-60%	30%
KITCHEN (C 4)	13,070	2000		86.5		
MEN'S TOILET (C 5)	2,600			85.6		
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	1,626		93	81.7	27-60%	37%
CONFERENCE ROOM (C 9)	4,950			74.9		
SHIFT ENGINEER'S OFFICE (C 10)	7,868	400		80.4		
MAIN CONTROL ROOM (C 12)	380,806	1709	80	73.6	40-60%	48%
MCR RETURN AIR PLENUM (above C12)	58,996			76.1		
RELAY ROOM and DPSO SHOP (C 13 & C20)	101,883		80	69.9	40-60%	55%
TECHNICAL SUPPORT CENTER (C 14)	22,012			68.2		
CORRIDOR (C 15)	7		93	87.2	27-60%	31%
CONFERENCE & TELEPHONE RM (C 16 & C17)	5,211			68.2		
NRC OFFICES (C 18)	3,623			66.3		
CORRIDOR (C 19)	5,367			77.2		
WEST STAIRWELL (STAIR C1)	0			97.9		
EAST STAIRWELL (STAIR C2)	25			86.4		
EAST ATTIC 1 (ABOVE C14)	9,070			71.8		
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	31			88.5		
EAST ATTIC 2 (ABOVE C15)	6			84.7		
EAST ATTIC 3 (ABOVE STAIR C2)	10			84.6		
WEST ATTIC 2 (ABOVE C2)	13			93.6		
WEST ATTIC 3 (ABOVE STAIR C1)	23			95.7		
SUMMARY:	691,205	4,109				

TOTAL SENSIBLE LOAD:	691,205 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	695,314 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

THIS PAGE REPLACED BY REV. 12

8.0 SUMMARY

TABLE 8.2
COOLING LOAD - LOCA OPERATION

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB	
	SENSIBLE	LATENT	DESIGN	ST. STATE
MECHANICAL EQUIPMENT ROOM (C1)	80,861		91	85.4
WOMEN'S TOILET (C 2)	45			110.0
CORRIDOR (C 3)	23		98	95.8
KITCHEN (C 4)	15,577	2000		92.4
MEN'S TOILET (C 5)	3,288			93.5
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	2,111		98	89.4
CONFERENCE ROOM (C 9)	6,253			79.8
SHIFT ENGINEER'S OFFICE (C 10)	9,435	400		85.4
MAIN CONTROL ROOM (MCR) (C 12)	434,140	1600	82	76.5
MCR RETURN AIR PLENUM (above C12)	60,086			79.0
RELAY ROOM and DPSO SHOP (C 13 & C20)	120,928		79	72.5
TECHNICAL SUPPORT CENTER (C 14)	38,136	14,847		77.2
CORRIDOR (C 15)	0		96	93.1
CONFERENCE & TELEPHONE RM (C 16 & C17)	6,878	1950		74.6
NRC OFFICES (C 18)	4,934	650		70.0
CORRIDOR (C 19)	6,708			82.6
WEST STAIRWELL (STAIR C1)	54			102.3
EAST STAIRWELL (STAIR C2)	9			89.0
EAST ATTIC 1 (ABOVE C14)	5,932			79.5
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	7			92.0
EAST ATTIC 2 (ABOVE C15)	19			88.9
EAST ATTIC 3 (ABOVE STAIR C2)	19			88.3
WEST ATTIC 2 (ABOVE C2)	60			99.6
WEST ATTIC 3 (ABOVE STAIR C1)	39			100.3
SUMMARY:	795,544	21,447		

TOTAL SENSIBLE LOAD:	795,544 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	816,991 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

THIS PAGE REPLACED BY REV. 12

8.0 SUMMARY

TABLE 8.3
HEATING LOAD - NORMAL OPERATION

ROOM NUMBER & DESCRIPTION	TEMPERATURE, °F DB		RELATIVE HUMIDITY	
	DESIGN	ST. STATE	DESIGN	ST.STATE
MECHANICAL EQUIPMENT ROOM (C1)	64	60.5	29-70%	73%
WOMEN'S TOILET (C 2)		63.4		
CORRIDOR (C 3)	65	65.8	27-60%	61% *
KITCHEN (C 4)		70.9		
MEN'S TOILET (C 5)		79.4		
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	65	75.6	27-60%	44%
CONFERENCE ROOM (C 9)		76.9		
SHIFT ENGINEER'S OFFICE (C 10)		74.1		
MAIN CONTROL ROOM (C 12)	75	75.3	40-60%	45%
MCR RETURN AIR PLENUM (above C12)		70.7		
RELAY ROOM and DPSO SHOP (C 13 & C20)	75	74.6	40-60%	46%
TECHNICAL SUPPORT CENTER (C 14)		74.6		
CORRIDOR (C 15)	65	64.1	27-60%	66% *
CONFERENCE & TELEPHONE RM (C 16 & C17)		75.5		
NRC OFFICES (C 18)		75.3		
CORRIDOR (C 19)		68.8		
WEST STAIRWELL (STAIR C1)		58.3		
EAST STAIRWELL (STAIR C2)		64.4		
EAST ATTIC 1 (ABOVE C14)		68.5		
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)		54.5		
EAST ATTIC 2 (ABOVE C15)		59.8		
EAST ATTIC 3 (ABOVE STAIR C2)		60.4		
WEST ATTIC 2 (ABOVE C2)		51.6		
WEST ATTIC 3 (ABOVE STAIR C1)		50		

* See Section 9.2, Conclusion, for evaluation of the humidity level.

R013

8.0 SUMMARY

TABLE 8.4
HEATING LOAD - LOCA OPERATION

R013

ROOM NUMBER & DESCRIPTION	TEMPERATURE, °F DB	
	DESIGN	ST. STATE
MECHANICAL EQUIPMENT ROOM (C1)	63	59.7
WOMEN'S TOILET (C 2)		52.9
CORRIDOR (C 3)	57	62.1
KITCHEN (C 4)		64.8
MEN'S TOILET (C 5)		64.4
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	58	63.8
WEST STAIRWELL (STAIR C1)		53.4
EAST STAIRWELL (STAIR C2)		58.0
CONFERENCE ROOM (C 9)		67.4
SHIFT ENGINEER'S OFFICE (C 10)		65.8
MAIN CONTROL ROOM (C 12)	75	75.3
RELAY ROOM and DPSO SHOP (C 13 & C20)	67	68.2
TECHNICAL SUPPORT CENTER (C 14)		66.2
CORRIDOR (C 15)	58	59.0
MCR RETURN AIR PLENUM (above C12)		70.6
CONFERENCE & TELEPHONE RM (C 16 & C17)		68.1
NRC OFFICES (C 18)		68.2
CORRIDOR (C 19)		63.5
EAST ATTIC 1 (ABOVE C14)		60.9
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)		56.3
EAST ATTIC 2 (ABOVE C15)		54.7
EAST ATTIC 3 (ABOVE STAIR C2)		54.2
WEST ATTIC 2 (ABOVE C2)		48.7
WEST ATTIC 3 (ABOVE STAIR C1)		47.9

R13

9.0 CONCLUSION for single unit operation only results (See Appendix C for dual unit operation results and conclusions)

THE ROOM TEMPERATURES AND RELATIVE HUMIDITIES WHICH ARE LISTED IN THE ENVIRONMENTAL DRAWINGS, REFERENCES 5.3.4, 5.3.5 & 5.3.7, ARE COMPARED TO THOSE ESTABLISHED IN THE CALCULATION.

9.1 90% DESIGN AIR FLOW RATE

COOLING NORMAL

ROOM		REF.	CRITERIA		CALCULATED (from Table 8.1)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	64 to 86	29 to 70	82	37
CORRIDOR	755 - C3	5.3.4	65 to 93	27 to 60	89	30
LOCKER ROOM	755 - C6	5.3.4	65 to 93	27 to 60	82	37
MAIN CNTRL RM	755 - C12	5.3.3	75 to 80	40 to 60	74	48
RELAY ROOM	755 - C13	5.3.3	75 to 80	40 to 60	70	55
CORRIDOR	755 - C15	5.3.4	65 to 93	27 to 60	87	31

COOLING LOCA

ROOM		REF.	CRITERIA		CALCULATED (from Table 8.2)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	63 to 91	NA	85	NA
CORRIDOR	755 - C3	5.3.4	57 to 98		96	
LOCKER ROOM	755 - C6	5.3.4	58 to 98		89	
MAIN CNTRL RM	755 - C12	5.3.3	75 to 82		77	
RELAY ROOM	755 - C13	5.3.3	67 to 79		73	
CORRIDOR	755 - C15	5.3.4	58 to 96		93	

9.0 CONCLUSION (cont'd)

9.2 110% DESIGN AIR FLOW RATE

HEATING NORMAL

ROOM		REF.	CRITERIA		CALCULATED (from Table 8.3)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	64 to 86	29 to 70	~~64~~ 61	~~68~~ 73 (1)
CORRIDOR	755 - C3	5.3.4	65 to 93	27 to 60	66	61 (1)
LOCKER ROOM	755 - C6	5.3.4	65 to 93	27 to 60	76	44
MAIN CNTRL RM	755 - C12	5.3.3	75 to 80	40 to 60	75	45
RELAY ROOM	755 - C13	5.3.3	75 to 80	40 to 60	75	46
CORRIDOR	755 - C15	5.3.4	65 to 93	27 to 60	~~65~~ 64	66 (1)

Rev 3 SMY 11-3-09 Cmg 11/3/09

Rev 3 SMY 11-3-09 Cmg 11/3/09

HEATING LOCA

ROOM		REF.	CRITERIA		CALCULATED (from Table 8.4)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	63 to 91	NA	~~83~~ 60	NA
CORRIDOR	755 - C3	5.3.4	57 to 98		62	
LOCKER ROOM	755 - C6	5.3.4	58 to 98		~~68~~ 64	
MAIN CNTRL RM	755 - C12	5.3.3	75 to 82		75	
RELAY ROOM	755 - C13	5.3.3	67 to 79		68	
CORRIDOR	755 - C15	5.3.4	58 to 96		59	

Rev 3 SMY 11-3-09 Cmg 11/3/09

(1) Calculated humidity level in MCR is higher than the minimum value specified at the Environmental Drawing (ref. 5.3.3). This value is conservative since the injection of the low humidity outside air (13 °F, 20% relative humidity) was not taken into account. The slightly higher humidity level has no adverse impact since the subject rooms have no equipment and no permanent people occupancy.

9.0 CONCLUSION (cont'd)

9.3 MINIMUM AIR FLOW RATE

COOLING NORMAL - MINIMUM AIR FLOW RATE (70% DESIGN FLOW RATE)

ROOM		REF.	CRITERIA		CALCULATED (from Appendix A, pg. A.28)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	64 to 86	29 to 70	86	33
CORRIDOR	755 - C3	5.3.4	65 to 93	27 to 60	92	27
LOCKER ROOM	755 - C6	5.3.4	65 to 93	27 to 60	85	33
MAIN CNTRL RM	755 - C12	5.3.3	75 to 80	40 to 60	78	42
RELAY ROOM	755 - C13	5.3.3	75 to 80	40 to 60	73	49
CORRIDOR	755 - C15	5.3.4	65 to 93	27 to 60	89	29

COOLING LOCA - MINIMUM AIR FLOW RATE (78% DESIGN FLOW RATE)

ROOM		REF.	CRITERIA		CALCULATED (from Appendix B, pg. B.27)	
			TEMP	RH	TEMP	RH
NAME	El. & No.		°F DB	%	°F DB	%
MECH EQUP RM	755 - C1	5.3.7	63 to 91	NA	88	NA
CORRIDOR	755 - C3	5.3.4	57 to 98	↓	98	↓
LOCKER ROOM	755 - C6	5.3.4	58 to 98		92	
MAIN CNTRL RM	755 - C12	5.3.3	75 to 82		80	
RELAY ROOM	755 - C13	5.3.3	67 to 79		75	
CORRIDOR	755 - C15	5.3.4	58 to 96		95	

9.4 SUMMARY

AS SHOWN IN SECTIONS 9.1 & 9.2, CALCULATED ROOMS' STEADY STATE TEMPERATURES AND HUMIDITY LEVELS FOR THE CONTROL BUILDING MAIN CONTROL ROOM AND ASSOCIATED ROOMS ARE ACCEPTABLE FOR NORMAL AND ACCIDENT (LOCA) COOLING ~~AND HEATING~~ OPERATING MODES, AT 90% ~~AND 110%~~ AIR FLOW RATES FOR COOLING ~~AND HEATING~~ OPERATING MODES, ~~RESPECTIVELY~~. See next page for discussion of heating mode results.

R013 Smy 11-3-09 Cmg 11/3/09

AS DEMONSTRATED IN SECTION 9.3, CALCULATED ROOMS' STEADY STATE TEMPERATURES AND HUMIDITY LEVELS FOR THE CONTROL BUILDING MAIN CONTROL ROOM AND ASSOCIATED ROOMS ARE ACCEPTABLE AT 70% AND 78% DESIGN FLOW RATE FOR NORMAL AND ACCIDENT (LOCA) COOLING OPERATING MODES, RESPECTIVELY.

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9.0 CONCLUSION (cont'd)

9.4 SUMMARY (cont'd)

As shown in sections 9.1 & 9.2, calculated rooms' steady state temperatures and humidity levels for the Control Building Main Control Room and associated rooms are acceptable for Normal and Accident (LOCA) heating operating mode at 110% air flow rates except for Mechanical Equipment Room 755.0-C1. With the corrected heating mode heat loads for Room 755.0-C1 utilized in this revision, the steady state temperatures for both Normal and LOCA operation are found to be approximately 3°F below the respective minimum temperature limits for this room. Room 755.0-C1 contains no equipment such as batteries that could be affected by temperatures lower than 60°F. Therefore, Environmental Data Drawing 47E235-24 (Ref. 5.3.7) should be revised to reflect a Normal operating mode minimum temperature of 60°F and a LOCA operating mode minimum temperature of 59°F for Room 755.0-C1.

Subject: Cooling and Heating Load Analysis, Main Control Room
Prepared by: LRN Date: 12/18/01 Checked by: RRC Date: 03/08/02

APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 2,825 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 85.5 °F Design Room Temperature: 86°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			9.4	1,841
SOUTH	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	110.0	85.5	24.5	4,017
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			2.0	223
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	85.0	85.5	-0.5	-33
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	97.9	85.5	12.4	198
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	92.5	85.5	7.0	36
EAST	Door C39	7.17	6.00	43.0	0.448	92.5	85.5	7.0	134
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	90.9	85.5	5.3	629
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	91.0	85.5	5.5	1,458
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	95.3	85.5	9.8	191
FLOOR	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	110.0	85.5	24.5	15,143
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			14.8	7,274
							TOTAL TRANSMISSION LOAD =		31,112

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.

Area (excluding floor) = 4502

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 14.8 °F
CLTDcorr(west) = [(21.6+0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 9.4 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 2.0 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	32,002
TOTAL ROOM SENSIBLE LOAD:					**63,114**

ROOM TEMPERATURE (Tr) = Tr + Q / (1.08 x 0.7 x CFM) = 56.0 + 63,114 / (1.08 x 0.7 x 2,825) = 85.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085125 + 0 / (0.7 x 4840 x 2825) = **0.0085**

CALCULATED ROOM CONDITIONS: 85.5 °F dry bulb 33% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: WOMEN'S TOILET

			Reference
Design air flow:	230 cfm	(Transfer from room C3)**	pg. 30
Supply Air Temp:	92.5 °F	(Transfer from room C3)	pg. A.4
Supply Air Humidity Ratio:	0.0089 lbW/lb dry air	(Transfer from room C3)	pg. A.4
Steady State Temperature:	97.9 °F		

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	85.5	97.9	-12.4	-198
SOUTH	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	110.0	97.9	12.1	218
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	92.5	97.9	-5.5	-149
NORTH	Door C38	7.17	3.00	21.5	0.448	92.5	97.9	-5.5	-53
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	99.8	97.9	1.9	30
FLOOR	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	110.0	97.9	12.1	170
CEILING	W. Attic 2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	95.3	97.9	-2.6	-41
					TOTAL TRANSMISSION LOAD =				-23

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 255

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**969**

ROOM TEMPERATURE (Tr) = (Ts 92.5) + (Q 969 / (1.08 x 0.7 .756 x CFM 230)) = 98.0 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) = 0.0089 + 0 / (0.7 x 4840 x 230) = **0.0089**

CALCULATED ROOM CONDITIONS: 97.8 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

			Reference
Design air flow:	320 cfm	(Transfer from room C10)	pg. 30
Supply Air Temp:	84.4 °F	(Transfer from room C10)	pg. A11
Supply Air Humidity Ratio:	0.0089 lbW/lb dry air	(Transfer from room C10)	pg. A11
Steady State Temperature:	92.5 °F	Design Room Temperature: 93°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	97.9	92.5	5.5	149
SOUTH	Door C38	7.17	3.00	21.5	0.448	97.9	92.5	5.5	53
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	99.8	92.5	7.3	525
SOUTH	Door C37	7.17	3.00	21.5	0.448	99.8	92.5	7.3	71
SOUTH*	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	110.0	92.5	17.6	264
SOUTH	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	110.0	92.5	17.6	226
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	90.9	92.5	-1.6	-66
NORTH	Door C40	7.17	3.00	21.5	0.448	90.9	92.5	-1.6	-15
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	84.4	92.5	-8.1	-320
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	84.4	92.5	-8.1	-162
NORTH	Door C46	7.17	3.00	21.5	0.448	84.4	92.5	-8.1	-78
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	89.3	92.5	-3.2	-87
NORTH	Door C42	7.17	3.00	21.5	0.448	89.3	92.5	-3.2	-30
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	77.9	92.5	-14.6	-425
EAST	Door C56	7.17	4.50	32.3	0.448	77.9	92.5	-14.6	-210
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	85.5	92.5	-7.0	-36
WEST	Door C39	7.17	6.00	43.0	0.448	85.5	92.5	-7.0	-134
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	99.8	92.5	7.3	118
FLOOR	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	110.0	92.5	17.6	404
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	95.0	92.5	2.6	296
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	95.0	92.5	2.6	66
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	91.0	92.5	-1.5	-316
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	91.0	92.5	-1.5	-54
					TOTAL TRANSMISSION LOAD =				238

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8".

Area (excluding floor) = 1175

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,757
TOTAL ROOM SENSIBLE LOAD:					**1,995**

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C3 (cont'd)
ROOM NAME: CORRIDOR

		Ts			Q	1.08 x 0.9	CFM		
ROOM TEMPERATURE (Tr) =	(	84.4)	+	(	1,995	/(.756 x	320)	=	92.6 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0089 + 0 / (0.7 x 4840 x 320) = **0.0089**

CALCULATED ROOM CONDITIONS: **92.5 °F dry bulb 27% RH**

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

		Reference
Design air flow:	440 cfm**	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	90.9 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	85.5	90.9	-5.3	-629
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	92.5	90.9	1.6	66
SOUTH	Door C40	7.17	3.00	21.5	0.448	92.5	90.9	1.6	15
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	89.3	90.9	-1.6	-75
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	84.9	90.9	-5.9	-347
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	90.9	-5.8	-155
FLOOR	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	110.0	90.9	19.2	823
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	95.0	90.9	4.2	643
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	91.0	90.9	0.1	14
					TOTAL TRANSMISSION LOAD =				355

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 1107

LOAD SUMMARY:

PEOPLE (pg. 18) :	10	X	250		=	2,500
ELECTRICAL LOAD (pg. 18) :						8,787
TOTAL ROOM SENSIBLE LOAD:						**11,642**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 11,642 / (1.08 x 0.7 x 440) = 91.0 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	10	X	200		2000
TOTAL ROOM LATENT LOAD:					**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 2,000 / (4840 x 0.7 x 440) = **0.0099**

CALCULATED ROOM CONDITIONS: 90.9 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

		Reference
Design air flow:	90 cfm***	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	89.3 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	90.9	89.3	1.6	75
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	92.5	89.3	3.2	87
SOUTH	Door C42	7.17	3.00	21.5	0.448	92.5	89.3	3.2	30
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	84.9	89.3	-4.4	-122
NORTH	Door C45	7.17	3.00	21.5	0.448	84.9	89.3	-4.4	-42
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	84.4	89.3	-4.9	-239
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	95.0	89.3	5.7	412
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	91.0	89.3	1.7	77
					TOTAL TRANSMISSION LOAD =				279

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 517

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,994
TOTAL ROOM SENSIBLE LOAD:					**2,273**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 2,273 / (1.08 x 0.7 x 90) = 89.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 89.3 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 65 cfm***
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 84.9 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	89.3	84.9	4.4	122
SOUTH	Door C45	7.17	3.00	21.5	0.448	89.3	84.9	4.4	42
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	85.0	84.9	0.1	2
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	78.4	84.9	-6.5	-237
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	84.4	84.9	-0.5	-10
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	85.5	84.9	0.6	38
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	95.0	84.9	10.1	519
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	95.0	84.9	10.1	137
CEILING	W. Attic 1 - 5/8" GB (Dn)	16.02	10.31	165.2	0.338	91.0	84.9	6.1	338
					TOTAL TRANSMISSION LOAD =				952

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 581

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	464
TOTAL ROOM SENSIBLE LOAD:					**1,416**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 1,416 / (1.08 x 0.7 x 65) = 84.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 65) = **0.0085**

CALCULATED ROOM CONDITIONS: 84.9 °F dry bulb, 33% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 99.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	97.9	99.8	-1.9	-30
SOUTH	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	110.0	99.8	10.2	396
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	92.5	99.8	-7.3	-525
NORTH	Door C37	7.17	3.00	21.5	0.448	92.5	99.8	-7.3	-71
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	92.5	99.8	-7.3	-118
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	97.3	99.8	-2.5	-150
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-498

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (Note 1, pg.18)	164.3	X	3.413	X	100%	=	561
TOTAL ROOM SENSIBLE LOAD:							**63**

CALCULATED ROOM CONDITIONS: 99.8 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 88.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	88.7	88.3	0.4	6
WEST	Door C53	7.17	3.00	21.5	0.448	88.7	88.3	0.4	4
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	72.9	88.3	-15.4	-141
SOUTH	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	110.0	88.3	21.7	903
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	80.2	88.3	-8.1	-504
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	72.9	88.3	-15.4	-368
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	80.2	88.3	-8.1	-122
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	80.2	88.3	-8.1	-61
EAST	Door C60	7.17	3.00	21.5	0.448	80.2	88.3	-8.1	-79
CEILING	E.Attic 3 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	86.4	88.3	-1.9	-113
CEILING	C13-1/2" & 5/8" GB (Up)	4.39	6.00	26.3	0.448	72.9	88.3	-15.4	-182
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-657

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (Note 1, pg.18) :	215.3	X	3.413	X	100%	=	735
TOTAL ROOM SENSIBLE LOAD:							**78**

CALCULATED ROOM CONDITIONS: 88.3 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

		Reference
Design air flow:	270 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	78.4 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	84.9	78.4	6.5	237
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	84.4	78.4	6.0	306
SOUTH	Door C48	7.17	3.00	21.5	0.448	84.4	78.4	6.0	58
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	85.0	78.4	6.6	235
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	77.9	78.4	-0.5	-20
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	95.0	78.4	16.6	901
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	91.0	78.4	12.6	1,057
					TOTAL TRANSMISSION LOAD =				**2,774**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 595

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,829
TOTAL ROOM SENSIBLE LOAD:					**4,603**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 4,603 / (1.08 x 0.7 x 270) = 78.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 270) = **0.0085**

CALCULATED ROOM CONDITIONS: 78.4 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

		Reference
Design air flow:	330 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	84.4 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	89.3	84.4	4.9	239
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	84.9	84.4	0.5	10
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	92.5	84.4	8.1	320
SOUTH	Door C46	7.17	3.00	21.5	0.448	92.5	84.4	8.1	78
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	92.5	84.4	8.1	162
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	78.4	84.4	-6.0	-306
NORTH	Door C48	7.17	3.00	21.5	0.448	78.4	84.4	-6.0	-58
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	77.9	84.4	-6.5	-503
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	95.0	84.4	10.6	1,110
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	91.0	84.4	6.6	1,065
						TOTAL TRANSMISSION LOAD =			2,116

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

Area (excluding floor) = 895

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	250		=	500
ELECTRICAL LOAD (pg. 18) :					=	4,502
TOTAL ROOM SENSIBLE LOAD:						**7,118**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	7,118 / (1.08 x 0.7 x	330)	=	84.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	2	X	200	400
TOTAL ROOM LATENT LOAD:				**400**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 400 / (4840 x 0.7 x 330) = **0.0089**

CALCULATED ROOM CONDITIONS: 84.4 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

			Reference
Design air flow:	2,580	cfm (Transfer from room C14)	pg. 30
Supply Air Temp:	71.1	°F (Transfer from room C14)	pg. A.18
Supply Air Humidity Ratio:	0.0085	lbW/lb dry air (Transfer from room C14)	pg. A.18
Steady State Temperature:	75.0	°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	72.9	75.0	-2.1	-316
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			19.8	1,692
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			12.5	552
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	110.0	75.0	35.0	1,388
FLOOR	C14 Ceiling (Ac.tile) (Dn)	16.80	42.00	705.6	0.330	71.1	75.0	-3.9	-908
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			25.3	5,345
					TOTAL TRANSMISSION LOAD =				7,752

Area (excluding floor) = 1693

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 19.8 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 12.5 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 25.3 °F

ROOM TEMPERATURE (Tr) = (Ts 71.1) + (Q 7,752 / (1.08 x 0.9 .756 x CFM 2,580) = 75.1 °F

CALCULATED ROOM CONDITIONS: 75.0 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 86.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	80.4	86.5	-6.1	-144
SOUTH	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	110.0	86.5	23.5	669
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	72.9	86.5	-13.6	-821
EAST	E. Attic 3, 8" CI	9.08	4.00	36.3	0.500	86.4	86.5	-0.1	-2
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	72.9	86.5	-13.6	-126
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	88.7	86.5	2.2	129
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			13.8	331
							TOTAL TRANSMISSION LOAD =		37

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 13.8 °F

CALCULATED ROOM CONDITIONS: 86.5 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 86.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	86.5	86.4	0.1	2
SOUTH	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	110.0	86.4	23.6	1,028
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	72.9	86.4	-13.5	-1,246
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	72.9	86.4	-13.5	-211
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	88.3	86.4	1.9	113
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			13.9	338
							TOTAL TRANSMISSION LOAD =		23

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 13.9 °F

CALCULATED ROOM CONDITIONS: 86.4 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 21,650 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 77.9 °F Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	92.5	77.9	14.6	425
WEST	Door C56	7.17	4.50	32.3	0.448	92.5	77.9	14.6	210
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	84.4	77.9	6.5	503
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	78.4	77.9	0.5	20
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	91.0	77.9	13.1	548
SOUTH	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	110.0	77.9	32.1	11,416
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	85.0	77.9	7.1	447
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	80.0	77.9	2.1	69
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	85.0	77.9	7.1	804
NORTH	Door C49	6.50	3.00	19.5	0.448	85.0	77.9	7.1	62
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	80.0	77.9	2.1	69
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	89.0	77.9	11.1	524
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	85.0	77.9	7.1	436
NORTH	Door C50	6.50	3.00	19.5	0.448	85.0	77.9	7.1	62
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	88.7	77.9	10.8	94
EAST	Door C55	7.17	4.50	32.3	0.448	88.7	77.9	10.8	156
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	86.5	77.9	8.6	30
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	72.9	77.9	-5.0	-760
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	95.0	77.9	17.1	35,067
CEILING**	MCR Plenum	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	50,185

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic)

LOAD SUMMARY: Area (excl. floor/ceiling) = 3857

PEOPLE (pg. 18) :	8	X	250	=	2,000
ELECTRICAL LOAD (pg. 18) :				=	316,241
TOTAL ROOM SENSIBLE LOAD:					**368,426**

	CFM					Ts	Tr	
Transfer - Air (C 13) - pg. 30 & A.17	2727	X	1.08	X	0.7	72.9	77.9	-10,306
Transfer - Air (W. Attic 1) - pg. 30 & A.25	143	X	1.08	X	0.7	91.0	77.9	1,411
NET ROOM SENSIBLE LOAD:								**359,530**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 359,530 / (1.08 x 0.7 x 21,650) = 78.0 °F

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM **(cont'd)**

LATENT LOAD:										Q latent
PEOPLE (pg. 18) :	8	X	200							1600
Transfer - Air (W. Attic 1) - pg. 30 & A.25		143	X	4840	X	0.7	0.0087	-0.0085		109
Transfer - Air (C 13) - pg. 30 & A.17		2,727	X	4840	X	0.7	0.0085	-0.0085		0
TOTAL ROOM LATENT LOAD:										**1,709**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 1709 / (4840 x 0.7 x 21,650) = **0.0085**

CALCULATED ROOM CONDITIONS: **77.9 °F dry bulb**
42% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

		Reference
Design air flow:	7,490 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	72.9 °F	

Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	77.9	72.9	5.0	760
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	80.4	72.9	7.5	884
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	86.4	72.9	13.5	211
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	86.5	72.9	13.6	126
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	88.3	72.9	15.4	368
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	80.2	72.9	7.3	954
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	88.7	72.9	15.8	514
SOUTH	Door C52	7.17	7.00	50.2	0.448	88.7	72.9	15.8	355
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	86.5	72.9	13.6	821
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	86.4	72.9	13.5	1,246
SOUTH(Second tier)	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	110.0	72.9	37.1	1,911
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	85.0	72.9	12.1	2,923
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	71.3	72.9	-1.7	-104
EAST	Door C63	7.17	3.00	21.5	0.448	71.3	72.9	-1.7	-16
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	68.9	72.9	-4.0	-214
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	88.3	72.9	15.4	141
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	75.0	72.9	2.1	316
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	71.1	72.9	-1.8	-47
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	95.0	72.9	22.1	14,408
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	95.0	72.9	22.1	357
FLOOR	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	110.0	72.9	37.1	8,724
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	71.3	72.9	-1.7	-120
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	68.9	72.9	-4.0	-182
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	80.2	72.9	7.3	211
FLOOR (Sec. tier)	C19 (1/2"& 5/8" GB)(Up)			282.2	0.448	80.2	72.9	7.3	916
FLOOR (Sec. tier)	E.Stair(1/2"/5/8"GB)(Up)			26.3	0.448	88.3	72.9	15.4	182
ROOF (CLTD)	27", uninsulated (Down)			2567.7	0.300			27.4	21,068
					TOTAL TRANSMISSION LOAD =				56,715

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
** Ceiling for this room is 8" concrete slab

Area (excluding floor) =	5970

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 27.4 °F

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 18) :					=	39,255
TOTAL ROOM SENSIBLE LOAD:						**95,970**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	95,970	/ (1.08 x 0.7 x	7,490	) =	72.9 °F	

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0	/ (4840 x 0.9 x	7,490	) =	**0.0085**

CALCULATED ROOM CONDITIONS: 72.9 °F dry bulb, 49% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

		Reference
Design air flow:	1,840 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	71.1 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	80.2	71.1	9.1	107
WEST	Door C51	6.80	3.92	26.7	0.448	80.2	71.1	9.1	108
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	71.3	71.1	0.2	11
WEST	Door C62	7.17	3.00	21.5	0.448	71.3	71.1	0.2	1
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	68.9	71.1	-2.2	-106
WEST	Window	4.00	3.30	13.2	0.810	68.9	71.1	-2.2	-24
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	72.9	71.1	1.8	47
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	110.0	71.1	38.9	1,542
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			16.4	724
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			23.7	2,613
FLOOR	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	110.0	71.1	38.9	7,054
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	75.0	71.1	3.9	908
					TOTAL TRANSMISSION LOAD =				12,986

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 1874

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 23.7 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 16.4 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	315				=	0
ELECTRICAL LOAD (pg. 18) :							=	8,007
TOTAL ROOM SENSIBLE LOAD:								**20,993**
	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 30 & A.22	740	X	1.08	X	0.7	71.3	-71.1	84
NET ROOM SENSIBLE LOAD:								**21,077**

	Ts		Q			CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	21,077	/ (	1.08 x 0.7 x	1,840	)	=	71.1 °F

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C14 (cont'd)
ROOM NAME: TECHNICAL SUPPORT CENTER

LATENT LOAD:								Q latent
PEOPLE (pg. 18) :	0	X	325					0
Transfer - Air (C 16) - pg. 30 & A.22	740	X	4840	X	0.7	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 1,840) = **0.0085**

CALCULATED ROOM CONDITIONS: 71.1 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 88.7 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	77.9	88.7	-10.8	-94
WEST	Door C55	7.17	4.50	32.3	0.448	77.9	88.7	-10.8	-156
SOUTH*	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	110.0	88.7	21.3	438
SOUTH	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	110.0	88.7	21.3	270
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	72.9	88.7	-15.8	-514
NORTH	Door C52	7.17	7.00	50.2	0.448	72.9	88.7	-15.8	-355
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	88.3	88.7	-0.4	-2
EAST	Door C53	7.17	6.04	43.3	0.448	88.3	88.7	-0.4	-8
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	95.0	88.7	6.3	265
CEILING	E. Attic 2 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	86.5	88.7	-2.2	-129
					TOTAL TRANSMISSION LOAD =				-284

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) =	415

LOAD SUMMARY:

ELECTRICAL:							
PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (pg. 18, Note 2) :	86.0	X	3.413	X	100%	=	294
EQUIPMENT (pg. 18, Note 2) :	17.2	X	3.413	X	100%	=	59
TOTAL ROOM SENSIBLE LOAD:							**68**

CALCULATED ROOM CONDITIONS: 88.7 °F dry bulb 29% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM (above room C12)

		Reference
Design air flow:	24,520 cfm (Transfer from room C12)	pg. 30
Supply Air Temp:	77.9 °F (Transfer from room C12)	pg. A.15
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air (Transfer from room C12)	pg. A.15
Steady State Temperature:	80.4 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT.(Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH	T1 - 36" CI	7.75	150.70	1167.93	0.236	110.0	80.4	29.6	8,159
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	85.0	80.4	4.6	225
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	80.0	80.4	-0.4	-10
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	85.0	80.4	4.6	404
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	80.0	80.4	-0.4	-10
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	89.0	80.4	8.6	315
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	85.0	80.4	4.6	236
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	72.9	80.4	-7.5	-884
EAST	E.Attic 2, 12" CI	7.75	6.04	46.8	0.431	86.5	80.4	6.1	123
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	91.0	80.4	10.6	1,717
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			19.9	37,692
					TOTAL TRANSMISSION LOAD =				47,964

(*) Luminious ceiling panel (plastic)

Area (excluding floor) = 9311

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 19.9 °F

$$\text{ROOM TEMPERATURE (Tr)} = \frac{\text{Ts}}{(\ 77.9\ )} + \frac{\text{Q}}{(\ 47{,}964\ /(\ .756 \times 24{,}520\ )} = 80.5\ ^\circ\text{F}$$

CALCULATED ROOM CONDITIONS: 80.4 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 380 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 71.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	72.9	71.3	1.7	104
WEST	Door C63	7.17	3.00	21.5	0.448	72.9	71.3	1.7	16
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	80.2	71.3	8.9	108
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	80.2	71.3	8.9	294
SOUTH	Door C57	7.17	3.00	21.5	0.448	80.2	71.3	8.9	86
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	68.9	71.3	-2.3	-51
NORTH	Door C64	7.17	2.67	19.1	0.448	68.9	71.3	-2.3	-20
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	71.1	71.3	-0.2	-11
EAST	Door C62	7.17	3.00	21.5	0.448	71.1	71.3	-0.2	-1
FLOOR	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	110.0	71.3	38.8	1,790
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	72.9	71.3	1.7	120
								TOTAL TRANSMISSION LOAD =	2,434

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 720

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	315	=	0
ELECTRICAL LOAD (pg. 18) :				=	2,597
TOTAL ROOM SENSIBLE LOAD:					**5,031**

	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 30 & A.23	360	X	1.08	X	0.7	68.9	-71.3	-640
NET ROOM SENSIBLE LOAD:								**4,391**

ROOM TEMPERATURE (Tr) = Ts 56.0 + Q 4,391 / (1.08 x 0.7 x CFM 380) = 71.3 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	0	X	200					0
Transfer - Air (C 18) - pg. 30 & A.23	360	X	4840	X	0.7	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 380) = **0.0085**

CALCULATED ROOM CONDITIONS: 71.3 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

		Reference
Design air flow:	360 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	68.9 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	72.9	68.9	4.0	214
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	71.3	68.9	2.3	51
SOUTH	Door C64	7.17	2.67	19.1	0.448	71.3	68.9	2.3	20
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	85.0	68.9	16.1	275
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			18.6	249
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	71.1	68.9	2.2	106
EAST	Window	4.00	3.30	13.2	0.820	71.1	68.9	2.2	24
FLOOR	708' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	110.0	68.9	41.1	1,196
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	72.9	68.9	4.0	182
					TOTAL TRANSMISSION LOAD =				2,317

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 544

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) ÷ (84 -85)] CLTDcorr (north)= 18.6 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	315		=	0
ELECTRICAL LOAD (pg. 18) :					=	1,222
TOTAL ROOM SENSIBLE LOAD:						**3,539**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	3,539	/ (1.08 x 0.7 x	360	) =	69.0 °F	

LATENT LOAD:

					Q latent
PEOPLE (pg. 18) :	0	X	325		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 360) = **0.0085**

CALCULATED ROOM CONDITIONS: 69.0 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

		Reference
Design air flow:	260 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	80.2 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	88.3	80.2	8.1	122
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	88.3	80.2	8.1	61
WEST	Door C60	7.17	3.00	21.5	0.448	88.3	80.2	8.1	79
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	72.9	80.2	-7.3	-173
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	72.9	80.2	-7.3	-954
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	71.3	80.2	-8.9	-206
NORTH	Door C57	7.17	3.00	21.5	0.448	71.3	80.2	-8.9	-86
SOUTH	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	110.0	80.2	29.9	1,979
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	72.9	80.2	-7.3	-448
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	71.3	80.2	-8.9	-108
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	71.1	80.2	-9.1	-107
EAST	Door C51	6.83	3.92	26.8	0.448	71.1	80.2	-9.1	-109
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	95.0	80.2	14.9	539
FLOOR	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	110.0	80.2	29.9	595
FLOOR	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	110.0	80.2	29.9	2,345
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	72.9	80.2	-7.3	-211
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	72.9	80.2	-7.3	-692
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	72.9	80.2	-7.3	-225
					TOTAL TRANSMISSION LOAD =				2,401

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

Area (excluding floor) = 1344

PEOPLE (pg. 18) : 0 X 250 = 0
ELECTRICAL LOAD (pg. 18) : = 2,361
TOTAL ROOM SENSIBLE LOAD: **4,762**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.7 x CFM) = 56.0 + 4,762 / (1.08 x 0.7 x 260) = 80.2 °F

LATENT LOAD: Q latent
PEOPLE (pg. 18) : 0 X 200 = 0
TOTAL ROOM LATENT LOAD: **0**
ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.7 x 260) = **0.0085**

CALCULATED ROOM CONDITIONS: 80.2 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Reference pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 91.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	110.0	91.0	19.1	964
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	97.3	91.0	6.3	636
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	95.3	91.0	4.3	202
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	85.5	91.0	-5.5	-1,458
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	97.3	91.0	6.3	145
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	85.0	91.0	-6.0	-585
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	80.4	91.0	-10.6	-1,717
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	77.9	91.0	-13.1	-548
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	92.5	91.0	1.5	370
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	90.9	91.0	-0.1	-14
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	89.3	91.0	-1.7	-77
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.338	84.9	91.0	-6.1	-338
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	78.4	91.0	-12.6	-1,057
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	84.4	91.0	-6.6	-1,065
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			9.3	4,447
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			9.3	124
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			9.3	145
							TOTAL TRANSMISSION LOAD =		174

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.

Area (excluding floor) = 3433

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 9.3 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 1) - pg. 30 & A.1	53	X	1.08	X	0.7	85.5	-91.0	-218
Transfer - Air (C 3) - pg. 30 & A.4	90	X	1.08	X	0.7	92.5	-91.0	102
TOTAL ROOM SENSIBLE LOAD:								**58**

ROOM HUMIDITY RATIO (Wr):

(ROOM C1) - pg. 30 & A.1	53	@	0.0085
(ROOM C3) pg. 30 & A.4	90	@	0.0089

Wr = 0.0087

CALCULATED ROOM CONDITIONS: 91.0 °F dry bulb 29% RH

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APPENDIX A - MINIMUM FLOW (NORMAL)

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 95.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	85.5	95.3	-9.8	-191
SOUTH	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	110.0	95.3	14.7	322
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	91.0	95.3	-4.3	-202
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	97.3	95.3	2.0	39
FLOOR	755.0'-C2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	97.9	95.3	2.6	41
ROOF (CLTD)	27", uninsulated (Down)	9.53	4.00	38.1	0.300			5.0	57
							TOTAL TRANSMISSION LOAD =		66

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 5.0 °F

CALCULATED ROOM CONDITIONS: 95.3 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 97.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	95.3	97.3	-2.0	-39
SOUTH	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	110.0	97.3	12.7	600
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	91.0	97.3	-6.3	-636
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	91.0	97.3	-6.3	-124
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	99.8	97.3	2.5	150
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			3.0	80
							TOTAL TRANSMISSION LOAD =		32

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 3.0 °F

CALCULATED ROOM CONDITIONS: 97.3 °F dry bulb

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APPENDIX A - MINIMUM FLOW (NORMAL)

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 30, Diagram 2)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. page	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	75.0	0.0085	A.12	22.0	193,500
CORRIDOR (C 19)	260	80.2	0.0085	A.24	2.2	206,787
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	72.9	0.0085	A.17	40.5	18,954
SHIFT ENGINEERS OFFICE (C10)	10	84.4	0.0089	A.11	0.1	844
CONFERENCE ROOM (C 9)	270	78.4	0.0085	A.10	2.3	21,168
MCR RETURN AIR PLENUM	24,520	80.4	0.0085	A.21	209.3	1,971,368
TOTAL	Vreturn = 32,403				276.4	2,412,621

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn = Treturn: **74.5 °F**

Return Air Humidity from MCR spaces: SUM (cfm X HUM.) / Vreturn = Wret: **0.0085 # MOIST / # DRY AIR**

Outside Air Flow: Voa = 3,597 cfm (pg. 30, Diagram 2)
Outside Air Temperature: Toa = 95 °F DB, 74 °F WB (Section 6.1)
Outside Air Humidity Ratio: Woa = 0.0133 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT: Te = [(Vreturn x Treturn) +(Voa x Toa)] / (Vreturn + Voa)

Te = 76.5 °F DB, 61.5 °F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT: We = [(Vreturn x Wreturn) +(Voa x Woa)] / (Vreturn + Voa)

Humidity ratio = 0.0090 # MOIST / # DRY AIR
Relative humidity = 47%

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APPENDIX A

COOLING LOAD - NORMAL OPERATION WITH MIMIMUM FLOW RATE

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB		RELATIVE HUMIDITY	
	SENSIBLE	LATENT	DESIGN	ST. STATE	DESIGN	ST.STATE
MECHANICAL EQUIPMENT ROOM (C1)	63,114		86	86.5	29-70%	33%
WOMEN'S TOILET (C 2)	969			97.9		
CORRIDOR (C 3)	1,995		93	92.5	27-60%	27%
KITCHEN (C 4)	11,642	2000		90.9		
MEN'S TOILET (C 5)	2,273			89.3		
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	1,416		93	84.9	27-60%	33%
CONFERENCE ROOM (C 9)	4,603			78.4		
SHIFT ENGINEER'S OFFICE (C 10)	7,118	400		84.4		
MAIN CONTROL ROOM (C 12)	368,426	1709	80	77.9	40-60%	42%
MCR RETURN AIR PLENUM (above C12)	47,964			80.4		
RELAY ROOM and DPSO SHOP (C 13 & C20)	95,970		80	72.9	40-60%	49%
TECHNICAL SUPPORT CENTER (C 14)	21,077			71.1		
CORRIDOR (C 15)	68		93	88.7	27-60%	29%
CONFERENCE & TELEPHONE RM (C 16 & C17)	5,031			71.3		
NRC OFFICES (C 18)	3,539			68.9		
CORRIDOR (C 19)	4,762			80.2		
WEST STAIRWELL (STAIR C1)	63			99.8		
EAST STAIRWELL (STAIR C2)	78			88.3		
EAST ATTIC 1 (ABOVE C14)	7,752			75.0		
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	58			91.0		
EAST ATTIC 2 (ABOVE C15)	37			86.5		
EAST ATTIC 3 (ABOVE STAIR C2)	23			86.4		
WEST ATTIC 2 (ABOVE C2)	66			95.3		
WEST ATTIC 3 (ABOVE STAIR C1)	32			97.3		
SUMMARY:	648,075	4,109				

TOTAL SENSIBLE LOAD:	648,075 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	652,185 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

CONCLUSION:

As demostrated in Appendix A, rooms' temperatures remained at or below the design limits when MCR AHU is operating at 70% design air flow rate capacity during NORMAL operating mode.

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 2,825 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 87.7 °F Design Room Temperature: 91°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			7.2	1,412
SOUTH***	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	120.0	87.7	32.3	5,296
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			-0.2	-17
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	104.0	87.7	16.3	1,068
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	111.5	87.7	23.8	381
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	98.3	87.7	10.6	55
EAST	Door C39	7.17	6.00	43.0	0.448	98.3	87.7	10.6	204
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	95.5	87.7	7.8	911
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	94.1	87.7	6.4	1,712
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	101.3	87.7	13.6	265
FLOOR***	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	120.0	87.7	32.3	19,965
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			12.6	6,189
							TOTAL TRANSMISSION LOAD =		37,439

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 12.6 °F
CLTDcorr(west) = [(21.6 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 7.2 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= -0.2 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	32,002
TOTAL ROOM SENSIBLE LOAD:					**69,441**

TRANSFER AIR	CFM		FACTOR		Ts	Tr	Delta T	
(W. Attic 1) - pg.31 & B.24	1,175	X	0.756		94.1	87.7	6.4	5,685
NET ROOM SENSIBLE LOAD:								**75,126**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	75,126	/ (1.08 x 0.78 x	2,825)	=	87.6 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	0	X	200					0
Transfer - Air (West Attic 1) - pg. 31 & B.24	1,175	X	4840	X	0.78	0.0075	(0.0070)	2,267
TOTAL ROOM LATENT LOAD:								**2267**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,267 / (4840 x 0.78 x 2,825) = **0.0072**

CALCULATED ROOM CONDITIONS: 87.7 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: WOMEN'S TOILET

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 111.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	87.7	111.5	-23.8	-381
SOUTH**	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	120.0	111.5	8.5	153
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	98.3	111.5	-13.2	-362
NORTH	Door C38	7.17	3.00	21.5	0.448	98.3	111.5	-13.2	-127
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	104.2	111.5	-7.3	-117
FLOOR**	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	120.0	111.5	8.5	120
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	101.3	111.5	-10.2	-219
					TOTAL TRANSMISSION LOAD =				-933

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**59**

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 111.5 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 98.3 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	111.5	98.3	13.2	362
SOUTH	Door C38	7.17	3.00	21.5	0.448	111.5	98.3	13.2	127
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	104.2	98.3	5.9	423
SOUTH	Door C37	7.17	3.00	21.5	0.448	104.2	98.3	5.9	57
SOUTH* ***	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	120.0	98.3	21.7	326
SOUTH***	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	120.0	98.3	21.7	280
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	95.5	98.3	-2.8	-116
NORTH	Door C40	7.17	3.00	21.5	0.448	95.5	98.3	-2.8	-27
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	88.3	98.3	-10.0	-396
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	88.3	98.3	-10.0	-200
NORTH	Door C46	7.17	3.00	21.5	0.448	88.3	98.3	-10.0	-96
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	96.3	98.3	-2.0	-56
NORTH	Door C42	7.17	3.00	21.5	0.448	96.3	98.3	-2.0	-19
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	79.4	98.3	-18.9	-552
EAST	Door C56	7.17	4.50	32.3	0.448	79.4	98.3	-18.9	-273
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	87.7	98.3	-10.6	-55
WEST	Door C39	7.17	6.00	43.0	0.448	87.7	98.3	-10.6	-204
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	104.2	98.3	5.9	95
FLOOR***	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	110.0	98.3	11.7	270
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	116.0	98.3	17.7	2,058
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	116.0	98.3	17.7	461
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	94.1	98.3	-4.2	-877
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	94.1	98.3	-4.2	-151
						TOTAL TRANSMISSION LOAD =			1,439

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8". (***) Use normal maximum temperature to remove conservatism postulated in Assumprion 4.1.6.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,757
TOTAL ROOM SENSIBLE LOAD:					**3,196**

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C3
ROOM NAME: CORRIDOR (cont'd)

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(ROOM C4) - pg. 31 & B.5	440	X	0.84	95.5	98.3	-2.8	-1,045
(ROOM C5) - pg. 31 & B.6	155	X	0.84	96.3	98.3	-2.0	-264
(ROOM C10) - pg.31 & B.11	220	X	0.84	88.3	98.3	-10.0	-1,848
NET ROOM SENSIBLE LOAD:							39

ROOM HUMIDITY RATIO (Wr):			
(ROOM C4) - pg. 31 & B.5	440	@	0.0082
(ROOM C5) - pg. 31 & B.6	155	@	0.0070
(ROOM C10) - pg.31 & B.11	220	@	0.0073

Wr = 0.0077

CALCULATED ROOM CONDITIONS: 88 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 440 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 95.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	13.38	107.0	0.500	87.7	95.5	-7.8	-415
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	98.3	95.5	2.8	116
SOUTH	Door C40	7.17	3.00	21.5	0.448	98.3	95.5	2.8	27
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	96.3	95.5	0.8	39
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	91.7	95.5	-3.8	-218
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	95.5	-10.5	-277
FLOOR**	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	120.0	95.5	24.6	1,055
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	116.0	95.5	20.6	3,185
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	94.1	95.5	-1.4	-188
					TOTAL TRANSMISSION LOAD =				3,324

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	10	X	250	=	2,500
ELECTRICAL LOAD (pg. 18) :				=	8,787
TOTAL ROOM SENSIBLE LOAD:					**14,611**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM)

56.0 + 14,611 / (1.08 x 0.78 x 440) = 95.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	10	X	200	2000
TOTAL ROOM LATENT LOAD:				**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,000 / (4840 x 0.78 x 440) = **0.0082**

CALCULATED ROOM CONDITIONS: 95.5 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 90 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 96.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	95.5	96.3	-0.8	-39
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	98.3	96.3	2.0	56
SOUTH	Door C42	7.17	3.00	21.5	0.448	98.3	96.3	2.0	19
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	91.7	96.3	-4.6	-126
NORTH	Door C45	7.17	3.00	21.5	0.448	91.7	96.3	-4.6	-44
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	88.3	96.3	-8.0	-387
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	116.0	96.3	19.8	1,428
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	94.1	96.3	-2.2	-100
						TOTAL TRANSMISSION LOAD =			807

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,994
TOTAL ROOM SENSIBLE LOAD:					**2,801**

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(Room C6) - pg. 31 & B.7	65	X	0.84	96.3	91.7	4.6	249
NET ROOM SENSIBLE LOAD:							**3,050**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	3,050	/ (1.08	x 0.78	x 90	) =	96.2 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 18) :	0	X	200					0
Transfer - Air (Room C6) - pg. 31 & B.7	65	X	4840	X	0.78	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 0 / (4840 x 0.78 x 90) = **0.0070**

CALCULATED ROOM CONDITIONS: 96.3 °F dry bulb

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COOLING LOAD - LOCA

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 65 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 91.7 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	96.3	91.7	4.6	126
SOUTH	Door C45	7.17	3.00	21.5	0.448	96.3	91.7	4.6	44
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	104.0	91.7	12.3	239
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	82.4	91.7	-9.3	-340
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	88.3	91.7	-3.4	-66
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	87.7	91.7	-4.0	-256
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	116.0	91.7	24.3	1,250
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	116.0	91.7	24.3	328
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	94.1	91.7	2.4	169
					TOTAL TRANSMISSION LOAD =				1,495

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	464
TOTAL ROOM SENSIBLE LOAD:					**1,959**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM) = 56.0 + 1,959 / (1.08 x 0.78 x 65) = 91.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 0 / (4840 x 0.78 x 65) = **0.0070**

CALCULATED ROOM CONDITIONS: 91.7 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 104.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" Cl	8.00	4.00	32.0	0.500	111.5	104.2	7.3	117
SOUTH**	755.0 - T1, 36" Cl	8.00	20.54	164.3	0.236	120.0	104.2	15.8	613
NORTH*	755.0' - C3, 8" Cl	8.00	20.54	142.8	0.500	98.3	104.2	-5.9	-423
NORTH	Door C37	7.17	3.00	21.5	0.448	98.3	104.2	-5.9	-57
EAST	755.0' - C3, 8" Cl	8.00	4.00	32.0	0.500	98.3	104.2	-5.9	-95
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	101.8	104.2	-2.4	-144
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				10

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 104.2 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 90.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	94.4	90.5	3.9	60
WEST	Door C53	7.17	3.00	21.5	0.448	94.4	90.5	3.9	38
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	74.6	90.5	-15.9	-146
SOUTH**	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	120.0	90.5	29.5	1,227
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	84.7	90.5	-5.8	-362
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	90.5	-15.9	-380
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	84.7	90.5	-5.8	-87
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	84.7	90.5	-5.8	-44
EAST	Door C60	7.17	3.00	21.5	0.448	84.7	90.5	-5.8	-56
CEILING	E.Attic 3 - 3/4" PL, (Up)	4.00	20.33	81.3	0.730	89.7	90.5	-0.8	-47
CEILING	C13 (1/2" & 5/8" GB) (Up)	4.39	6.00	26.3	0.448	74.6	90.5	-15.9	-188
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				14

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 90.5 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 270 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 82.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	91.7	82.4	9.3	340
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	88.3	82.4	5.9	301
SOUTH	Door C48	7.17	3.00	21.5	0.448	88.3	82.4	5.9	57
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	104.0	82.4	21.6	768
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	79.4	82.4	-3.0	-120
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	116.0	82.4	33.6	1,823
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	94.1	82.4	11.7	986
					TOTAL TRANSMISSION LOAD =				4,154

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	1,829
TOTAL ROOM SENSIBLE LOAD:					**5,983**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM) = 56.0 + 5,983 / (1.08 x 0.78 x 270) = 82.3 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 82.4 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 330 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 88.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	96.3	88.3	8.0	387
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	91.7	88.3	3.4	66
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	98.3	88.3	10.0	396
SOUTH	Door C46	7.17	3.00	21.5	0.448	98.3	88.3	10.0	96
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	98.3	88.3	10.0	200
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	82.4	88.3	-5.9	-301
NORTH	Door C48	7.17	3.00	21.5	0.448	82.4	88.3	-5.9	-57
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	79.4	88.3	-8.9	-689
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	116.0	88.3	27.7	2,902
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	94.1	88.3	5.8	943
						TOTAL TRANSMISSION LOAD =			3,943

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	250		=	500
ELECTRICAL LOAD (pg. 18) :					=	4,502
TOTAL ROOM SENSIBLE LOAD:						**8,945**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM) = 56.0 + 8,945 / (1.08 x 0.78 x 330) = 88.2 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	2	X	200	400
TOTAL ROOM LATENT LOAD:				**400**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 400 / (4840 x 0.78 x 330) = **0.0073**

CALCULATED ROOM CONDITIONS: 88.3 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 31
pg. B.18
pg. B.18

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 79.6 °F (Transfer from room C14)
Supply Air Humidity Ratio: 0.0091 lbW/lb dry air (Transfer from room C14)
Steady State Temperature: 82.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	74.6	82.0	-7.4	-1,115
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			12.8	1,095
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			5.5	244
SOUTH*	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	82.0	38.0	1,507
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	79.6	82.0	-2.4	-703
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			18.3	3,863
					TOTAL TRANSMISSION LOAD =				4,891

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 12.8 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 5.5 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 18.3 °F

ROOM TEMPERATURE (Tr) = (Ts 79.6) + (Q 4,891 / (1.08 x 0.78 .84 x CFM 2,580) = 81.9 °F

CALCULATED ROOM CONDITIONS: 82.0 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Steady State Temperature: 90.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	82.1	90.4	-8.3	-196
SOUTH*	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	120.0	90.4	29.6	843
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	74.6	90.4	-15.8	-953
EAST	E. Attic 3, 8"CI	9.08	4.00	36.3	0.500	89.7	90.4	-0.7	-13
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	74.6	90.4	-15.8	-146
FLOOR	C15 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	94.4	90.4	4.0	234
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			9.8	237
							TOTAL TRANSMISSION LOAD =		6

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 9.8 °F

CALCULATED ROOM CONDITIONS: 90.4 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Steady State Temperature: 89.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E.Attic 2, 8" CI	9.08	4.00	36.3	0.500	90.4	89.7	0.7	13
SOUTH*	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	120.0	89.7	30.3	1,320
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	74.6	89.7	-15.1	-1,394
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	74.6	89.7	-15.1	-236
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	90.5	89.7	0.8	47
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			10.6	257
							TOTAL TRANSMISSION LOAD =		8

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 10.6 °F

CALCULATED ROOM CONDITIONS: 89.7 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 21,650 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 79.4 °F Design Room Temperature: 82°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	98.3	79.4	18.9	552
WEST	Door C56	7.17	4.50	32.3	0.448	98.3	79.4	18.9	273
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	88.3	79.4	8.9	689
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	82.4	79.4	3.0	120
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	94.1	79.4	14.7	617
SOUTH ***	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	120.0	79.4	40.6	14,439
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	104.0	79.4	24.6	1,550
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	104.0	79.4	24.6	813
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	104.0	79.4	24.6	2,787
NORTH	Door C49	6.50	3.00	19.5	0.448	104.0	79.4	24.6	215
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	104.0	79.4	24.6	813
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	104.0	79.4	24.6	1,161
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	104.0	79.4	24.6	1,512
NORTH	Door C50	6.50	3.00	19.5	0.448	104.0	79.4	24.6	215
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	94.4	79.4	15.0	130
EAST	Door C55	7.17	4.50	32.3	0.448	94.4	79.4	15.0	217
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	90.4	79.4	11.0	38
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	74.6	79.4	-4.8	-730
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	116.0	79.4	36.6	75,057
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	**100,468**

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic) (***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	8	X	250	=	2,000
ELECTRICAL LOAD (pg. 18) :				=	334,003
TOTAL ROOM SENSIBLE LOAD:					**436,471**

	CFM				Ts	(-Tr)	
Transfer - Air (C 13) - pg. 31 & B.17	2727	X	1.08	X 0.78	74.6	-79.4	-11,025
NET ROOM SENSIBLE LOAD:							**425,446**

ROOM TEMPERATURE (Tr) = Ts + Q / (CFM x 1.08 x 0.78) = 56.0 + 425,446 / (21,650 x 1.08 x 0.78) = 79.3 °F

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM (cont'd)

LATENT LOAD:									Q latent
PEOPLE (pg. 18) :	8	X	200						1600
Transfer - Air (C 13) - pg. 31 & B.17		2,727	X	4840	X	0.78	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:									**1,600**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,600 / (4840 x 0.78 x 21,650) = **0.0070**

CALCULATED ROOM CONDITIONS: 78.4 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 7,490 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 74.6 °F Design Room Temperature: 79°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	79.4	74.6	4.8	730
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	82.1	74.6	7.5	884
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	89.7	74.6	15.1	236
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	90.4	74.6	15.8	146
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	90.5	74.6	15.9	380
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	84.7	74.6	10.1	1,323
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	94.4	74.6	19.8	644
SOUTH	Door C52	7.17	7.00	50.2	0.448	94.4	74.6	19.8	445
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	90.4	74.6	15.8	953
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	89.7	74.6	15.1	1,394
SOUTH(Sec. tier)***	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	120.0	74.6	45.4	2,339
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	104.0	74.6	29.4	7,101
EAST *	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	76.9	74.6	2.3	145
EAST	Door C63	7.17	3.00	21.5	0.448	76.9	74.6	2.3	22
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	72.0	74.6	-2.6	-139
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	90.5	74.6	15.9	146
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	82.0	74.6	7.4	1,115
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	79.6	74.6	5.0	129
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	116.0	74.6	41.4	26,991
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	116.0	74.6	41.4	669
FLOOR***	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	120.0	74.6	45.4	10,676
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	76.9	74.6	2.3	167
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	72.0	74.6	-2.6	-119
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	84.7	74.6	10.1	292
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Up)			282.2	0.448	84.7	74.6	10.1	1,270
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Up)			26.3	0.448	90.5	74.6	15.9	188
ROOF (CLTD)	27", uninsulated (Down)			2541.4	0.300			25.7	19,556
					TOTAL TRANSMISSION LOAD =				77,684

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling for this room is 8" concrete slab
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 25.7 °F

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C13
ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 18) :					=	39,255
TOTAL ROOM SENSIBLE LOAD:						**116,939**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM) =

56.0 + 116,939 / (1.08 x 0.78 x 7,490) = 74.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS 74.5 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 1,840 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 79.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	84.7	79.6	5.1	60
WEST	Door C51	6.80	3.92	26.7	0.448	84.7	79.6	5.1	60
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	76.9	79.6	-2.7	-206
WEST	Door C62	7.17	3.00	21.5	0.448	76.9	79.6	-2.7	-26
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	72.0	79.6	-7.6	-367
WEST	Window	4.00	3.30	13.2	0.810	72.0	79.6	-7.6	-81
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	74.6	79.6	-5.0	-129
SOUTH**	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	79.6	40.4	1,602
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			7.9	350
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			15.2	1,678
FLOOR**	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	120.0	79.6	40.4	7,326
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	82.0	79.6	2.4	559
								TOTAL TRANSMISSION LOAD =	**10,825**

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 15.2 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 7.9 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	34	X	250	=	8,500
ELECTRICAL LOAD (pg. 18) :				=	8,007
TOTAL ROOM SENSIBLE LOAD:					**38,156**

	CFM				Ts	(-Tr)	
Transfer - Air (C 16) - pg. 31 & B.21	740	X	1.08	X 0.78	76.9	-79.6	-1,683
NET ROOM SENSIBLE LOAD							**36,473**

ROOM TEMPERATURE (Tr) = 56.0 + 36,473 / (1.08 x 0.78 x 1,840) = 79.5 °F

LATENT LOAD:							Q latent
PEOPLE (pg. 18) :	34	X	325				11,050
Transfer - Air (C 16) - pg. 31 & B.21	740	X	4840	X	0.78	0.0084 (0.0070)	3,797
TOTAL ROOM LATENT LOAD:							**14,847**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 14,847 / (4840 x 0.78 x 1,840) = **0.0091**

CALCULATED ROOM CONDITIONS: **79.6 °F dry bulb**

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 94.4 °F Design Room Temperature: 96°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	79.4	94.4	-15.0	-130
WEST	Door C55	7.17	4.50	32.3	0.448	79.4	94.4	-15.0	-217
SOUTH* **	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	120.0	94.4	25.6	527
SOUTH**	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	120.0	94.4	25.6	325
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	74.6	94.4	-19.8	-644
NORTH	Door C52	7.17	7.00	50.2	0.448	74.6	94.4	-19.8	-445
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	90.5	94.4	-3.9	-18
EAST	Door C53	7.17	6.04	43.3	0.448	90.5	94.4	-3.9	-76
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	116.0	94.4	21.6	909
CEILING	E. Attic 2 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	90.4	94.4	-4.0	-234
					TOTAL TRANSMISSION LOAD =				-4

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) See Assumption 4.1.6

LOAD SUMMARY:

INTERNAL:							
PEOPLE (pg. 18) :	0	X	250			=	0
LIGHTING (pg.18, Note 2) :	86.0	X	3.413	X	0%	=	0
EQUIPMENT (pg. 18, Note 2) :	17.2	X	3.413	X	0%	=	0
TOTAL ROOM SENSIBLE LOAD:							**0**

CALCULATED ROOM CONDITIONS: 94.4 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM

Reference
pg. 31
pg. B.15
pg. B.15

Design air flow: 24,017 cfm (Transfer from C12)
Supply Air Temp: 79.4 °F (Transfer from room C12)
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air (Transfer from room C12)
Steady State Temperature: 82.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH**	T1 - 36" CI	7.75	150.70	1167.9	0.236	120.0	82.1	37.9	10,446
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	104.0	82.1	21.9	1,069
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	104.0	82.1	21.9	561
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	104.0	82.1	21.9	1,923
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	104.0	82.1	21.9	561
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	104.0	82.1	21.9	801
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	104.0	82.1	21.9	1,122
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	74.6	82.1	-7.5	-884
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	90.4	82.1	8.3	167
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	94.1	82.1	12.0	1,953
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			18.2	34,464
								TOTAL TRANSMISSION LOAD =	**52,183**

(*) Luminious ceiling panel (plastic)

(**) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 18.2 °F

ROOM TEMPERATURE (Tr) = (Ts 79.4) + (Q 52,183 / (1.08 x 0.78) CFM 24,017) = 82.0 °F

CALCULATED ROOM CONDITIONS: 82.0 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 380 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 76.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	74.6	76.9	-2.3	-145
WEST	Door C63	7.17	3.00	21.5	0.448	74.6	76.9	-2.3	-22
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	84.7	76.9	7.8	94
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	84.7	76.9	7.8	256
SOUTH	Door C57	7.17	3.00	21.5	0.448	84.7	76.9	7.8	75
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	72.0	76.9	-4.9	-105
NORTH	Door C64	7.17	2.67	19.1	0.448	72.0	76.9	-4.9	-42
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	79.6	76.9	2.7	206
EAST	Door C62	7.17	3.00	21.5	0.448	79.6	76.9	2.7	26
FLOOR***	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	120.0	76.9	43.1	1,991
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	74.6	76.9	-2.3	-167
					TOTAL TRANSMISSION LOAD =				2,166

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	4	X	315				=	1,260
ELECTRICAL LOAD (pg. 18) :							=	2,597
TOTAL ROOM SENSIBLE LOAD:								**8,189**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 31 & B.22	360	X	1.08	X	0.78	72.0	-76.9	-1,486
NET ROOM SENSIBLE LOAD								**6,703**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	6,703	/ (1.08 x 0.78 x	380	)	=	76.9 °F

LATENT LOAD:								Q latent
PEOPLE (pg. 18) :	4	X	325					1300
Transfer - Air (C 18) - pg. 31 & B22		360	X	4840	X	0.78	0.0075 (0.0070)	650
TOTAL ROOM LATENT LOAD:								**1,950**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,950 / (4840 x 0.78 x 380) = **0.0084**

CALCULATED ROOM CONDITIONS: 76.9 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 360 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 72.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	74.6	72.0	2.6	139
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	76.9	72.0	4.9	105
SOUTH	Door C64	7.17	2.67	19.1	0.448	76.9	72.0	4.9	42
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	104.0	72.0	32.0	547
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			15.5	208
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	79.6	72.0	7.6	367
EAST	Window	4.00	3.30	13.2	0.820	79.6	72.0	7.6	82
FLOOR***	708.0' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	120.0	72.0	48.0	1,396
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	74.6	72.0	2.6	119
							TOTAL TRANSMISSION LOAD =		3,005

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 15.5 °F

LOAD SUMMARY:

PEOPLE (pg. 18) :	2	X	315	=	630
ELECTRICAL LOAD (pg. 18) :				=	1,222
TOTAL ROOM SENSIBLE LOAD:					**4,857**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.78 x CFM) = 56.0 + 4,857 / (1.08 x 0.78 x 360) = 72.0 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 18) :	2	X	325	650
TOTAL ROOM LATENT LOAD:				**650**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 650 / (4840 x 0.78 x 360) = **0.0075**

CALCULATED ROOM CONDITIONS: 72.0 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 260 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 84.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	90.5	84.7	5.8	87
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	90.5	84.7	5.8	44
WEST	Door C60	7.17	3.00	21.5	0.448	90.5	84.7	5.8	56
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	84.7	-10.1	-240
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	74.6	84.7	-10.1	-1,323
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	76.9	84.7	-7.8	-180
NORTH	Door C57	7.17	3.00	21.5	0.448	76.9	84.7	-7.8	-75
SOUTH^	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	120.0	84.7	35.4	2,344
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	90.5	84.7	5.8	362
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	76.9	84.7	-7.8	-94
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	79.6	84.7	-5.1	-60
EAST	Door C51	6.83	3.92	26.8	0.448	79.6	84.7	-5.1	-61
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	116.0	84.7	31.4	1,137
FLOOR ***	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	120.0	84.7	35.4	704
FLOOR ***	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	120.0	84.7	35.4	2,778
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	74.6	84.7	-10.1	-292
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	74.6	84.7	-10.1	-959
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	74.6	84.7	-10.1	-312
							TOTAL TRANSMISSION LOAD =		3,918

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 18) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 18) :				=	2,361
TOTAL ROOM SENSIBLE LOAD:					**6,279**

ROOM TEMPERATURE (Tr) = $Ts + \frac{Q}{1.08 \times 0.78 \times CFM}$ = $56.0 + \frac{6,279}{1.08 \times 0.78 \times 260}$ = 84.7 °F

CALCULATED ROOM CONDITIONS: 84.7 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 94.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)*	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	120.0	94.1	25.9	1,311
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	101.8	94.1	7.7	771
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	101.3	94.1	7.2	335
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	87.7	94.1	-6.4	-1,712
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	101.8	94.1	7.7	175
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	104.0	94.1	9.9	973
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	82.1	94.1	-12.0	-1,953
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	79.4	94.1	-14.7	-617
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	98.3	94.1	4.2	1,028
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	95.5	94.1	1.4	188
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	96.3	94.1	2.2	100
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.427	91.7	94.1	-2.4	-169
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	82.4	94.1	-11.7	-986
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	88.3	94.1	-5.8	-943
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			6.2	2,941
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			6.2	82
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			6.2	96
							TOTAL TRANSMISSION LOAD =		1,619

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.
(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 6.2 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 12) - pg. 31 & B.15	360	X	1.08	X	0.78	79.4	-94.1	-4,458
Transfer - Air (C 3) - pg. 31 & B.4	815	X	1.08	X	0.78	98.3	-94.1	2,863
TOTAL ROOM SENSIBLE LOAD:								**24**

ROOM HUMIDITY RATIO (Wr):

(Room C12) - pg. 31 & B.15	360	@	0.0070
(Room C3) - pg. 31 & B.4	815	@	0.0077

Wr = 0.0075

CALCULATED ROOM CONDITIONS: 94.1 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Steady State Temperature: 101.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	87.7	101.3	-13.6	-265
SOUTH*	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	120.0	101.3	18.7	410
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	94.1	101.3	-7.2	-335
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	101.8	101.3	0.5	10
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	111.5	101.3	10.2	219
ROOF (CLTD)	27", uninsulated (Up)	9.53	4.00	38.1	0.331			-1.1	-13
							TOTAL TRANSMISSION LOAD =		25

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= -1.1 °F

CALCULATED ROOM CONDITIONS: 101.3 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Steady State Temperature: 101.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	101.3	101.8	-0.5	-10
SOUTH*	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	120.0	101.8	18.2	860
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	94.1	101.8	-7.7	-771
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	94.1	101.8	-7.7	-150
FLOOR	Stair C1 - 3/4" PL, (Up)	20.54	4.00	82.2	0.730	104.2	101.8	2.4	144
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			-1.6	-42
							TOTAL TRANSMISSION LOAD =		31

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= -1.6 °F

CALCULATED ROOM CONDITIONS: 101.8 °F dry bulb

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APPENDIX B - MINIMUM FLOW (LOCA)

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 31, Diagram 4)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. page	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	82.0	0.0091	B.12	23.6	211,560
CORRIDOR (C 19)	260	84.7	0.0070	B.23	1.8	22,009
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	74.6	0.0070	B.17	33.3	355,357
SHIFT ENGINEERS OFFICE (C10)	110	88.3	0.0073	B.11	0.8	9,713
CONFERENCE ROOM (C 9)	270	82.4	0.0070	B.10	1.9	22,248
MCR RETURN AIR PLENUM	24,017	82.1	0.0070	B.20	168.1	1,971,755
TOTAL	**Vreturn = 32,000**				**229.5**	**2,592,642**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn: Treturn = **81.0 °F**
Return Air Humidity Ratio from MCR spaces: Wreturn = **0.0072 # MOIST / # DRY AIR**

Mechanical equipment room flow (Vmer) = 3289 cfm (pg. 31, Diagram 4)
Mechanical equip. room temperature (Tmer) = 87.7 °F (pg. B.1)
Mech. equip. room humidity ratio (Wmer) = 0.0072 # MOIST / # DRY AIR

Outside Air Flow (Voa) = 711 cfm (pg. 31, Diagram 4)
Outside Air Temperature (Toa) = 95 °F DB, 74 °F WB (Section 6.1)
Δ T pressurizing fan (Δ Tpr) = 4.9 °F (Fan Heat Gain @ pg.22)
Outside Air Humidity Ratio (Woa) = 0.0133 # MOIST / # DRY AIR

Δ T air cleaning unit (Δ Tcu) = 7.7 °F (Fan Heat Gain @ pg.23)
Air cleaning unit flow (Vcu) = 4000 cfm (pg. 31, Diagram 4)

AIR CLEANING UNIT DISCHARGE TEMPERATURE:

Tcu = Δ Tcu + [(Vmer x Tmer) + Voa x (Toa + Δ Tpr)] / Vcu
Tcu = 97.6 °F

AIR CLEANING UNIT HUMIDITY RATIO:

Wcu = [(Voa x Woa) + (Wmer x Vmer)] / Vcu
Wcu = 0.0083 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT (Te) :

Te = [(Vreturn x Treturn) +(Vcu x Tcu)] / (Vreturn + Vcu)
Te = 83 °F DB, 64°F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT (We) : We = [(Vreturn x Wreturn) +(Vcu x Wcu)] / (Vreturn + Vcu)
We = 0.0073 # MOIST / # DRY AIR
Relative humidity = 30%

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APPENDIX B

COOLING LOAD - LOCA OPERATION WITH MIMIMUM FLOW RATE

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB	
	SENSIBLE	LATENT	DESIGN	ST. STATE
MECHANICAL EQUIPMENT ROOM (C1)	75,126		91	87.7
WOMEN'S TOILET (C 2)	59			111.5
CORRIDOR (C 3)	39		98	98.3
KITCHEN (C 4)	14,611	2000		95.5
MEN'S TOILET (C 5)	3,050			96.3
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	1,959		98	91.7
CONFERENCE ROOM (C 9)	5,983			82.4
SHIFT ENGINEER'S OFFICE (C 10)	8,945	400		88.3
MAIN CONTROL ROOM (MCR) (C 12)	425,446	1600	82	79.4
MCR RETURN AIR PLENUM (above C12)	52,183			82.1
RELAY ROOM and DPSO SHOP (C 13 & C20)	116,939		79	74.6
TECHNICAL SUPPORT CENTER (C 14)	36,473	14,847		79.6
CORRIDOR (C 15)	0		96	94.4
CONFERENCE & TELEPHONE RM (C 16 & C17)	6,703	1950		76.9
NRC OFFICES (C 18)	4,857	650		72.0
CORRIDOR (C 19)	6,279			84.7
WEST STAIRWELL (STAIR C1)	10			104.2
EAST STAIRWELL (STAIR C2)	14			90.5
EAST ATTIC 1 (ABOVE C14)	4,891			82.0
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	24			94.1
EAST ATTIC 2 (ABOVE C15)	6			90.4
EAST ATTIC 3 (ABOVE STAIR C2)	8			89.7
WEST ATTIC 2 (ABOVE C2)	25			101.3
WEST ATTIC 3 (ABOVE STAIR C1)	31			101.8
SUMMARY:	763,662	21,447		

TOTAL SENSIBLE LOAD:	763,662 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	785,110 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

CONCLUSION:

As demostrated in Appendix B, rooms' temperatures remained at or below the design limits when MCR AHU is operating at 78% design air flow rate capacity during accident (LOCA) operating mode.

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Appendix C – Dual Unit Operation Analysis

The purpose of this appendix is to determine the dual unit operation cooling load in the Main Control Room and associated rooms of the Control Building el. 755.0. The room conditions for each individual room of el. 755.0 of the control building will also be determined. The tables found in this appendix are available from Excel spreadsheet EPMLCP072489REV13.xls that can be retrieved from File Keeper (Document ID #313149).

Room Electrical Heat Loads

This Appendix utilizes electrical heat loads from the relevant dual unit operation applicable revisions of electrical heat load calculations WBNEEBMSTI090022 and WBNEEBMSTI090058 (References 5.8.8 and 5.8.9 respectively) and UVA 4.2.1. A room-by-room explanation of electrical heat loads is provided below-

Mechanical Equipment Room (755.0-C1)

Reference 5.8.8 accounts for a lighting heat load of 1,462 Watts for this room for either Normal or LOCA conditions. There are no electrical cable heat loads for this room. Reference 5.8.8 also accounts for 18,178 Watts and 22,430 Watts for Normal and LOCA conditions respectively for equipment heat loads. However, many of these equipment heat loads are either not running or the heat generating equipment is mounted within the airstream of the ductwork or equipment housing. The main body of this calculation identifies the equipment that is located in the airstream on pages 22 and 23. Subtracting out these heat loads results in heat load reductions of 13,200 Watts and 17,700 Watts for Normal and LOCA conditions respectively. Additionally, Reference 5.8.8 also accounts for heat generated from Control Building Pressurization Fans that are abandoned per Reference 5.2.1. This results in a further 600 Watt reduction for both Normal and LOCA conditions. Lastly, an additional 187.5 watts can be eliminated for LOCA conditions for taking credit that the Spreading Room Supply Fan is not running concurrent with a CRI signal (Reference 5.6). The resulting equipment heat loads are 4,378 Watts and 3,943 Watts for Normal and LOCA conditions respectively. Adding the lighting heat loads of 1,462 Watts, the total electrical heat load is 5,840 Watts (19,927 Btu/hr) and 5405 Watts (18,443 Btu/hr) for Normal and LOCA conditions respectively. These heat loads are far less than the heat load of 32,002 Btu/hr that was used for the single unit operation only part of the calculation. The 32,002 Btu/hr amount was determined by analysis of actual measured temperatures and HVAC system flow rates. Therefore, for conservatism, the 32,002 Btu/hr value will be retained for the Normal and LOCA conditions cooling load analysis part of this appendix. The heating load analysis part of this calculation will use the 4378 Watts (14,938 Btu/hr) and 3943 Watts (13,454 Btu/hr) values because those values will be conservative for that purpose.

Women's Toilet (755.0-C2)

Reference 5.8.9 states a reduced electrical heat load amount of 160 Watts (546 Btu/hr) for this room. However, the higher 992 Btu/hr value used by the single unit operation only part of the calculation will be retained for conservatism for the cooling load analysis part of this appendix. For conservatism, a value of 0 Btu/hr will be used for the heating load analysis part of this appendix. The same also goes for Corridor 755.0-C15, the West Stair, and the East Stair in the heating load analysis.

Corridor, Locker Rm & Showers, Conference Rm, Technical Support Center, NRC Offices and Corridor (755.0-C3, -C6, -C7, -C8, -C9, -C14, -C18, and –C19)

All of these rooms have higher electrical heat loads from References 5.8.8 and 5.8.9 than those used in the single unit operation only part of this calculation. Therefore, for the purposes of the cooling load analysis part of this appendix and conservatism, the new higher electrical heat loads from References 5.8.8 and 5.8.9 will be utilized.

For the heating load analysis, only 25% of the heat loads from equipment is utilized for these rooms. The new equipment heat loads from References 5.8.8 and 5.8.9 for these rooms are the same or lower than those used in the single unit operation only part of this calculation except for 755.0-C14. Therefore, for conservatism, the lower heat loads are always used.

Kitchen, Men's Toilet, Shift Engineer's Office, Conference Rm & Telephone (755.0-C4, -C5, -C10, -C16, and –C17)

Reference 5.8.9 demonstrates heat load reductions for these rooms. Therefore, for the sake of conservatism in the cooling load analysis part of this appendix, the electrical heat loads used in the single unit operation only part of this calculation are retained.

For the heating load analysis, again only 25% of the heat loads from equipment is utilized. The equipment heat loads in Reference 5.8.9 for these rooms are the same as was used in the single unit operation only part of this calculation.

Relay Room, & DPSO Shop (755.0-C13 and –C20)

References 5.8.8 and 5.8.9 account for a higher electrical heat load that that used in the single unit operation only part of this calculation. Therefore, for the sake of conservatism in the cooling load analysis part of this appendix, the new electrical heat loads totaled from References 5.8.8 and 5.8.9 for rooms C13 and C20 are utilized.

For the heating load analysis, only 50% of the heat loads from equipment is utilized for these rooms. The equipment heat loads total from Reference 5.8.8 and 5.8.9 for these rooms is the same as was used in the single unit operation only part of this calculation.

Main Control Room (MCR) (755.0-C12)

The methodology of this calculation treats the MCR as two separate but related spaces the division of which is demarcated by the suspended ceiling (See Section View B7-B7 of Reference 5.1.3). The lower 10 feet of the space is the MCR proper (i.e. the MCR), and the upper 7.75 feet is the MCR plenum. Previous revisions of this calculation accounted for all electrical heat loads, including lighting heat loads, to be located in the MCR proper. In reality, all of the lighting heat load originates and mostly remains in the MCR plenum. This is due to the fact that both the fluorescent and emergency incandescent lights are suspended about 18" above the suspended ceiling (Section View A3-A3 of Reference 5.1.16) with the suspended ceiling at El. 765.0 and the lights at approximately El. 766.5. This is possible due to the fact that the suspended ceiling is of a "luminous ceiling panel" type of suspended ceiling (Note 2 on Reference 5.1.2). Conditioned air is delivered directly to the lower MCR proper space by triangular duct and grilles (Section View C3-C3 of Reference 5.1.2) that are mounted flush with the suspended ceiling. The mixed and heated air in the MCR proper rises and enters the MCR plenum via natural convection. Little or no air should fall from the MCR plenum back into the MCR proper because the return ductwork and grilles are located in the MCR plenum. Therefore, most of the lighting heat load leaves the MCR plenum before ever having the chance to transfer to the MCR proper.

This appendix will account for half of the MCR lighting heat loads to be in the MCR plenum. This is a deviation from the previous revision methodology and is not as conservative as the previous methodology but is still conservative since only a small fraction of the lighting heat actually transfers to below the suspended ceiling. Another deviation from the previous revision methodology is the treatment of transfer air from the Relay Room (755.0-C13). Per Section View D3-D3 of Reference 5.1.12, the wall penetration for fire damper 0-XFD-31-153 is above the MCR suspended ceiling. Therefore, the air is transferred to the MCR plenum instead of the MCR proper. This is conservative for the purposes of analyzing cooling loads because the air in 755.0-C13 is demonstrated to be cooler than the air in either of the MCR spaces (i.e. the MCR proper will not have the benefit of cooling air from 755.0-C13).

UVA 4.2.1 states MCR electrical heat loads that are higher than those used by the single unit operation only part of this calculation. Even with half of the lighting load moved to the MCR plenum (27,016 Watts or 92,182 Btu/hr), the electrical heat load in the MCR proper is significantly higher than the value used in the single unit operation only part of this calculation (121,016 Watts or 413,000 Btu/hr vs. 316,241 Btu/hr for Normal conditions and 334,003 Btu/hr for LOCA conditions).

For the heating load analysis, only 50% of the heat loads from equipment in the MCR is utilized. This amounts to about 160,000 Btu/hr. This value is lower (more conservative for heating load analysis) than the value (172,362 Btu/hr) used in the

single unit operation only part of the calculation. Since the amount of heat load specifically from emergency lighting in the MCR is known (UVA 4.2.1), this heat is accounted for in the MCR plenum. The amount is 12,150 Watts or 41,457 Btu/hr.

Summary of Room Heat Loads

Cooling-

ROOM NUMBER & DESCRIPTION	NUMBER of PEOPLE		ELECTRICAL LOAD (BTU/HR)	
	NORMAL	LOCA	NORMAL	LOCA
MECHANICAL EQUIPMENT ROOM (C1) [5]			32,002	32,002
WOMEN'S TOILET (C 2) [5]			992	992
CORRIDOR (C 3) [4]			4,832	4,832
KITCHEN (C 4) [5]	10	10	8,787	8,787
MEN'S TOILET (C 5) [5]			1,994	1,994
LOCKER RM & SHOWERS (C 6, C7 & C8) [4]			1,808	1,808
CONFERENCE ROOM (C 9) [4]			2,310	2,310
SHIFT ENGINEER'S OFFICE (C 10) [5]	2	2	4,502	4,502
MAIN CONTROL ROOM (C 12) [4]	8	8	413,000	413,000
RELAY ROOM and DPSO SHOP (C 13 & C20) [4]			81,857	81,857
TECHNICAL SUPPORT CENTER (C 14) [3][4]		34	21,851	21,851
CORRIDOR (C 15) [2]				
CONF. RM & TELEPHONE (C 16 & C17) [3][5]		4	2,597	2,597
NRC OFFICES (C 18) [3][4]		2	1,621	1,621
CORRIDOR (C 19) [4]			7,459	7,459
WEST STAIR C1 [1]				
EAST STAIR C2 [1]				

NOTES:

[1] SEE SECTION 6.7 OF THE MAIN CALCULATION BODY FOR STAIR ELECTRICAL LOAD.

[2] FOR CORRIDOR (ROOM C15) ELECTRICAL LOAD IS TAKEN FROM REF. 5.8.2: 86 WATTS (LIGHTING) AND 17.2 WATTS (EQUIPMENT).

[3] TOTAL 40 PEOPLE IN THESE THREE ROOMS. SEE ATTACHMENT 1 AND SECTION 6.6.

[4] ELECTRICAL LOADS FROM REFS. 5.8.8, 5.8.9 AND UVA 4.2.1

[5] ELECTRICAL LOADS RETAINED FROM SINGLE UNIT OPERATION ONLY ANALYSIS FOR CONSERVATISM

Heating-

ELECTRICAL LOAD / ROOM NUMBER & DESCRIPTION	DESIGN LIGHTING [1] (WATTS)	DESIGN EQUIPMENT (WATTS)	DESIGN EQUIPMENT (BTU/HR) [2]	REF.	ACTUAL [6] (Ref. 5.10) (BTU/HR)	ELECTRICAL LOAD TO BE USED NORMAL (BTU/HR)	LOCA (BTU/HR)	
MECHANICAL EQUIPMENT ROOM (C1)	1,462	4,377	14,940	5.8.2	32,002	14,940	13,453	(Note 6)
WOMEN'S TOILET (C 2)	133	27	23	5.8.4		0	0	(Note 5)
CORRIDOR (C 3)	1,180	236	201	5.8.4	1,757	201	0	(Note 3 & 4)
KITCHEN (C 4)	627	125	107	5.8.4	8,787	107	0	↓
MEN'S TOILET (C 5)	487	97	83	5.8.4	1,994	83	0	↓
LOCKER RM & SHOWERS (C 6, C7 & C8)	441	89	76	5.8.2	464	76	0	(Note 4 & 6)
CONFERENCE ROOM (C 9)	564	113	96	5.8.4	1,829	96	0	(Note 3 & 4)
SHIFT ENGINEER'S OFFICE (C 10)	1,099	220	188	5.8.4	4,502	188	0	(Note 3 & 4)
MAIN CONTROL ROOM (C 12)	27,016	94,000	160,411	5.8.3	316,241	160,411	160,411	(Note 6)
RELAY ROOM and DPSO SHOP (C 13 & C20)	3,658	20,332	34,697	5.8.2	39,255	34,697	34,697	(Note 3)
TECHNICAL SUPPORT CENTER (C 14)	2,433	2,627	2,241	5.8.4	8,007	2,241	2,241	(Note 3)
CORRIDOR (C 15)	86	0	0	5.8.2		0	0	(Note 5)
CONFERENCE RM & TELEPHONE (C 16 & C17)	634	127	108	5.8.4	2,597	108	0	(Note 3 & 4)
NRC OFFICES (C 18)	396	79	67	5.8.4	1,222	67	0	↓
CORRIDOR (C 19)	1,185	1,031	880	5.8.4	2,361	880	0	↓
WEST STAIR C1	-	-	-	Sect. 6.7		0	0	(Note 5)
EAST STAIR C2	-	-	-	Sect. 6.7		0	0	(Note 5)

NOTES:

(1) LIGHTING LOAD, EXCEPT FOR MCR PLENUM EMERGENCY LIGHTS, IS NOT CONSIDERED; SEE ASSUMPTION 4.1.5.

(2) TOTAL LOAD FOR ROOM C1, 50% OF EQUIPMENT LOAD FOR ROOMS C12 & C13, AND 25% OF EQUIPMENT LOAD FOR REMAINING ROOMS AS STATED IN ASSUMPTION 4.1.5.

(3) NO CHANGE IN ELECTRICAL HEAT LOADS BETWEEN SINGLE UNIT OPERATION ONLY AND VALUES IN REFERENCES 5.8.8 AND 5.8.9 EXCEPT FOR ROOM C14 WHICH HAS A NEW HIGHER EQUIPMENT ELECTRICAL HEAT LOAD. SINGLE UNIT OPERATION ELECTRICAL HEAT LOAD VALUE USED FOR CONSERVATISM

(4) MISC. EQUIPMENT LOAD WAS CONSIDERED AS 20% OF THE LIGHTING LOAD. SINCE LIGHTING LOAD IS "0", EQUIPMENT LOAD = "0" ALSO; CONSERVATIVE.

(5) CONSERVATIVELY, ELECTRICAL LOAD WAS CONSIDERED AS "0" FOR THIS ROOM.

(6) LOWER ELECTRICAL HEAT LOADS FROM REFERENCES 5.8.8, 5.8.9, AND UVA 4.2.1 ARE USED FOR CONSERVATISM

Room Transmission Loads (Cooling - Normal Operation)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

		Reference
Design air flow:	2,825 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	81.6 °F Design Room Temperature: 86°F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			13.3	2,603
SOUTH	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	110.0	81.6	28.4	4,656
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			5.9	649
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	85.0	81.6	3.4	223
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	97.7	81.6	16.1	258
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	93.4	81.6	11.8	61
EAST	Door C39	7.17	6.00	43.0	0.448	93.4	81.6	11.8	227
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	87.3	81.6	5.7	664
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	90.2	81.6	8.6	2,309
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	94.9	81.6	13.3	259
FLOOR	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	110.0	81.6	28.4	17,554
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			18.7	9,198
					TOTAL TRANSMISSION LOAD =				38,661

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.

Area (excluding floor) = 4502

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 18.7 °F
CLTDcorr(west) = [(21.6+0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 13.3 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 5.9 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 4 of App. C) :					=	32,002
TOTAL ROOM SENSIBLE LOAD:						**70,663**

	Tr		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	70,663	/ (1.08 x 0.9 x	2,825	) =	81.7 °F	

LATENT LOAD: Q latent

PEOPLE (pg. 4 of App. C) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0	/ (0.9 x 4840 x	2825	) =	**0.0085**

CALCULATED ROOM CONDITIONS: **81.6 °F dry bulb, 37% RH**

This Appendix added by Revision 013.

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: WOMEN'S TOILET

			Reference
Design air flow:	230 cfm	(Transfer from room C3)**	pg. 30
Supply Air Temp:	93.4 °F	(Transfer from room C3)	pg. 8 of App. C
Supply Air Humidity Ratio:	0.0088 lbW/lb dry air	(Transfer from room C3)	pg. 8 of App. C
Steady State Temperature:	97.7 °F		

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	81.6	97.7	-16.1	-258
SOUTH	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	110.0	97.7	12.3	221
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	93.4	97.7	-4.3	-118
NORTH	Door C38	7.17	3.00	21.5	0.448	93.4	97.7	-4.3	-41
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	100.6	97.7	2.8	45
FLOOR	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	110.0	97.7	12.3	173
CEILING	W. Attic 2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	94.9	97.7	-2.8	-45
					TOTAL TRANSMISSION LOAD =				-22

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 255

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**970**

ROOM TEMPERATURE (Tr) = (Ts 93.4) + (Q 970 / (1.08 x 0.9 x CFM 230)) = 97.7 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0088 + 0 / (0.9 x 4840 x 230) = **0.0088**

CALCULATED ROOM CONDITIONS: **97.7 °F dry bulb**

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

Reference
pg. 30
pg. 15 pf App. C
pg. 15 pf App. C

Design air flow: 320 cfm (Transfer from room C10)
Supply Air Temp: 81.8 °F (Transfer from room C10)
Supply Air Humidity Ratio: 0.0088 lbW/lb dry air (Transfer from room C10)
Steady State Temperature: 93.4 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	97.7	93.4	4.3	118
SOUTH	Door C38	7.17	3.00	21.5	0.448	97.7	93.4	4.3	41
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	100.5	93.4	7.1	507
SOUTH	Door C37	7.17	3.00	21.5	0.448	100.5	93.4	7.1	68
SOUTH*	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	110.0	93.4	16.6	249
SOUTH	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	110.0	93.4	16.6	214
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.456	87.3	93.4	-6.2	-254
NORTH	Door C40	7.17	3.00	21.5	0.448	87.3	93.4	-6.2	-59
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	81.8	93.4	-11.6	-461
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	81.8	93.4	-11.6	-233
NORTH	Door C46	7.17	3.00	21.5	0.448	81.8	93.4	-11.6	-112
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	86.9	93.4	-6.5	-180
NORTH	Door C42	7.17	3.00	21.5	0.448	86.9	93.4	-6.5	-63
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	78.1	93.4	-15.3	-447
EAST	Door C56	7.17	4.50	32.3	0.448	78.1	93.4	-15.3	-221
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	81.6	93.4	-11.8	-61
WEST	Door C39	7.17	6.00	43.0	0.448	81.6	93.4	-11.8	-227
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	100.5	93.4	7.1	114
FLOOR	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	110.0	93.4	16.6	382
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	95.0	93.4	1.6	186
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	95.0	93.4	1.6	42
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	90.2	93.4	-3.2	-667
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	90.2	93.4	-3.2	-115
						TOTAL TRANSMISSION LOAD =			-1,179

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8".

Area (excluding floor) = 1175

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 4 of App. C) :					=	4,832
TOTAL ROOM SENSIBLE LOAD:						3,653

	Ts		Q	1.08 x 0.9	CFM		
ROOM TEMPERATURE (Tr) = (	81.8)	+ (	3,653	/(.972 x	320)	=	93.5 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				0

ROOM HUMIDITY RATIO (Wr) = 0.0088 + 0 / (0.9 x 4840 x 320) = **0.0088**

CALCULATED ROOM CONDITIONS:	93.4 °F dry bulb
	27% RH

This Appendix added by Revision 013.

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 440 cfm**
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 87.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	81.6	87.3	-5.7	-664
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	93.4	87.3	6.2	254
SOUTH	Door C40	7.17	3.00	21.5	0.448	93.4	87.3	6.2	59
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	86.9	87.3	-0.3	-17
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	86.1	87.3	-1.2	-67
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	87.3	-2.3	-60
FLOOR	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	110.0	87.3	22.8	977
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	95.0	87.3	7.8	1,201
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	90.2	87.3	3.0	415
					TOTAL TRANSMISSION LOAD =				2,099

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 1107

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	10	X	250	=	2,500
ELECTRICAL LOAD (pg. 4 of App. C) :					8,787
TOTAL ROOM SENSIBLE LOAD:					**13,386**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 13,386 / (1.08 x 0.9 x 440) = 87.3 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	10	X	200	2000
TOTAL ROOM LATENT LOAD:				**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 2,000 / (4840 x 0.9 x 440) = **0.0096**

CALCULATED ROOM CONDITIONS: 87.3 °F dry bulb

ROOM NO. 755.0-C5
ROOM NAME: MEN'S TOILET

(Ref. 5.1.4 & 5.5.1)

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 90 cfm***
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 86.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	87.3	86.9	0.3	17
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	93.4	86.9	6.5	180
SOUTH	Door C42	7.17	3.00	21.5	0.448	93.4	86.9	6.5	63
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	86.1	86.9	-0.8	-22
NORTH	Door C45	7.17	3.00	21.5	0.448	86.1	86.9	-0.8	-8
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	81.8	86.9	-5.1	-248
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	95.0	86.9	8.1	586
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	90.2	86.9	3.3	155
						TOTAL TRANSMISSION LOAD =			722

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 517

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,994
TOTAL ROOM SENSIBLE LOAD:					**2,716**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	2,716	/ (1.08 x 0.9 x	90	) =	87.0 °F	

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 86.9 °F dry bulb

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 65 cfm***
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 86.1 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	86.9	86.1	0.8	22
SOUTH	Door C45	7.17	3.00	21.5	0.448	86.9	86.1	0.8	8
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	85.0	86.1	-1.1	-21
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	76.7	86.1	-9.4	-343
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	81.8	86.1	-4.3	-83
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	81.6	86.1	-4.5	-288
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	95.0	86.1	8.9	458
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	95.0	86.1	8.9	120
CEILING	W. Attic 1 - 5/8" GB (Dn)	16.02	10.31	165.2	0.338	90.2	86.1	4.1	231
					TOTAL TRANSMISSION LOAD =				102

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.
(***) Air is exhausted via toilet & locker room relief fan.

Area (excluding floor) = 581

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,808
TOTAL ROOM SENSIBLE LOAD:					**1,910**

ROOM TEMPERATURE (Tr) = Ts 56.0 + Q 1,910 / (1.08 x 0.9 x CFM 65) = 86.2 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 65) = **0.0085**

CALCULATED ROOM CONDITIONS:	86.1 °F dry bulb 32% RH

ROOM NO. - STAIR C1
ROOM NAME: WEST STAIRWELL

(Ref. 5.1.1 & 5.1.12)

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 100.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	97.7	100.5	-2.8	-45
SOUTH	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	110.0	100.5	9.5	388
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	93.4	100.5	-7.1	-507
NORTH	Door C37	7.17	3.00	21.5	0.448	93.4	100.5	-7.1	-68
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	93.4	100.5	-7.1	-114
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	97.2	100.5	-3.3	-198
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-563

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250			=	0
LIGHTING (Note 1, pg. 4 of App. C)	184.3	X	3.413	X	100%	=	561
TOTAL ROOM SENSIBLE LOAD:							**0**

CALCULATED ROOM CONDITIONS:	100.5 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 91.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	90.0	91.1	-1.1	-17
WEST	Door C53	7.17	3.00	21.5	0.448	90.0	91.1	-1.1	-11
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	74.6	91.1	-16.5	-151
SOUTH	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	110.0	91.1	18.9	786
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	85.0	91.1	-6.1	-377
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	91.1	-16.5	-394
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	85.0	91.1	-6.1	-91
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	85.0	91.1	-6.1	-46
EAST	Door C60	7.17	3.00	21.5	0.448	85.0	91.1	-6.1	-59
CEILING	E.Attic 3 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	87.9	91.1	-3.2	-190
CEILING	C13-1/2" & 5/8" GB (Up)	4.39	6.00	26.3	0.448	74.6	91.1	-16.5	-195
FLOOR (See Note)									
					TOTAL TRANSMISSION LOAD =				-745

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250			=	0
LIGHTING (Note 1, pg. 4 of App. C) :	215.3	X	3.413	X	100%	=	735
TOTAL ROOM SENSIBLE LOAD:							0

CALCULATED ROOM CONDITIONS:	91.1 °F dry bulb

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 270 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 76.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	86.1	76.7	9.4	343
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	81.8	76.7	5.1	260
SOUTH	Door C48	7.17	3.00	21.5	0.448	81.8	76.7	5.1	49
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	85.0	76.7	8.3	295
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	78.1	76.7	1.4	56
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	95.0	76.7	18.3	993
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	90.2	76.7	13.5	1,140
					TOTAL TRANSMISSION LOAD =				3,137

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 595

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C): 0 X 250 = 0
ELECTRICAL LOAD (pg. 4 of App. C): = 2,310
TOTAL ROOM SENSIBLE LOAD: 5,447

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 76.7 °F
56.0 + 5,447 / (1.08 x 0.9 x 270) = 76.7 °F

LATENT LOAD: Q latent
PEOPLE (pg. 4 of App. C): 0 X 200 = 0
TOTAL ROOM LATENT LOAD: 0

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 270) = 0.0085

CALCULATED ROOM CONDITIONS: 76.7 °F dry bulb

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 330 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 81.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	86.9	81.8	5.1	248
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	86.1	81.8	4.3	83
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	93.4	81.8	11.6	461
SOUTH	Door C46	7.17	3.00	21.5	0.448	93.4	81.8	11.6	112
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	93.4	81.8	11.6	233
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	76.7	81.8	-5.1	-260
NORTH	Door C48	7.17	3.00	21.5	0.448	76.7	81.8	-5.1	-49
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	78.1	81.8	-3.7	-287
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	95.0	81.8	13.2	1,383
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	90.2	81.8	8.4	1,371
						TOTAL TRANSMISSION LOAD =			3,295

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

Area (excluding floor) = 895

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	2	X	250	=	500
ELECTRICAL LOAD (pg. 4 of App. C) :				=	4,502
TOTAL ROOM SENSIBLE LOAD:					**8,297**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	56.0 +	8,297 / (1.08 x 0.9 x	330)	=	81.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	2	X	200	400
TOTAL ROOM LATENT LOAD:				**400**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 400 / (4840 x 0.9 x 330) = **0.0088**

CALCULATED ROOM CONDITIONS: 81.8 °F dry bulb

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 30
pg. 21 of App. C
pg. 21 of App. C

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 73.4 °F (Transfer from room C14)
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air (Transfer from room C14)
Steady State Temperature: 76.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" Cl	7.75	42.00	325.5	0.463	74.8	76.3	-1.7	-256
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			18.5	1,582
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			11.2	495
SOUTH	708.0' - T1, 36" Cl	10.00	16.80	168.0	0.236	110.0	76.3	33.7	1,336
FLOOR	C14 Ceiling (Ac.tile) (Dn)	16.80	42.00	705.6	0.330	73.4	76.3	-2.9	-675
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			24.0	5,070
					TOTAL TRANSMISSION LOAD =				7,551

Area (excluding floor) = 1693

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 18.5 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 11.2 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 24.0 °F

ROOM TEMPERATURE (Tr) = (Ts 73.4) + (Q 7,551 / (1.08 x 0.9 .972 x CFM 2,580)) = 76.4 °F

CALCULATED ROOM CONDITIONS: 76.3 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 87.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	83.3	87.9	-4.6	-109
SOUTH	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	110.0	87.9	22.1	629
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	74.6	87.9	-13.3	-802
EAST	E. Attic 3, 8" CI	9.08	4.00	36.3	0.500	87.9	87.9	0.0	0
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	74.6	87.9	-13.3	-123
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	90.0	87.9	2.1	123
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			12.4	297
							TOTAL TRANSMISSION LOAD =		15

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 12.4 °F

CALCULATED ROOM CONDITIONS: 87.9 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 87.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	87.9	87.9	0.0	0
SOUTH	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	110.0	87.9	22.1	963
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	74.6	87.9	-13.3	-1,226
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	74.6	87.9	-13.3	-208
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	91.1	87.9	3.2	190
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			12.4	301
							TOTAL TRANSMISSION LOAD =		18

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 12.4 °F

CALCULATED ROOM CONDITIONS: 87.9 °F dry bulb

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 21,650 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 78.1 °F Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	93.4	78.1	15.3	447
WEST	Door C56	7.17	4.50	32.3	0.448	93.4	78.1	15.3	221
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	81.8	78.1	3.7	287
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	76.7	78.1	-1.4	-56
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	90.2	78.1	12.1	509
SOUTH	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	110.0	78.1	31.9	11,345
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	85.0	78.1	6.9	435
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	80.0	78.1	1.9	63
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	85.0	78.1	6.9	782
NORTH	Door C49	6.50	3.00	19.5	0.448	85.0	78.1	6.9	60
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	80.0	78.1	1.9	63
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	89.0	78.1	10.9	514
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	85.0	78.1	6.9	424
NORTH	Door C50	6.50	3.00	19.5	0.448	85.0	78.1	6.9	60
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	90.0	78.1	11.9	103
EAST	Door C55	7.17	4.50	32.3	0.448	90.0	78.1	11.9	172
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	87.9	78.1	9.8	34
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	74.6	78.1	-3.5	-532
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	95.0	78.1	16.9	34,657
CEILING**	MCR Plenum	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	49,589

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic)

LOAD SUMMARY:

Area (excl. floor/ceiling) = 3857

PEOPLE (pg. 4 of App. C) :	8	X	250	=	2,000
ELECTRICAL LOAD (pg. 4 of App. C) :				=	413,000
TOTAL ROOM SENSIBLE LOAD:					**464,589**

	CFM				Ts	Tr	
Transfer - Air (C 13) - not included here see MCR Plenum	2727	X	1.08	X	0.9	74.6	78.1	-9,276
Transfer - Air (West Attic 1) - pg. 30 & App. C pg.27	143	X	1.08	X	0.9	90.2	78.1	1,686
NET ROOM SENSIBLE LOAD:								**466,275**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 78.1 °F

56.0 + 466,275 / (1.08 x 0.9 x 21,650) = 78.1 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	8	X	200					1600
Transfer - Air (C 13) - not included here see MCR Plenum	2,727	X	4840	X	0.9	0.0085	-0.0085	0
Transfer - Air (West Attic 1) - pg. 30 & App. C pg. 27	143	X	4840	X	0.9	0.0087	-0.0085	109
TOTAL ROOM LATENT LOAD:								**1,709**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 1709 / (4840 x 0.9 x 21,650) = **0.0085**

CALCULATED ROOM CONDITIONS:	78.1 °F dry bulb 41% RH

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 7,490 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 74.6 °F Design Room Temperature: 80°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	78.1	74.6	3.5	532
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	83.3	74.6	8.7	1,026
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	87.9	74.6	13.3	208
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	87.9	74.6	13.3	123
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	91.1	74.6	16.5	394
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	85.0	74.6	10.4	1,369
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	85.0	0.500	90.0	74.6	15.4	501
SOUTH	Door C52	7.17	7.00	50.2	0.448	90.0	74.6	15.4	346
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	87.9	74.6	13.3	802
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	87.9	74.6	13.3	1,228
SOUTH(Second tier)	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	110.0	74.6	35.4	1,824
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	85.0	74.6	10.4	2,512
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	70.4	74.6	-4.2	-265
EAST	Door C63	7.17	3.00	21.5	0.448	70.4	74.6	-4.2	-40
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	68.4	74.6	-6.2	-331
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	91.1	74.6	16.5	151
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	76.3	74.6	1.7	256
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	73.4	74.6	-1.2	-31
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	95.0	74.6	20.4	13,300
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	95.0	74.6	20.4	330
FLOOR	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.389	110.0	74.6	35.4	8,324
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	70.4	74.6	-4.2	-304
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	68.4	74.6	-6.2	-283
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	85.0	74.6	10.4	302
FLOOR (Sec. tier)	C19 (1/2"& 5/8" GB)(Up)			282.2	0.448	85.0	74.6	10.4	1,315
FLOOR (Sec. tier)	E.Stair(1/2"/5/8"GB)(Up)			26.3	0.448	91.1	74.6	16.5	195
ROOF (CLTD)	27", uninsulated (Down)			2587.7	0.300			25.7	19,759
					TOTAL TRANSMISSION LOAD =				53,541

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
** Ceiling for this room is 8" concrete slab

Area (excluding floor) =	5970

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 25.7 °F

ROOM NO. 755.0-C13 & C20 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 4 of App. C) :					=	81,857
TOTAL ROOM SENSIBLE LOAD:						**135,398**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) =

56.0 + 135,398 / (1.08 x 0.9 x 7,490) = 74.6 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 7,490) = **0.0085**

CALCULATED ROOM CONDITIONS: **74.6 °F dry bulb**
46% RH

This Appendix added by Revision 013.

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

		Reference
Design air flow:	1,840 cfm	pg. 30
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0085 lbW/lb dry air	pg. 29A
Steady State Temperature:	73.4 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	85.0	73.4	11.6	138
WEST	Door C51	6.80	3.92	26.7	0.448	85.0	73.4	11.6	139
WEST*	755.0' - C18, 10" CI	8.67	21.50	164.9	0.463	70.4	73.4	-3.0	-229
WEST	Door C62	7.17	3.00	21.5	0.448	70.4	73.4	-3.0	-29
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	68.4	73.4	-5.0	-241
WEST	Window	4.00	3.30	13.2	0.810	68.4	73.4	-5.0	-53
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	74.6	73.4	1.2	31
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	110.0	73.4	36.6	1,451
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			14.1	622
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			21.4	2,360
FLOOR	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	110.0	73.4	36.6	6,637
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	76.3	73.4	2.9	675
					TOTAL TRANSMISSION LOAD =				11,500

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 1874

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 21.4 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 14.1 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	315				=	0
ELECTRICAL LOAD (pg. 4 of App. C) :							=	21,851
TOTAL ROOM SENSIBLE LOAD:								**33,351**

	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 30 & App. C pg. 24	740	X	1.08	X	0.9	70.4	-73.4	-2,158
NET ROOM SENSIBLE LOAD:								**31,193**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	31,193	/ (1.08 x 0.9 x	1,840	)	=	73.4 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	0	X	325					0
Transfer - Air (C 16) - pg. 30 & App. C pg. 24	740	X	4840	X	0.9	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) =	0.0085	+	0 / (4840	x 0.9 x	1,840	)	=	**0.0085**

CALCULATED ROOM CONDITIONS: 73.4 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 90.0 °F Design Room Temperature: 93°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	78.1	90.0	-11.9	-103
WEST	Door C55	7.17	4.50	32.3	0.448	78.1	90.0	-11.9	-172
SOUTH*	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	110.0	90.0	20.0	411
SOUTH	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	110.0	90.0	20.0	254
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	74.6	90.0	-15.4	-501
NORTH	Door C52	7.17	7.00	50.2	0.448	74.6	90.0	-15.4	-346
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	91.1	90.0	1.1	5
EAST	Door C53	7.17	6.04	43.3	0.448	91.1	90.0	1.1	21
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	95.0	90.0	5.0	210
CEILING	E. Attic 2 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	87.9	90.0	-2.1	-123
					TOTAL TRANSMISSION LOAD =				-344

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

Area (excluding floor) = 415

LOAD SUMMARY:

ELECTRICAL:

PEOPLE (pg. 4 of App. C) :	0	X	250			=	0
LIGHTING (pg. 4 of App. C, Note 2) :	86.0	X	3.413	X	100%	=	294
EQUIPMENT (pg. 4 of App. C, Note 2) :	17.2	X	3.413	X	100%	=	59
TOTAL ROOM SENSIBLE LOAD:							**9**

CALCULATED ROOM CONDITIONS: 90.0 °F dry bulb
28% RH

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM (above room C12)

Reference
pg. 30
pg. 18 of App. C
pg. 18 of App. C

Design air flow: 24,520 cfm (Transfer from room C12)
Supply Air Temp: 78.1 °F (Transfer from room C12)
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air (Transfer from room C12)
Steady State Temperature: 83.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH	T1 - 36" CI	7.75	150.70	1167.93	0.236	110.0	83.3	26.7	7,359
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	85.0	83.3	1.7	83
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	80.0	83.3	-3.3	-84
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	85.0	83.3	1.7	149
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	80.0	83.3	-3.3	-84
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	89.0	83.3	5.7	209
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	85.0	83.3	1.7	87
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	74.6	83.3	-8.7	-1,026
EAST	E.Attic 2, 12" CI	7.75	6.04	46.8	0.431	87.9	83.3	4.6	93
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	90.2	83.3	6.9	1,128
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			17.0	32,185
					TOTAL TRANSMISSION LOAD** =				123,005

(*) Luminious ceiling panel (plastic)
(**) includes the transfer air from C13 and 92,182 Btu/hr for lights

Area (excluding floor) = 9311

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 17.0 °F

ROOM TEMPERATURE (Tr) = (Ts 78.1) + (Q 123,005 / (1.08 x 0.9 .972 x CFM 24,520) = 83.3 °F

CALCULATED ROOM CONDITIONS: 83.3 °F dry bulb

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 380 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 70.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	74.6	70.4	4.2	265
WEST	Door C63	7.17	3.00	21.5	0.448	74.6	70.4	4.2	40
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	85.0	70.4	14.6	177
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	85.0	70.4	14.6	481
SOUTH	Door C57	7.17	3.00	21.5	0.448	85.0	70.4	14.6	141
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	68.4	70.4	-2.0	-43
NORTH	Door C64	7.17	2.67	19.1	0.448	68.4	70.4	-2.0	-17
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	73.4	70.4	3.0	229
EAST	Door C62	7.17	3.00	21.5	0.448	73.4	70.4	3.0	29
FLOOR	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	110.0	70.4	39.6	1,828
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	74.6	70.4	4.2	304
							TOTAL TRANSMISSION LOAD =		3,437

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 720

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250				=	0
ELECTRICAL LOAD (pg. 4 of App. C) :							=	2,597
TOTAL ROOM SENSIBLE LOAD:								**6,034**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 30 & App. C pg. 25	360	X	1.08	X	0.9	68.4	-70.4	-700
NET ROOM SENSIBLE LOAD:								**5,334**

ROOM TEMPERATURE (Tr) = Ts 56.0 + Q 5,334 / (1.08 x 0.9 x CFM 380) = 70.4 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	0	X	315					0
Transfer - Air (C 18) - pg. 30 & App. C pg. 25	360	X	4840	X	0.9	0.0085	-0.0085	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 380) = **0.0085**

CALCULATED ROOM CONDITIONS: 70.4 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C18
ROOM NAME: NRC OFFICES

(Ref. 5.1.1, 5.1.6, 5.1.10)

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 360 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 68.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	74.6	68.4	6.2	331
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	70.4	68.4	2.0	43
SOUTH	Door C64	7.17	2.67	19.1	0.448	70.4	68.4	2.0	17
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	85.0	68.4	16.6	284
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			19.1	256
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	73.4	68.4	5.0	241
EAST	Window	4.00	3.30	13.2	0.820	73.4	68.4	5.0	54
FLOOR	708' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	110.0	68.4	41.6	1,210
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	74.6	68.4	6.2	283
							TOTAL TRANSMISSION LOAD =		2,719

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

Area (excluding floor) = 544

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 19.1 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	315	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,621
TOTAL ROOM SENSIBLE LOAD:					**4,340**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 4,340 / (1.08 x 0.9 x 360) = 68.4 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	325	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 360) = **0.0085**

CALCULATED ROOM CONDITIONS: 68.4 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 30
pg. 29A
pg. 29A

Design air flow: 260 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0085 lbW/lb dry air
Steady State Temperature: 85.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	91.1	85.0	6.1	91
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	91.1	85.0	6.1	46
WEST	Door C60	7.17	3.00	21.5	0.448	91.1	85.0	6.1	59
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	85.0	-10.4	-249
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	74.6	85.0	-10.4	-1,369
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	70.4	85.0	-14.6	-339
NORTH	Door C57	7.17	3.00	21.5	0.448	70.4	85.0	-14.6	-141
SOUTH	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	110.0	85.0	25.0	1,657
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	74.6	85.0	-10.4	-643
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	70.4	85.0	-14.6	-177
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	73.4	85.0	-11.6	-137
EAST	Door C51	6.83	3.92	26.8	0.448	73.4	85.0	-11.6	-139
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	95.0	85.0	10.0	363
FLOOR	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	110.0	85.0	25.0	498
FLOOR	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	110.0	85.0	25.0	1,964
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	74.6	85.0	-10.4	-302
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	74.6	85.0	-10.4	-992
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	74.6	85.0	-10.4	-323
							TOTAL TRANSMISSION LOAD =		-132

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

Area (excluding floor) = 1344

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	7,459
TOTAL ROOM SENSIBLE LOAD:					**7,327**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 7,327 / (1.08 x 0.9 x 260) = 85.0 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

ROOM HUMIDITY RATIO (Wr) = 0.0085 + 0 / (4840 x 0.9 x 260) = **0.0085**

CALCULATED ROOM CONDITIONS: **85.0 °F dry bulb**

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 90.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	110.0	90.2	19.8	1,001
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	97.2	90.2	7.0	698
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	94.9	90.2	4.7	217
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	81.6	90.2	-8.6	-2,309
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	97.2	90.2	7.0	159
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	85.0	90.2	-5.2	-514
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	83.3	90.2	-8.9	-1,128
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	78.1	90.2	-12.1	-509
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	93.4	90.2	3.2	782
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	87.3	90.2	-3.0	-415
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	86.9	90.2	-3.3	-155
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.338	86.1	90.2	-4.1	-231
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	76.7	90.2	-13.5	-1,140
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	81.8	90.2	-8.4	-1,371
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			10.0	4,792
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			10.0	134
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			10.0	156
						TOTAL TRANSMISSION LOAD =			166

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.

Area (excluding floor) = 3433

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 10.0 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 1) - pg. 30 & App. C pg. 8	53	X	1.08	X	0.9	81.6	-90.2	-445
Transfer - Air (C 3) - pg. 30 & App. C pg. 8	90	X	1.08	X	0.9	93.4	-90.2	277
TOTAL ROOM SENSIBLE LOAD:								**0**

ROOM HUMIDITY RATIO (Wr):

(ROOM C1) - pg. 30 & App. C pg. 8	53	@	0.0085	
(ROOM C3) pg. 30 & App. C pg. 8	90	@	0.0088	
			Wr =	**0.0087**

CALCULATED ROOM CONDITIONS: **90.2 °F dry bulb**
29% RH

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 94.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	81.6	94.9	-13.3	-259
SOUTH	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	110.0	94.9	15.1	331
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	90.2	94.9	-4.7	-217
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	97.2	94.9	2.3	45
FLOOR	755.0'-C2, 5/8" GB (Dn)	9.53	4.00	38.1	0.417	97.7	94.9	2.8	45
ROOF (CLTD)	27", uninsulated (Down)	9.53	4.00	38.1	0.300			5.3	61
						TOTAL TRANSMISSION LOAD =			5

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 5.3 °F

CALCULATED ROOM CONDITIONS: 95 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 97.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	94.9	97.2	-2.3	-45
SOUTH	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	110.0	97.2	12.8	605
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	90.2	97.2	-7.0	-698
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	90.2	97.2	-7.0	-136
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	100.6	97.2	3.3	198
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			3.1	83
						TOTAL TRANSMISSION LOAD =			7

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 3.1 °F

CALCULATED ROOM CONDITIONS: 97 °F dry bulb

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 30, Diagram 2)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. pg. App. C	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	76.3	0.0085	16	22.0	196,854
CORRIDOR (C 19)	260	85.0	0.0085	26	2.2	219,300
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	74.6	0.0085	20	40.5	19,396
SHIFT ENGINEERS OFFICE (C10)	10	81.8	0.0088	15	0.1	818
CONFERENCE ROOM (C 9)	270	76.7	0.0085	14	2.3	20,709
MCR RETURN AIR PLENUM	24,520	83.3	0.0085	23	209.2	2,042,475
TOTAL	Vreturn = 32,403				276.3	2,499,552

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn = Treturn: 77.1 °F

Return Air Humidity from MCR spaces: SUM (cfm X HUM.) / Vreturn = Wret: 0.0085 # MOIST / # DRY AIR

Outside Air Flow: Voa = 3,597 cfm (pg. 30, Diagram 2)
Outside Air Temperature: Toa = 95 °F DB, 74 °F WB (Section 6.1)
Outside Air Humidity Ratio: Woa = 0.0133 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT: Te = [(Vreturn x Treturn) +(Voa x Toa)] / (Vreturn + Voa)

Te = 79 °F DB, 61.5 °F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT: We = [(Vreturn x Wreturn) +(Voa x Woa)] / (Vreturn + Voa)

Humidity ratio = 0.0090 # MOIST / # DRY AIR

Relative humidity = 52%

This Appendix added by Revision 013.

Room Transmission Loads (Cooling - LOCA Operation)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 2,825 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 85.9 °F Design Room Temperature: 91°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (CLTD)	36" CE	17.75	42.00	745.5	0.262			9.0	1,763
SOUTH***	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	120.0	85.9	34.1	5,591
NORTH (CLTD)	36" CE	17.75	23.50	417.1	0.262			1.6	179
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	104.0	85.9	18.1	1,186
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	111.9	85.9	26.0	416
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	98.9	85.9	13.0	67
EAST	Door C39	7.17	6.00	43.0	0.448	98.9	85.9	13.0	250
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	93.1	85.9	7.2	846
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	94.2	85.9	8.3	2,207
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	101.3	85.9	15.4	300
FLOOR***	708.0' - T1, 18" C (Up)	39.14	42.00	1643.9	0.376	120.0	85.9	34.1	21,077
ROOF (CLTD)	27", uninsulated (Down)	39.14	42.00	1643.9	0.300			14.4	7,077
							TOTAL TRANSMISSION LOAD =		40,960

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative.
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 14.4 °F
CLTDcorr(west) = [(21.6 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (west)= 9.0 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 1.6 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 4 of App. C) :					=	32,002
TOTAL ROOM SENSIBLE LOAD:						**72,962**

TRANSFER AIR	CFM		FACTOR		Ts	Tr	Delta T	
(W. Attic 1) - pg. 31 & App. C pg	1,175	X	0.972		94.2	85.9	8.3	9,422
NET ROOM SENSIBLE LOAD:								**82,384**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 86.0 °F
56.0 + 82,384 / (1.08 x 0.9 x 2,825) = 86.0 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200					0
Transfer - Air (West Attic 1) - pg. 31 & App. C pg. 51		1,175	X	4840	X	0.9	0.0074	(0.0070)	2,267
TOTAL ROOM LATENT LOAD:								**2267**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,267 / (4840 x 0.9 x 2,825) = **0.0072**

CALCULATED ROOM CONDITIONS: **85.9 °F dry bulb**

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)

ROOM NAME: WOMEN'S TOILET

Reference
pg. 31

Design air flow: - cfm

Supply Air Temp: - °F

Supply Air Humidity Ratio: - lbW/lb dry air

Steady State Temperature: 111.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	85.9	111.9	-26.0	-416
SOUTH**	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	120.0	111.9	8.1	146
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	98.9	111.9	-13.1	-357
NORTH	Door C38	7.17	3.00	21.5	0.448	98.9	111.9	-13.1	-126
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	104.6	111.9	-7.3	-117
FLOOR**	708.0' - T1, 18" TC (Up)	9.53	4.00	38.1	0.369	120.0	111.9	8.1	114
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	101.3	111.9	-10.6	-227
					TOTAL TRANSMISSION LOAD =				-983

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	992
TOTAL ROOM SENSIBLE LOAD:					**9**

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS: 111.9 °F dry bulb

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

Reference pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 98.9 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	111.9	98.9	13.1	357
SOUTH	Door C38	7.17	3.00	21.5	0.448	111.9	98.9	13.1	126
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	104.6	98.9	5.7	409
SOUTH	Door C37	7.17	3.00	21.5	0.448	104.6	98.9	5.7	55
SOUTH* ***	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	120.0	98.9	21.2	318
SOUTH***	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	120.0	98.9	21.2	273
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	93.1	98.9	-5.8	-237
NORTH	Door C40	7.17	3.00	21.5	0.448	93.1	98.9	-5.8	-55
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	86.7	98.9	-12.2	-485
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	86.7	98.9	-12.2	-245
NORTH	Door C46	7.17	3.00	21.5	0.448	86.7	98.9	-12.2	-118
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	94.2	98.9	-4.7	-130
NORTH	Door C42	7.17	3.00	21.5	0.448	94.2	98.9	-4.7	-45
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	80.3	98.9	-18.6	-542
EAST	Door C56	7.17	4.50	32.3	0.448	80.3	98.9	-18.6	-268
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	85.9	98.9	-13.0	-67
WEST	Door C39	7.17	6.00	43.0	0.448	85.9	98.9	-13.0	-250
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	104.6	98.9	5.7	92
FLOOR***	708.0' - T1, 18" TC (Up)	6.67	9.36	62.4	0.369	120.0	98.9	21.2	487
FLOOR	729.0' - C1, 8" TC (Up)	6.67	33.21	221.5	0.524	116.0	98.9	17.2	1,991
FLOOR	729.0' - C1, 8" TC (Up)	4.67	10.63	49.6	0.524	116.0	98.9	17.2	446
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	94.2	98.9	-4.7	-989
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	94.2	98.9	-4.7	-170
						TOTAL TRANSMISSION LOAD =			952

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8". (***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	4,832
TOTAL ROOM SENSIBLE LOAD:					**5,784**

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(ROOM C4) - pg. 31 & App. C pg. 33	440	X	0.972	93.1	98.9	-5.8	-2,459
(ROOM C5) - pg. 31 & App. C pg. 34	155	X	0.972	94.2	98.9	-4.7	-708
(ROOM C10) - pg. 31 & App. C pg. 39	220	X	0.972	86.7	98.9	-12.2	-2,609
NET ROOM SENSIBLE LOAD:							**8**

ROOM HUMIDITY RATIO (Wr):

(ROOM C4) - pg. 31 & App. C pg. 33	440	@	0.0080
(ROOM C5) - pg. 31 & App. C pg. 34	155	@	0.0070
(ROOM C10) - pg. 31 & App. C pg. 39	220	@	0.0073

Wr = 0.0076

CALCULATED ROOM CONDITIONS: 98.9 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

		Reference
Design air flow:	440 cfm	pg. 31
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0070 lbW/lb dry air	pg. 29
Steady State Temperature:	93.1 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	13.38	107.0	0.500	85.9	93.1	-7.2	-385
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	98.9	93.1	5.8	237
SOUTH	Door C40	7.17	3.00	21.5	0.448	98.9	93.1	5.8	55
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	94.2	93.1	1.1	51
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	93.8	93.1	0.7	43
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	85.0	93.1	-8.1	-215
FLOOR**	708.0' - T1, 18" TC (Up)	8.70	13.38	116.4	0.369	120.0	93.1	26.9	1,155
FLOOR	729.0' - C1, 8" TC (Up)			295.8	0.524	116.0	93.1	22.9	3,549
CEILING	W. Attic 1 - 5/8" GB (Dn)	29.38	14.03	412.2	0.338	94.2	93.1	1.1	146
						TOTAL TRANSMISSION LOAD =			4,638

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	10	X	250		=	2,500
ELECTRICAL LOAD (pg. 4 of App. C) :					=	8,787
TOTAL ROOM SENSIBLE LOAD:						**15,925**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 15,925 / (1.08 x 0.9 x 440) = 93.2 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	10	X	200	2000
TOTAL ROOM LATENT LOAD:				**2000**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 2,000 / (4840 x 0.9 x 440) = **0.0080**

CALCULATED ROOM CONDITIONS: 93.1 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 90 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 94.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	93.1	94.2	-1.1	-51
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	98.9	94.2	4.7	130
SOUTH	Door C42	7.17	3.00	21.5	0.448	98.9	94.2	4.7	45
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	93.8	94.2	-0.3	-9
NORTH	Door C45	7.17	3.00	21.5	0.448	93.8	94.2	-0.3	-3
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	86.7	94.2	-7.5	-365
FLOOR	729.0' - C1, 8" TC (Up)	10.31	13.38	137.9	0.524	116.0	94.2	21.9	1,579
CEILING	W. Attic 1 - 5/8" GB (Dn)	10.31	13.38	137.9	0.338	94.2	94.2	0.0	0
						TOTAL TRANSMISSION LOAD =			1,327

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,994
TOTAL ROOM SENSIBLE LOAD:					**3,321**

TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(Room C6) - pg. 31 & App. C pg. 35	65	X	0.972	94.2	93.8	0.3	20
NET ROOM SENSIBLE LOAD:							**3,341**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 3,341 / (1.08 x 0.9 x 90) = 94.2 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200					0
Transfer - Air (Room C6) - pg. 31 & App. C pg 35	65	X	4840	X	0.9	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:								**0**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 0 / (4840 x 0.9 x 90) = **0.0070**

CALCULATED ROOM CONDITIONS:	94.2 °F dry bulb

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 65 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 93.8 °F Design Room Temperature: 98°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	94.2	93.8	0.3	9
SOUTH	Door C45	7.17	3.00	21.5	0.448	94.2	93.8	0.3	3
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	104.0	93.8	10.2	198
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	81.6	93.8	-12.2	-447
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	86.7	93.8	-7.2	-139
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	85.9	93.8	-7.9	-508
FLOOR	729.0' - C1, 18" TC (Up)	16.02	8.70	139.4	0.369	116.0	93.8	22.2	1,140
FLOOR	729.0' - C1, 8" TC (Up)			25.8	0.524	116.0	93.8	22.2	300
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	94.2	93.8	0.3	23
					TOTAL TRANSMISSION LOAD =				578

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,808
TOTAL ROOM SENSIBLE LOAD:					**2,386**

	Ts		Q		CFM			
ROOM TEMPERATURE (Tr) =	56.0	+	2,386	/ (1.08 x 0.9 x	65	) =	93.8 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

ROOM HUMIDITY RATIO (Wr) =	0.0070	+	0 / (4840	x 0.9 x	65	) =	**0.0070**

CALCULATED ROOM CONDITIONS:	93.8 °F dry bulb

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

Reference pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 104.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	111.9	104.6	7.3	117
SOUTH**	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	120.0	104.6	15.4	598
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	98.9	104.6	-5.7	-409
NORTH	Door C37	7.17	3.00	21.5	0.448	98.9	104.6	-5.7	-55
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	98.9	104.6	-5.7	-92
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	102.0	104.6	-2.6	-155
FLOOR (See Note)									
						TOTAL TRANSMISSION LOAD =			4

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS:	104.6 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 93.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	95.7	93.4	2.3	35
WEST	Door C53	7.17	3.00	21.5	0.448	95.7	93.4	2.3	22
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	77.1	93.4	-16.3	-149
SOUTH**	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	120.0	93.4	26.6	1,106
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	90.1	93.4	-3.3	-204
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	77.1	93.4	-16.3	-390
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	90.1	93.4	-3.3	-49
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	90.1	93.4	-3.3	-25
EAST	Door C60	7.17	3.00	21.5	0.448	90.1	93.4	-3.3	-32
CEILING	E.Attic 3 - 3/4" PL, (Up)	4.00	20.33	81.3	0.730	91.6	93.4	-1.8	-107
CEILING	C13 (1/2" & 5/8" GB) (Up)	4.39	6.00	26.3	0.448	77.1	93.4	-16.3	-192
FLOOR (See Note)									
							TOTAL TRANSMISSION LOAD =		16

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS:	93.4 °F dry bulb

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

		Reference
Design air flow:	270 cfm	pg. 31
Supply Air Temp:	56.0 °F	pg. 29A
Supply Air Humidity Ratio:	0.0070 lbW/lb dry air	pg. 29
Steady State Temperature:	81.6 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	93.8	81.6	12.2	447
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	86.7	81.6	5.1	258
SOUTH	Door C48	7.17	3.00	21.5	0.448	86.7	81.6	5.1	49
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	104.0	81.6	22.4	796
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	80.3	81.6	-1.3	-52
FLOOR	729.0' - C1, 8" CRP (Up)	10.03	16.70	167.5	0.324	116.0	81.6	34.4	1,867
CEILING	W. Attic 1 - 3/4" PL (Dn)	10.03	16.70	167.5	0.503	94.2	81.6	12.6	1,057
					TOTAL TRANSMISSION LOAD =				4,421

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	2,310
TOTAL ROOM SENSIBLE LOAD:					**6,731**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 81.6 °F

56.0 + 6,731 / (1.08 x 0.9 x 270) = 81.6 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200	0
TOTAL ROOM LATENT LOAD:				**0**

CALCULATED ROOM CONDITIONS:	81.6 °F dry bulb

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 330 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 86.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	94.2	86.7	7.5	365
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	93.8	86.7	7.2	139
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	98.9	86.7	12.2	485
SOUTH	Door C46	7.17	3.00	21.5	0.448	98.9	86.7	12.2	118
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	98.9	86.7	12.2	245
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	81.6	86.7	-5.1	-258
NORTH	Door C48	7.17	3.00	21.5	0.448	81.6	86.7	-5.1	-49
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	80.3	86.7	-6.4	-492
FLOOR	729.0' - C1, 8" CRP (Up)	16.70	19.36	323.3	0.324	116.0	86.7	29.4	3,075
CEILING	W. Attic 1 - 3/4" PL (Dn)	16.70	19.36	323.3	0.503	94.2	86.7	7.5	1,220
						TOTAL TRANSMISSION LOAD =			4,848

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	2	X	250	=	500
ELECTRICAL LOAD (pg. 4 of App. C) :				=	4,502
TOTAL ROOM SENSIBLE LOAD:					**9,850**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 9,850 / (1.08 x 0.9 x 330) = 86.7 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	2	X	200	400
TOTAL ROOM LATENT LOAD:				**400**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 400 / (4840 x 0.9 x 330) = **0.0073**

CALCULATED ROOM CONDITIONS:	86.7 °F dry bulb

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 31
pg. 45 of App. C
pg. 45 of App. C

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 78.0 °F (Transfer from room C14)
Supply Air Humidity Ratio: 0.0089 lbW/lb dry air (Transfer from room C14)
Steady State Temperature: 80.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	77.1	80.5	-3.4	-512
EAST (CLTD)	36" CE	7.75	42.00	325.5	0.262			14.3	1,223
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			7.0	310
SOUTH*	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	80.5	39.5	1,566
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	78.0	80.5	-2.5	-732
ROOF (CLTD)	27", uninsulated (Down)	16.80	42.00	705.6	0.300			19.8	4,181
					TOTAL TRANSMISSION LOAD =				6,036

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 14.3 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 7.0 °F
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 19.8 °F

$$\text{ROOM TEMPERATURE (Tr)} = \left(\frac{Ts}{78.0} \right) + \left(\frac{Q}{6{,}036 / (.972 \times 1.08 \times 0.9 \times 2{,}580)} \right) = 80.4\ ^\circ F$$

CALCULATED ROOM CONDITIONS: 80.5 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Steady State Temperature: 92.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	85.7	92.1	-6.4	-151
SOUTH*	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	120.0	92.1	27.9	795
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	77.1	92.1	-15.0	-905
EAST	E. Attic 3, 8"CI	9.08	4.00	36.3	0.500	91.6	92.1	-0.5	-9
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	77.1	92.1	-15.0	-139
FLOOR	C15 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	95.7	92.1	3.6	211
ROOF (CLTD)	27", uninsulated (Dn)	13.29	6.04	80.3	0.300			8.2	196
						TOTAL TRANSMISSION LOAD =			0

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 8.2 °F

CALCULATED ROOM CONDITIONS: 92.1 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Steady State Temperature: 91.6 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E.Attic 2, 8" CI	9.08	4.00	36.3	0.500	92.1	91.6	0.5	9
SOUTH*	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	120.0	91.6	28.4	1,237
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	77.1	91.6	-14.5	-1,338
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	77.1	91.6	-14.5	-227
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	93.4	91.6	1.8	107
ROOF (CLTD)	27", uninsulated (Dn)	4.00	20.33	81.3	0.300			8.7	211
						TOTAL TRANSMISSION LOAD =			0

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 8.7 °F

CALCULATED ROOM CONDITIONS: 91.6 °F dry bulb

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 21,650 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 80.3 °F Design Room Temperature: 82°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	98.9	80.3	18.6	542
WEST	Door C56	7.17	4.50	32.3	0.448	98.9	80.3	18.6	268
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	98.7	80.3	6.4	492
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	81.6	80.3	1.3	52
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	94.2	80.3	13.9	582
SOUTH ***	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	120.0	80.3	39.7	14,119
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	104.0	80.3	23.7	1,493
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	104.0	80.3	23.7	783
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	104.0	80.3	23.7	2,685
NORTH	Door C49	6.50	3.00	19.5	0.448	104.0	80.3	23.7	207
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	104.0	80.3	23.7	783
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	104.0	80.3	23.7	1,119
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	104.0	80.3	23.7	1,457
NORTH	Door C50	6.50	3.00	19.5	0.448	104.0	80.3	23.7	207
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	95.7	80.3	15.4	133
EAST	Door C55	7.17	4.50	32.3	0.448	95.7	80.3	15.4	223
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	92.1	80.3	11.8	41
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	77.1	80.3	-3.2	-487
FLOOR	729.0' -C1, 8" CRP (Up)	42.00	150.70	6329.4	0.324	116.0	80.3	35.7	73,211
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	97,910

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic)
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	8	X	250				=	2,000
ELECTRICAL LOAD (pg. 4 of App. C) :							=	413,000
TOTAL ROOM SENSIBLE LOAD:								**512,910**

	CFM					Ts	(-Tr)	
Transfer - Air (C 13) - not included here see MCR Plenum	2727	X	1.08	X	0.9	77.1	-80.3	-8,481
NET ROOM SENSIBLE LOAD:								**512,910**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 512,910 / (1.08 x 0.9 x 21,650) = 80.4 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	8	X	200					1600
Transfer - Air (C 13) - not included here see MCR Plenum	2,727	X	4840	X	0.9	0.0070	(0.0070)	0
TOTAL ROOM LATENT LOAD:								**1,600**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,600 / (4840 x 0.9 x 21,650) = **0.0070**

CALCULATED ROOM CONDITIONS: 80.3 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 7,490 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 77.1 °F Design Room Temperature: 79°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	80.3	77.1	3.2	487
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	85.7	77.1	8.6	1,014
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	91.6	77.1	14.5	227
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	92.1	77.1	15.0	139
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	93.4	77.1	16.3	390
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	90.1	77.1	13.0	1,711
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	95.7	77.1	18.6	605
SOUTH	Door C52	7.17	7.00	50.2	0.448	95.7	77.1	18.6	418
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	92.1	77.1	15.0	905
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	91.6	77.1	14.5	1,338
SOUTH(Sec. tier)***	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	120.0	77.1	42.9	2,210
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	104.0	77.1	26.9	6,497
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	74.1	77.1	-3.0	-190
EAST	Door C63	7.17	3.00	21.5	0.448	74.1	77.1	-3.0	-29
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	71.5	77.1	-5.6	-299
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	93.4	77.1	16.3	149
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	80.5	77.1	3.4	512
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	78.0	77.1	0.9	23
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	116.0	77.1	38.9	25,361
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	116.0	77.1	38.9	628
FLOOR***	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	120.0	77.1	42.9	10,088
FLOOR (Sec. tier)**	C16 (Area above) (Dn)			179.7	0.403	74.1	77.1	-3.0	-217
FLOOR (Sec. tier)**	C18 (Area above) (Dn)			113.2	0.403	71.5	77.1	-5.6	-255
FLOOR (Sec. tier)**	C19 (Near C16) (Up)			54.0	0.538	90.1	77.1	13.0	378
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Up)			282.2	0.448	90.1	77.1	13.0	1,643
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Up)			26.3	0.448	93.4	77.1	16.3	192
ROOF (CLTD)	27", uninsulated (Down)			2541.4	0.300			23.2	17,650
					TOTAL TRANSMISSION LOAD =				71,576

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling for this room is 8" concrete slab
(***) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 23.2 °F

ROOM NO. 755.0-C13
ROOM NAME: RELAY ROOM and DPSO SHOP (cont'd)

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250		=	0
ELECTRICAL LOAD (pg. 4 of App. C) :					=	81,857
TOTAL ROOM SENSIBLE LOAD:						**153,433**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 77.1 °F

56.0 + 153,433 / (1.08 x 0.9 x 7,490) = 77.1 °F

LATENT LOAD:

					Q latent
PEOPLE (pg. 4 of App. C) :	0	X	200		0
TOTAL ROOM LATENT LOAD:					**0**

CALCULATED ROOM CONDITIONS: 77.1 °F dry bulb

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 1,840 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 78.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	90.1	78.0	12.1	144
WEST	Door C51	6.80	3.92	26.7	0.448	90.1	78.0	12.1	144
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	74.1	78.0	-3.9	-298
WEST	Door C62	7.17	3.00	21.5	0.448	74.1	78.0	-3.9	-38
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	71.5	78.0	-6.5	-314
WEST	Window	4.00	3.30	13.2	0.810	71.5	78.0	-6.5	-69
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	77.1	78.0	-0.9	-23
SOUTH**	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	120.0	78.0	42.0	1,665
NORTH (CLTD)	36" CE	10.00	16.80	168.0	0.262			9.5	420
EAST (CLTD)	36" CE	10.00	42.00	420.0	0.262			16.8	1,854
FLOOR**	708 - T1, 18" CRP (Up)	16.80	42.00	705.6	0.257	120.0	78.0	42.0	7,616
CEILING	E. Attic 1 (Ac. tile) (Dn)	16.80	42.00	705.6	0.330	80.5	78.0	2.5	582
					TOTAL TRANSMISSION LOAD =				11,684

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(east) = [(21.5 + 0)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (east)= 16.8 °F
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 9.5 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	34	X	250				=	8,500
ELECTRICAL LOAD (pg. 4 of App. C) :							=	21,851
TOTAL ROOM SENSIBLE LOAD:								**42,035**
	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 31 & App. C pg. 48	740	X	1.08	X	0.9	74.1	-78.0	-2,805
NET ROOM SENSIBLE LOAD								**39,229**

ROOM TEMPERATURE (Tr) = 56.0 + 39,229 / (1.08 x 0.9 x 1,840) = 77.9 °F

LATENT LOAD:								Q latent
PEOPLE (pg. 4 of App. C) :	34	X	325					11,050
Transfer - Air (C 16) - pg. 31 & App. C pg. 48	740	X	4840	X	0.9	0.0082	(0.0070)	3,797
TOTAL ROOM LATENT LOAD:								**14,847**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 14,847 / (4840 x 0.9 x 1,840) = **0.0089**

CALCULATED ROOM CONDITIONS: **78.0 °F dry bulb**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 95.7 °F Design Room Temperature: 96°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	80.3	95.7	-15.4	-133
WEST	Door C55	7.17	4.50	32.3	0.448	80.3	95.7	-15.4	-223
SOUTH* **	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	120.0	95.7	24.3	500
SOUTH**	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	120.0	95.7	24.3	308
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	77.1	95.7	-18.6	-605
NORTH	Door C52	7.17	7.00	50.2	0.448	77.1	95.7	-18.6	-418
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	93.4	95.7	-2.3	-10
EAST	Door C53	7.17	6.04	43.3	0.448	93.4	95.7	-2.3	-45
FLOOR	729.0' - C1, 8" TC (Up)	13.29	6.04	80.3	0.524	116.0	95.7	20.3	854
CEILING	E. Attic 2 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	92.1	95.7	-3.6	-211
					TOTAL TRANSMISSION LOAD =				17

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

(**) See Assumption 4.1.6

LOAD SUMMARY:

INTERNAL:

PEOPLE (pg. 4 of App. C) :	0	X	250			=	0
LIGHTING (pg. 4 of App. C, Note 2) :	86.0	X	3.413	X	0%	=	0
EQUIPMENT (pg. 4 of App. C, Note 2) :	17.2	X	3.413	X	0%	=	0
TOTAL ROOM SENSIBLE LOAD:							**17**

CALCULATED ROOM CONDITIONS: 95.7 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM

Reference
pg. 31
pg. 42 of App. C
pg. 42 of App. C

Design air flow: 24,017 cfm (Transfer from C12)
Supply Air Temp: 80.3 °F (Transfer from C12)
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air (Transfer from C12)
Steady State Temperature: 85.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH**	T1 - 36" CI	7.75	150.70	1167.9	0.236	120.0	85.7	34.3	9,454
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	104.0	85.7	18.3	894
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	104.0	85.7	18.3	469
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	104.0	85.7	18.3	1,607
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	104.0	85.7	18.3	469
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	104.0	85.7	18.3	669
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	104.0	85.7	18.3	937
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	77.1	85.7	-8.6	-1,014
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	92.1	85.7	6.4	129
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	94.2	85.7	8.5	1,375
FLOOR*	C12 (Susp. ceiling)			The return air is directed from the room to the plenum.					
ROOF (CLTD)	27", uninsulated (Down)			6329.4	0.300			14.6	27,628
					TOTAL TRANSMISSION LOAD*** =				126,318

(*) Luminious ceiling panel (plastic) (**) See Assumption 4.1.6
(***) includes the transfer air from C13 and 92,182 Btu/hr for lights

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 14.6 °F

ROOM TEMPERATURE (Tr) = (Ts 80.3) + (Q 126,318 / (1.08 x 0.9 .972 x CFM 24,017) = 85.7 °F

CALCULATED ROOM CONDITIONS: 85.7 °F dry bulb

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 380 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 74.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	77.1	74.1	3.0	190
WEST	Door C63	7.17	3.00	21.5	0.448	77.1	74.1	3.0	29
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	90.1	74.1	16.0	194
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	90.1	74.1	16.0	528
SOUTH	Door C57	7.17	3.00	21.5	0.448	90.1	74.1	16.0	154
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	71.6	74.1	-2.6	-56
NORTH	Door C64	7.17	2.67	19.1	0.448	71.6	74.1	-2.6	-22
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	78.0	74.1	3.9	298
EAST	Door C62	7.17	3.00	21.5	0.448	78.0	74.1	3.9	38
FLOOR***	708' - T1, 18" CRP (Up)	21.50	8.36	179.7	0.257	120.0	74.1	45.9	2,120
CEILING**	C13 (Second tier) (Dn)	21.50	8.36	179.7	0.403	77.1	74.1	3.0	217
							TOTAL TRANSMISSION LOAD =		3,689

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	4	X	315				=	1,260
ELECTRICAL LOAD (pg. 4 of App. C) :							=	2,597
TOTAL ROOM SENSIBLE LOAD:								**7,546**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 31 & App. C pg. 49	360	X	1.08	X	0.9	71.5	-74.1	-910
NET ROOM SENSIBLE LOAD								**6,637**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 56.0 + 6,637 / (1.08 x 0.9 x 380) = 74.0 °F

LATENT LOAD:

								Q latent
PEOPLE (pg. 4 of App. C) :	4	X	325					1300
Transfer - Air (C 18) - pg. 31 & App. C pg. 49	360	X	4840	X	0.9	0.0074	(0.0070)	650
TOTAL ROOM LATENT LOAD:								**1,950**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 1,950 / (4840 x 0.9 x 380) = **0.0082**

CALCULATED ROOM CONDITIONS: **74.1 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 360 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 71.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	77.1	71.5	5.6	299
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	74.1	71.5	2.6	56
SOUTH	Door C64	7.17	2.67	19.1	0.448	74.1	71.5	2.6	22
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	104.0	71.5	32.5	556
NORTH (CLTD)	36" CE	8.67	5.88	51.0	0.262			16.0	214
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	78.0	71.5	6.5	314
EAST	Window	4.00	3.30	13.2	0.820	78.0	71.5	6.5	70
FLOOR**	708.0' - T1, 18" CRP (Up)	13.54	8.36	113.2	0.257	120.0	71.5	48.5	1,411
CEILING**	C13 (Second tier) (Dn)	13.54	8.36	113.2	0.403	77.1	71.5	5.6	255
					TOTAL TRANSMISSION LOAD =				3,198

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(north) = [(11.7 + 1)*0.83 + (78 - Tr) + (84 -85)] CLTDcorr (north)= 16.0 °F

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	2	X	315	=	630
ELECTRICAL LOAD (pg. 4 of App. C) :				=	1,621
TOTAL ROOM SENSIBLE LOAD:					**5,449**

ROOM TEMPERATURE (Tr) = Ts 56.0 + Q 5,449 / (1.08 x 0.9 x CFM 360) = 71.6 °F

LATENT LOAD:

				Q latent
PEOPLE (pg. 4 of App. C) :	2	X	325	650
TOTAL ROOM LATENT LOAD:				**650**

ROOM HUMIDITY RATIO (Wr) = 0.0070 + 650 / (4840 x 0.9 x 360) = **0.0074**

CALCULATED ROOM CONDITIONS: **71.5 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 31
pg. 29A
pg. 29

Design air flow: 260 cfm
Supply Air Temp: 56.0 °F
Supply Air Humidity Ratio: 0.0070 lbW/lb dry air
Steady State Temperature: 90.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	93.4	90.1	3.3	49
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	93.4	90.1	3.3	25
WEST	Door C60	7.17	3.00	21.5	0.448	93.4	90.1	3.3	32
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	77.1	90.1	-13.0	-311
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	77.1	90.1	-13.0	-1,711
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	74.1	90.1	-16.0	-371
NORTH	Door C57	7.17	3.00	21.5	0.448	74.1	90.1	-16.0	-154
SOUTH^	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	120.0	90.1	29.9	1,982
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	93.4	90.1	3.3	204
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	74.1	90.1	-16.0	-194
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	78.0	90.1	-12.1	-143
EAST	Door C51	6.83	3.92	26.8	0.448	78.0	90.1	-12.1	-145
FLOOR	729.0' - C1, 8" TC (Up)	4.39	15.77	69.2	0.524	116.0	90.1	25.9	940
FLOOR ***	708.0' - T1, 18" TC (Up)	9.00	6.00	54.0	0.369	120.0	90.1	29.9	596
FLOOR ***	708.0' - T1, 18" TC (Up)	23.40	9.10	212.9	0.369	120.0	90.1	29.9	2,349
CEILING (Sec. tier)**	C13 (Near C16) (Up)	9.00	6.00	54.0	0.538	77.1	90.1	-13.0	-378
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	23.40	9.10	212.9	0.448	77.1	90.1	-13.0	-1,240
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Up)	4.39	15.77	69.2	0.448	77.1	90.1	-13.0	-403
							TOTAL TRANSMISSION LOAD =		1,127

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

PEOPLE (pg. 4 of App. C) :	0	X	250	=	0
ELECTRICAL LOAD (pg. 4 of App. C) :				=	7,459
TOTAL ROOM SENSIBLE LOAD:					**8,586**

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 0.9 x CFM) = 90.0 °F

56.0 + 8,586 / (1.08 x 0.9 x 260) = 90.0 °F

CALCULATED ROOM CONDITIONS: 90.1 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Design air flow: - cfm
Supply Air Temp: - °F
Supply Air Humidity Ratio: - lbW/lb dry air
Steady State Temperature: 94.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)*	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	120.0	94.2	25.9	1,309
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	102.0	94.2	7.8	786
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	101.3	94.2	7.1	332
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	85.9	94.2	-8.3	-2,207
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	102.0	94.2	7.8	179
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	104.0	94.2	9.8	968
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	85.7	94.2	-8.5	-1,375
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	80.3	94.2	-13.9	-582
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	98.9	94.2	4.7	1,159
FLOOR	755.0' - C4, 5/8" GB (Dn)			412.2	0.338	93.1	94.2	-1.1	-146
FLOOR	755.0' - C5, 5/8" GB (Dn)			137.9	0.338	94.2	94.2	0.0	0
FLOOR	755.0 - C6, 5/8" GB (Dn)			165.2	0.427	93.8	94.2	-0.3	-23
FLOOR	755.0 - C9, 3/4" PL (Dn)			167.5	0.503	81.6	94.2	-12.6	-1,057
FLOOR	755.0'-C10, 3/4" PL (Dn)			323.3	0.503	86.7	94.2	-7.5	-1,220
ROOF (CLTD)	27" (Uninsulated) (Dn)	37.33	42.70	1594.0	0.300			6.1	2,917
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	9.53	44.5	0.300			6.1	81
ROOF (CLTD)	27" (Uninsulated) (Dn)	4.67	11.12	51.9	0.300			6.1	95
					TOTAL TRANSMISSION LOAD =				1,216

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.
(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= 6.1 °F

	CFM					Ts	(-Tr)	
Transfer - Air (C 12) - pg. 31 & App. C pg. 42	360	X	1.08	X	0.9	80.3	-94.2	-4,846
Transfer - Air (C 3) - pg. 31 & App. C pg. 32	815	X	1.08	X	0.9	98.9	-94.2	3,723
TOTAL ROOM SENSIBLE LOAD:								**93**

ROOM HUMIDITY RATIO (Wr):

(Room C12) - pg. 31 & App. C pg. 42	360	@	0.0070
(Room C3) - pg. 31 & App. C pg. 32	815	@	0.0076

Wr = 0.0074

CALCULATED ROOM CONDITIONS: 94.2 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Steady State Temperature: 101.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	86.9	101.3	-15.4	-300
SOUTH*	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	120.0	101.3	18.7	410
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	94.2	101.3	-7.1	-332
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	102.0	101.3	0.7	14
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	111.9	101.3	10.6	227
ROOF (CLTD)	27", uninsulated (Up)	9.53	4.00	38.1	0.331			-1.1	-13
							TOTAL TRANSMISSION LOAD =		5

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= -1.1 °F

CALCULATED ROOM CONDITIONS: 101.3 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Steady State Temperature: 102.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	101.3	102.0	-0.7	-14
SOUTH*	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	120.0	102.0	18.0	851
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	94.2	102.0	-7.8	-786
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	94.2	102.0	-7.8	-153
FLOOR	Stair C1 - 3/4" PL, (Up)	20.54	4.00	82.2	0.730	104.6	102.0	2.6	155
ROOF (CLTD)	27", uninsulated (Up)	20.54	4.00	82.2	0.331			-1.8	-48
							TOTAL TRANSMISSION LOAD =		5

(*) See Assumption 4.1.6

CLTDcorr = [(CLTD + LM)K + (78 - Tr) + (To -85)]F; To = 95 - 22/2 = 84; F=1.0
CLTDcorr(roof) = [(29 + 2)*0.75 + (78 - Tr) + (84 -85)] CLTDcorr (roof)= -1.8 °F

CALCULATED ROOM CONDITIONS: 102.0 °F dry bulb

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR					
	FLOW (cfm) (pg. 30, Diagram 2)	TEMP. (°F)	HUMIDITY # MOIST / # DRY	Ref. pg. App. C	cfm X HUM.	cfm X °F
EAST ATTIC 1	2,580	80.5	0.0089	40	22.8	207,690
CORRIDOR (C 19)	260	90.1	0.0070	50	1.8	23,426
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	77.1	0.0070	45	33.3	367,265
SHIFT ENGINEERS OFFICE (C10)	110	86.7	0.0073	39	0.8	9,532
CONFERENCE ROOM (C 9)	270	81.6	0.0070	38	1.9	22,032
MCR RETURN AIR PLENUM	24,017	85.7	0.0070	47	168.1	2,058,215
TOTAL	Vreturn = 32,000				228.8	2,688,168

Return Air Temperature from MCR spaces: SUM (cfm X °F) / Vreturn: Treturn = **84.0 °F**

Return Air Humidity Ratio from MCR spaces: Wreturn = **0.0072 # MOIST / # DRY AIR**

Mechanical equipment room flow (Vmer) = 3289 cfm (pg. 31, Diagram 4)
Mechanical equip. room temperature (Tmer) = 85.9 °F (App. C pg 30)
Mech. equip. room humidity ratio (Wmer) = 0.0072 # MOIST / # DRY AIR (App. C pg. 30)

Outside Air Flow (Voa) = 711 cfm (pg. 31, Diagram 4)
Outside Air Temperature (Toa) = 95 °F DB, 74 °F WB (Section 6.1)
Δ T pressurizing fan (Δ Tpr) = 4.9 °F (Fan Heat Gain @ pg.22)
Outside Air Humidity Ratio (Woa) = 0.0133 # MOIST / # DRY AIR

Δ T air cleaning unit (Δ Tcu) = 7.7 °F (Fan Heat Gain @ pg.23)
Air cleaning unit flow (Vcu) = 4000 cfm (pg. 31, Diagram 4)

AIR CLEANING UNIT DISCHARGE TEMPERATURE:

Tcu = Δ Tcu + [(Vmer x Tmer) + Voa x (Toa + Δ Tpr)] / Vcu

Tcu = 96.1 °F

AIR CLEANING UNIT HUMIDITY RATIO:

Wcu = [(Voa x Woa) + (Wmer x Vmer)] / Vcu

Wcu = 0.0083 # MOIST / # DRY AIR

TEMPERATURE OF AIR ENTERING THE AIR HANDLING UNIT (Te) :

Te = [(Vreturn x Treturn) +(Vcu x Tcu)] / (Vreturn + Vcu)

Te = 85 °F DB, 61 °F WB

HUMIDITY RATIO OF AIR ENTERING THE AIR HANDLING UNIT (We) :

We = [(Vreturn x Wreturn) +(Vcu x Wcu)] / (Vreturn + Vcu)

We = 0.0073 # MOIST / # DRY AIR

Relatiove humidity = 33%

Room Transmission Loads (Heating - Normal Operation)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 30
pg. 75 of App. C

Design air flow: 2,825 cfm
Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air

Steady State Temperature: 60.6 °F Design Room Temperature: 64°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	36" CE	17.75	42.00	745.5	0.268	13.0	60.6	-47.6	-9,510
SOUTH	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	50.0	60.6	-10.6	-1,738
NORTH	36" CE	17.75	23.50	417.1	0.268	13.0	60.6	-47.6	-5,321
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	75.0	60.6	14.4	943
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	64.9	60.6	4.3	69
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	67.7	60.6	7.1	36
EAST	Door C39	7.17	6.00	43.0	0.448	67.7	60.6	7.1	136
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	76.3	60.6	15.7	1,845
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	55.8	60.6	-4.8	-1,284
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	52.3	60.6	-8.3	-162
FLOOR	708.0' - T1, 18" C (Dn)	39.14	42.00	1643.9	0.305	50.0	60.6	-10.6	-5,315
ROOF	27", uninsulated (winter)	39.14	42.00	1643.9	0.340	13.0	60.6	-47.6	-26,605
							TOTAL TRANSMISSION LOAD =		-48,905

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of Appendix C) : = 14,940

TOTAL ROOM SENSIBLE LOAD: -31,965

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	-31,965	/ (1.08 x 1.1 x	2,825	) =	60.7 °F

CALCULATED ROOM CONDITIONS: 60.6 °F dry bulb

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: WOMEN'S TOILET

Reference
pg. 30
pg. 56 of App. C

Design air flow: 230 cfm (Transfer from room C3)
Supply Air Temp: 67.7 °F (Transfer from room C3)

Steady State Temperature: 64.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	60.6	64.9	-4.3	-69
SOUTH	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	50.0	64.9	-14.9	-268
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	67.7	64.9	2.8	75
NORTH	Door C38	7.17	3.00	21.5	0.448	67.7	64.9	2.8	27
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	59.5	64.9	-5.4	-86
FLOOR	708.0' - T1, 18" TC (Dn)	9.53	4.00	38.1	0.300	50.0	64.9	-14.9	-170
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	52.3	64.9	-12.6	-270
					TOTAL TRANSMISSION LOAD =				-762

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: **-762**

$$\text{ROOM TEMPERATURE (Tr)} = \frac{Ts - Q}{1.08 \times 1.1 \times CFM} = \frac{67.7 - (-762)}{1.08 \times 1.1 \times 230} = 64.9\ ^\circ F$$

CALCULATED ROOM CONDITIONS: 64.9 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

Reference
pg. 30
pg. 62 of App. C

Design air flow: 320 cfm (Transfer from room C10)
Supply Air Temp: 77.0 °F @ 0.0085 lbW/lb dry air (Transfer from room C10)
Steady State Temperature: 67.7 °F Design Room Temperature: 65°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	64.9	67.7	-2.8	-75
SOUTH	Door C38	7.17	3.00	21.5	0.448	64.9	67.7	-2.8	-27
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	59.5	67.7	-8.2	-582
SOUTH	Door C37	7.17	3.00	21.5	0.448	59.5	67.7	-8.2	-79
SOUTH*	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	50.0	67.7	-17.7	-265
SOUTH	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	50.0	67.7	-17.7	-228
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	76.3	67.7	8.6	357
NORTH	Door C40	7.17	3.00	21.5	0.448	76.3	67.7	8.6	83
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	77.0	67.7	9.3	371
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	77.0	67.7	9.3	188
NORTH	Door C46	7.17	3.00	21.5	0.448	77.0	67.7	9.3	90
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	80.9	67.7	13.2	366
NORTH	Door C42	7.17	3.00	21.5	0.448	80.9	67.7	13.2	127
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	74.9	67.7	7.3	212
EAST	Door C56	7.17	4.50	32.3	0.448	74.9	67.7	7.3	105
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	60.6	67.7	-7.1	-36
WEST	Door C39	7.17	6.00	43.0	0.448	60.6	67.7	-7.1	-136
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	59.5	67.7	-8.2	-130
FLOOR	708.0' - T1, 18" TC (Dn)	6.67	9.36	62.4	0.300	50.0	67.7	-17.7	-331
FLOOR	729.0' - C1, 8" TC (Dn)	6.67	33.21	221.5	0.395	60.0	67.7	-7.7	-669
FLOOR	729.0' - C1, 8" TC (Dn)	4.67	10.63	49.6	0.395	60.0	67.7	-7.7	-150
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	55.8	67.7	-11.9	-2,493
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	55.8	67.7	-11.9	-429
						TOTAL TRANSMISSION LOAD =			-3,730

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8".

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 201
TOTAL ROOM SENSIBLE LOAD: **-3,528**

ROOM TEMPERATURE (Tr) = Ts / (1.08 x 1.1 x CFM) = Q / (1.08 x 1.1 x CFM) + Ts

77.0 -3,528 / (1.08 x 1.1 x 320) = 67.7 °F

CALCULATED ROOM CONDITIONS: **67.7 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

Reference
pg. 30
pg. 75 of App. C
pg. 24

Design air flow: 440 cfm (through two heaters - see below)
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 15.0 °F (Heater 0-HTR-31-099; Estimated < 43.5)
Duct Heater Supply: 85.2 °F
Steady State Temperature: 76.3 °F

							Thermostat setting @ 75°F			
WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	60.8	76.3	-15.7	-1,845
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	67.7	76.3	-8.6	-357
SOUTH	Door C40	7.17	3.00	21.5	0.448	67.7	76.3	-8.6	-83
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	80.9	76.3	4.6	222
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	76.4	76.3	0.0	3
NORTH	757.0' - A5, 36" CI	8.00	16.00	128.0	0.236	75.0	76.3	-1.3	-39
FLOOR	708.0' - T1, 18" TC (Dn)	8.70	13.38	116.4	0.300	50.0	76.3	-26.3	-918
FLOOR	729.0' - C1, 8" TC (Dn)			295.8	0.395	60.0	76.3	-16.3	-1,904
CEILING	W. Attic 1 - 5/8" GB (Up)	29.38	14.03	412.2	0.427	55.8	76.3	-20.5	-3,608
					TOTAL TRANSMISSION LOAD =				-8,531

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	107
TOTAL ROOM SENSIBLE LOAD:								**-8,425**

	CFM					Ts	(-Tr)	
110 cfm via heater 0-HTR-31-097 (pg. 59 of App. C)	110	X	1.08	X	1.1	114.5	-76.3	4,992
330 cfm via heater 0-HTR-31-099	330	X	1.08	X	1.1	85.2	-76.3	3,489
NET ROOM SENSIBLE LOAD:								**56**

	CFM						ΔT Duct Heater	
DUCT HEATER:	330	X	1.08	X	1.1	X	15.0	**5,881**

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw (Heater 0-HTR-31-099)
DUCT HEATER CALCULATED CAPACITY: 1.7 Kw
HEATER % OPERATION: 34 %

CALCULATED ROOM CONDITIONS: 76.3 °F dry bulb

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

Reference
pg. 30
pg. 75 of App. C
pg. 59 of App. C

Design air flow: 90 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 44.3 °F
Duct Heater Supply: 114.5 °F
Steady State Temperature: 80.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	76.3	80.9	-4.6	-222
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	67.7	80.9	-13.2	-366
SOUTH	Door C42	7.17	3.00	21.5	0.448	67.7	80.9	-13.2	-127
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	76.4	80.9	-4.5	-125
NORTH	Door C45	7.17	3.00	21.5	0.448	76.4	80.9	-4.5	-43
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	77.0	80.9	-3.8	-188
FLOOR	729.0' - C1, 8" TC (Dn)	10.31	13.38	137.9	0.395	60.0	80.9	-20.9	-1,136
CEILING	W. Attic 1 - 5/8" GB (Up)	10.31	13.38	137.9	0.427	55.8	80.9	-25.1	-1,476
					TOTAL TRANSMISSION LOAD =				-3,682

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 83
TOTAL ROOM SENSIBLE LOAD: **-3,600**

DUCT HEATER NOMINAL CAPACITY: 10.0 Kw
DUCT HEATER CALCULATED CAPACITY: 4.1 Kw (See pg. 59 of App. C)
HEATER % OPERATION: 41 % (See pg. 59 of App. C)

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	114.5	-3,600	/ (1.08 x 1.1 x	90	) =	80.8 °F

CALCULATED ROOM CONDITIONS: **80.9 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 30
pg. 75 of App. C
pg. 24

Design air flow: 65 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 44.3 °F (Estimated; < 108.4°F calculated)
Duct Heater Supply: 114.5 °F
Steady State Temperature: 76.4 °F Design Room Temperature: 65°F

Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	80.9	76.4	4.5	125
SOUTH	Door C45	7.17	3.00	21.5	0.448	80.9	76.4	4.5	43
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	75.0	76.4	-1.3	-26
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	80.1	76.4	3.8	137
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	77.0	76.4	0.7	13
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	60.6	76.4	-15.8	-1,009
FLOOR	729.0' - C1, 18" TC (Dn)	16.02	8.70	139.4	0.300	60.0	76.4	-16.4	-684
FLOOR	729.0' - C1, 8" TC (Dn)			25.8	0.395	60.0	76.4	-16.4	-167
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	55.8	76.4	-20.6	-1,449
						TOTAL TRANSMISSION LOAD =			-3,017

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	76
TOTAL ROOM SENSIBLE LOAD:								**-2,941**

	CFM						ΔT Duct Heater	
DUCT HEATER:	265	X	1.08	X	1.1	X	44.3	13,947

DUCT HEATER NOMINAL CAPACITY: 10.0 Kw
DUCT HEATER CALCULATED CAPACITY: 4.1 Kw
HEATER % OPERATION: 41 %

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	114.5	-2,941 / (1.08 x 1.1 x		65	) =	76.4 °F

CALCULATED ROOM CONDITIONS:	76.4 °F dry bulb

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

Design air flow: - cfm
Steady State Temperature: 59.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	64.9	59.5	5.4	86
SOUTH	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	50.0	59.5	-9.5	-368
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	67.7	59.5	8.2	582
NORTH	Door C37	7.17	3.00	21.5	0.448	67.7	59.5	8.2	78
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	67.7	59.5	8.2	130
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	51.0	59.5	-8.5	-510
FLOOR (See Note)									
							TOTAL TRANSMISSION LOAD =		-1

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

CALCULATED ROOM CONDITIONS: 59.5 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Design air flow: - cfm
Steady State Temperature: 64.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	64.1	64.4	-0.3	-5
WEST	Door C53	7.17	3.00	21.5	0.448	64.1	64.4	-0.3	-3
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	74.6	64.4	10.2	93
SOUTH	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	50.0	64.4	-14.4	-599
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	68.8	64.4	4.4	272
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	64.4	10.2	244
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	68.8	64.4	4.4	66
EAST*	755.0' - C19, 8" RMW	8.67	4.39	16.6	0.455	68.8	64.4	4.4	33
EAST	Door C60	7.17	3.00	21.5	0.448	68.8	64.4	4.4	42
CEILING	E.Attic 3 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	60.4	64.4	-4.0	-237
CEILING	C13 (1/2" & 5/8" GB) (Dn)	4.39	6.00	26.3	0.351	74.6	64.4	10.2	94
FLOOR (See Note)									
							TOTAL TRANSMISSION LOAD =		1

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

CALCULATED ROOM CONDITIONS: 64.4 °F dry bulb

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

Reference
pg. 30
pg. 75
pg. 24

Design air flow: 270 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 24.0 °F
Duct Heater Supply: 94.2 °F
Steady State Temperature: 80.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	76.4	80.1	-3.8	-137
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	77.0	80.1	-3.1	-158
SOUTH	Door C48	7.17	3.00	21.5	0.448	77.0	80.1	-3.1	-30
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	75.0	80.1	-5.1	-181
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	74.9	80.1	-5.2	-209
FLOOR	729.0' - C1, 8" CRP (Dn)	10.03	16.70	167.5	0.270	60.0	80.1	-20.1	-909
CEILING	W. Attic 1 - 3/4" PL (Up)	10.03	16.70	167.5	0.730	55.8	80.1	-24.3	-2,971
						TOTAL TRANSMISSION LOAD =			-4,595

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 96
TOTAL ROOM SENSIBLE LOAD: **-4,499**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	94.2	-4,499	/ (1.08 x 1.1 x	270	) =	80.2 °F

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw
DUCT HEATER CALCULATED CAPACITY: 5.0 Kw (see pg. 62 of App. C)
HEATER % OPERATION: 100 % (see pg. 62 of App. C)

CALCULATED ROOM CONDITIONS:	80.1 °F dry bulb

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 30
pg. 75 of App. C
pg. 24

Design air flow: 330 cfm
Supply Air Temp: 70.2 °F
ΔT Duct Heater: 24.0 °F
Duct Heater Supply: 94.2 °F
Steady State Temperature: 77.0 °F

Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	80.9	77.0	3.8	188
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	76.4	77.0	-0.7	-13
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	67.7	77.0	-9.3	-371
SOUTH	Door C46	7.17	3.00	21.5	0.448	67.7	77.0	-9.3	-90
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	67.7	77.0	-9.3	-188
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	80.1	77.0	3.1	158
NORTH	Door C48	7.17	3.00	21.5	0.448	80.1	77.0	3.1	30
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	74.9	77.0	-2.1	-163
FLOOR	729.0' - C1, 8" CRP (Dn)	16.70	19.36	323.3	0.270	60.0	77.0	-17.0	-1,484
CEILING	W. Attic 1 - 3/4" PL (Up)	16.70	19.36	323.3	0.730	55.8	77.0	-21.2	-5,004
					TOTAL TRANSMISSION LOAD =				-6,937

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 188
TOTAL ROOM SENSIBLE LOAD: **-6,749**

ROOM TEMPERATURE (Tr) = Ts 94.2 | Q -6,749 / (1.08 x 1.1 x | CFM 330) = 77.0 °F

	CFM						ΔT Duct Heater	
DUCT HEATER:	600	X	1.08	X	1.1	X	24.0	17,107

DUCT HEATER NOMINAL CAPACITY: 5.0 Kw
DUCT HEATER CALCULATED CAPACITY: 5.0 Kw
HEATER % OPERATION: 100 %

CALCULATED ROOM CONDITIONS: **77.0 °F dry bulb**

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 30
pg. 75 of App. C

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 77.7 °F

Steady State Temperature: 71.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	74.6	71.1	3.5	527
EAST	36" CE	7.75	42.00	325.5	0.268	13.0	71.1	-58.1	-5,068
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	71.1	-58.1	-2,616
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	50.0	71.1	-21.1	-837
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	77.7	71.1	6.6	1,933
ROOF	27", uninsulated (winter)	16.80	42.00	705.6	0.340	13.0	71.1	-58.1	-13,938
					TOTAL TRANSMISSION LOAD =				-19,999

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	77.7	-19,999	/ (1.08 x 1.1 x	2580	) =	71.2 °F

CALCULATED ROOM CONDITIONS:	71.1 °F dry bulb

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 59.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	71.7	59.9	11.8	279
SOUTH	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	50.0	59.9	-9.9	-282
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	74.6	59.9	14.7	887
EAST	E. Attic 3, 8" CI	9.08	4.00	36.3	0.500	60.4	59.9	0.5	9
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	74.6	59.9	14.7	136
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	64.1	59.9	4.2	246
ROOF	27", uninsulated (winter)	13.29	6.04	80.3	0.340	13.0	59.9	-46.9	-1,280
							TOTAL TRANSMISSION LOAD =		-6

CALCULATED ROOM CONDITIONS: 59.9 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 60.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	59.9	60.4	-0.5	-9
SOUTH	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	50.0	60.4	-10.4	-453
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	74.6	60.4	14.2	1,311
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	74.6	60.4	14.2	222
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	64.4	60.4	4.0	237
ROOF	27", uninsulated (winter)	4.00	20.33	81.3	0.340	13.0	60.4	-47.4	-1,311
							TOTAL TRANSMISSION LOAD =		-2

CALCULATED ROOM CONDITIONS: 60.4 °F dry bulb

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 30
pg. 75 of App. C

Design air flow: 21650 cfm
Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air

Steady State Temperature: 74.9 °F Design Room Temperature: 75 °F Thermostat setting @ 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	67.7	74.9	-7.3	-212
WEST	Door C56	7.17	4.50	32.3	0.448	67.7	74.9	-7.3	-105
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	77.0	74.9	2.1	163
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	80.1	74.9	5.2	209
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	55.8	74.9	-19.1	-802
SOUTH	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	50.0	74.9	-24.9	-8,856
NORTH	757.0' - A1, 36" CI	10.00	28.70	287.0	0.236	75.0	74.9	0.1	6
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	75.0	74.9	0.1	3
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	75.0	74.9	0.1	11
NORTH	Door C49	6.50	3.00	19.5	0.448	75.0	74.9	0.1	1
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	75.0	74.9	0.1	3
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	75.0	74.9	0.1	5
NORTH*	757.0' - A21/A22, 36" CI	10.00	28.00	260.5	0.236	75.0	74.9	0.1	6
NORTH	Door C50	6.50	3.00	19.5	0.448	75.0	74.9	0.1	1
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	64.1	74.9	-10.8	-94
EAST	Door C55	7.17	4.50	32.3	0.448	64.1	74.9	-10.8	-156
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	59.9	74.9	-15.0	-52
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	74.6	74.9	-0.3	-46
FLOOR	729.0' -C1, 8" CRP (Dn)	42.00	150.70	6329.4	0.270	60.0	74.9	-14.9	-25,463
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	-35,377

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic)

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	160,411
TOTAL ROOM SENSIBLE LOAD:								**125,034**
	CFM					Ts	Tr	
Transfer - Air (C 13) - not included here see MCR Plenu	2727	X	1.08	X	1.1	74.6	74.9	-972
Transfer - Air (West Attic 1) - pg. 30 & App. C pg. 73	143	X	1.08	X	1.1	55.8	74.9	-3,245
NET ROOM SENSIBLE LOAD:								**121,789**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	121,789 / (1.08 x	1.1 x	21,650)	=	74.9 °F

CALCULATED ROOM CONDITIONS:	75 °F dry bulb

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 30
pg. 75 of App. C
pg. 24

Design air flow: 7490 cfm
Supply Air Temp: 70.2 °F @ 0.0085 lbW/lb dry air
ΔT Duct Heater: 8.7 °F (100% capacity)
Duct Heater Supply: 78.9 °F
Steady State Temperature: 74.6 °F Design Room Temperature: 75°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	Thermostat setting @ 75°F DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	74.9	74.6	0.3	46
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	71.7	74.6	-2.9	-342
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	60.4	74.6	-14.2	-222
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	59.9	74.6	-14.7	-136
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	64.4	74.6	-10.2	-244
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	68.8	74.6	-5.8	-763
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	64.1	74.6	-10.5	-341
SOUTH	Door C52	7.17	7.00	50.2	0.448	64.1	74.6	-10.5	-236
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	59.9	74.6	-14.7	-887
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	60.4	74.6	-14.2	-1,311
SOUTH(Second tier)	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	50.0	74.6	-24.6	-1,267
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	75.0	74.6	0.4	97
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	75.8	74.6	1.2	76
EAST	Door C63	7.17	3.00	21.5	0.448	75.8	74.6	1.2	12
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	75.8	74.6	1.0	53
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	64.4	74.6	-10.2	-93
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	71.1	74.6	-3.5	-527
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	77.7	74.6	3.1	80
FLOOR	729.0' - C1, 8" TC (Dn)	32.63	38.13	1244.2	0.395	60.0	74.6	-14.6	-7,175
FLOOR	729.0' - C1, 8" TC (Dn)	2.32	13.29	30.8	0.395	60.0	74.6	-14.6	-178
FLOOR	708.0' - T1, 18" TC (Dn)	32.63	19.53	637.3	0.300	50.0	74.6	-24.6	-4,703
FLOOR (Sec. tier)**	C16 (Area above) (Up)			179.7	0.538	75.8	74.6	1.2	116
FLOOR (Sec. tier)**	C18 (Area above) (Up)			113.2	0.538	75.6	74.6	1.0	61
FLOOR (Sec. tier)**	C19 (Near C16) (Dn)			54.0	0.403	68.8	74.6	-5.8	-126
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Dn)			282.2	0.351	68.8	74.6	-5.8	-574
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Dn)			26.3	0.351	64.4	74.6	-10.2	-94
ROOF	27", uninsulated (winter)			2541.4	0.340	13.0	74.6	-61.6	-53,227
						TOTAL TRANSMISSION LOAD =			-71,908

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
** Ceiling for this room is 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 34,697

TOTAL ROOM SENSIBLE LOAD: **-37,212**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	78.9	-37,212	/ (1.08 x 1.1 x	7,490	) =	74.7 °F

CALCULATED ROOM CONDITIONS: **74.6 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 30
pg. 75 of App. C
pg. 24

Design air flow:	1,840 cfm
Supply Air Temp:	70.2 °F
ΔT Duct Heater:	15.6 °F
Duct Heater Supply:	85.8 °F
Steady State Temperature:	77.7 °F

								Thermostat setting @ 75°F	
WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	68.8	77.7	-8.9	-106
WEST	Door C51	6.80	3.92	26.7	0.448	68.8	77.7	-8.9	-106
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	75.8	77.7	-1.9	-145
WEST	Door C62	7.17	3.00	21.5	0.448	75.8	77.7	-1.9	-18
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	75.6	77.7	-2.1	-101
WEST	Window	4.00	3.30	13.2	0.810	75.6	77.7	-2.1	-22
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	74.6	77.7	-3.1	-80
SOUTH	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	50.0	77.7	-27.7	-1,098
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	77.7	-64.7	-2,913
EAST	36" CE	10.00	42.00	420.0	0.268	13.0	77.7	-64.7	-7,283
FLOOR	708 - T1, 18" CRP (Dn)	16.80	42.00	705.6	0.222	50.0	77.7	-27.7	-4,339
CEILING	E. Attic 1 (Ac. tile) (Up)	16.80	42.00	705.6	0.415	71.1	77.7	-6.6	-1,933
					TOTAL TRANSMISSION LOAD =				-18,145

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :								=	2,241
TOTAL ROOM SENSIBLE LOAD:									**-15,903**
	CFM					Ts	(-Tr)		
Transfer - Air (C 16) - pg. 30 & App. C pg. 70	740	X	1.08	X	1.1	75.8	-77.7		-1,670
NET ROOM SENSIBLE LOAD									**-17,574**

	CFM						ΔT Duct Heater	
DUCT HEATER:	1,840	X	1.08	X	1.1	X	15.6	34,100

DUCT HEATER NOMINAL CAPACITY:	10.0 Kw
DUCT HEATER CALCULATED CAPACITY:	10.0 Kw
HEATER % OPERATION:	100 %

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	85.8	-17,574	/ (1.08 x 1.1 x	1,840	) =	77.8 °F

CALCULATED ROOM CONDITIONS:	**77.7 °F dry bulb**

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference pg. 30

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 64.1 °F Design Room Temperature: 65°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	74.9	64.1	10.8	94
WEST	Door C55	7.17	4.50	32.3	0.448	74.9	64.1	10.8	156
SOUTH*	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	50.0	64.1	-14.1	-290
SOUTH	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	50.0	64.1	-14.1	-179
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	74.6	64.1	10.5	341
NORTH	Door C52	7.17	7.00	50.2	0.448	74.6	64.1	10.5	236
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	64.4	64.1	0.3	1
EAST	Door C53	7.17	6.04	43.3	0.448	64.4	64.1	0.3	6
FLOOR	729.0' - C1, 8" TC (Dn)	13.29	6.04	80.3	0.395	60.0	64.1	-4.1	-130
CEILING	E. Attic 2 - 3/4" PL, (Up)	13.29	6.04	80.3	0.730	59.9	64.1	-4.2	-246
					TOTAL TRANSMISSION LOAD =				-11

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: -11

CALCULATED ROOM CONDITIONS: 64.1 °F dry bulb

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM

Reference
pg. 30
pg. 65 of App. C

Design air flow: 24,520 cfm (Transfer from room C12)
Supply Air Temp: 74.9 °F @ 0.0085 lbW/lb dry air (Transfer from room C12)

Steady State Temperature: 71.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH	T1 - 36" CI	7.75	150.70	1167.9	0.236	50.0	71.7	-21.7	-5,981
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	75.0	71.7	3.3	161
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	75.0	71.7	3.3	84
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	75.0	71.7	3.3	290
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	75.0	71.7	3.3	84
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	75.0	71.7	3.3	121
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	75.0	71.7	3.3	169
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	74.6	71.7	2.9	342
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	59.9	71.7	-11.8	-238
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	55.8	71.7	-15.9	-2,586
FLOOR*	C12 (Susp. ceiling)	The return air is directed from the room to the plenum.							
ROOF	27", uninsulated (winter)			6329.4	0.340	13.0	71.7	-58.7	-126,322
					TOTAL TRANSMISSION LOAD** =				-93,392

(*) Luminious ceiling panel (plastic)
(**) includes the transfer air from C13 and 41,457 Btu/hr for lights

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	74.9	-93,392	/ (1.08 x 1.1 x	24,520)	=	71.7 °F

CALCULATED ROOM CONDITIONS: 71.7 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 30
pg. 75 of App. C
pg. 66 of App. C

Design air flow:	380 cfm
Supply Air Temp:	70.2 °F
ΔT Duct Heater:	8.7 °F
Duct Heater Supply:	78.9 °F
Steady State Temperature:	75.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	74.6	75.8	-1.2	-76
WEST	Door C63	7.17	3.00	21.5	0.448	74.6	75.8	-1.2	-12
WEST	755.0' - C19, 8" RMW	8.67	3.08	26.7	0.455	68.8	75.8	-7.0	-85
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	68.8	75.8	-7.0	-231
SOUTH	Door C57	7.17	3.00	21.5	0.448	68.8	75.8	-7.0	-67
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	75.6	75.8	-0.2	-4
NORTH	Door C64	7.17	2.67	19.1	0.448	75.6	75.8	-0.2	-2
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	77.7	75.8	1.9	145
EAST	Door C62	7.17	3.00	21.5	0.448	77.7	75.8	1.9	18
FLOOR	708' - T1, 18" CRP (Dn)	21.50	8.36	179.7	0.222	50.0	75.8	-25.8	-1,029
CEILING**	C13 (Second tier) (Up)	21.50	8.36	179.7	0.538	74.6	75.8	-1.2	-116
					TOTAL TRANSMISSION LOAD =				-1,459

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :								=	108
TOTAL ROOM SENSIBLE LOAD:									**-1,351**
	CFM					Ts	(-Tr)		
Transfer - Air (C 18) - pg. 30 & App. C pg. 71	360	X	1.08	X	1.1	75.6	-75.8		-86
NET ROOM SENSIBLE LOAD									**-1,436**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	78.9	-1,351 / (1.08 x 1.1 x	380	) =	75.9 °F

CALCULATED ROOM CONDITIONS:	**75.8 °F dry bulb**

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

		Reference
Design air flow:	360 cfm	pg. 30
Supply Air Temp:	70.2 °F	pg. 75 of App. C
ΔT Duct Heater:	8.7 °F	pg. 66 of App. C
Duct Heater Supply:	78.9 °F	
Steady State Temperature:	75.6 °F	

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	74.6	75.6	-1.0	-53
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	75.8	75.6	0.2	4
SOUTH	Door C64	7.17	2.67	19.1	0.448	75.8	75.6	0.2	2
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	75.0	75.6	-0.6	-10
NORTH	36" CE	8.67	5.88	51.0	0.262	13.0	75.6	-62.6	-836
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	77.7	75.6	2.1	101
EAST	Window	4.00	3.30	13.2	0.820	77.7	75.6	2.1	23
FLOOR	708.0' - T1, 18" CRP (Dn)	13.54	8.36	113.2	0.222	50.0	75.6	-25.6	-643
CEILING**	C13 (Second tier) (Up)	13.54	8.36	113.2	0.538	74.6	75.6	-1.0	-61
						TOTAL TRANSMISSION LOAD =			-1,474

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	67
TOTAL ROOM SENSIBLE LOAD:		**-1,407**

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	78.9	-1,407 / (1.08 x 1.1 x	360)	=	75.6 °F

CALCULATED ROOM CONDITIONS:	75.6 °F dry bulb

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 30
pg. 75 of App. C

Design air flow: 260 cfm
Supply Air Temp: 70.2 °F

Steady State Temperature: 68.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	64.4	68.8	-4.4	-66
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	64.4	68.8	-4.4	-33
WEST	Door C60	7.17	3.00	21.5	0.448	64.4	68.8	-4.4	-42
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	74.6	68.8	5.8	139
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	74.6	68.8	5.8	763
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	75.8	68.8	7.0	162
NORTH	Door C57	7.17	3.00	21.5	0.448	75.8	68.8	7.0	67
SOUTH	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	50.0	68.8	-18.8	-1,246
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	64.4	68.8	-4.4	-272
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	75.8	68.8	7.0	85
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	77.7	68.8	8.9	105
EAST	Door C51	6.83	3.92	26.8	0.448	77.7	68.8	8.9	107
FLOOR	729.0' - C1, 8" TC (Dn)	4.39	15.77	69.2	0.395	60.0	68.8	-8.8	-241
FLOOR	708.0' - T1, 18" TC (Dn)	9.00	6.00	54.0	0.300	50.0	68.8	-18.8	-305
FLOOR	708.0' - T1, 18" TC (Dn)	23.40	9.10	212.9	0.300	50.0	68.8	-18.8	-1,201
CEILING (Sec. tier)**	C13 (Near C16) (Dn)	9.00	6.00	54.0	0.403	74.6	68.8	5.8	126
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	23.40	9.10	212.9	0.351	74.6	68.8	5.8	434
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	4.39	15.77	69.2	0.351	74.6	68.8	5.8	141
					TOTAL TRANSMISSION LOAD =				-1,277

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 880

TOTAL ROOM SENSIBLE LOAD: -397

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	70.2	-397 / (1.08 x 1.1 x		260	) =	68.9 °F

CALCULATED ROOM CONDITIONS: 68.8 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Reference
pg. 30

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 55.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	50.0	55.8	-5.8	-294
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	51.0	55.8	-4.8	-481
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	52.3	55.8	-3.5	-163
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	60.6	55.8	4.8	1,284
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	51.0	55.8	-4.8	-109
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	75.0	55.8	19.2	1,886
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	71.7	55.8	15.9	2,588
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	74.9	55.8	19.1	802
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	67.7	55.8	11.9	2,922
FLOOR	755.0' - C4, 5/8" GB (Up)			412.2	0.427	76.3	55.8	20.5	3,608
FLOOR	755.0' - C5, 5/8" GB (Up)			137.9	0.427	80.9	55.8	25.1	1,476
FLOOR	755.0 - C6, 5/8" GB (Up)			165.2	0.427	76.4	55.8	20.6	1,449
FLOOR	755.0 - C9, 3/4" PL (Up)			167.5	0.730	80.1	55.8	24.3	2,971
FLOOR	755.0'-C10, 3/4" PL (Up)			323.3	0.730	77.0	55.8	21.2	5,004
ROOF	27" (uninsulated) (winter)	37.33	42.70	1594.0	0.340	13.0	55.8	-42.8	-23,196
ROOF	27" (uninsulated) (winter)	4.67	9.53	44.5	0.340	13.0	55.8	-42.8	-648
ROOF	27" (uninsulated) (winter)	4.67	11.12	51.9	0.340	13.0	55.8	-42.8	-756
							TOTAL TRANSMISSION LOAD =		-1,655

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.

	CFM					Ts	(-Tr)	
Transfer - Air (C3) - pg 30 & App. C pg. 56	90	X	1.08	X	1.1	67.7	-55.8	1,267
Transfer - Air (C1) - pg. 30 & App. C pg. 54	53	X	1.08	X	1.1	60.6	-55.8	302
NET ROOM SENSIBLE LOAD:								**-86**

CALCULATED ROOM CONDITIONS:	55.8 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 52.3 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	60.6	52.3	8.3	162
SOUTH	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	50.0	52.3	-2.3	-50
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	55.8	52.3	3.5	163
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	51.0	52.3	-1.3	-25
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	64.9	52.3	12.6	270
ROOF	27", uninsulated (winter)	9.53	4.00	38.1	0.340	13.0	52.3	-39.3	-509
					TOTAL TRANSMISSION LOAD =				9

CALCULATED ROOM CONDITIONS: 52.3 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F

Steady State Temperature: 51.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	52.3	51.0	1.3	25
SOUTH	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	50.0	51.0	-1.0	-47
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	55.8	51.0	4.8	481
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	55.8	51.0	4.8	94
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	59.5	51.0	8.5	510
ROOF	27", uninsulated (winter)	20.54	4.00	82.2	0.340	13.0	51.0	-38.0	-1,062
					TOTAL TRANSMISSION LOAD =				1

CALCULATED ROOM CONDITIONS: 51.0 °F dry bulb

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR			
	FLOW (cfm) (pg.30, Diagram 2)	TEMPERATURE (°F)	Ref. pg. App. C	cfm X °F
EAST ATTIC 1	2,580	71.1	63	183,438
CORRIDOR (C 19)	260	68.8	72	17,888
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	74.6	66	355,357
SHIFT ENGINEERS OFFICE (C10)	10	77.0	62	770
CONFERENCE ROOM (C 9)	270	80.1	61	21,627
MCR RETURN AIR PLENUM	24,520	71.7	69	1,758,049
TOTAL	Vreturn = **32,403**			**2,337,128**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / SUM (cfm) = (Treturn)= **72.1 °F**

Outside Air Flow	Voa =	3,597 cfm	(pg. 30, Diagram 2)
Outside Air Temperature	Toa =	13 °F	(Section 6.1)
Heater Discharge Temperature	Toah =	60 °F (Set point)	

RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT (Te) :

Te = (Vreturn x Treturn + Voa x Toah) / (Voa + Vreturn) = **70.9 °F DB**

Δ T fan =	4.0 °F (AHU Fan Heat Gain @ pg.23)
Estimated air temp. entering the fan Tes[1] =	**66.2 °F** (minimum temperature to meet 75 °F thermostat setting)
Ts[2] =	**70.2 °F** (Supply Air Temperature at Fan Discharge)

If (Te + Δ T fan) = Ts: 100 % coil bypass is required

If (Te + Δ T fan) > Ts: % bypass = (Tes - 50.8*) / (Te - 50.8*)

(Te + Δ T fan) = **74.9 °F** > Ts = **70.2 °F**

% bypass = 76.6 %

Percent of the returning air going through the coil face damper and cooling to 50.8°F:	**23.4 %**
Percent of the remaining returning air going through the coil bypass damper :	**76.6 %**

*50.8 °F is a temperature of air leaving cooling coil (T_{COIL}); see pg. 29.

NOTES:

(1) This temperature is also identified as T_{MIX} on AHU schematic (pg. 29).

(2) This temperature is also identified as T_{AHU} on AHU schematic (pg. 29).

(3) For normal heating mode consider W_{AHU} to be @ the same humidity level 0.0085 # moisture / # dry air (see pg. 29A).

Room Transmission Loads (Heating - LOCA Operation)

ROOM NO. 755.0-C1 (Ref. 5.1.1, 5.1.3, 5.1.5, 5.1.13 & 5.1.14)
ROOM NAME: MECHANICAL EQUIPMENT ROOM

Reference
pg. 31
pg. 97 of App. C

Design air flow: 2,825 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 59.7 °F Design Room Temperature: 63°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	36" CE	17.75	42.00	745.5	0.268	13.0	59.7	-46.7	-9,330
SOUTH***	708.0' - T1, 36" CI	17.75	39.14	694.7	0.236	40.0	59.7	-19.7	-3,230
NORTH	36" CE	17.75	23.50	417.1	0.268	13.0	59.7	-46.7	-5,221
NORTH	757.0' - A5, 36" CI	17.75	15.64	277.6	0.236	75.0	59.7	15.3	1,002
EAST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	52.9	59.7	-6.8	-109
EAST*	755.0' - C3, 8" CI	8.00	6.67	10.3	0.500	62.1	59.7	2.4	12
EAST	Door C39	7.17	6.00	43.0	0.448	62.1	59.7	2.4	46
EAST	755.0' - C4, 8" CI	8.00	29.38	235.0	0.500	64.8	59.7	5.1	599
EAST (Second tier)**	W. Attic 1, Metal	9.75	37.33	364.0	0.735	56.4	59.7	-3.3	-883
EAST (Second tier)**	W. Attic 2, 8" CI	9.75	4.00	39.0	0.500	48.7	59.7	-11.0	-215
FLOOR***	708.0' - T1, 18" C (Dn)	39.14	42.00	1643.9	0.305	50.0	59.7	-9.7	-4,863
ROOF	27", uninsulated (winter)	39.14	42.00	1643.9	0.340	13.0	59.7	-46.7	-26,102
						TOTAL TRANSMISSION LOAD =			-48,292

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Wall height used = (775.75 - 763) = 9.75' for all West Attic walls; conservative
(***) Use normal minimum temperature to remove conservatism postulated in Assumprion 4.1.6.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :						=	13,453
TOTAL ROOM SENSIBLE LOAD:							**-34,839**
TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(W. Attic 1) - pg. 31 & App. C pg. 95	1,175	X	1.188	56.4	59.7	-3.3	-4,606
NET ROOM SENSIBLE LOAD:							**-39,445**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-39,445	/ (1.08 x 1.1 x	2,825	) =	59.7 °F

CALCULATED ROOM CONDITIONS:	59.7 °F dry bulb

ROOM NO. 755.0-C2 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: WOMEN'S TOILET

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 52.9 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	4.00	32.0	0.500	59.7	52.9	6.8	109
SOUTH**	708.0' - T1, 36" CI	8.00	9.53	76.2	0.236	40.0	52.9	-12.9	-232
NORTH*	755.0' - C3, 8" CI	8.00	9.53	54.7	0.500	62.1	52.9	9.2	252
NORTH	Door C38	7.17	3.00	21.5	0.448	62.1	52.9	9.2	89
EAST	755.0' - W.Stair C1, 8" CI	8.00	4.00	32.0	0.500	53.4	52.9	0.5	8
FLOOR**	708.0' - T1, 18" TC (Dn)	9.53	4.00	38.1	0.300	40.0	52.9	-12.9	-148
CEILING	W. Attic 2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	48.7	52.9	-4.2	-90
					TOTAL TRANSMISSION LOAD =				-12

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-12**

CALCULATED ROOM CONDITIONS: 52.9 °F dry bulb

ROOM NO. 755.0-C3 (Ref. 5.1.1, 5.1.4 & 5.5.1)
ROOM NAME: CORRIDOR

Reference
pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 62.1 °F Design Room Temperature: 57°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C2, 8" CI	8.00	9.53	54.7	0.500	52.9	62.1	-9.2	-252
SOUTH	Door C38	7.17	3.00	21.5	0.448	52.9	62.1	-9.2	-89
SOUTH*	755.0' - Stair C1, 8" CI	8.00	20.54	142.8	0.500	53.4	62.1	-8.7	-621
SOUTH	Door C37	7.17	3.00	21.5	0.448	53.4	62.1	-8.7	-84
SOUTH* ***	755.0' - T1, 36" CI**	8.67	10.63	63.6	0.236	40.0	62.1	-22.1	-332
SOUTH***	Door C36 (Heavy Eq.)	7.13	4.00	28.5	0.452	40.0	62.1	-22.1	-285
NORTH*	755.0' - C4, 8" RMW	8.00	14.03	90.7	0.455	64.8	62.1	2.7	111
NORTH	Door C40	7.17	3.00	21.5	0.448	64.8	62.1	2.7	26
NORTH* (See Note)	755.0' - C10, 8" RMW	8.00	16.70	87.3	0.455	65.8	62.1	3.7	147
NORTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	65.8	62.1	3.7	74
NORTH	Door C46	7.17	3.00	21.5	0.448	65.8	62.1	3.7	36
NORTH*	755.0' - C5, 8" RMW	8.00	10.31	61.0	0.455	64.4	62.1	2.3	64
NORTH	Door C42	7.17	3.00	21.5	0.448	64.4	62.1	2.3	22
EAST*	755.0' - C12, 8" CI	8.00	11.34	58.5	0.500	75.6	62.1	13.5	395
EAST	Door C56	7.17	4.50	32.3	0.448	75.6	62.1	13.5	195
WEST*	755.0' - C1, 8" CI	8.00	6.67	10.3	0.500	59.7	62.1	-2.4	-12
WEST	Door C39	7.17	6.00	43.0	0.448	59.7	62.1	-2.4	-46
WEST	755.0' - Stair C1, 8" CI	8.00	4.00	32.0	0.500	53.4	62.1	-8.7	-139
FLOOR***	708.0' - T1, 18" TC (Dn)	6.67	9.36	62.4	0.300	40.0	62.1	-22.1	-414
FLOOR	729.0' - C1, 8" TC (Dn)	6.67	33.21	221.5	0.395	60.0	62.1	-2.1	-184
FLOOR	729.0' - C1, 8" TC (Dn)	4.67	10.63	49.6	0.395	60.0	62.1	-2.1	-41
CEILING	W. Attic 1 - 3/4" PL (Up)	6.67	43.20	288.1	0.730	56.4	62.1	-5.7	-1,199
CEILING	W. Attic 1 - 3/4" PL (Up)	4.67	10.63	49.6	0.730	56.4	62.1	-5.7	-207
						TOTAL TRANSMISSION LOAD =			-2,834

Note: Wall thickness varies from 8" to 12"; conservatively, widest room dimension is used.
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling raised to el. 763'-8". (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :						=	0
TOTAL ROOM SENSIBLE LOAD:							**-2,834**
TRANSFER AIR	CFM		FACTOR	Ts	Tr	Delta T	
(ROOM C4) - pg. 31 & App.C pg. 79	440	X	1.188	64.8	62.1	2.7	1,411
(ROOM C5) - pg. 31 & App. C pg. 80	155	X	1.188	64.4	62.1	2.3	424
(ROOM C10) - pg. 31 & App. C pg. 84	220	X	1.188	65.8	62.1	3.7	967
NET ROOM SENSIBLE LOAD:							**-33**

CALCULATED ROOM CONDITIONS: 62.1 °F dry bulb

ROOM NO. 755.0-C4 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: KITCHEN

Reference
pg. 31
pg. 97 of App. C

Design air flow: 440 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 64.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	8.00	29.38	235.0	0.500	59.7	64.8	-5.1	-599
SOUTH*	755.0' - C3, 8" RMW	8.00	14.03	90.7	0.455	62.1	64.8	-2.7	-111
SOUTH	Door C40	7.17	3.00	21.5	0.448	62.1	64.8	-2.7	-26
EAST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	64.4	64.8	-0.4	-19
EAST	755.0' - C6, 8" RMW	8.00	16.00	128.0	0.455	63.9	64.8	-0.9	-55
NORTH	757.0' - A5, 36" CI	8.00	14.03	112.2	0.236	75.0	64.8	10.2	270
FLOOR**	708.0' - T1, 18" TC (Dn)	8.70	13.38	116.4	0.300	40.0	64.8	-24.8	-866
FLOOR	729.0' - C1, 8" TC (Dn)			295.8	0.395	60.0	64.8	-4.8	-561
CEILING	W. Attic 1 - 5/8" GB (Up)	29.38	14.03	412.2	0.427	56.4	64.8	-8.4	-1,478
					TOTAL TRANSMISSION LOAD =				-3,447

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-3,447**

ROOM TEMPERATURE (Tr) = Ts − Q / (1.08 × 1.1 × CFM)

71.5 − -3,447 / (1.08 × 1.1 × 440) = 64.9 °F

CALCULATED ROOM CONDITIONS:	64.8 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C5 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: MEN'S TOILET

Reference
pg. 31
pg. 97 of App. C

Design air flow: 90 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 64.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT. (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C4, 8" RMW	8.00	13.38	107.0	0.455	64.8	64.4	0.4	19
SOUTH*	755.0' - C3, 8" RMW**	8.00	10.31	61.0	0.455	62.1	64.4	-2.3	-64
SOUTH	Door C42	7.17	3.00	21.5	0.448	62.1	64.4	-2.3	-22
NORTH	755.0' - C6, 8" RMW**	8.00	10.31	61.0	0.455	63.9	64.4	-0.6	-15
NORTH	Door C45	7.17	3.00	21.5	0.448	63.9	64.4	-0.6	-5
EAST	755.0' - C10, 8" RMW**	8.00	13.38	107.0	0.455	65.8	64.4	1.4	68
FLOOR	729.0' - C1, 8" TC (Dn)	10.31	13.38	137.9	0.395	60.0	64.4	-4.4	-240
CEILING	W. Attic 1 - 5/8" GB (Up)	10.31	13.38	137.9	0.427	56.4	64.4	-8.0	-471
					TOTAL TRANSMISSION LOAD =				-730

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: -730

TRANSFER AIR	CFM		FACTOR		Ts	Tr	Delta T	
(Room C6) - pg. 31 & App. C pg. 81	65	X	1.188		63.9	64.4	-0.6	-42

NET ROOM SENSIBLE LOAD: -772

ROOM TEMPERATURE (Tr) = Ts 71.5 − Q -772 / (1.08 x 1.1 x CFM 90) = 64.3 °F

CALCULATED ROOM CONDITIONS: 64.4 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C6, C7, and C8 (Ref. 5.1.4 & 5.5.1)
ROOM NAME: LOCKER ROOM AND SHOWERS

Reference
pg. 31
pg. 97 of App. C

Design air flow: 65 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 63.9 °F Design Room Temperature: 58°F

WALL	TYPE OF ENCLOSURE	LENGTH/	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH*	755.0' - C5, 8" RMW**	8.00	10.31	61.0	0.455	64.4	63.9	0.6	15
SOUTH	Door C45	7.17	3.00	21.5	0.448	64.4	63.9	0.6	5
NORTH	757.0' - A5, 36" CI	8.00	10.31	82.5	0.236	75.0	63.9	11.2	217
EAST	755.0' - C9, 8" RMW**	8.00	10.03	80.2	0.455	67.4	63.9	3.6	130
EAST	755.0' - C10, 8" RMW**	8.00	5.33	42.6	0.455	65.8	63.9	2.0	38
WEST	755.0' - C1, 8" CI	8.00	16.02	128.2	0.500	59.7	63.9	-4.2	-266
FLOOR	729.0' - C1, 18" TC (Dn)	16.02	8.70	139.4	0.300	60.0	63.9	-3.9	-161
FLOOR	729.0' - C1, 8" TC (Dn)			25.8	0.395	60.0	63.9	-3.9	-39
CEILING	W. Attic 1 - 5/8" GB (Up)	16.02	10.31	165.2	0.427	56.4	63.9	-7.5	-525
					TOTAL TRANSMISSION LOAD =				-587

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Walls are tiled; tile resistance coeff. is 0.05, insignificant. Conservatively, U for RMW wall is used.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: -587

	Ts	Q	CFM		
ROOM TEMPERATURE (Tr) =	71.5	-587 / (1.08 x 1.1 x	65	) =	63.9 °F

CALCULATED ROOM CONDITIONS: 63.9 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - STAIR C1 (Ref. 5.1.1 & 5.1.12)
ROOM NAME: WEST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Steady State Temperature: 53.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C2, 8" CI	8.00	4.00	32.0	0.500	52.9	53.4	-0.5	-8
SOUTH**	755.0 - T1, 36" CI	8.00	20.54	164.3	0.236	40.0	53.4	-13.4	-520
NORTH*	755.0' - C3, 8" CI	8.00	20.54	142.8	0.500	62.1	53.4	8.7	621
NORTH	Door C37	7.17	3.00	21.5	0.448	62.1	53.4	8.7	84
EAST	755.0' - C3, 8" CI	8.00	4.00	32.0	0.500	62.1	53.4	8.7	139
CEILING	W. Attic 3-3/4" PL (Up)	20.54	4.00	82.2	0.730	48.0	53.4	-5.4	-324
FLOOR (See Note)									
						TOTAL TRANSMISSION LOAD =			-7

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 53.4 °F dry bulb

ROOM NO. STAIR C2 (Ref. 5.1.1& 5.1.12)
ROOM NAME: EAST STAIRWELL

Reference
pg. 31

Design air flow: - cfm
Steady State Temperature: 58.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C15, 8" CI	8.67	6.04	30.9	0.500	59.1	58.0	1.1	17
WEST	Door C53	7.17	3.00	21.5	0.448	59.1	58.0	1.1	11
WEST	755.0' - C13, 8" RMW	8.67	2.32	20.1	0.455	68.2	58.0	10.2	93
SOUTH**	755.0 - T1, 36" CI	8.67	20.33	176.3	0.236	40.0	58.0	-18.0	-749
NORTH	755.0' - C19, 8" CI	8.67	14.27	123.7	0.500	63.5	58.0	5.5	340
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	68.2	58.0	10.2	244
EAST	755.0' - C19, 12" CI	8.67	4.00	34.7	0.431	63.5	58.0	5.5	82
EAST*	755.0' - C19, 8" RMW	8.00	4.39	13.6	0.455	63.5	58.0	5.5	34
EAST	Door C60	7.17	3.00	21.5	0.448	63.5	58.0	5.5	53
CEILING	E.Attic 3 - 3/4" PL, (Up)	4.00	20.33	81.3	0.730	54.2	58.0	-3.8	-226
CEILING	C13 (1/2" & 5/8" GB) (Dn)	4.39	6.00	26.3	0.351	68.2	58.0	10.2	94
FLOOR (See Note)									
						TOTAL TRANSMISSION LOAD =			-6

Note: No transmission through the floor is considered; open space (stairs) between elevations 755.0 and 692.0
(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 58.0 °F dry bulb

ROOM NO. 755.0-C9 (Ref. 5.1.4)
ROOM NAME: CONFERENCE ROOM

Reference
pg. 31
pg. 97 of Aapp. C

Design air flow: 270 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 67.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C6, 8" RMW	8.00	10.03	80.2	0.455	63.9	67.4	-3.6	-130
SOUTH*	755.0' - C10, 8" RMW	8.00	16.70	112.1	0.455	65.8	67.4	-1.6	-82
SOUTH	Door C48	7.17	3.00	21.5	0.448	65.8	67.4	-1.6	-15
NORTH	757.0' - A5, 36" CI	8.00	16.70	133.6	0.266	75.0	67.4	7.6	270
EAST	755.0' - C12, 8" CI	8.00	10.03	80.2	0.500	75.6	67.4	8.2	329
FLOOR	729.0' - C1, 8" CRP (Dn)	10.03	16.70	167.5	0.270	60.0	67.4	-7.4	-335
CEILING	W. Attic 1 - 3/4" PL (Up)	10.03	16.70	167.5	0.730	56.4	67.4	-11.0	-1,345
					TOTAL TRANSMISSION LOAD =				-1,307

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-1,307**

	Ts	Q		CFM			
ROOM TEMPERATURE (Tr) =	71.5	-1,307	/ (1.08 x 1.1 x	270	)	=	67.4 °F

CALCULATED ROOM CONDITIONS:	67.4 °F dry bulb

ROOM NO. 755.0-C10 (Ref. 5.1.4)
ROOM NAME: SHIFT ENGINEERS OFFICE

Reference
pg. 31
pg. 97 of App. C

Design air flow: 330 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 65.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C5, 8" RMW	8.00	13.38	107.0	0.455	64.4	65.8	-1.4	-68
WEST	755.0' - C6, 8" RMW	8.00	5.33	42.6	0.455	63.9	65.8	-2.0	-38
SOUTH* (See Note)	755.0' - C3, 8" RMW	8.00	16.70	87.3	0.455	62.1	65.8	-3.7	-147
SOUTH	Door C46	7.17	3.00	21.5	0.448	62.1	65.8	-3.7	-36
SOUTH	Door C46A (Glass)	7.38	3.36	24.8	0.810	62.1	65.8	-3.7	-74
NORTH* (See Note)	755.0' - C9, 8" RMW	8.00	16.70	112.1	0.455	67.4	65.8	1.6	82
NORTH	Door C48	7.17	3.00	21.5	0.448	67.4	65.8	1.6	15
EAST**	755.0' - C12, 8" CI	8.00	19.36	154.9	0.500	75.8	65.8	9.8	759
FLOOR	729.0' - C1, 8" CRP (Dn)	16.70	19.36	323.3	0.270	60.0	65.8	-5.8	-506
CEILING	W. Attic 1 - 3/4" PL (Up)	16.70	19.36	323.3	0.730	56.4	65.8	-9.4	-2,219
					TOTAL TRANSMISSION LOAD =				-2,232

Note: Wall thickness varies (see **); conservatively, widest room dimension is used.

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Part of the wall is 12" thick; conservatively, 8" thickness was considered.

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: **-2,232**

ROOM TEMPERATURE (Tr) = Ts − Q / (1.08 x 1.1 x CFM) = 65.8 °F

71.5 − -2,232 / (1.08 x 1.1 x 330) = 65.8 °F

CALCULATED ROOM CONDITIONS: **65.8 °F dry bulb**

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 1 (above C14) (Ref. 5.1.1 & 5.1.6)

Reference
pg. 31
pg. 89 of App. C

Design air flow: 2,580 cfm (Transfer from room C14)
Supply Air Temp: 65.7 °F (Transfer from room C14)
Steady State Temperature: 60.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST (Second tier)	755.0' - C13, 10" CI	7.75	42.00	325.5	0.463	68.2	60.5	7.7	1,160
EAST	36" CE	7.75	42.00	325.5	0.268	13.0	60.5	-47.5	-4,144
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	60.5	-47.5	-2,139
SOUTH*	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	40.0	60.5	-20.5	-813
FLOOR	C14 Ceiling (Ac. tile) (Up)	16.80	42.00	705.6	0.415	65.7	60.5	5.2	1,523
ROOF	27", uninsulated (winter)	16.80	42.00	705.6	0.340	13.0	60.5	-47.5	-11,395
					TOTAL TRANSMISSION LOAD =				-15,807

(*) See Assumption 4.1.6

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 1.1 x CFM) = 60.5 °F

65.7 + -15,807 / (1.08 x 1.1 x 2580) = 60.5 °F

CALCULATED ROOM CONDITIONS: 60.5 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: EAST ATTIC 2 (above C15)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 54.8 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	MCR Plen, 12" CI	9.08	6.04	54.8	0.431	71.4	54.8	16.6	392
SOUTH*	755.0' - T1, 36" CI	9.08	13.29	120.7	0.236	40.0	54.8	-14.8	-421
NORTH	755.0' - C13, 8" CI	9.08	13.29	120.7	0.500	68.2	54.8	13.4	809
EAST	E. Attic 3, 8"CI	9.08	4.00	36.3	0.500	54.2	54.8	-0.6	-11
EAST	C13 (sec. tier), 8" CI	9.08	2.04	18.5	0.500	68.2	54.8	13.4	124
FLOOR	C15 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	59.1	54.8	4.3	252
ROOF	27", uninsulated (winter)	13.29	6.04	80.3	0.340	13.0	54.8	-41.8	-1,141
					TOTAL TRANSMISSION LOAD =				4

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 54.8 °F dry bulb

ROOM NO. N/A
ROOM NAME: EAST ATTIC 3 (above Stair C2)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 54.2 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	E. Attic 2, 8" CI	9.08	4.00	36.3	0.500	54.8	54.2	0.6	11
SOUTH*	755.0 - T1, 36" CI	9.08	20.33	184.6	0.236	40.0	54.2	-14.2	-619
NORTH	755.0' - C13, 8" CI	9.08	20.33	184.6	0.500	68.2	54.2	14.0	1,292
EAST	755.0' - C13, 12" CI	9.08	4.00	36.3	0.431	68.2	54.2	14.0	219
FLOOR	E.Stair C2 - 3/4" PL (Up)	4.00	20.33	81.3	0.730	58.0	54.2	3.8	226
ROOF	27", uninsulated (winter)	4.00	20.33	81.3	0.340	13.0	54.2	-41.2	-1,139
					TOTAL TRANSMISSION LOAD =				-10

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 54.2 °F dry bulb

ROOM NO. 755.0-C12 (Ref. 5.1.1, 5.1.2 & 5.1.4)
ROOM NAME: MAIN CONTROL ROOM

Reference
pg. 31
pg. 97 of App. C

Design air flow: 21650 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 75.6 °F Design Room Temperature: 75 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C3, 8" CI	8.00	11.34	58.5	0.500	62.1	75.6	-13.5	-395
WEST	Door C56	7.17	4.50	32.3	0.448	62.1	75.6	-13.5	-195
WEST	755.0' - C10, 8" CI	8.00	19.36	154.9	0.500	65.8	75.6	-9.8	-759
WEST	755.0' - C9, 8" CI	8.00	10.03	80.2	0.500	67.4	75.6	-8.2	-329
WEST	W. Attic 1, 8" CI	2.00	42.00	84.0	0.500	56.4	75.6	-19.2	-806
SOUTH***	755.0' - T1, 36" CI	10.00	150.70	1507.0	0.236	40.0	75.6	-35.6	-12,661
NORTH	757.0' - A1, 36" CI	10.00	26.70	267.0	0.236	75.0	75.6	-0.60	-38
NORTH	757.0' - A25, 36" CI	10.00	14.00	140.0	0.236	75.0	75.6	-0.60	-20
NORTH*	757.0' - A3 to A5, 36" CI	10.00	48.00	480.0	0.236	75.0	75.6	-0.60	-68
NORTH	Door C49	6.50	3.00	19.5	0.448	75.0	75.6	-0.60	-5
NORTH	757.0' - A27, 36" CI	10.00	14.00	140.0	0.236	75.0	75.6	-0.60	-20
NORTH	757.0' - A23, 36" CI	10.00	20.00	200.0	0.236	75.0	75.6	-0.60	-28
NORTH*	757.0' - A21/A22, 36" CI	10.00	26.00	260.5	0.236	75.0	75.6	-0.60	-37
NORTH	Door C50	6.50	3.00	19.5	0.448	75.0	75.6	-0.60	-5
EAST*	755.0' - C15, 12" CI	8.67	6.04	20.1	0.431	59.1	75.6	-16.5	-143
EAST	Door C55	7.17	4.50	32.3	0.448	59.1	75.6	-16.5	-239
EAST	E. Attic 2, 12" CI	1.33	6.04	8.0	0.431	54.8	75.6	-20.8	-72
EAST	755.0' - C13, 12" CI	10.00	35.29	352.9	0.431	68.2	75.6	-7.4	-1,126
FLOOR	729.0' -C1, 8" CRP (Dn)	42.00	150.70	6329.4	0.270	60.0	75.6	-15.6	-26,659
CEILING**	MCR Plenum (Up)	The return air is directed from the room to the plenum.							
								TOTAL TRANSMISSION LOAD =	-43,605

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Luminious ceiling panel (plastic) (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	160,411
TOTAL ROOM SENSIBLE LOAD:								**116,806**
	CFM					Ts	(-Tr)	
Transfer - Air (C 13) - not included here see MCR Plenu	2727	X	1.08	X	1.1	68.2	-75.6	-23,969
NET ROOM SENSIBLE LOAD:								**116,806**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	116,806 / (1.08	x 1.1 x	24,017)	=	75.6 °F

CALCULATED ROOM CONDITIONS: 75.6 °F dry bulb

ROOM NO. 755.0-C13 (Ref. 5.1.4, 5.1.6, 5.1.10)
ROOM NAME: RELAY ROOM and DPSO SHOP

Reference
pg. 31
pg. 97 of App. C

Design air flow: 7490 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 68.2 °F Design Room Temperature: 67°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0'- C12, 12" CI	10.00	35.29	352.9	0.431	75.6	68.2	7.4	1,126
WEST (Second tier)	MCR Plenum, 12" CI	7.75	35.29	273.5	0.431	71.4	68.2	3.2	377
WEST (Second tier)	E. Attic 3, 12" CI	9.08	4.00	36.3	0.431	54.2	68.2	-14.0	-219
WEST (Second tier)	E. Attic 2, 8" CI	9.08	2.04	18.5	0.500	54.8	68.2	-13.4	-124
SOUTH	Stair C2, 8" RMW	8.67	6.06	52.5	0.455	58.0	68.2	-10.2	-244
SOUTH	755.0' - C19, 2-5/8"GB	8.67	37.67	326.6	0.403	63.5	68.2	-4.7	-619
SOUTH*	755.0' - C15, 8" CI	8.67	13.29	65.0	0.500	59.1	68.2	-9.1	-296
SOUTH	Door C52	7.17	7.00	50.2	0.448	59.1	68.2	-9.1	-205
SOUTH(Second tier)	E. Attic 2, 8" CI	9.08	13.29	120.7	0.500	54.8	68.2	-13.4	-809
SOUTH(Second tier)	E. Attic 3, 8" CI	9.08	20.33	184.6	0.500	54.2	68.2	-14.0	-1,292
SOUTH(Sec. tier)***	755.0' - T1, 36" CI	9.08	24.04	218.3	0.236	40.0	68.2	-28.2	-1,453
NORTH	757.0' - A21, 36" CI	17.75	57.66	1023.5	0.236	75.0	68.2	6.8	1,642
EAST*	755.0' - C16, 8" RMW	8.67	18.50	138.9	0.455	68.1	68.2	-0.1	-6
EAST	Door C63	7.17	3.00	21.5	0.448	68.1	68.2	-0.1	-1
EAST	755.0' - C18, 8" RMW	8.67	13.54	117.4	0.455	68.1	68.2	-0.1	-5
EAST (next to C15)	Stair C2, 8' RMW	8.67	2.32	20.1	0.455	58.0	68.2	-10.2	-93
EAST (Second tier)	East Attic 1, 10" CI	7.75	42.00	325.5	0.463	60.5	68.2	-7.7	-1,160
EAST (Second tier)	755.0' - C14, 10" CI	1.33	42.00	55.9	0.463	65.7	68.2	-2.5	-65
FLOOR	729.0' - C1, 8" TC (Up)	32.63	38.13	1244.2	0.524	60.0	68.2	-8.2	-5,346
FLOOR	729.0' - C1, 8" TC (Up)	2.32	13.29	30.8	0.524	60.0	68.2	-8.2	-132
FLOOR***	708.0' - T1, 18" TC (Up)	32.63	19.53	637.3	0.369	40.0	68.2	-28.2	-6,631
FLOOR (Sec. tier)**	C16 (Area above) (Up)			179.7	0.538	68.1	68.2	-0.1	-10
FLOOR (Sec. tier)**	C18 (Area above) (Up)			113.2	0.538	68.1	68.2	-0.1	-6
FLOOR (Sec. tier)**	C19 (Near C16) (Dn)			54.0	0.403	63.5	68.2	-4.7	-102
FLOOR (Sec. tier)	C19 (1/2" & 5/8" GB) (Dn)			282.2	0.351	63.5	68.2	-4.7	-466
FLOOR (Sec. tier)	E.Stair(1/2"& 5/8"GB) (Dn)			26.3	0.351	58.0	68.2	-10.2	-94
ROOF	27", uninsulated (winter)			2541.4	0.340	13.0	68.2	-55.2	-47,697
						TOTAL TRANSMISSION LOAD =			-63,930

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) Ceiling for this room is 8" concrete slab (***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 34,697

TOTAL ROOM SENSIBLE LOAD: -29,233

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-29,233	/ (1.08 x 1.1 x	7,490	) =	68.2 °F

CALCULATED ROOM CONDITIONS: 68.2 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C14 (Ref. 5.1.4, 5.1.5, 5.1.10)
ROOM NAME: TECHNICAL SUPPORT CENTER

Reference
pg. 31
pg. 97 of App. C

Design air flow: 1,840 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 65.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C19, 10" CI	8.67	6.03	25.6	0.463	63.5	65.7	-2.2	-26
WEST	Door C51	6.80	3.92	26.7	0.448	63.5	65.7	-2.2	-26
WEST*	755.0' - C16, 10" CI	8.67	21.50	164.9	0.463	68.1	65.7	2.4	183
WEST	Door C62	7.17	3.00	21.5	0.448	68.1	65.7	2.4	23
WEST*	755.0' - C18, 10" CI	8.67	13.54	104.2	0.463	68.1	65.7	2.4	116
WEST	Window	4.00	3.30	13.2	0.810	68.1	65.7	2.4	26
WEST (Second tier)	755.0' - C13, 10" CI	1.33	42.00	55.9	0.463	68.2	65.7	2.5	65
SOUTH**	708.0' - T1, 36" CI	10.00	16.80	168.0	0.236	40.0	65.7	-25.7	-1,019
NORTH	36" CE	10.00	16.80	168.0	0.268	13.0	65.7	-52.7	-2,373
EAST	36" CE	10.00	42.00	420.0	0.268	13.0	65.7	-52.7	-5,932
FLOOR**	708 - T1, 18" CRP (Dn)	16.80	42.00	705.6	0.222	40.0	65.7	-25.7	-4,026
CEILING	E. Attic 1 (Ac. tile) (Up)	16.80	42.00	705.6	0.415	60.5	65.7	-5.2	-1,523
						TOTAL TRANSMISSION LOAD =			-14,512

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	2,241
TOTAL ROOM SENSIBLE LOAD:								**-13,793**
	CFM					Ts	(-Tr)	
Transfer - Air (C 16) - pg. 31 & App. C pg. 92	360	X	1.08	X	1.1	68.1	-65.7	1,026
NET ROOM SENSIBLE LOAD								**-12,767**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-12,767 / (1.08 x	1.1 x	1,840)	=	65.7 °F

CALCULATED ROOM CONDITIONS: 65.7 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C15 (Ref. 5.1.1 & 5.1.11)
ROOM NAME: CORRIDOR

Reference pg. 31

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 59.1 °F Design Room Temperature: 58°F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0' - C12, 12" CI	8.67	6.04	20.1	0.431	75.6	59.1	16.5	143
WEST	Door C55	7.17	4.50	32.3	0.448	75.6	59.1	16.5	239
SOUTH* **	755.0' - T1, 36" CI	8.67	13.29	87.2	0.236	40.0	59.1	-19.1	-393
SOUTH**	Door C54 (Heavy eq.)	7.10	3.95	28.0	0.452	40.0	59.1	-19.1	-242
NORTH*	755.0' - C13, 8" CI	8.67	13.29	65.0	0.500	68.2	59.1	9.1	296
NORTH	Door C52	7.17	7.00	50.2	0.448	68.2	59.1	9.1	205
EAST*	Stair C2, 8"CI	8.67	6.04	9.1	0.500	58.0	59.1	-1.1	-5
EAST	Door C53	7.17	6.04	43.3	0.448	58.0	59.1	-1.1	-21
FLOOR	729.0' - C1, 8" TC (Dn)	13.29	6.04	80.3	0.395	60.0	59.1	0.9	29
CEILING	E. Attic 2 - 3/4" PL (Up)	13.29	6.04	80.3	0.730	54.8	59.1	-4.3	-252
					TOTAL TRANSMISSION LOAD =				-3

(*) The area of the door, listed directly below this wall area, has been subtracted from the total wall area.
(**) See Assumption 4.1.4

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-3**

CALCULATED ROOM CONDITIONS: 59.1 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. - N/A
ROOM NAME: M C R RETURN AIR PLENUM

Reference
pg. 31
pg. 87 of App. C

Design air flow: 24017 cfm (Transfer from room C12)
Supply Air Temp: 75.6 °F (Transfer from room C12)
Steady State Temperature: 71.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH**	T1 - 36" CI	7.75	150.70	1167.9	0.236	40.0	71.4	-31.4	-8,655
NORTH	757.0' - A1, 36" CI	7.75	26.70	206.9	0.236	75.0	71.4	3.6	176
NORTH	757.0' - A25, 36" CI	7.75	14.00	108.5	0.236	75.0	71.4	3.6	92
NORTH	757.0' - A3 to A5, 36" CI	7.75	48.00	372.0	0.236	75.0	71.4	3.6	316
NORTH	757.0' - A27, 36" CI	7.75	14.00	108.5	0.236	75.0	71.4	3.6	92
NORTH	757.0' - A23, 36" CI	7.75	20.00	155.0	0.236	75.0	71.4	3.6	132
NORTH	757.0' - A21/A22, 36" CI	7.75	28.00	217.0	0.236	75.0	71.4	3.6	184
EAST	C13 (Sec. tier), 12" CI	7.75	35.29	273.5	0.431	68.2	71.4	-3.2	-377
EAST	East Attic 2, 12" CI	7.75	6.04	46.8	0.431	54.8	71.4	-16.6	-335
WEST	West Attic 1, 8" CI	7.75	42.00	325.5	0.500	56.4	71.4	-15.0	-2,441
FLOOR*	C12 (Susp. ceiling)	The return air is directed from the room to the plenum.							
ROOF	27", uninsulated (winter)			6329.4	0.340	13.0	71.4	-58.4	-125,677
					TOTAL TRANSMISSION LOAD*** =				-119,006

(*) Luminious ceiling panel (plastic)
(**) See Assumption 4.1.6
(***) Includes the transfer air from C13 and 41,457 Btu/hr for lights

ROOM TEMPERATURE (Tr) = Ts + Q / (1.08 x 1.1 x CFM) = 75.6 + -119,005 / (1.08 x 1.1 x 24,017) = 71.4 °F

CALCULATED ROOM CONDITIONS: 71.4 °F dry bulb

This Appendix added by Revision 013.

ROOM NO. 755.0-C16 and C 17
ROOM NAME: CONFERENCE ROOM & TELEPHONE ROOM

Reference
pg. 31
pg. 97 of App. C

Design air flow: 380 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 68.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST*	755.0 - C13, 8" RMW	8.67	18.50	138.9	0.455	68.2	68.1	0.1	6
WEST	Door C63	7.17	3.00	21.5	0.448	68.2	68.1	0.1	1
WEST	755.0' - C19, 8" RMW	8.67	3.03	26.3	0.455	63.5	68.1	-4.6	-55
SOUTH	755.0 - C19, 8" RMW	8.67	8.36	72.5	0.455	63.5	68.1	-4.6	-152
SOUTH	Door C57	7.17	3.00	21.5	0.448	63.5	68.1	-4.6	-44
NORTH*	755.0' -C18, 2-5/8" GB	8.67	8.36	53.3	0.403	68.1	68.1	0.0	0
NORTH	Door C64	7.17	2.67	19.1	0.448	68.1	68.1	0.0	0
EAST*	755.0' - C14, 10" CI	8.67	21.50	164.9	0.463	65.7	68.1	-2.4	-183
EAST	Door C62	7.17	3.00	21.5	0.448	65.7	68.1	-2.4	-23
FLOOR***	708' - T1, 18" CRP (Dn)	21.50	8.36	179.7	0.222	40.0	68.1	-28.1	-1,121
CEILING**	C13 (Second tier) (Up)	21.50	8.36	179.7	0.538	68.2	68.1	0.1	10
					TOTAL TRANSMISSION LOAD =				-1,562

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :							=	0
TOTAL ROOM SENSIBLE LOAD:								**-1,562**
	CFM					Ts	(-Tr)	
Transfer - Air (C 18) - pg. 31 & App. C pg. 93	360	X	1.08	X	1.1	68.1	-68.1	0
NET ROOM SENSIBLE LOAD								**-1,562**

	Ts	Q		CFM		
ROOM TEMPERATURE (Tr) =	71.5	-1,562 / (1.08 x 1.1 x		380	) =	68.0 °F

CALCULATED ROOM CONDITIONS:	68.1 °F dry bulb

ROOM NO. 755.0-C18 (Ref. 5.1.1, 5.1.6, 5.1.10)
ROOM NAME: NRC OFFICES

Reference
pg. 31
pg. 97 of App. C

Design air flow: 360 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 68.1 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C13, 8" RMW	8.67	13.54	117.4	0.455	68.2	68.1	0.1	5
SOUTH*	755.0' - C16, 2-5/8"GB	8.67	8.36	53.3	0.403	68.1	68.1	0.0	0
SOUTH	Door C64	7.17	2.67	19.1	0.448	68.1	68.1	0.0	0
NORTH	757.0' - A21, 36" CI	8.67	8.36	72.5	0.236	75.0	68.1	6.9	116
NORTH	36" CE	8.67	5.88	51.0	0.262	13.0	68.1	-55.1	-736
EAST*	755.0' - C14, 10" CI	8.67	13.54	104.2	0.463	65.7	68.1	-2.4	-116
EAST	Window	4.00	3.30	13.2	0.820	65.7	68.1	-2.4	-26
FLOOR***	708.0' - T1, 18" CRP (Dn)	13.54	8.36	113.2	0.222	40.0	68.1	-28.1	-706
CEILING**	C13 (Second tier) (Up)	13.54	8.36	113.2	0.538	68.2	68.1	0.1	6
						TOTAL TRANSMISSION LOAD =			-1,454

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) :	=	0
TOTAL ROOM SENSIBLE LOAD:		**-1,454**

ROOM TEMPERATURE (Tr) = Ts − Q / (1.08 x 1.1 x CFM) = 71.5 − -1,454 / (1.08 x 1.1 x 360) = 68.1 °F

CALCULATED ROOM CONDITIONS: 68.1 °F dry bulb

ROOM NO. 755.0-C19
ROOM NAME: CORRIDOR

Reference
pg. 31
pg. 97 of App. C

Design air flow: 260 cfm
Supply Air Temp: 71.5 °F
Steady State Temperature: 63.5 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	Stair C2 - 12" CI	8.67	4.00	34.7	0.431	58.0	63.5	-5.5	-82
WEST*	Stair C2 - 8" RMW	8.67	4.39	16.6	0.455	58.0	63.5	-5.5	-41
WEST	Door C60	7.17	3.00	21.5	0.448	58.0	63.5	-5.5	-53
NORTH	755.0' - C13, 8" RMW	8.67	6.06	52.5	0.455	68.2	63.5	4.7	112
NORTH	755.0' - C13, 2-5/8"GB	8.67	37.67	326.6	0.403	68.2	63.5	4.7	619
NORTH*	755.0' - C16, 8" RMW	8.67	8.36	51.0	0.455	68.1	63.5	4.6	107
NORTH	Door C57	7.17	3.00	21.5	0.448	68.1	63.5	4.6	44
SOUTH ***	755.0' - T1, 36" CI	8.67	32.40	280.9	0.236	40.0	63.5	-23.5	-1,558
SOUTH	755.0' - Stair C2, 8" CI	8.67	14.27	123.7	0.500	58.0	63.5	-5.5	-340
EAST	755.0' - C16, 8" RMW	8.67	3.08	26.7	0.455	68.1	63.5	4.6	56
EAST*	755.0' - C14, 10" CI	8.67	6.03	25.5	0.463	65.7	63.5	2.2	26
EAST	Door C51	6.83	3.92	26.8	0.448	65.7	63.5	2.2	26
FLOOR	729.0' - C1, 8" TC (Dn)	4.39	15.77	69.2	0.395	60.0	63.5	-3.5	-96
FLOOR^	708.0' - T1, 18" TC (Dn)	9.00	6.00	54.0	0.300	40.0	63.5	-23.5	-381
FLOOR^	708.0' - T1, 18" TC (Dn)	23.40	9.10	212.9	0.300	40.0	63.5	-23.5	-1,501
CEILING (Sec. tier)**	C13 (Near C16) (Dn)	9.00	6.00	54.0	0.403	68.2	63.5	4.7	102
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	23.40	9.10	212.9	0.351	68.2	63.5	4.7	351
CEILING (Sec. tier)	C13 (1/2" & 5/8"GB)(Dn)	4.39	15.77	69.2	0.351	68.2	63.5	4.7	114
						TOTAL TRANSMISSION LOAD =			-2,494

(*) The area of the door or window, listed directly below this wall area, has been subtracted from the total wall area.
(**) 8" concrete slab
(***) See Assumption 4.1.6

LOAD SUMMARY:

ELECTRICAL LOAD (pg. 5 of App. C) : = 0

TOTAL ROOM SENSIBLE LOAD: -2,494

ROOM TEMPERATURE (Tr) = Ts − Q / (1.08 x 1.1 x CFM) = 63.4 °F

71.5 − -2,494 / (1.08 x 1.1 x 260) = 63.4 °F

CALCULATED ROOM CONDITIONS: 63.5 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 1 (above C3, C4, C5, C6, C9 & C10)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 56.4 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
SOUTH (See Note)*	755.0' - T1, 36" CI	9.75	22.00	214.5	0.236	40.0	56.4	-16.4	-830
SOUTH (See Note)	W. Attic 3, 8" CI	9.75	20.54	200.3	0.500	48.0	56.4	-8.4	-841
SOUTH (See Note)	W. Attic 2, 8" CI	9.75	9.53	92.9	0.500	48.7	56.4	-7.7	-358
WEST (See Note)	755.0' - C1, Metal column	9.75	37.33	364.0	0.735	59.7	56.4	3.3	883
WEST (See Note)	W. Attic 3, 8" CI	9.75	4.67	45.5	0.500	48.0	56.4	-8.4	-191
NORTH (See Note)	757.0' - A5, 36" CI	9.75	42.70	416.3	0.236	75.0	56.4	18.6	1,828
EAST	MCR Plen, 8" CI	7.75	42.00	325.5	0.500	71.4	56.4	15.0	2,441
EAST	755.0' - C12, 8" CI	2.00	42.00	84.0	0.500	75.6	56.4	19.2	806
FLOOR	755.0' - C3, 3/4" PL (Up)			337.8	0.730	62.1	56.4	5.7	1,406
FLOOR	755.0' - C4, 5/8" GB (Up)			412.2	0.427	64.8	56.4	8.4	1,478
FLOOR	755.0' - C5, 5/8" GB (Up)			137.9	0.427	64.4	56.4	8.0	471
FLOOR	755.0 - C6, 5/8" GB (Up)			165.2	0.427	63.9	56.4	7.5	525
FLOOR	755.0 - C9, 3/4" PL (Up)			167.5	0.730	67.4	56.4	11.0	1,345
FLOOR	755.0'-C10, 3/4" PL (Up)			323.3	0.730	65.8	56.4	9.4	2,219
ROOF	27" (uninsulated) (winter)	37.33	42.70	1594.0	0.340	13.0	56.4	-43.4	-23,521
ROOF	27" (uninsulated) (winter)	4.67	9.53	44.5	0.340	13.0	56.4	-43.4	-657
ROOF	27" (uninsulated) (winter)	4.67	11.12	51.9	0.340	13.0	56.4	-43.4	-766
					TOTAL TRANSMISSION LOAD =				-13,762

Note: Wall height used = (775.75 - 763) = 9.75' for all walls.
(*) See Assumption 4.1.6

	CFM					Ts	(-Tr)	
Transfer - Air (C 12) - pg. 31 & App. C pg. 87	360	X	1.08	X	1.1	75.6	-56.4	8,211
Transfer - Air (C 3) - pg. 31 & App. C pg. 78	815	X	1.08	X	1.1	62.1	-56.4	5,519
TOTAL ROOM SENSIBLE LOAD:								**-32**

CALCULATED ROOM CONDITIONS:	56.4 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 2 (above C2)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 48.7 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	755.0' - C1, 8" CI	9.75	4.00	39.0	0.500	59.7	48.7	11.0	215
SOUTH*	708.0' - T1, 36" CI	9.75	9.53	92.9	0.236	40.0	48.7	-8.7	-191
NORTH	W. Attic 1 - 8" CI	9.75	9.53	92.9	0.500	56.4	48.7	7.7	358
EAST	W. Attic 3 - 8" CI	9.75	4.00	39.0	0.500	48.0	48.7	-0.7	-14
FLOOR	755.0' - C2, 5/8" GB (Up)	9.53	4.00	38.1	0.562	52.9	48.7	4.2	90
ROOF	27" (uninsulated) (winter)	9.53	4.00	38.1	0.340	13.0	48.7	-35.7	-463
						TOTAL TRANSMISSION LOAD =			-5

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 48.7 °F dry bulb

ROOM NO. - N/A
ROOM NAME: WEST ATTIC 3 (above Stair C1)

Design air flow: - cfm
Supply Air Temp: - °F
Steady State Temperature: 48.0 °F

WALL	TYPE OF ENCLOSURE	LENGTH/ HGT (Ft)	WIDTH (Ft)	AREA (Sq Ft)	U Btu/h.sqft.F	Ts (°F)	Tr (°F)	DELTA T (°F)	SENSIBLE HEAT (BTU/h)
WEST	W. Attic 2 - 8" CI	9.75	4.00	39.0	0.500	48.7	48.0	0.7	14
SOUTH*	755.0 - T1, 36" CI	9.75	20.54	200.3	0.236	40.0	48.0	-8.0	-378
NORTH	W. Attic 1 - 8" CI	9.75	20.54	200.3	0.500	56.4	48.0	8.4	841
EAST	W. Attic 1 - 8" CI	9.75	4.00	39.0	0.500	56.4	48.0	8.4	164
FLOOR	Stair C1 - 3/4" PL (Up)	20.54	4.00	82.2	0.730	53.4	48.0	5.4	324
ROOF	27" (uninsulated) (winter)	20.54	4.00	82.2	0.340	13.0	48.0	-35.0	-978
						TOTAL TRANSMISSION LOAD =			-13

(*) See Assumption 4.1.6

CALCULATED ROOM CONDITIONS: 48.0 °F dry bulb

CALCULATION OF RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT:

ROOM NUMBER & DESCRIPTION	RETURN AIR			
	FLOW (cfm) (pg.31, Diagram 4)	TEMPERATURE (°F)	Ref. pg. App. C	cfm X °F
EAST ATTIC 1	2,580	60.5	85	156,090
CORRIDOR (C 19)	260	63.5	94	16,510
RELAY ROOM & DPSO SHOP (C13 & C20)	4,763	68.2	88	324,870
SHIFT ENGINEERS OFFICE (C10)	110	65.8	84	7,238
CONFERENCE ROOM (C 9)	270	67.4	83	18,198
MCR RETURN AIR PLENUM	24,017	71.4	91	1,714,778
TOTAL	Vretum = **32,000**			**2,237,686**

Return Air Temperature from MCR spaces: SUM (cfm X °F) / SUM (cfm) = (Treturn)= **69.9 °F**

Outside Air Flow (Voa) = 711 cfm (pg. 31, Diagram 4)
Outside Air Temperature (Toa) = 13 °F (Section 6.1)
Δ T pressurizing fan (Δ Tpr) = 4.0 °F (Fan Heat Gain @ pg.22)

Mechanical equipment room flow (Vmer) = 3289 cfm (pg. 31, Diagram 4)
Mechanical equip. room temperature (Tmer) = 59.7 °F (pg. 76 of App. C)

Air cleaning unit flow (Vcu) = 4000 cfm (pg. 31, Diagram 4)
Δ T air cleaning unit (Δ Tcu) = 6.3 °F (Fan Heat Gain @ pg.23)

AIR CLEANING UNIT DISCHARGE TEMPERATURE: Tcu = Δ Tcu + [(Vmer x Tmer) + Voa x (Toa + Δ Tpr)] / Vcu

Tcu = 58.4 °F

RETURN AIR TEMPERATURE ENTERING THE AIR HANDLING UNIT (Te) = [(Vretum x Tretum) + (Vcu x Tcu)] / (Vcu + Vretum)

Te = 68.3 °F

Δ T fan = 4.0 °F (AHU Fan Heat Gain @ pg.23)
Estimated air temp. entering the fan Tes[1] = **67.5 °F** (minimum temperature to meet 75 °F thermostat setting)
Ts[4] = **71.5 °F** (Supply Air Temperature at Fan Discharge)

If (Te + Δ T fan) = Ts: 100 % coil bypass is required
If (Te + Δ T fan) > Ts: % bypass = (Tes - 50.8*) / (Te - 50.8*)

Te + Δ T fan = 72.3 °F > Ts = 71.5 °F

% bypass = 95.5 %

Percent of the returning air going through the coil face damper and cooling to 50.8°F: **4.5 %**
Percent of the remaining returning air going through the coil bypass damper : **95.5 %**

*50.8 °F is a temperature of air leaving cooling coil (T_{COIL}); see pg. 29.

NOTES:
[1] This temperature is also identified as T_{MIX} on AHU schematic (pg. 29).
[4] This temperature is also identified as T_{AHU} on AHU schematic (pg. 29).

Summary

COOLING LOAD - NORMAL OPERATION

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB		RELATIVE HUMIDITY	
	SENSIBLE	LATENT	DESIGN	ST. STATE	DESIGN	ST.STATE
MECHANICAL EQUIPMENT ROOM (C1)	70,663		86	81.6	29-70%	37%
WOMEN'S TOILET (C 2)	970			97.7		
CORRIDOR (C 3)	3,653		93	93.4	27-60%	27%
KITCHEN (C 4)	13,386	2000		87.3		
MEN'S TOILET (C 5)	2,716			86.9		
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	1,910		93	86.1	27-60%	32%
CONFERENCE ROOM (C 9)	5,447			76.7		
SHIFT ENGINEER'S OFFICE (C 10)	8,297	400		81.8		
MAIN CONTROL ROOM (C 12)	464,589	1709	80	78.1	40-60%	41%
MCR RETURN AIR PLENUM (above C12)	123,005			83.3		
RELAY ROOM and DPSO SHOP (C 13 & C20)	135,398		80	74.6	40-60%	48%
TECHNICAL SUPPORT CENTER (C 14)	31,193			73.4		
CORRIDOR (C 15)	9		93	90.0	27-60%	28%
CONFERENCE & TELEPHONE RM (C 16 & C17)	6,034			70.4		
NRC OFFICES (C 18)	4,340			68.4		
CORRIDOR (C 19)	7,327			85.0		
WEST STAIRWELL (STAIR C1)	0			100.5		
EAST STAIRWELL (STAIR C2)	0			91.1		
EAST ATTIC 1 (ABOVE C14)	7,551			76.3		
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	0			90.2		
EAST ATTIC 2 (ABOVE C15)	15			87.9		
EAST ATTIC 3 (ABOVE STAIR C2)	18			87.9		
WEST ATTIC 2 (ABOVE C2)	5			94.9		
WEST ATTIC 3 (ABOVE STAIR C1)	7			97.2		
SUMMARY:	886,534	4,109				

TOTAL SENSIBLE LOAD:	886,534 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	890,644 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

This Appendix added by Revision 013.

COOLING LOAD - LOCA OPERATION

ROOM NUMBER & DESCRIPTION	COOLING LOAD, BTU/HR		TEMPERATURE, °F DB	
	SENSIBLE	LATENT	DESIGN	ST. STATE
MECHANICAL EQUIPMENT ROOM (C1)	82,384		91	85.9
WOMEN'S TOILET (C 2)	9			111.9
CORRIDOR (C 3)	8		98	98.9
KITCHEN (C 4)	15,925	2000		93.1
MEN'S TOILET (C 5)	3,341			94.2
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	2,386		98	93.8
CONFERENCE ROOM (C 9)	6,731			81.6
SHIFT ENGINEER'S OFFICE (C 10)	9,850	400		86.7
MAIN CONTROL ROOM (MCR) (C 12)	512,910	1600	82	80.3
MCR RETURN AIR PLENUM (above C12)	126,318			85.7
RELAY ROOM and DPSO SHOP (C 13 & C20)	153,433		79	77.1
TECHNICAL SUPPORT CENTER (C 14)	39,229	14,847		78.0
CORRIDOR (C 15)	17		96	95.7
CONFERENCE & TELEPHONE RM (C 16 & C17)	6,637	1950		74.1
NRC OFFICES (C 18)	5,449	650		71.5
CORRIDOR (C 19)	8,586			90.1
WEST STAIRWELL (STAIR C1)	4			104.6
EAST STAIRWELL (STAIR C2)	16			93.4
EAST ATTIC 1 (ABOVE C14)	6,036			80.5
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)	93			94.2
EAST ATTIC 2 (ABOVE C15)	0			92.1
EAST ATTIC 3 (ABOVE STAIR C2)	0			91.6
WEST ATTIC 2 (ABOVE C2)	5			101.3
WEST ATTIC 3 (ABOVE STAIR C1)	5			102.0
SUMMARY:	979,370	21,447		

TOTAL SENSIBLE LOAD:	979,370 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)
TOTAL LOAD:	1,000,818 BTU/HR < Min. sensible design load 1,435,000 BTU/HR (Attachment C)

This Appendix added by Revision 013.

HEATING LOAD - NORMAL OPERATION

ROOM NUMBER & DESCRIPTION	TEMPERATURE, °F DB		RELATIVE HUMIDITY	
	DESIGN	ST. STATE	DESIGN	ST.STATE
MECHANICAL EQUIPMENT ROOM (C1)	64	60.6	29-70%	73% *
WOMEN'S TOILET (C 2)		64.9		
CORRIDOR (C 3)	65	67.7	27-60%	59%
KITCHEN (C 4)		76.3		
MEN'S TOILET (C 5)		80.9		
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	65	76.4	27-60%	44%
CONFERENCE ROOM (C 9)		80.1		
SHIFT ENGINEER'S OFFICE (C 10)		77.0		
MAIN CONTROL ROOM (C 12)	75	74.9	40-60%	46%
MCR RETURN AIR PLENUM (above C12)		71.7		
RELAY ROOM and DPSO SHOP (C 13 & C20)	75	74.6	40-60%	47%
TECHNICAL SUPPORT CENTER (C 14)		77.7		
CORRIDOR (C 15)	65	64.1	27-60%	67% *
CONFERENCE & TELEPHONE RM (C 16 & C17)		75.8		
NRC OFFICES (C 18)		75.6		
CORRIDOR (C 19)		68.8		
WEST STAIRWELL (STAIR C1)		59.5		
EAST STAIRWELL (STAIR C2)		64.4		
EAST ATTIC 1 (ABOVE C14)		71.1		
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)		55.8		
EAST ATTIC 2 (ABOVE C15)		59.9		
EAST ATTIC 3 (ABOVE STAIR C2)		60.4		
WEST ATTIC 2 (ABOVE C2)		52.3		
WEST ATTIC 3 (ABOVE STAIR C1)		51		

* See Section 9.2, Conclusion, for evaluation of the humidity level.

HEATING LOAD - LOCA OPERATION

ROOM NUMBER & DESCRIPTION	TEMPERATURE, °F DB	
	DESIGN	ST. STATE
MECHANICAL EQUIPMENT ROOM (C1)	63	59.7
WOMEN'S TOILET (C 2)		52.9
CORRIDOR (C 3)	57	62.1
KITCHEN (C 4)		64.8
MEN'S TOILET (C 5)		64.4
LOCKER ROOM & SHOWERS (C 6, C7 & C8)	58	63.9
WEST STAIRWELL (STAIR C1)		53.4
EAST STAIRWELL (STAIR C2)		58.0
CONFERENCE ROOM (C 9)		67.4
SHIFT ENGINEER'S OFFICE (C 10)		65.8
MAIN CONTROL ROOM (C 12)	75	75.6
RELAY ROOM and DPSO SHOP (C 13 & C20)	67	68.2
TECHNICAL SUPPORT CENTER (C 14)		65.7
CORRIDOR (C 15)	58	59.1
MCR RETURN AIR PLENUM (above C12)		71.4
CONFERENCE & TELEPHONE RM (C 16 & C17)		68.1
NRC OFFICES (C 18)		68.1
CORRIDOR (C 19)		63.5
EAST ATTIC 1 (ABOVE C14)		60.5
WEST ATTIC 1 (ABOVE C3, C4, C5, C9 & C10)		56.4
EAST ATTIC 2 (ABOVE C15)		54.8
EAST ATTIC 3 (ABOVE STAIR C2)		54.2
WEST ATTIC 2 (ABOVE C2)		48.7
WEST ATTIC 3 (ABOVE STAIR C1)		48.0

Conclusion

For Normal Operation cooling of the 755.0 elevation of the Control Building, all steady state room temperatures are at least 2 degrees lower than the Maximum Design Room Temperatures for Normal Operating conditions except for Corridor C3 (Room 755.0-C3) which is a fraction of a degree higher that its Maximum Design Room Temperature for Normal Operating conditions. The required relative humidity levels are within the design limits for all rooms of concern. The Environmental Data Drawing for Corridor C3 (Ref. 5.3.4) should be revised to reflect a maximum Normal Operation room temperature of 94°F for Room 755.0-C3.

For LOCA Operation cooling of the 755.0 elevation of the Control Building, all steady state room temperatures are at least slightly below the Maximum Design Room Temperatures for LOCA Operation conditions except for Corridor C3 which is almost a single degree Fahrenheit higher than its Maximum Design Room Temperature for LOCA Operating conditions. The Environmental Data Drawing for Corridor C3 (Ref. 5.3.4) should be revised to reflect a maximum LOCA Operation room temperature of 99°F for Room 755.0-C3.

This Appendix added by Revision 013.

For Normal Operation heating of the 755.0 elevation of the Control Building, all rooms have steady state room temperatures that are lower then the Minimum Design Room Temperatures for Normal Operating conditions except for the Corridor C3 and the Locker Room & Showers. However, most of the rooms that do not have high enough steady state temperatures miss the minimum design temperature by less than a single degree Fahrenheit (MCR, Relay Room, and Corridor C15). This was generally the same results determined by past revisions of this calculation. Therefore, revision of the Minimum Design Room Temperatures for Normal Operation on the Environmental Data Drawings for the MCR, Relay Room, and Corridor C15 is not required.

The Mechanical Equipment Room C1 has a steady state temperature that is about 3.5°F below its Minimum Design Room Temperatures for Normal Operating heating conditions. This is essentially the same result that was determined in the corrected Single Unit Operation heating analysis performed in this revision. Therefore, the proposed revision of reference 5.3.7 discussed in Section 9.4 is also applicable to Dual Unit Operation.

The Mechanical Equipment Room C1 and Corridor C15 both have relative humidity levels higher than the design limit range for Normal Operating conditions during heating mode. The evaluation of high humidity levels is provided in Note 1 of Section 9.2 of the main body of the calculation. This evaluation applies to these two rooms.

For LOCA Operation heating of the 755.0 elevation of the Control Building, all rooms have steady state room temperatures that are higher then the Minimum Design Room Temperatures for LOCA Operating conditions except for the Mechanical Equipment Room C1. The Mechanical Equipment Room C1 has a steady state temperature that is about 3.5°F below its Minimum Design Room Temperatures for LOCA Operating heating conditions. Again, this is essentially the same result that was determined in the corrected Single Unit Operation heating analysis performed in this revision. Therefore, the proposed revision of reference 5.3.7 discussed in Section 9.4 is also applicable to Dual Unit Operation.

Conclusion Summary

Results of this Appendix require that reference 5.3.4 be revised to reflect higher temperatures in Corridor C3 during cooling mode for both Normal and LOCA operation. The Maximum Design Room Temperatures should be raised by 1 degree Fahrenheit for Room 755.0-C3. This change is only applicable to Dual Unit Operation. Reference 5.3.4 is acceptable as is for Single Unit Operation

Results of this Appendix concur with the requirement in Section 9.4 that reference 5.3.7 be revised to reflect lower temperatures in Room 755-C1. Therefore, this change would be applicable to both Single and Dual Unit operation.

The total heat loads computed in this appendix do not challenge the capacities of the AHUs nor are the AHU return air temperatures above either the rated Entering Air Dry Bulb or Wet Bulb Temperatures from page 1 of Attachment C. However, since the steady state room temperatures of some rooms do slightly exceed their design limits, the MCR HVAC system as configured does not have excess capacity with regards to air flow (however, excess coil capacity is available). Therefore, a minimum air flow analysis like that performed in Appendices A and B is not performed in conjunction with Revision 013 of this calculation.

Appendix D - Evaluation of Relative Humidity in Main Control Room during Outside Abnormal Condition

1. Purpose

This white paper is to determine the minimum and maximum relative humidity in Main Control Room (MCR) during the abnormal conditions. According to environmental drawing 2-47E235-36 Rev.0 (Ref.2.1), the maximum abnormal temperature is 102 °F with a specific humidity of 140 grain of moisture per pound of dry air (0.02 pound of moisture per pound dry air).

2. Reference

2.1 TVA Drawing 2-47E235-36 Rev.0.
2.2 TVA Drawing 47A373-1, Rev.2
2.3 Appendix C of this calculation, Pages 18 and 29
2.4 ASHRAE Fundamental 2009, IP edition
2.5 Westinghouse Document, WCAP8587
2.6 System Operation Instruction, SOI-31.01 Rev.051

3. Design Input Data

3.1 Cooling Coil Vendor Information for MCR Air Handling Unit (Ref.2.2)

Entering air temperature, dry bulb, °F	87.8
Entering air temperature, wet bulb, °F	65.4
Maximum leaving air temperature, dry bulb, °F	50.8
Maximum leaving air temperature, wet bulb, °F	49

3.2 Outside Abnormal Condition with Maximum Temperature(Ref.2.1)

Temperature, °F	102
Specific Humidity, pound of moisture per pound dry air	0.02

3.3 For the normal operation, the intake flow rate from outside to MCR air conditioning unit is 3597 cfm and the total return air flow is 32403 cfm . The return air temperature and humidity ratio with normal maximum temperature (95 °F) are 77.1 °F and 0.0085 pound of moisture per pound dry air (Ref.2.3).

3.4 The air temperature and relative humidity for MCR with normal maximum temperature (95 °F) are 78.1°F and 41% (Ref.2.3).

3.5. See Figure 1 for schematic of Air Handling Unit for MCR spaces.

4. Supporting Graphics

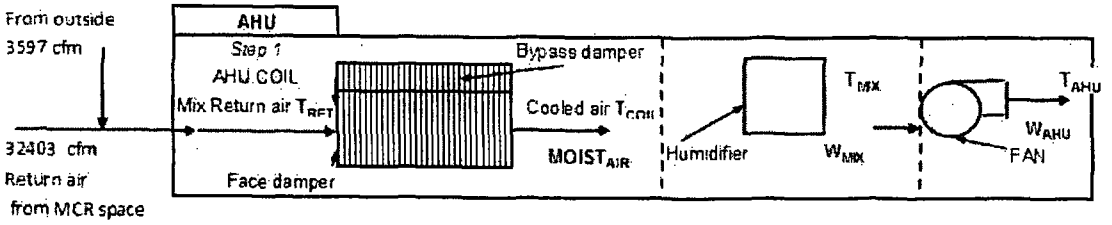


Figure 1 Schematic of Air Handling Unit for MCR Spaces

This Appendix added by Revision 014.

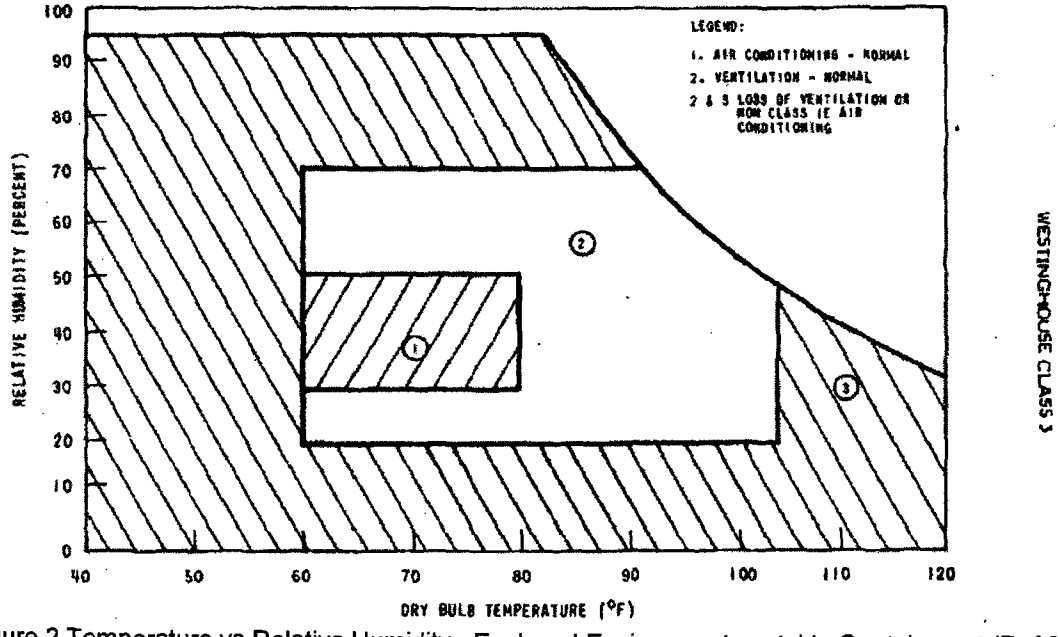


Figure 2 Temperature vs Relative Humidity - Enclosed Environments outside Containment (Ref.2.5)

5. Calculation

5.1 Minimum Humidity

According to System Operation instruction SOI-31.01 (Ref.2.6, Page 8), the MCR steam generator (humidifier) shall be in service any time the relative humidity in the MCR is <50% as indicated at the MCR AHUs. Humidity levels of less than 20% may affect function of touch screens and will affect operability of Unit 2 Common Q PAMS. If the relative humidity is less than 20%, instrumentation operability must be assessed. Therefore, the use of 20% as the minimum relative humidity in MCR is reasonable.

5.2 Maximum Humidity

Considering that the HVAC system for MCR is safety-related system, the air condition unit will continue to operate during outside abnormal conditions. During the abnormal condition, the entering temperature and humidity ratio to the cooling coil can be calculated as follows:

Te = [(Qreturn×Treturn)+(Qoutside×Toutside)]/(Qreturn+Qoutside)

Te = [(32403 cfm × 77.1 °F)+(3597 cfm × 102 °F)]/(32403 cfm + 3597 cfm) = 79.6 °F, less than 87.8 °F (Vendor data, Ref.2.2)

We = [(Qreturn×Wreturn)+(Qoutside×Woutside)]/(Qreturn+Qoutside)

We = [(32403 cfm × 0.0085 pound of moisture per pound dry air) + (3597 cfm ×0.02 pound of moisture per pound dry air)]/(32403 cfm + 3597 cfm) = 0.0096 pound of moisture per pound dry air

According to Psychometric Chart (Ref.2.4), the wet bulb temperature is 64.5 °F, which is less than 65.4°F (Vendor data, Ref.2.2)

Since the calculated entering dry and wet bulb temperatures to cooling coil are less than those entering temperatures listed in vendor data, the leaving temperatures and specific humidity from coil are still conservative and the supply air temperature and specific humidity ratio to MCR spaces stay the same. According to Calculation EPMLCP072489

Rev.13 (Ref.2.3), the air temperature and relative humidity for MCR during the abnormal condition stay the same as those in normal condition, which are 78.1°F and 41% RH, respectively.

6.0 Conclusion

Based on the above analysis, the temperature and relative humidity in MCR still remains as 78.1°F and 41% RH during outside abnormal condition. As shown in Figure 2, the condition in MCR will remain within the range of block 1 (Air Conditioning - Normal) during outside abnormal condition with maximum temperature. According to System Operation instruction SOI-31.01, the relative humidity in MCR is maintained at or above 20%.

EPM-LCP-072489

NUCLEAR EXPERIENCE REVIEW PROGRAM EVALUATION

ATTACHMENT A 1 OF 4

AUG 19 1992

T.W. Overlid, IOB 1H-WBN

S. O. Casteel, Operating Experience Manager, FSB 2K-WBN

WATTS BAR NUCLEAR PLANT (WBN) - WBN OE EVALUATION OF IEN 92-32, "Problems Identified With Emergency Ventilation Systems For Near-Site (Within 10 Miles) Emergency Operations Facilities and Technical Support Centers"

NER Number: 920516	TROI ID: IE NOTICE 92-032	Due Date: 09/23/92
Action Sequence: 10	Organizational Code (RO): WBP/LMN/TWO	NER Contact: Ron Rogers, x3852

A. The subject Nuclear Experience Review (NER) item has been screened by the OE staff and determined to be potentially applicable. Please review and evaluate the attached information and determine whether further actions are needed. (Refer to reverse side for general review instructions.) Please provide your response by the above due date.
Additional Comment(s)/Action(s):

IEN 92-32 was reviewed by Technical Support. Provide a discussion of what the Technical Support Center (TSC) ventilation system design parameters are (i.e., number of people, heat load). Based on emergency preparedness estimate of 40 (or less) people in the TSC area, is the system adequately designed? Provide justification and copy of applicable design criteria documents with response to OE manager.

B. REVIEWING ORGANIZATION'S DISPOSITION: (Use guidelines on reverse side.)

1. Applicable: Yes ☒ No ☐
2. Operability Affected: Yes ☐ No ☒
3. Required for Fuel Load: Yes ☐ No ☒
4. P2 Activity Number: ______
5. SCAR/ACP Initiated: Yes ☐ No ☒
   Document Number: ______
6. Hardware/Software: HW ☐ SW ☒
   Implementation Date: U1 10/31/92 U2 ______
   Milestone Priority Code: U1 X BFL U2 ______
   DCN Number: NONE
7. System(s) Affected/Involved: Yes ☒ No ☐
   System Number/Completion Date: 031 / 12/12/92

RECEIVED SEP 29 1992 Watts Bar Nuclear Experience Review Staff

8. Response: SEE ATTACHMENT

9. Donald T. Sokol 9/24/92 [initials] 9-24-92
Reviewer Date

10. T.W. Overlid 9/24/92
Responsible Manager Date

C. RESPONSE EVALUATION: (OE USE ONLY)
1. Response is acceptable: Yes ☒ No ☐
2. Comments: Action to provide excerpts from revised calculation to OE Manager added to TROI as sequence 11.

INFORMATION ONLY

3. Ronald P. Rogers 9/29/92
OE Reviewer Date

______ ______
OE Supervisor Date

S:\NER\FORMS\WBPTWO.LLE
August 19, 1992

EPM-LCP-072489

ATTACHMENT

Response to NER 920516: ATTACHMENT A 2 OF 4

Description: NRC INFORMATION NOTICE 92-32

PROBLEMS IDENTIFIED WITH EMERGENCY VENTILATION SYSTEMS FOR NEAR-SITE (WITHIN 10 MILES) EMERGENCY OPERATIONS FACILITIES AND TECHNICAL SUPPORT CENTERS - SYSTEM 31

This response is a supplement to the response provided by Technical Support and addresses the design parameters of the HVAC system for the TSC. It also evaluates the adequacy of TSC HVAC system to maintain habitability with 40 people in the TSC area.

The environment of the TSC area is controlled by the Main Control Room (MCR) HVAC system. Since this system is a safety related system, the maintenance and test criteria have already been established and are in place. There should be no problems like those identified in IEN 92-032.

The subject IEN suggested that 70 people would be a more appropriate number to use in determining the cooling load in the TSC area. It also proposed that the heat load for each person should be 640 BTU/hr instead of 450 BTU/hr.

During the investigation of this problem the design basis calculation for the MCR HVAC system, EPM-LCP-072489 R1, was reviewed to identify the design parameters used to determine the adequacy of the system. The calculation is based on 25 people in the TSC, 2 people in the NRC Office and 4 people in the Conference Room. Bill Peggram of Watts Bar Nuclear Plant's Emergency Preparedness Group estimated that there could be as many as 40 people in these three rooms after a Design Basis Accident (DBA). This number is based on exercises conducted at Sequoyah Nuclear Plant and includes up to five people representing the NRC.

The existing heat load in the calculation is 450 BTU/hr. This rate is based on the heat produced by a mixed group of males and females "seated, light work, typing" per the 1985 ASHRAE Handbook, page 26.21 Table 18. If all the people are male and the activity is defined as "standing, light work or walking slowly" a more appropriate heat load for each person is 640 BTU/hr. This is broken down into 315 BTU/hr sensible heat and 325 BTU/hr latent heat per person.

Calculation EPM-LCP-072489 is being revised as part of the Mechanical Reverification Program and will include 40 people in the TSC area at the 640 BTU/hr load per person. This change has been coordinated with the SERT team leader. A review of this calculation confirms that there is sufficient margin in the cooling capacity of the existing MCR HVAC system to maintain a habitable environment in the MCR and the TSC area with these changes.

EPM-LCP-072489

ATTACHMENT A 3 OF 4

Response to NER 920516:

Description: Problems identified with Emergency Ventilation Systems for Near-Site Emergency Operations Facilities and TSC. Called Rick Saputa (Licensing, ext -3828), he says I do not need to address those items which deal with the Emergency Operations Facility (EOF).

At WBN the Technical Support Center (TSC) is located inside of the Main Control Room Pressure Enclosure, elevation 755 in the Control Building. The TSC is cooled/ventilated by the same system which supports the Main Control Room. This Safety Related ventilation system is required by Tech Specs. The portion of this ventilation system which is dedicated to the TSC was originally designed to support 25 people at 250 BTU/Hr (latent) and 250 BTU/Hr (sensible) per person. Reference Calc EPM LCP 072489, ALSO Revision 1 B26910419215.

Bill Peggram (Emergency Preparedness Section) says that no more than 40 people will be in the TSC area which includes the NRC office and the conference room.

On 07/14/92 discussed this NER item with Don Sokol (Site Engineering). He is confident that the existing system is adequate to support 45 people located in the TSC area which includes the NRC office and the conference room. He makes this statement based on 250 BTU/Hr (latent) and 250 BTU/Hr (sensible) per person. This reflects approximately the same 640 BTU/Hr per person as referenced in NRC Information Notice 92-32. This determination based on the 1985 ASHRAE Handbook, page 26.21, Table 18 (Rates of Heat Gain from Occupants of Conditioned Spaces).

Based on the above information, WBN does not have similar conditions as those identified by IE Notice 92-032. No additional actions are necessary.

7-15-92

INFORMATION ONLY

EPM-LCP-072489

Table 17E Cooling Load Factors When Lights Are on for 16 Hours

"a" Coefficients	"b" Classification	Number of hours after lights are turned on																						
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
0.45	A	0.12	0.54	0.63	0.70	0.76	0.81	0.85	0.88	0.90	0.92	0.94	0.95	0.96	0.97	0.97	0.98	0.98	0.54	0.43	0.35	0.28	0.23	0.18	0.15
	B	0.23	0.66	0.69	0.72	0.75	0.78	0.80	0.82	0.84	0.85	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.49	0.44	0.39	0.35	0.32	0.29	0.26
	C	0.29	0.72	0.74	0.75	0.77	0.78	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.88	0.89	0.45	0.42	0.39	0.37	0.35	0.33	0.31
	D	0.31	0.75	0.76	0.77	0.77	0.78	0.79	0.79	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.40	0.39	0.37	0.36	0.35	0.34	0.33
0.55	A	0.10	0.63	0.70	0.76	0.81	0.84	0.87	0.90	0.92	0.93	0.95	0.96	0.97	0.97	0.98	0.98	0.99	0.44	0.35	0.28	0.23	0.18	0.15	0.12
	B	0.19	0.72	0.75	0.77	0.80	0.82	0.84	0.85	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.94	0.40	0.36	0.32	0.29	0.26	0.24	0.21
	C	0.24	0.77	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.88	0.89	0.90	0.90	0.91	0.37	0.34	0.32	0.30	0.29	0.27	0.25
	D	0.26	0.80	0.80	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85	0.85	0.86	0.86	0.86	0.87	0.87	0.33	0.32	0.31	0.30	0.29	0.28	0.27
0.65	A	0.07	0.71	0.77	0.81	0.85	0.88	0.90	0.92	0.94	0.95	0.96	0.97	0.97	0.98	0.98	0.99	0.99	0.34	0.27	0.22	0.18	0.14	0.12	0.09
	B	0.15	0.78	0.81	0.82	0.84	0.86	0.87	0.88	0.90	0.91	0.92	0.92	0.93	0.94	0.94	0.95	0.96	0.31	0.25	0.23	0.20	0.18	0.16	
	C	0.18	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.89	0.90	0.90	0.91	0.92	0.92	0.93	0.93	0.28	0.27	0.25	0.24	0.22	0.21	0.20
	D	0.20	0.84	0.85	0.85	0.86	0.86	0.87	0.87	0.87	0.88	0.88	0.88	0.89	0.89	0.89	0.90	0.90	0.25	0.25	0.24	0.23	0.22	0.22	0.21
0.75	A	0.05	0.79	0.83	0.87	0.89	0.91	0.93	0.94	0.95	0.96	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.24	0.20	0.16	0.13	0.10	0.08	0.07
	B	0.11	0.83	0.86	0.87	0.89	0.90	0.91	0.92	0.93	0.93	0.94	0.95	0.95	0.96	0.96	0.96	0.97	0.22	0.20	0.18	0.16	0.15	0.13	0.12
	C	0.13	0.87	0.88	0.89	0.89	0.90	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94	0.94	0.95	0.95	0.20	0.19	0.18	0.17	0.16	0.15	0.14
	D	0.14	0.89	0.89	0.89	0.90	0.90	0.90	0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.93	0.93	0.18	0.18	0.17	0.17	0.16	0.16	0.15

Table 18 Rates of Heat Gain from Occupants of Conditioned Spaces[a]

Degree of Activity	Typical Application	Total Heat Adults, Male Btu/h	Total Heat Adjusted[b] Btu/h	Sensible Heat Btu/h	Latent Heat Btu/h
Seated at rest	Theater, movie	400	350	210	140
Seated, very light work writing	Offices, hotels, apts	480	420	230	190
Seated, eating	Restaurant[c]	520	580 [c]	255	325
Seated, light work, typing	Offices, hotels, apts	640	510	255	255
Standing, light work or walking slowly	Retail Store, bank	800	640	315	325
Light bench work	Factory	880	780	345	435
Walking, 3 mph, light machine work	Factory	1040	1040	345	695
Bowling[d]	Bowling alley	1200	960	345	615
Moderate dancing	Dance hall	1360	1280	405	875
Heavy work, heavy machine work, lifting	Factory	1600	1600	565	1035
Heavy work, athletics	Gymnasium	2000	1800	635	1165

[a]Note: Tabulated values are based on 78 F room dry-bulb temperature. For 80 F room dry-bulb, the total heat remains the same, but the sensible heat value should be decreased by approximately 6% and the latent heat values increased accordingly.

[b]Adjusted total heat gain is based on normal percentage of men, women and children for the application listed, with the postulate that the gain from an adult female is 85% of that for an adult male, and that the gain from a child is 75% of that for an adult male.

[c]Adjusted total heat value for eating in a restaurant, includes 60 Btu/h for food per individual (30 Btu/h sensible and 30 Btu/h latent).

[d]For bowling figure one person per alley actually bowling, and all others as sitting 400 Btu/h or standing and walking slowly 790 Btu/h.

Also refer to Tables 4 and 7, Chapter 8.
All values rounded to nearest 10 Btu/h.

Table 19 Sensible Heat Cooling Load Factors for People

Total Hours in Space	Hours after Each Entry into Space																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2	0.49	0.58	0.17	0.13	0.10	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4	0.49	0.59	0.66	0.71	0.27	0.21	0.16	0.14	0.11	0.10	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.01
6	0.50	0.60	0.67	0.72	0.76	0.79	0.34	0.26	0.21	0.18	0.15	0.13	0.11	0.10	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03
8	0.51	0.61	0.67	0.72	0.76	0.80	0.82	0.84	0.38	0.30	0.25	0.21	0.18	0.15	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
10	0.53	0.62	0.69	0.74	0.77	0.80	0.83	0.85	0.87	0.89	0.42	0.34	0.28	0.23	0.20	0.17	0.15	0.13	0.11	0.10	0.09	0.08	0.07	0.06
12	0.53	0.64	0.70	0.75	0.79	0.81	0.84	0.86	0.88	0.89	0.91	0.92	0.45	0.36	0.30	0.25	0.21	0.19	0.16	0.14	0.12	0.11	0.09	0.08
14	0.58	0.66	0.72	0.77	0.80	0.83	0.85	0.87	0.89	0.90	0.91	0.92	0.93	0.94	0.47	0.38	0.31	0.26	0.23	0.20	0.17	0.15	0.13	0.11
16	0.62	0.70	0.75	0.79	0.82	0.85	0.87	0.88	0.90	0.91	0.92	0.93	0.94	0.95	0.95	0.96	0.49	0.39	0.33	0.28	0.24	0.20	0.18	0.16
18	0.66	0.74	0.79	0.82	0.85	0.87	0.89	0.90	0.92	0.93	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.97	0.50	0.40	0.33	0.28	0.24	0.21

Test Data Record No. 1
Air Balance Cover Sheet

INFORMATION ONLY

WATTS BAR NUCLEAR

AIR BALANCE TEST PROCEDURE
AB-031P-01

CSI NO. 1031P0186M05000

HVAC AIR BALANCE
FOR

Main Control Room A.C. sys.

6/16/95

Prepared By: Jimmie Griffin Date 6-16-95

Reviewed By: [signature] Date 7/25/95

Reviewed By: (NE)* [signature] for DT Sokol Date 7-25-95

Approved By: (SUT) [signature] Date 7-28-95
STARTUP MANAGER

* N/A for non-safety related systems

TEST INSTRUCTION

EPM-LCP-072489

2 OF 7

ATTACHMENT B

TEST DATA RECORD NO. 8
TRAVERSE SUMMARY

Page 1 of 1

Test No. AB-031P-01	CSI No. 1031P0186M05000	Class: Q	System: 031P

5.3 OPERATIONAL MODE: NORMAL TRAIN "A"

6.3.10

#	LOCATION(BLDG/EL/RM)			AREA	DES.CFM	MIN.CFM	ACT.CFM	MAX.CFM	%DESIGN
T-1	CB	755	C401	15.56	33175	31363	34232	35293	103
S-01	CB	755	C401	1.81	2825	2782	2545	2935	90
T-2	CB	755	C412	3.06	5413	5227	5398	5687	100
T-3	CB	755	C412	3.33	5413	5296	5335	5644	99
T-4	CB	755	C412	3.0	5413	5216	5178	5692	96
T-5	CB	755	C412	3.0	5413	5216	5619	5692	104
T-6	CB	755	C412	5.83	10330	9975	10500	10853	102
T-7	CB	755	C413	1.50	2100	1938	2277	2267	108
T-8	CB	755	C413	3.06	1070	1055	1047	1377	98
T-9	CB	755	C413	3.06	1070	1055	1019	1377	95
T-10	CB	755	C401	10.42	N/A	N/A	21705	N/A	N/A
T-11	CB	755	C401	4.58	NA	N/A	8304	N/A	N/A
T-12	CB	755	C401	6.11	N/A	N/A	11468	N/A	N/A
T-16	CB	755	C401	1.77	N/A	N/A	2802	N/A	N/A
T-17	CB	755	C401	1.36	825	743	824	908	100
						N/A			

REMARKS: System Balanced with Train "A" running. Grille S-1 was read with a Temp. Test Station and labeled Traverse # S-01. T-10, 11, 12 are Return Flow Traverses and have no design Flow. T-16 is the outside air traverse and has no Dsgn Flow. 6-13-95

DATA TAKEN BY: Jimmie Griff — DATE: 6-13-95	Reviewer Evaluation: Acceptance satisfied and all "NA" entries verified appropriate Yes (✓)
DATA TAKEN BY: N/A — DATE:	
PERFORMED BY: Jimmie Griff — DATE: 6-13-95 SSN: 237-92-7840	COMMENTS:
REVIEWED BY: [signature] — DATE: 7 25 95 SSN: 229-76-5589	REF TDN 37195
APPROVED BY: [signature] — DATE: 7-25-95 SSN: 420-84-2176	

TEST DATA PACKAGE SHEET 13 OF 112

TEST INSTRUCTIONS

EPM-LCP-072489 **ATTACHMENT B**

TEST DATA RECORD NO. 4
DUCT TRAVERSE Page 1 of 2

TEST NO. AP-231P-01	CSI NO. 1031P0186-405000	CLASS: Q	SYSTEM: 031P
5.3 OPERATIONAL MODE: NORMAL (TRAIN A)			DESIGN FPM = NA FPM
REFERENCE DRAWINGS: 1-47W866-4 REV. 24	AREA: HxW or in^2	MAX CFM = NA	AIR TEMP. = 81 °F
TRAVERSE LOC. BLDG/EL/RM CB/755/C4081	(SQ. FT) 144 144	DES. CFM = NA	BAR. PRESS. = 28.97 INHG
TRAVERSE SIZE: RECT. NA RND 18"Ø	1.77	MIN. CFM = NA	TRAVERSE PT. SP = -.57 INWG

6.3.10 TRAVERSE POINT#: T-16 (RECORD READINGS LEFT TO RIGHT, TOP TO BOTTOM, LOOKING IN DIRECTION OF AIR FLOW)

	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP
1	.13	.361	.14	.374																
2	.12	.346	.14	.374																
3	.11	.332	.13	.361																
4	.11	.332	.13	.361																
5	.11	.332	.19	.436								NA								
6	.19	.436	.20	.447																
7	.17	.412	.19	.436																
8	.16	.400	.16	.400																
9	.15	.387	.17	.412																
10	.13	.361	.15	.387																
TOTAL	N/A	3.699	N/A	3.988	N/A	NA	N/A	NA	N/A	NA	N/A	NA	N/A	NA	N/A	NA	N/A	NA	N/A	NA

CORRECTED FACTOR: (USE TO CALCULATE ACTUAL VELOCITY)

CORRECTED DENSITY = 1.325 [(BAR.PR. + ((0.0734) (SP))] / (460 + AIR TEMP.)]
= 1.325 [(28.97 + ((0.0734) (-.57))) / (460 + 81)] = .071 LBS/CU. FT

AVG VEL. PRES. = (SUM OF THE SQ. RTs / NO. OF READ.s)²
= (7.687 / 20)² = .148 AVG. VEL. PRES. INWG

DUCT AVG. VEL. = 1096.2 (AVG. VEL.PR / CORR.DEN)^½
= 1096.2 (.148 / .071)^½ = 1583 DUCT. AVG. VEL. FPM

ACTUAL FLOW = (AREA SQ. FT.) (AVERAGE FPM)
= (1.77) (1583) = 2802 CFM

% DESIGN FLOW = 100 (ACTUAL CFM / DESIGN CFM)
= 100 (2802 / NA) = NA %

TEST DATA PACKAGE SHEET 40 OF 112

INFORMATION ONLY

F8

TEST INSTRUCTIONS

EPM-LCP-072489 ATTACHMENT B

INFORMATION ONLY

TEST DATA RECORD NO. 7
M&TE/SIGNATURE SHEET FOR
TEST DATA RECORDS NOs 4,5,6,9,10,11

Page 2 of 2

Test No. AB-031P-01	CSI No. 1031P0186M05000	Class: Q	System: 031P
5.3 Operational Mode NORMAL (TRAIN A)			
6.3.10	Traverse Pt.# T-16 N/A ☐	Grille Sht. ___ N/A ☑	Component Performance ___ NA ☑
Filter Data ___ N/A ☑		Fume Hood Checkout ___ N/A ☑	

(3.2) TEST EQUIPMENT	ID NUMBER	ACCURACY	CAL DUE DATE
MANOMETER	E20730	± 1 SUBDIVISION	NA
THERMOMETER	E21184	± 2 DEG F	6/21/95
BAROMETER	567763	± .4% OF RANGE	9/30/95
		NA	

(6.5) Restoration

(6.5.7) Lifted Leads Landed/Jumpers Removed	YES ( )	N/A (✓)
(6.5.8) Lifted Lead and Jumper Log Utilized	YES ( )	NO (✓)
(6.5.8) Fuse Log Utilized	YES ( )	NO (✓)
(6.5.8) Configuration Control Log Utilized	YES ( )	NO (✓)

(6.5.9) Restoration Complete James E Fox DATE 5/17/95

REMARKS:

DATA TAKEN BY: James E Fox DATE: 5/17/95

DATA TAKEN BY: DATE:

Reviewer Evaluation:
Acceptance satisfied and all "NA" entries verified appropriate
Yes (✓)

PERFORMED BY: James E Fox DATE: 5/17/95
SSN: 062484215

REVIEWED BY: DATE: 6 19 95
SSN: 329 76 8689

APPROVED BY: DATE: 7-25-95
SSN: 426-64-2196

COMMENTS: None

EPM-LCP-072489

INFORMATION ONLY

ATTACHMENT B

TEST DATA RECORD NO. 8
TRAVERSE SUMMARY

Page 1 of 1

Test No. AB-031P-01	CSI No. 1031P0186M05000	Class: Q	System: 031P
5.3 OPERATIONAL MODE: NORMAL TRAIN "B"			
6.3.10			

#	LOCATION(BLDG/EL/RM)	AREA	DES.CFM	MIN.CFM	ACT.CFM	MAX.CFM	%DESIGN
T-1	CB 755 C401	15.56	33175	31363	31136	35293	94
S-01	CB 755 C401	1.81	2825	2782	2862	2935	101
T-10	CB 755 C401	10.42	N/A	N/A	20142	N/A	N/A
T-12	CB 755 C401	6.11	N/A	N/A	10747	N/A	N/A
T-16	CB 755 C401	1.77	N/A	N/A	2637	N/A	N/A
			N/A				

REMARKS: Only the traverses that equal total flow for the supply air, return air and outside air were read with Train "B" operating 6-13-95

DATA TAKEN BY: Jimmy Griffin DATE: 6-13-95

DATA TAKEN BY: N/A DATE:

Reviewer Evaluation:
Acceptance satisfied and all "NA" entries verified appropriate
Yes (✓)

PERFORMED BY: Jimmy Griffin DATE: 6-13-95
SSN: 237-92-7840

COMMENTS:
REF DOC 37195

REVIEWED BY: [signature] DATE: 6-25-95
SSN: 229-78-8687

APPROVED BY: [signature] DATE: 7-25-95
SSN: 420-64-2196

TEST INSTRUCTIONS

57

EPM-LCP-072489

ATTACHMENT B

TEST DATA RECORD NO. 4
DUCT TRAVERSE Page 1 of 2

TEST NO. A5-031P-01	CSI NO. 1031P0186M05000	CLASS: Q	SYSTEM: 031P
5.3 OPERATIONAL MODE: NORMAL (TRAIN B)			DESIGN FPM = N/A FPM
REFERENCE DRAWINGS: 1-47W866-4 R25	AREA: HxW or in^2	MAX CFM = N/A	AIR TEMP. = 75 °F
TRAVERSE LOC. BLDG/EL/RM CB / 755 / C401	(SQ. FT) 144 144	DES. CFM = N/A	BAR. PRESS. = 29.20 INHG
TRAVERSE SIZE: RECT. N/A RND 18"ø	1.77	MIN. CFM = N/A	TRAVERSE PT. SP = -.30 INWG
6.3.10 TRAVERSE POINT#: T.16	(RECORD READINGS LEFT TO RIGHT, TOP TO BOTTOM, LOOKING IN DIRECTION OF AIR FLOW)		

	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP	VP	√VP
1	.10	.316	.12	.346																
2	.10	.316	.13	.361																
3	.11	.332	.16	.400																
4	.11	.332	.16	.400																
5	.11	.332	.15	.387									.1P							
6	.15	.387	.16	.400																
7	.15	.387	.12	.346																
8	.16	.400	.13	.361																
9	.16	.400	.13	.361																
10	.15	.387	.11	.332																
TOTAL	N/A	3.589	N/A	3.694	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CORRECTED FACTOR; (USE TO CALCULATE ACTUAL VELOCITY)

CORRECTED DENSITY = 1.325 [(BAR.PR. + ((0.0734) (SP))) / (460 + AIR TEMP.)]
= 1.325 [(29.20 + ((0.0734) (-.30))) / (460 + 75)] = .072 LBS/CU. FT

AVG VEL. PRES. = (SUM OF THE SQ. RTs / NO. OF READ.s)²
= (7.283 / 20)² = .133 AVG. VEL. PRES. INWG

DUCT AVG. VEL. = 1096.2 (AVG. VEL.PR / CORR.DEN)^h
= 1096.2 (.133 / .072)^h = 1490 DUCT. AVG. VEL. FPM

ACTUAL FLOW = (AREA SQ. FT.) (AVERAGE FPM)
= (1.77) (1490) = 2637 CFM

% DESIGN FLOW = 100 (ACTUAL CFM / DESIGN CFM)
= 100 (2637 / N/A) = N/A %

TEST DATA PACKAGE SHEET 66 OF 112

INFORMATIONAL USE ONLY

TEST INSTRUCTIONS

EPM-LCP-072489

ATTACHMENT B

7 OF 7

INFORMATION ONLY

TEST DATA RECORD NO. 7
M&TE/SIGNATURE SHEET FOR
TEST DATA RECORDS NOs 4,5,6,9,10,11

Page 2 of 2

Test No. AB-0312-01	CSI No. 1031P0186M05000	Class: Q	System: 0312
5.3 Operational Mode NORMAL			
6.3.10	Traverse Pt.# T-16 N/A ☐	Grille Sht. ___ N/A ☑	Component Performance ___ NA/ ☑
Filter Data ___ N/A ☑		Fume Hood Checkout ___ N/A ☑	

(3.2) TEST EQUIPMENT	ID NUMBER	ACCURACY	CAL DUE DATE
MANOMETER	E15302	± .1 AT 1-5	N/A
BAROMETER	567763	± .4% of RANGE	9-30-95
THERMOMETER	E21184	± 2°F	6-21-95
		N/A	

(6.5) Restoration

(6.5.7) Lifted Leads Landed/Jumpers Removed	YES ( )	N/A (–)
(6.5.8) Lifted Lead and Jumper Log Utilized	YES ( )	NO (–)
.5.8) Fuse Log Utilized	YES ( )	NO (–)
.5.8) Configuration Control Log Utilized	YES ( )	NO (–)

(6.5.9) Restoration Complete Jimmie Griff DATE 5-31-95

REMARKS: Train "B" Running, O-FAN-31-11 Outside air Ducting For NORMAL operation, No design Flow per DCN W34372-A JG 5-31-95

CALCULATIONS VERIFIED BY: [signature] 6/8/95

DATA TAKEN BY: Jimmie Griff	DATE: 5-31-95	Reviewer Evaluation: Acceptance satisfied and all "NA" entries verified appropriate Yes (✓)
DATA TAKEN BY: N/A	DATE:	
PERFORMED BY: Jimmie Griff	DATE: 5-31-95 SSN: 237-12-7340	COMMENTS: None
REVIEWED BY: [signature]	DATE: 6/9/95 SSN: 229 70 8689	
APPROVED BY: [signature]	DATE: 7-25-95 SSN: 420 64 7196	

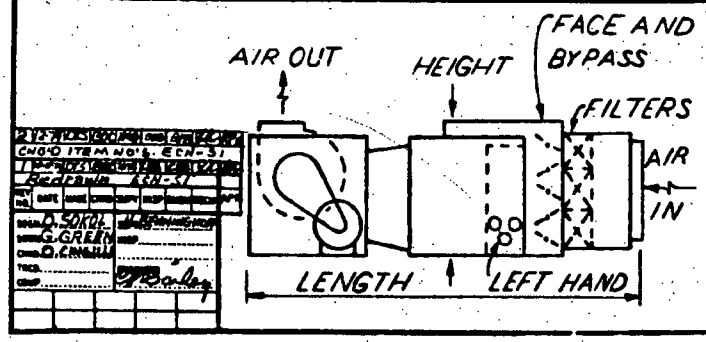
TEST DATA PACKAGE SHEET 67 OF 112

CALC ID EPM-LCP-072489 R11

ATTACHMENT C SHEET 1 of 4

AIR HANDLING UNITS

TITLE	Main Control Room Unit A-A	Main Control Room Unit B-B	Electrical Board Room Units A-A and C-B	Electrical Board Room Units B-A and D-B	
Mark No. 47A373-	1	2	3	4	
Number Required	1	1	2	2	
Location Building	Control	Control	Control	Control	
Location Drawing	47W930-3	47W930-3	47W930-1	47W930-1	
Min Capacity, CFM	36,000	36,000	20,835	20,835	
External S.P. In of Water	5.0	5.0	6.0	6.0	
Motor Type	Dripproof	Dripproof	Dripproof	Dripproof	
Motor Volts	230/460	230/460	230/460	230/460	
Motor Phase and Hz	3 and 60	3 and 60	3 and 60	3 and 60	
Motor Max RPM	1800	1800	1800	1800	
Motor No. of Speeds	Single	Single	Single	Single	
Drive Type	V-belt	V-belt	V-belt	V-belt	
Cooling, Ent Air, DBF	87.8	87.8	82.7	82.7	
Cooling, Ent Air, WBF	65.4	65.4	63.9	63.9	
Cooling, Max Lvg Air, DBF	50.8	50.8	50.9	50.9	
Cooling, Max Lvg Air, WBF	49.0	49.0	49.0	49.0	
Cooling, Min Sens, BTUH	1,435,000	1,435,000	715,000	715,000	
Cooling, Min Tot, BTUH	1,720,000	1,720,000	890,000	890,000	
Evap Water Ent Temp, F	40	40	42	42	
Evap Water Lvg Temp, F	50	50	52	52	
Evap Water, GPM	345	345	180	180	
Humidifier, Lb Steam/Hr	200	200	100	100	
Filters	Yes	Yes	Yes	Yes	
Mixing Box and Dampers	Yes	Yes	Yes	Yes	
Unit Mounting Position	Horizontal	Horizontal	Horizontal	Horizontal	
Fan Discharge Direction	Top	Top	Top	Top	
Max Total Fan BHP	63	63	41.5	41.5	
Max Fan RPM	1600	1600	2050	2050	
Unit Air Return Location	Front	Front	Front	Front	
Max Casing Height	12'-0"	12'-0"	9'-0"	9'-0"	
Max Casing Width	15'-0"	15'-0"	10'-6"	10'-6"	
Max Casing Length	15'-6"	15'-6"	13'-6"	13'-6"	
Hand of Coil Connections	Left	Right	Left	Right	
Coil Max Pd Ft of Water	10	10	10	10	
Motor Mounting Position	Left	Right	Left	Right	
Resilient Base	None	None	None	None	
Seismic Requirements	Yes	Yes	Yes	Yes	
Seismic Location	El 755.0	El 755.0	El 692.0	El 692.0	
Quality Assurance Required	Yes	Yes	Yes	Yes	
Requisition No.	83153	83153	83119	83119	
Schedule No.	-	-	-	-	
Item No.	3	4	3	4	
Remarks					



ALL FEATURES
MECHANICAL
HEATING, VENTILATING, & AIR COND
AIR HANDLING UNITS

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

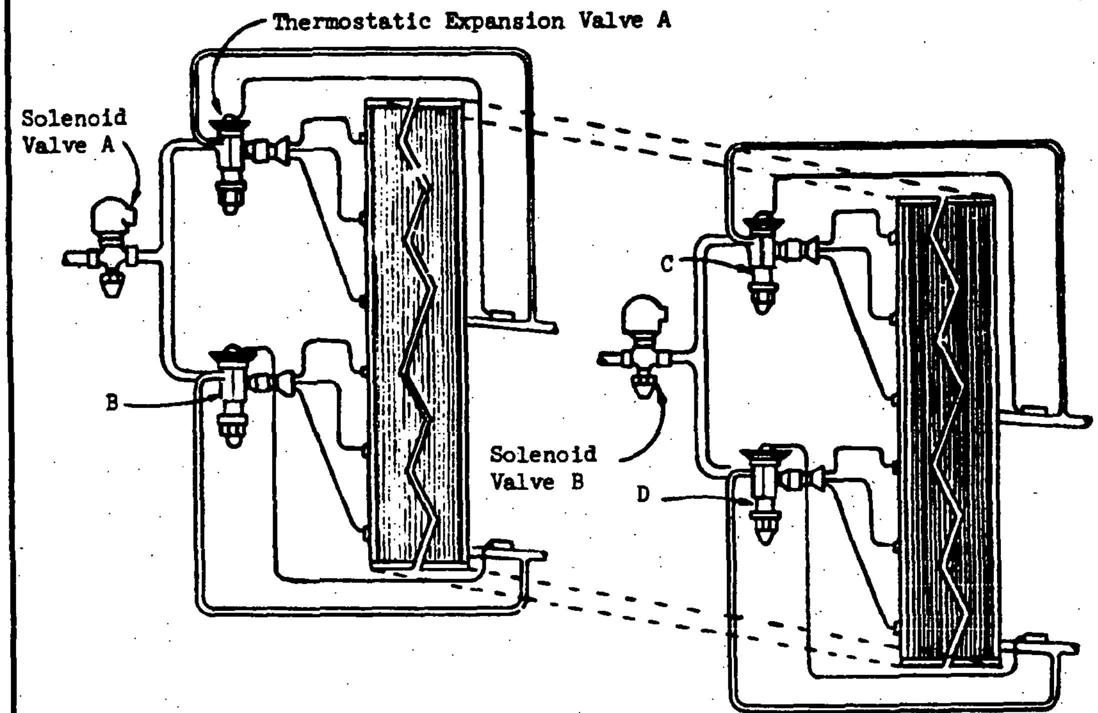
DRAWN	CHECKED	APPROVED	KNOXVILLE	DATE	SCALE	DRAWING NO.	REV
Charles L Bailey	J.C. Ley	R.W. Pierce		8-7-74	85	47A373-1	R2

INFORMATION ONLY

R1 F2

R2

CALC ID EPM-LCP-072489 R11
ATTACHMENT C SHEET 2 of 4



INFORMATION ONLY

Notes:

1. Coil shall be designed for row control with the first set of rows cooling approximately 66% of total capacity and second set cooling 34% of total capacity.
2. Sizing of thermostatic expansion valve, distributor, and feeder lines shall be as follows:
   (A) TEV and Distributors A and B shall each feed approximately 32% of coil total load.
   (B) TEV and Distributors C and D shall each feed approximately 16% of coil total load.
3. TVA shall control the coil cooling capacity as follows:

MF
RO

System Capacity	Position of Solenoid Valve A	Position of Solenoid Valve B
100%		
67%	Open	Open
66%		
35%	Open	Closed
34%		
16%	Closed	Open
14%	Closed	Closed

ALL FEATURES

MECHANICAL
HEATING, VENTILATING, & AIR COND
AIR HANDLING UNITS

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED Chas. L. Bailey | RECOMMENDED J.C. Key | APPROVED R.M. Pierce

KNOXVILLE | 12-11-73 | 85 M | 47A373-2 R0

DWG

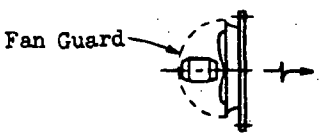
CALC ID EPM-LCP-072489 R11

ATTACHMENT C SHEET 3 of 4

AXIAL-FLOW FANS

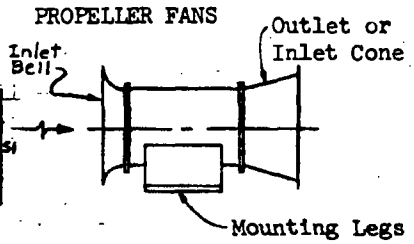
	Pressurizing	Turbine Building Exhaust	Air Return	Emergency Air Cleanup	Emergency Pressurization
Mark No. 47A371	1	2	6	7	8
Number required	2	36	4	2	2
Location	Control	Turbine	Reactor	Control	Control
Location, drawing	47W930-3	47W910-3	47W915-5	47W930-3	47W930-3
Fan type	Vaneaxial	Propeller	Vaneaxial	Vaneaxial	Vaneaxial
Minimum capacity, cfm	8200	11,500	40,000*	4,000	200
Static pressure, inches water	.75	0.25	Varies*	6.5	.375
Maximum rpm	1300	500	1800	4200	3450
Maximum wheel diameter	27"	44"	54"	18"	6"
AMCA arrangement	4	-	4	4	4
Motor type	TEAO	Dripproof	TEAO	TEAO	TEAO
Motor, single or two speed	Single	Single	Single	Single	Single
Motor, volts	230/460	230/460	460	230/460	230/460
Motor, phase and Hz	3/60	3 and 60	3 and 60	3/60	3/60
Motor, maximum rpm	1800	1800	1800	1800	3600
Drive type	Direct	V-Belt	Direct	Direct	Direct
Outlet cone	None	Yes	Yes	None	None
Inlet cone	None	-	None	None	None
Inlet bell with guard	None	-	None	None	None
Propeller fan guard	-		-	None	None
Director of airflow	Horizontal	Horizontal	Vert-DN	Horizontal	Horizontal
Mounting legs, location	-		-	-	-
Seismic component	Device		Device	Device	Device
Seismic elevation	EL 768'-7"		745.0	EL 769'-0"	EL 771'-8"
Requisition No.	83184	83184	83165*	83184	83184
Item No.	28	31	1	29	30
Schedule No.	V	VI	I	V	V
Remarks: Seis Cat.	QA I	MTG, Panel A Dim. MAX 49"	QA I	QA I	QA I

Note: Mark Numbers 3, 4 and 5 not used.



TUBE OR VANEAXIAL FANS

*See specification 2478, paragraph 12 for operating conditions.



ALL FEATURES

MECHANICAL
HEATING, VENTILATING, & AIR COND
AXIAL-FLOW FANS

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Charles L. Bailey	J. C. Clay	R. M. Parsons
KNOXVILLE	11-6-74	85 M 4 47A371-1 R3

NOT RELEASED FOR CONSTRUCTION

INFORMATION ONLY

NOT RELEASED FOR CONSTRUCTION

CALC ID EPM-LCP-072489 R11

ATTACHMENT C SHEET 4 OF 4

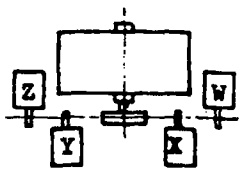
CENTRIFUGAL FANS

	Toilet and Locker Room Exhaust	Battery Room Exhaust C-B			
Mark No. 47A370-	6	7			
Number required	1	1			
Location building	Control	Control			
Location, drawing	47W930-3,4	47W930-1			
Minimum capacity, cfm	1200	2200			
Static pressure, inches water	0.625	2.25			
Maximum outlet velocity, fpm	1500	1750			
Maximum rpm	1500	1900			
Blade curve	Backward	Backward			
Inlet and width	Single	Single			
AMCA arrangement	10	4 or 10			
Rotation-Discharge	CW-UB	CCW-UB			
Motor location	-	-			
Sides minimum gauge	-	-			
Scroll minimum gauge	-	-			
Class No.	I	I			
Motor type	Dripproof	Dripproof			
Motor, single or two speed	Single	Single			
Motor, volts	230/460	230/460			
Motor, phase and Hz	3 and 60	3 and 60			
Motor, maximum rpm	1800	1800			
Drive type	V-Belt	-			
Outlet damper	-	-			
Inlet damper	-	-			
Damper motor	-	-			
Outlet damper normal position	-	-			
Inlet guard	None	None			
Belt guard or drive cover	Yes	Yes			
Resilient base	None	None			
Split housing	-	-			
Seismic component	Assembly	Assembly			
Location for seismic, elevation	755.0	692.0			
~~Seismic Cat.~~	I (L)	I			
Requisition No.	83184	83184			
Schedule No.	I	I			
Item No.	6	7			
Remarks:	QA	QA			

INFORMATION ONLY

RIMF R2

Note: Mark numbers 8 through 45 not used.



ALL FEATURES

MECHANICAL
HEATING, VENTILATING, & AIR COND
CENTRIFUGAL FANS

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
Charles L Bailey	J. C. Key	R. M. Rivers
KNOXVILLE	11-3-1985 M	47A370-2 R1

RECORD DRAWING AS CONSTRUCTED

Heat Gains for Thick Walls and Roofs

Simple calculation method extends ASHRAE methodology to heavier constructions

External walls and roofs of buildings gain heat through convection from outside air as well as by radiation from the sun. This heat is transferred to the building interior by conduction through the walls, which also alternately store and release heat. Thus, the process is very complex. To enable design calculations with comparative ease, the *1989 ASHRAE Handbook of Fundamentals*, Chapter 26, provides the following procedure, which is used throughout the industry. Heat gain is calculated by the following formula:

$$q = UA(CLTD) \quad (1)$$

where

q = heat gained by the room, Btuh
A = surface area of wall or roof, sq ft
$CLTD$ = cooling load temperature difference, F
U = overall heat-transfer coefficient, Btuh per sq ft per deg F

Values of $CLTD$ for a variety of wall and roof constructions used in commercial buildings have been listed in the *ASHRAE Handbook*. These are limited to about 1 ft thick concrete walls and 6 in. thick concrete roofs. While this range is quite adequate for commercial buildings, much heavier construction is used in some buildings. For example, external walls in nuclear power plants are typically more than 2 ft thick concrete and roofs are 1 ft or more thick concrete. For such constructions, no guidance is provided by the *ASHRAE Handbook*. My research has resulted in a simple calculation procedure that extends the ASHRAE methodology to such heavy constructions. This procedure and its basis are briefly described in the following.

Research

The one-dimensional transient heat conduction equation was numerically solved for solid concrete walls 1.5 to 4 ft thick and solid concrete roofs 1 to 2 ft thick, with and without external insulation. The air on one side of the wall/roof was considered to be at a constant temperature; this temperature was 75

Table 1—Summary of some typical calculations done for determining CLTD for thick concrete walls and roofs.

Type	Thickness, ft: Concrete	Thickness, ft: Insulation	Mean T_∞, F	T_r, F	Btuh per sq ft per deg F: h_i	Btuh per sq ft per deg F: h_o	Calculated CLTD, F: Max	Calculated CLTD, F: Min	Calculated CLTD, F: Mean	Mean ($T_\infty - T_r$)
Roof	1.0	0.083	107	78	1.08	4.0	35.2	23.2	29.2	29.0
Roof	1.0	0.167	107	78	1.08	4.0	34.0	24.5	29.2	29.0
Roof	1.0	None	107	78	1.08	4.0	43.8	15.2	29.5	29.0
Roof	1.5	None	107	78	1.08	4.0	34.6	24.1	29.3	29.0
Roof	2.0	None	107	78	1.08	4.0	31.4	27.2	29.3	29.0
Wall	1.5	None	100	78	1.08	4.0	26.0	18.5	22.2	22.0
Wall	2.0	None	115	104	0.50	1.0	11.0	9.8	10.4	11.0
Wall	2.0	None	115	104	1.46	4.0	12.8	9.8	11.3	11.0
Wall	2.0	None	100	78	1.46	4.0	23.8	20.7	22.2	22.0
Wall	2.0	None	115	78	1.46	4.0	38.8	35.5	37.3	37.0
Wall	1.0	None	100	78	1.46	4.0	22.6	22.2	22.4	22.0
Wall	1.0	None	100	78	1.08	4.0	22.4	22.4	22.4	22.0

By M. MOHAMMED SHAH,
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Darien, Conn.

Table 2—Calculated CLTD for dark horizontal roofs.

Roof description		Solar time, hr																						
Concrete thickness, in.	Insulation thickness, in.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
12	2	33	33	32	31	31	30	29	28	26	26	25	25	24	25	26	27	28	29	31	32	33	34	34	34
12	1	33	32	31	30	29	27	26	25	24	23	23	24	24	26	27	29	31	32	34	35	35	35	35	34
12	0	36	34	31	28	25	22	20	18	16	15	16	17	20	23	27	31	36	39	42	43	44	43	41	39
18	0	35	35	34	34	33	32	30	29	28	27	25	25	24	24	24	25	26	27	29	30	32	33	34	34
24	0	30	30	31	31	31	31	31	31	31	31	30	30	29	29	28	28	27	27	27	28	28	28	29	30

or 104 F in various runs, thus simulating design room temperatures. The air on the other side of the wall/roof was at the sol-air temperatures listed in Table 1 of the *ASHRAE Handbook* and thus varied with time. In some runs, higher sol-air temperatures were also used. Inside and outside air film heat-transfer coefficients were varied in the range that may be expected in practice. The heat transferred from the wall to the room air was calculated at each instant; the *CLTD* at each instant was then calculated using Equation 1. Computer runs were continued until calculated *CLTD*s were repeated in 24-hr cycles.

In Table 1, a summary of some typical calculations for walls and roofs is presented. The mean sol-air temperatures and mean *CLTD*s are 24-hr mean values. h_i and h_o are inside and outside air film heat-transfer coefficients, respectively.

In Table 2, the calculated *CLTD*s for various horizontal roofs are listed. All of these are for dark roofs and the sol-air temperatures listed in Table 1 in the *ASHRAE Handbook*. Note that all *CLTD*s listed in the *Handbook* for various roofs and walls were also calculated using the sol-air temperatures from this source.

All calculations were done for heavyweight concrete of 140 lb per cu ft density. The insulation considered had a density of 15 lb per cu ft, thermal conductivity of 0.024 Btuh per ft per deg F, and specific heat of 0.17 Btu per lb per deg F.

Results

The results listed in Table 1 show that:

$$\text{Mean } CLTD = \text{Mean } T_{sa} - T_r \qquad (2)$$

where

T_{sa} = sol-air temperature
T_r = room air temperature

Thus, the 24-hr mean heat gain can be calculated with Equation 1 using the mean *CLTD* from Equation 2.

Study of Table 1 also shows that for walls 2 ft thick or thicker, the extreme values of *CLTD* do not differ much from the mean *CLTD* given by Equation 2. It should be realized that due to the large thermal lag of these walls, these high *CLTD*s will be reached only if the sol-air temperatures remain at the peak values for more than one day. This will occur only rarely. Hence, the mean *CLTD* from Equation 2 will generally be the maximum *CLTD*.

Footnote 4 of Tables 29 and 31 in the *ASHRAE Handbook* list *CLTD* values to be used for roofs and walls with additional insulation, which takes them beyond the range of those tables. Study of those listed *CLTD* values show that they are exactly in accordance with Equation 2. Thus, the present research has shown that the calculation method given by ASHRAE for lightweight, thickly insulated walls/roofs is also applicable to heavyweight walls/roofs, with or without insulation.

Table 1 also shows that very large changes in the inside and outside film heat-transfer coefficients have comparatively small influence on the *CLTD*. It also shows agreement with the ASHRAE method for correcting for variations of room temperature and outside air temperatures.

Calculation procedure

For heavyweight concrete walls 2 ft thick or thicker, with or without insulation, use the following "uncorrected" *CLTD*s (in accordance with Footnote 4 of Table 31 in the *ASHRAE Handbook*): N, 11; NE, 17; E, 22; SE, 21; S, 17; SW, 21; W, 22; NW, 17 (letters represent wall orientation, numbers are *CLTD*s). These *CLTD*s are to be adjusted for color, latitude, room temperature, and outside air temperature as described in Footnote 2 of that table.

For the horizontal roof constructions listed in Table 2, obtain *CLTD* and then adjust it for color, latitude, room temperature, and outside air temperature as described in Footnote 2 of Table 29 in the *ASHRAE Handbook*.

For horizontal, uninsulated roofs thicker than 2 ft and insulated roofs more than 1.5 ft thick, use 29 F as the uncorrected *CLTD* (according to Footnote 4 of Table 29) and then correct it according to Footnote 2 of that table.

Conclusion

The calculation procedure given for heavy walls and roofs was derived from computerized solutions of the governing heat-transfer equation and is in agreement with ASHRAE's recommended procedure for lightweight walls and roofs with thick insulation. Its use will result in simple, reliable calculations, eliminating the need for guesswork and conservatism, which had to be resorted to until now. Ω