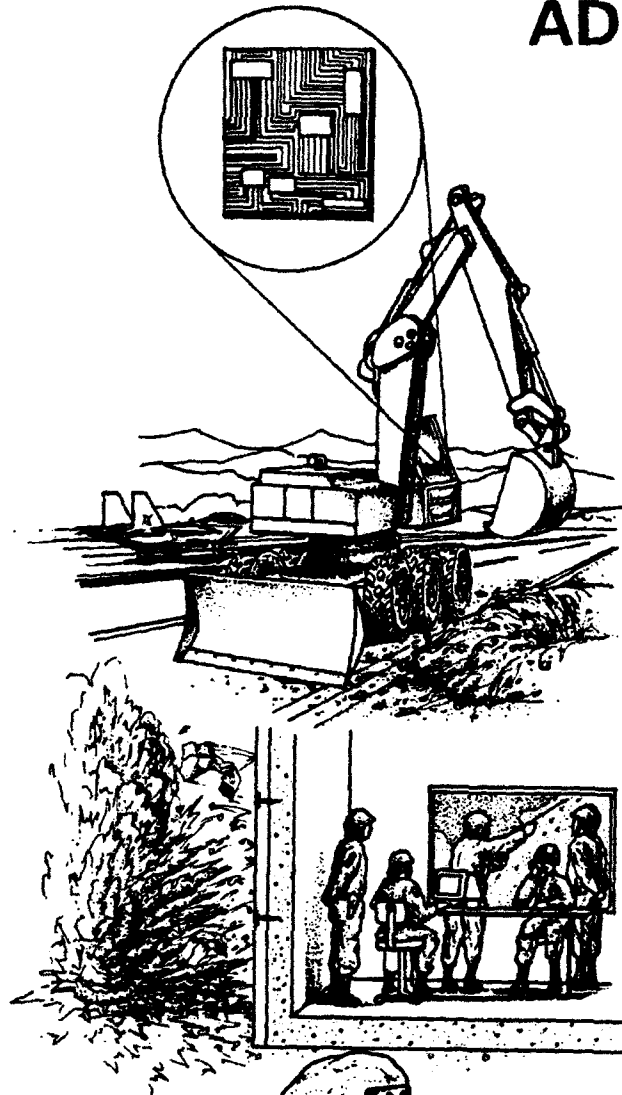


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ESL-TR-91-22
Volume IX

1



THE POST-DAM SYSTEM VOLUME IX - FIELD MANUAL

T.L. WARREN, J.J. HOWARD,
D.H. MERKLE

APPLIED RESEARCH ASSOCIATES, INC,
POST OFFICE BOX 40128
TYNDALL AFB FL 32403

OCTOBER 1992

FINAL REPORT

FEBRUARY 1989 - MARCH 1991

APPROVED FOR PUBLIC RELEASE:
DISTRIBUTION UNLIMITED



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Air Force Civil Engineering Support Agency
Civil Engineering Laboratory
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Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE

October 1992

3. REPORT TYPE AND DATES COVERED

Draft, 1 February 1989 - 1 March 1991

4. TITLE AND SUBTITLE

The POST-DAM System
Volume 9 - Field Manual

5. FUNDING NUMBERS

C: F08635-88-C-0067

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION
REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

HQ Air Force Civil Engineering Support Agency
Tyndall AFB FL 32403

10. SPONSORING/MONITORING
AGENCY REPORT NUMBER

ESL-TR-91-22
Volume IX

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release.
Distribution unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

Mission accomplishment in PACAF and USAFE depends on base recovery capability in a postattack environment. Base recovery includes identifying, analyzing, and repairing facility damage. For facilities critical to sortie generation, this process must be accomplished expediently.

In a postattack environment, field information on facility damage is collected and analyzed to determine structural integrity and usability. From this analysis, a repair schedule is developed. This is currently a time consuming process that is shortened by using a computerized system.

The scope of this effort was to develop a computerized postattack damage assessment system that recommends repair strategies, keeps inventory of materials and equipment, and schedules repairs based on manpower and equipment availability.

14. SUBJECT TERMS

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION
OF REPORT

UNCLASSIFIED

18. SECURITY CLASSIFICATION
OF THIS PAGE

UNCLASSIFIED

19. SECURITY CLASSIFICATION
OF ABSTRACT

UNCLASSIFIED

20. LIMITATION OF ABSTRACT

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EXECUTIVE SUMMARY

A. OBJECTIVE

The objective of this report is to describe the software and hardware of the POST-DAM System, developed by Applied Research Associates, Inc., for airbase facility postattack damage assessment. This report contains descriptions of prototype software and hardware, and recommendations for full-scale development of both software and hardware.

B. BACKGROUND

In a postattack environment, field information on mission-critical facility damage is collected and analyzed to determine structural integrity and usability. From this analysis, a repair schedule is developed. This is a time-consuming process when done without the aid of a computerized system. Consequently, the POST-DAM System was developed to determine repair strategies with an expert system, keep track of materials and equipment with a relational database management system, and schedule repairs based on manpower and equipment availability with a project management system.

C. SCOPE

This technical report consists of nine volumes. Volume I describes software and hardware used with the prototype POST-DAM System, and recommends software and hardware for full-scale development. Volumes II through VIII are software user's manuals, which describe how to install and use the prototype software with the POST-DAM System. Volume IX is a field manual that contains diagrams of structures that are used with the POST-DAM system to locate damaged elements.

D. EVALUATION METHODOLOGY

The prototype POST-DAM System was developed using commercial, off-the-shelf (COTS) software and hardware. The system was constructed by integrating the software and hardware in such a way that a remote computer in the field can communicate with a host computer in the Base Civil Engineering (BCE) Damage Control Center (DCC). The POST-DAM system determines repair strategies, keeps track of materials and equipment, and schedules repairs based on manpower and equipment availability. This prototype system has been evaluated in-depth, and subsequent recommendations are made herein about software and hardware that should be used for full-scale development.

E. CONCLUSIONS

The prototype POST-DAM System is functional, but has limitations with respect to both hardware and software. The following problems were encountered:

1. The prototype remote computer is not portable, and cannot be used in the field. No satisfactory, hand-held remote terminal was available for this project.

2. The expert system cannot hold all the information required for full-scale development, because it cannot use extended memory.

3. Both the relational database management system and project management system require more human interaction than desired.

4. The communication system software is not compatible with the Survivable Base Recovery After Attack Communication System (SBCS) being developed for ESD by Sumaria Systems, Inc., with which the POST-DAM System is required to interface.

F. RECOMMENDATIONS

For full-scale development, the following features should be incorporated in the POST-DAM System.

1. Replace the prototype remote computer with a hand-held terminal unit having at least 2 Mb of random access memory, and which can run applications requiring 640 Kb of base memory.

2. Replace the prototype host computer with a system having at least 4 Mb of random access memory, IEEE 802.3 LAN ports, and able to support multi-tasking operations.

3. Replace the CLIPS expert system shell with an expert system shell capable of supporting applications at least twice as large as those developed for the prototype system.

4. Set the host computer up to interface with the IEEE 802.3 Ethernet local area network (LAN) used by SBCS.

5. Construct a single computer program to replace the relational database management system and the project management system, to minimize the required amount of human intervention. This system should be developed by personnel with a strong background in computer science.

PREFACE

This report was prepared by Applied Research Associates, Inc. (ARA), P.O. Box 40128, Tyndall Air Force Base, FL 32403, under Contract F08635-88-C-0067, for the Air Force Civil Engineering Support Agency, Tyndall Air Force Base, Florida.

This report (Volumes I through IX) summarizes work completed between 1 February 1989 and 1 March 1991. Lt. James Underwood (USN) was the HQ AFCESA/RACS Project Officer.

This report has been reviewed by the Public Affairs Office, and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the public, including foreign nations.

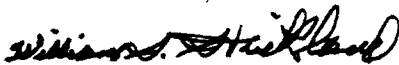
This technical report has been reviewed and is approved for publication.



Dan Shenbach, Maj., IAF
Project Officer



Felix Uhlik, Lt. Col., USAF
Chief, Engineering Research Division



William S. Strickland
Chief, Airbase Survivability Branch



Frank P. Gallagher, III, Col., USAF
Director, Civil Engineering Laboratory

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TABLE OF CONTENTS

Section	Title	Page
I	INTRODUCTION.....	1
	A. OBJECTIVE.....	1
	B. BACKGROUND.....	1
	C. APPROACH.....	1
II	MISSION-CRITICAL FACILITIES.....	3
	A. BUILDING 138.....	3
	B. BUILDING 464.....	3
	C. BUILDING 4058.....	3
	D. BUILDING 9999.....	3
APPENDIX		
A	BUILDING 138 PDES FACILITY-SPECIFIC DATA FILE.....	37
B	BUILDING 464 PDES FACILITY-SPECIFIC DATA FILE.....	41
C	BUILDING 4058 PDES FACILITY-SPECIFIC DATA FILE.....	45
D	BUILDING 9999 PDES FACILITY-SPECIFIC DATA FILE.....	49

LIST OF FIGURES

Figure	Title	Page
1	Basement Plan View of Building 138.....	4
2	Ground Floor Plan View of Building 138.....	5
3	Penthouse Plan View of Building 138.....	6
4	Roof Plan View of Building 138.....	7
5	Elevation View of Northeast Side of Building 138.....	8
6	Elevation View of Southwest Side of Building 138.....	9
7	Elevation View of Northwest Side of Building 138.....	10
8	Elevation View of Southeast Side of Building 464.....	11
9	Basement Plan View of Building 464.....	12
10	Ground Floor Plan View of Building 464.....	13
11	Penthouse Plan View of Building 464.....	14
12	Roof Plan View of Building 464.....	15
13	Elevation View of Northeast Side of Building 464.....	16
14	Elevation View of Southwest Side of Building 464.....	17
15	Elevation View of Northwest Side of Building 464.....	18
16	Elevation View of Southeast Side of Building 464.....	19
17	Ground Floor Plan View of Building 4058.....	20
18	Second Floor Plan View of Building 4058.....	21
19	Third Floor Plan View of Building 4058.....	22
20	Roof Plan View of Building 4058.....	23
21	Elevation View of Northeast Side of Building 4058.....	24
22	Elevation View of Southwest Side of Building 4058.....	25
23	Elevation View of Northwest Side of Building 4058.....	26
24	Elevation View of Southeast Side of Building 4058.....	27
25	Basement Plan View of Building 9999.....	28
26	Ground Floor Plan View of Building 9999.....	29
27	Penthouse Plan View of Building 9999.....	30
28	Roof Plan View of Building 9999.....	31
29	Elevation View of North Side of Building 9999.....	32
30	Elevation View of South Side of Building 9999.....	33
31	Elevation View of East Side of Building 9999.....	34
32	Elevation View of West Side of Building 9999.....	35

LIST OF TABLES

Table	Title	Page
1	ELEMENT NUMBERING SYSTEM.....	2

SECTION I

INTRODUCTION

A. OBJECTIVE

This field manual contains construction drawings of mission-critical facilities located at Tyndall AFB, Florida, and Bitburg AB, Germany. The purpose of these drawings is to display the critical elements of these facilities, using a number system consistent with the prototype POST-DAM Expert System (PDES) being developed by Applied Research Associates, Inc.. This manual is intended to be used by Damage Assessment Teams (DATs) to indicate to PDES what element has been damaged in a facility; by the Base Civil Engineer (BCE) when assessing PDES output data; and by Damage Repair Teams (DRTs) to locate the damage needing repair.

B. BACKGROUND

The POST-DAM system is a computer-based system for postattack facility damage assessment. It consists of remote computers operated in the field by DAT's, and a host computer operated in the Damage Control Center (DCC) by the BCE. The remote computers are used to run the knowledge-based expert system PDES, which recommends expedient repair strategies, and determines the required materials, equipment, and labor required for each repair. The host computer processes the PDES output data, by determining if repairs are possible based on material, equipment, and manpower availability, then schedules the possible repairs based on equipment and manpower availability.

C. APPROACH

When assessing damage to a mission-critical facility, the DAT member operating the remote computer is queried by PDES about damage to the facility. This involves entering into the remote computer the type, location, and magnitude of damage, and comments about the damage. The damage location is defined by using this field manual, which contains construction drawings for each mission-critical facility. For each facility, drawings are given showing the plan view of the roof, plan views of each floor, and elevation views of all four sides. In these drawings, each facility is divided into a finite number of elements, and each element is given a distinct number. PDES queries the user for the number of a damaged element, and the user enters the number shown on the drawing. Information about the element numbering system is given in Table 1.

The field manual is also used in the DCC to aid in evaluating the data received from the remote computers, and by the DRTs to locate areas requiring repair. The host computer operator in the DCC uses the manual to see where the damage is, and to determine other possible repair strategies, if required. The DRTs use the manual to avoid wasting time determining where a repairable damaged area is, thus minimizing the time required to finish the repair.

TABLE 1. ELEMENT NUMBERING SYSTEM.

ELEMENT TYPE	ELEMENT NUMBER SEQUENCE
EXTERIOR WALL	100 - 199
INTERIOR WALL	200 - 299
ROOF	300 - 399
FLOOR	400 - 499
BEAM	500 - 599
COLUMN	600 - 699
DOOR	700 - 799
MISCELLANEOUS	800 - 899

SECTION II

MISSION-CRITICAL FACILITIES

A. BUILDING 138

The 525th Squadron Operations Building at Bitburg AB, Germany, is semi-hardened, and used for command, control, and communications. It has a priority code of C2, which means it is critical for launch and recovery for a 72 hour period. Figures 1 through 3 show plan views of each floor, Figure 4 shows a plan view of the roof, and Figures 5 through 8 show elevation views of the four sides (the building plans of this structure were modified to accommodate memory limitations involved with the prototype PDES).

PDES Facility-Specific Data for Building 138 are provided in Appendix A.

B. BUILDING 464

This is the Telecommunications Facility located at Bitburg AB, Germany. This structure is semihardened, and used for command, control, and communications. It is a priority code of C2, which means it is critical for launch and recovery for a 72 hour period. Figures 9 through 11 show plan views of each floor, Figure 12 shows a plan view of the roof, and Figures 13 through 16 show elevation views of the four sides.

PDES Facility-Specific Data for Building 464 are provided in Appendix B.

C. BUILDING 4058

This is the Maintenance Shelter and Alternate Survival/Recovery Center (SRC) located at Bitburg AB, Germany. This structure is an altered Tab Vee aircraft shelter that is semihardened, and used for command, control, and communications. It has a priority code of C1, which means it is critical for launch. Figures 17 through 19 show plan views of each floor, Figure 20 shows a plan view of the roof, and Figures 21 through 24 show elevation views of the four sides.

PDES Facility-Specific Data for Building 4058 are provided in Appendix C.

D. BUILDING 9999

This is the NATO structure at the SKY-10 test facility at Tyndall AFB, Florida. This structure is assumed to be at Bitburg AB, Germany for the purpose of testing the POST-DAM system. This structure is semihardened, and used for command, control, and communications. It has a priority code of C1, which means it is critical for launch. Figures 25 through 27 show plan views of each floor, Figure 28 shows a plan view of the roof, and Figures 29 through 32 show elevation views of the four sides.

PDES Facility-Specific Data for Building 9999 are provided in Appendix D.

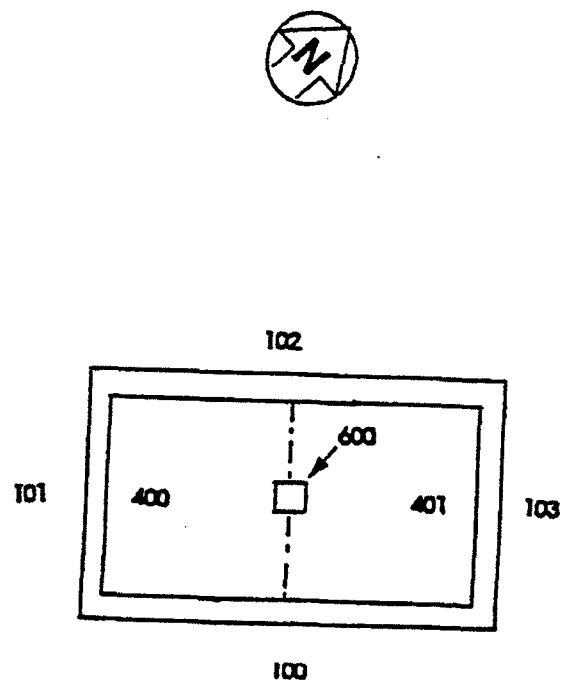


Figure 1. Basement Plan View of Building 138.

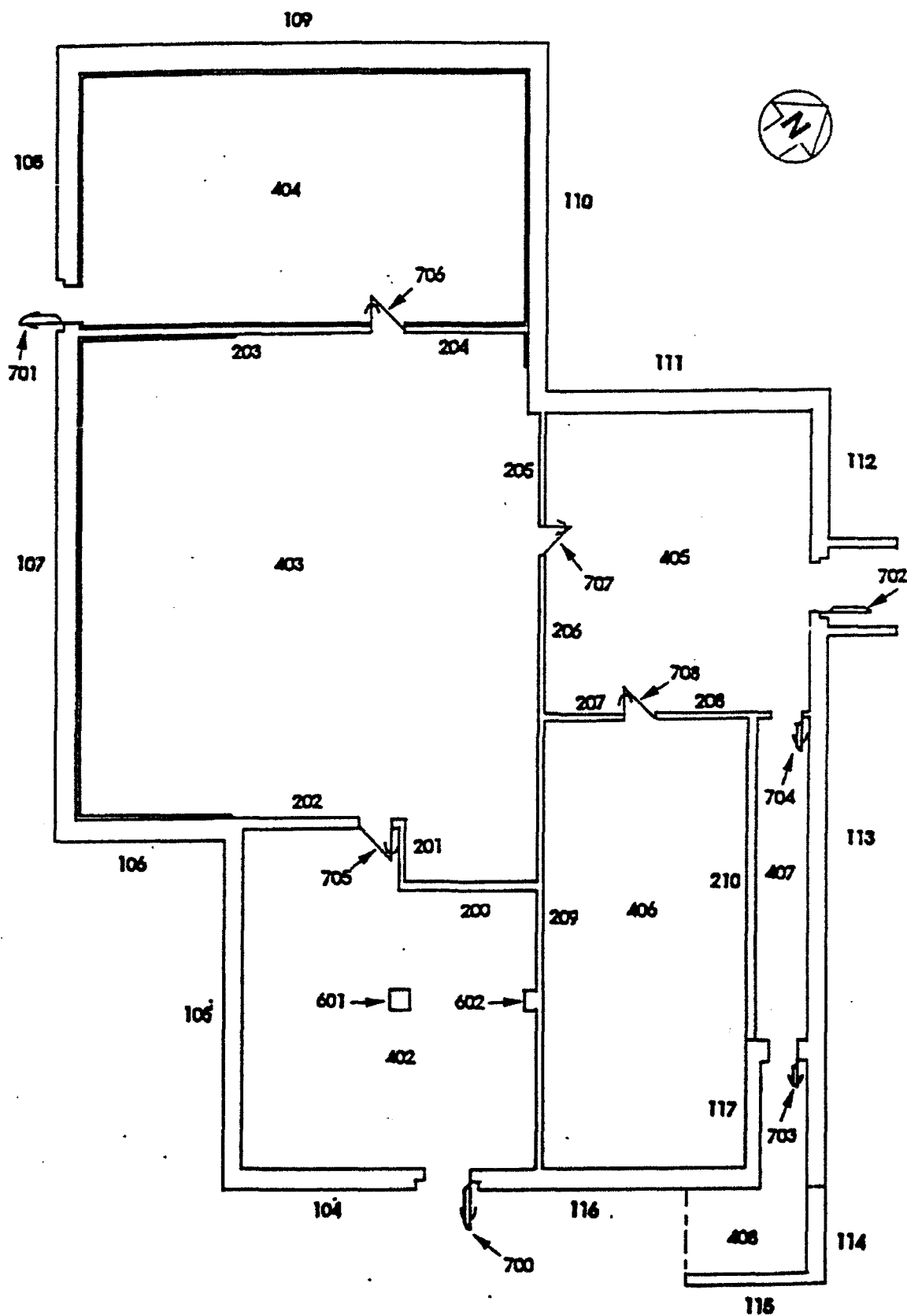


Figure 2. Ground Floor Plan View of Building 138.

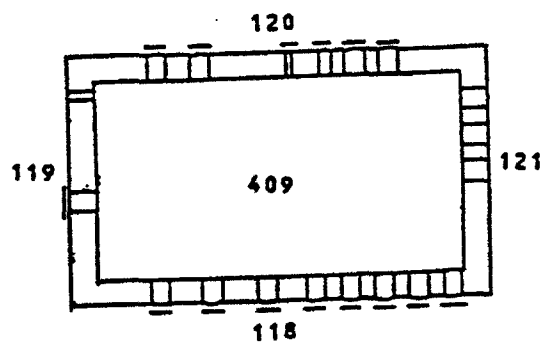


Figure 3. Penthouse Plan View of Building 138.

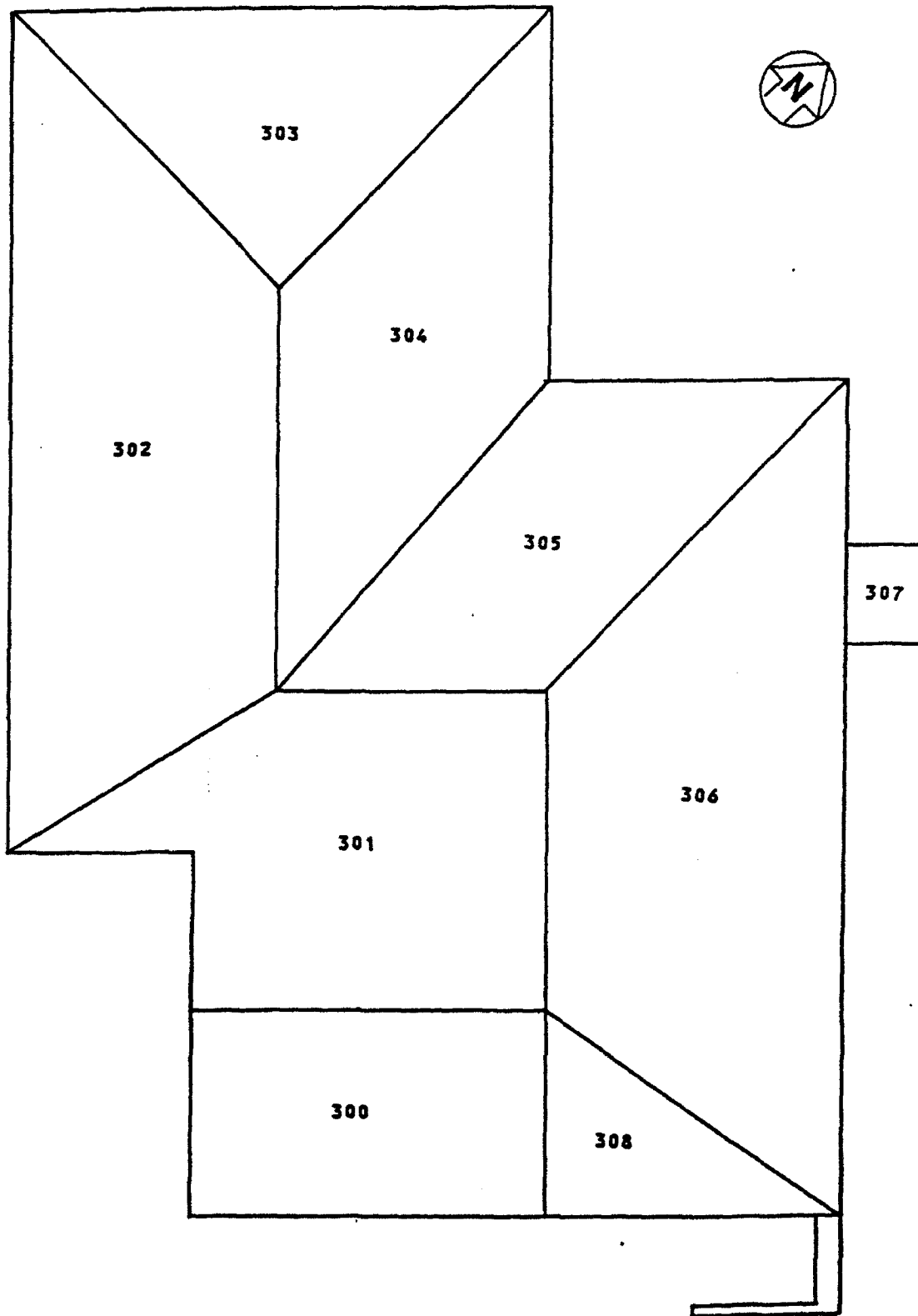


Figure 4. Roof Plan View of Building 138.

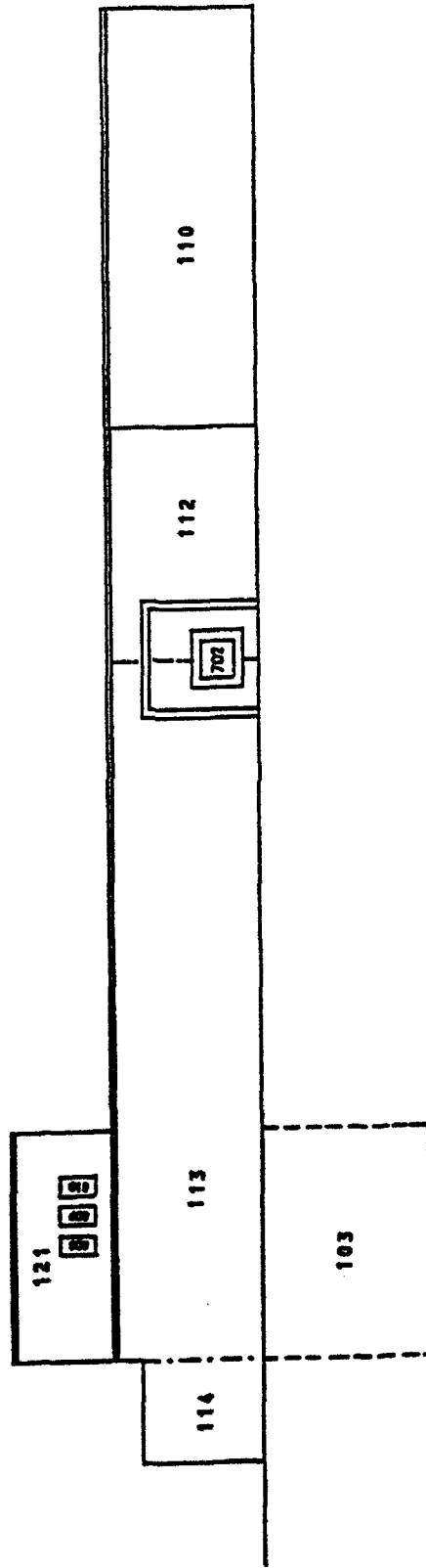


Figure 5. Elevation View of Northeast Side of Building 138.

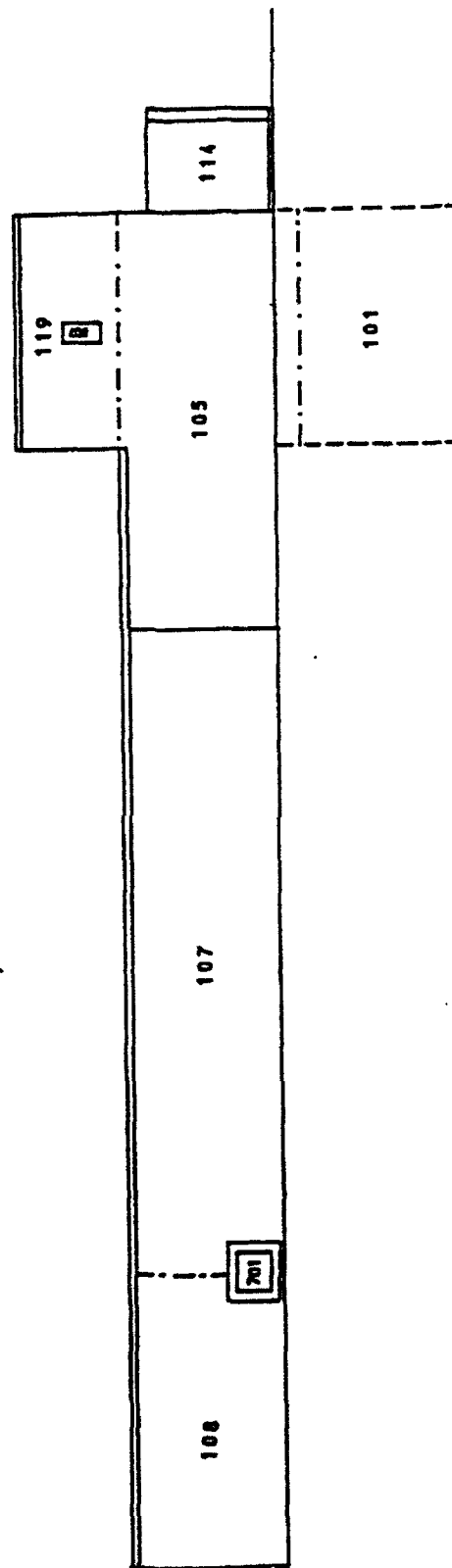


Figure 6. Elevation View of Southwest Side of Building 138.

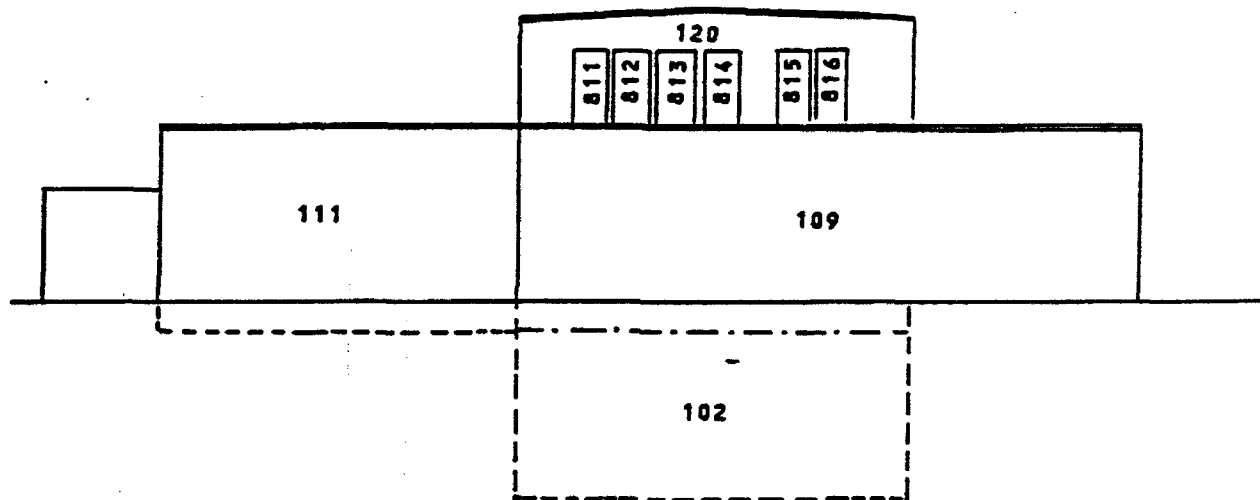


Figure 7. Elevation View of Northwest Side of Building 138.

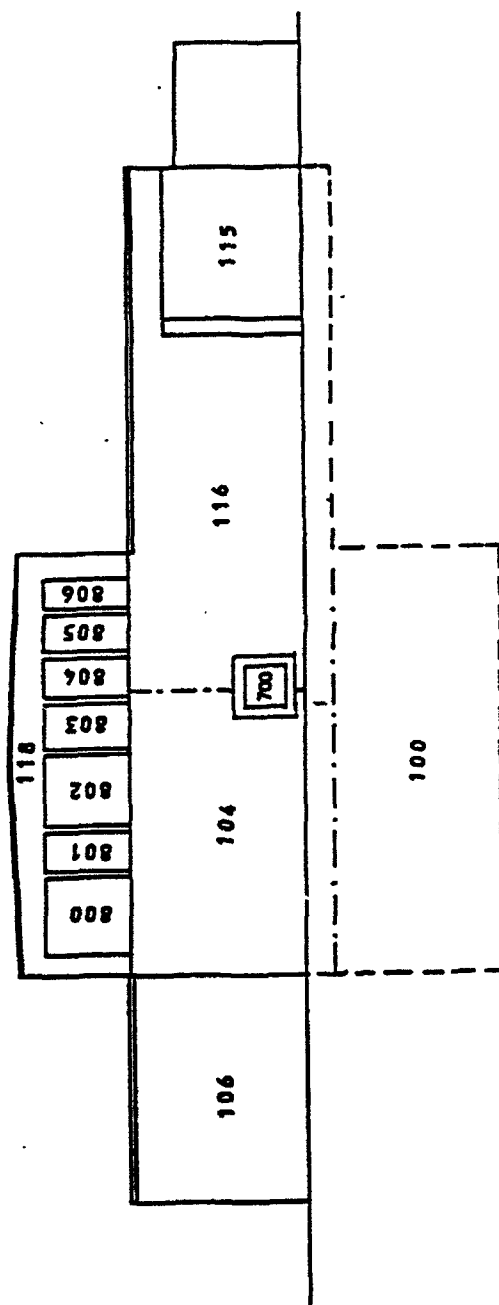


Figure 8. Elevation of Southeast Side of Building 138.

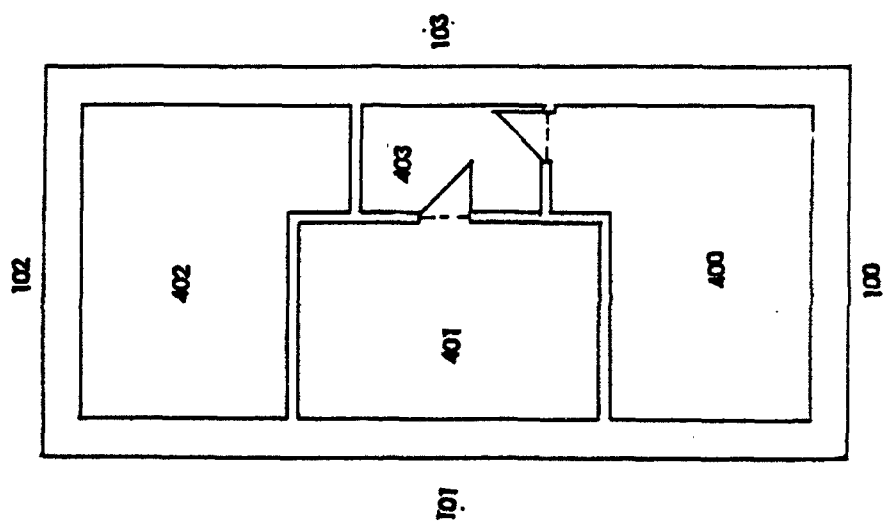


Figure 9. Basement Plan View of Building 464.

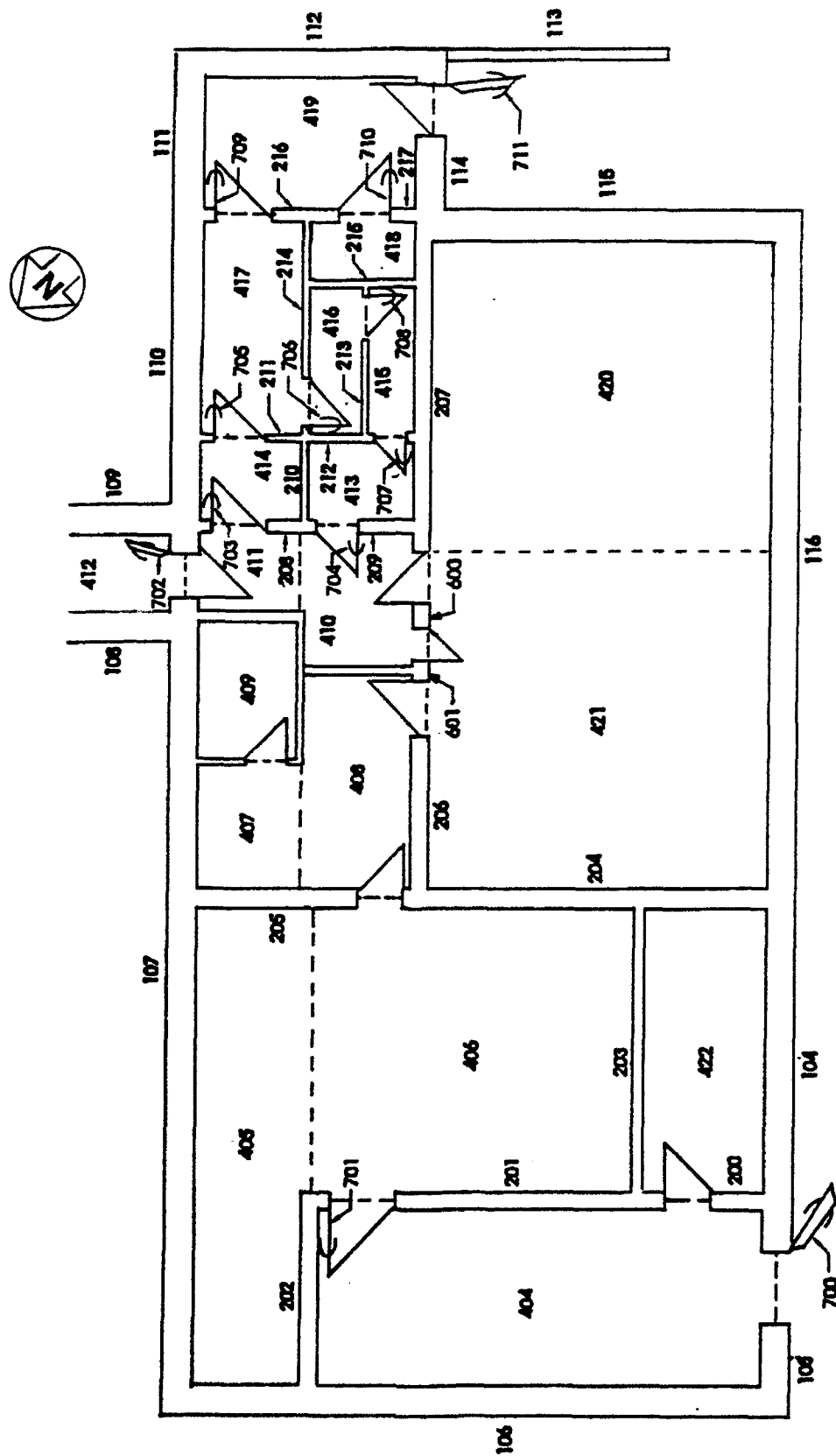


Figure 10. Ground Floor Plan View of Building 464.

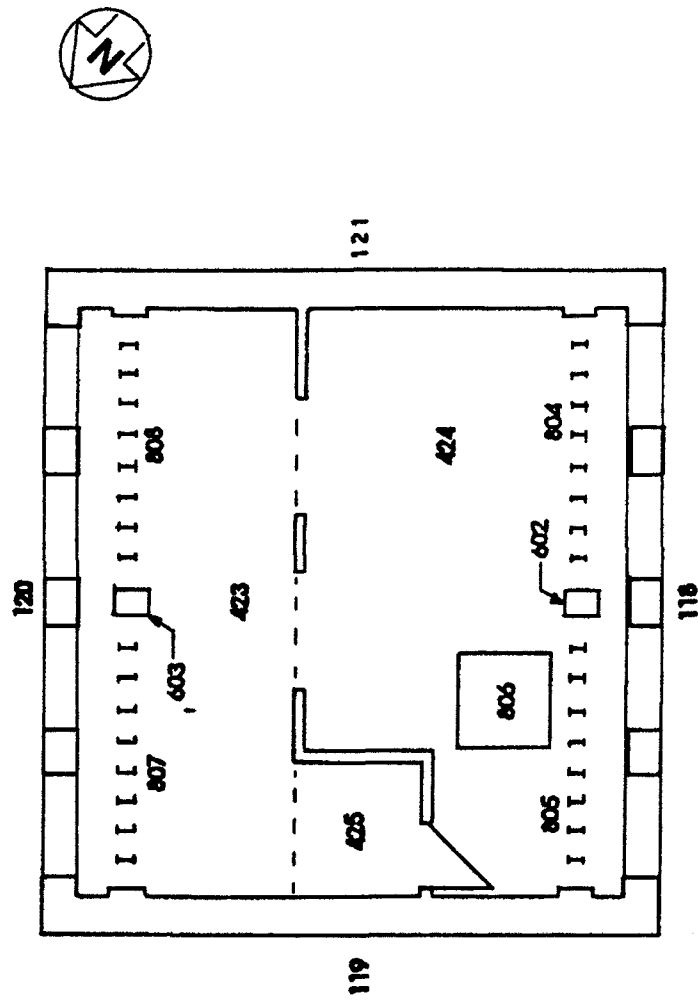


Figure 11. Penthouse Plan View of Building 464.

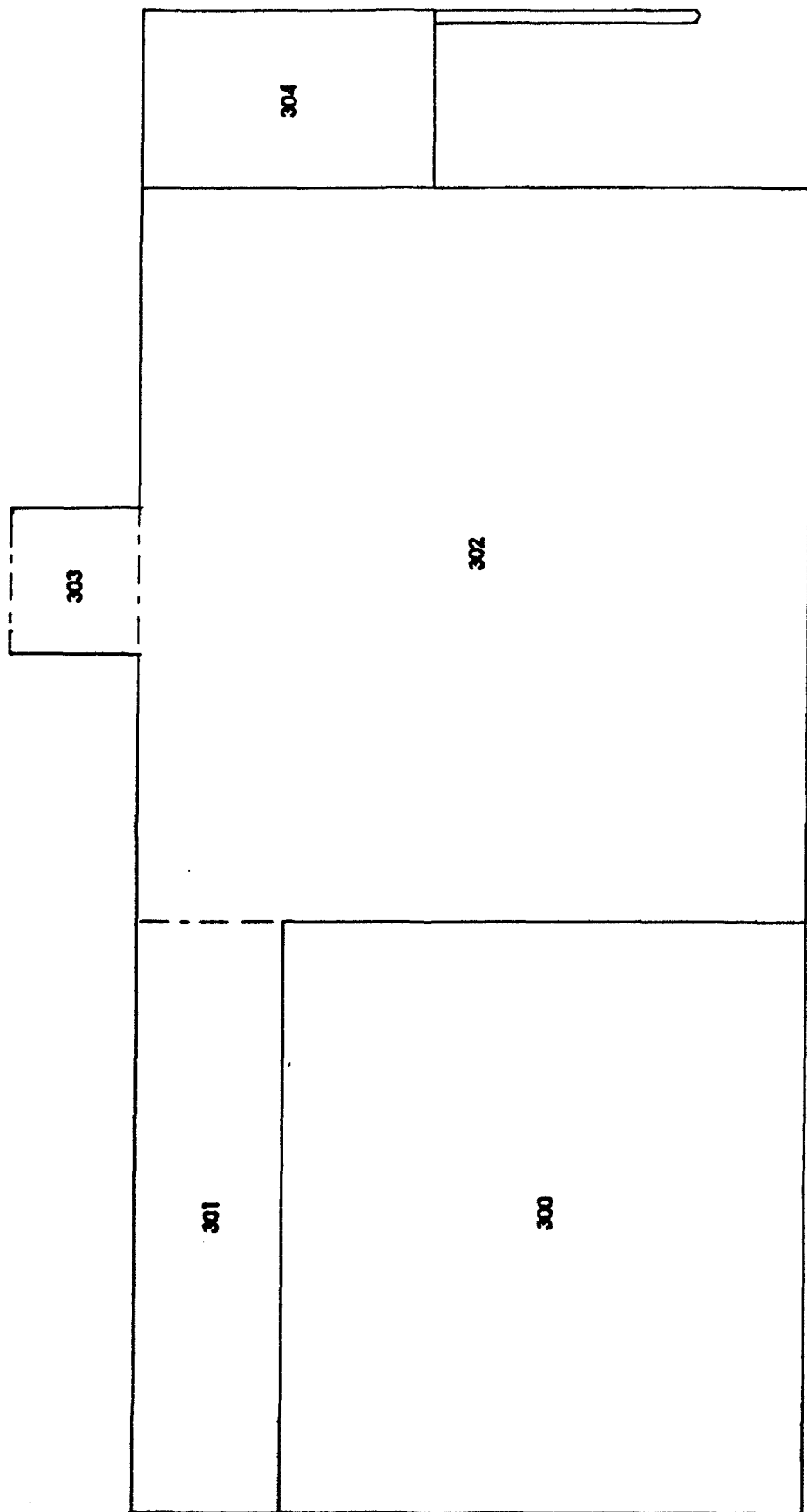


Figure 12. Roof Plan View of Building 464.

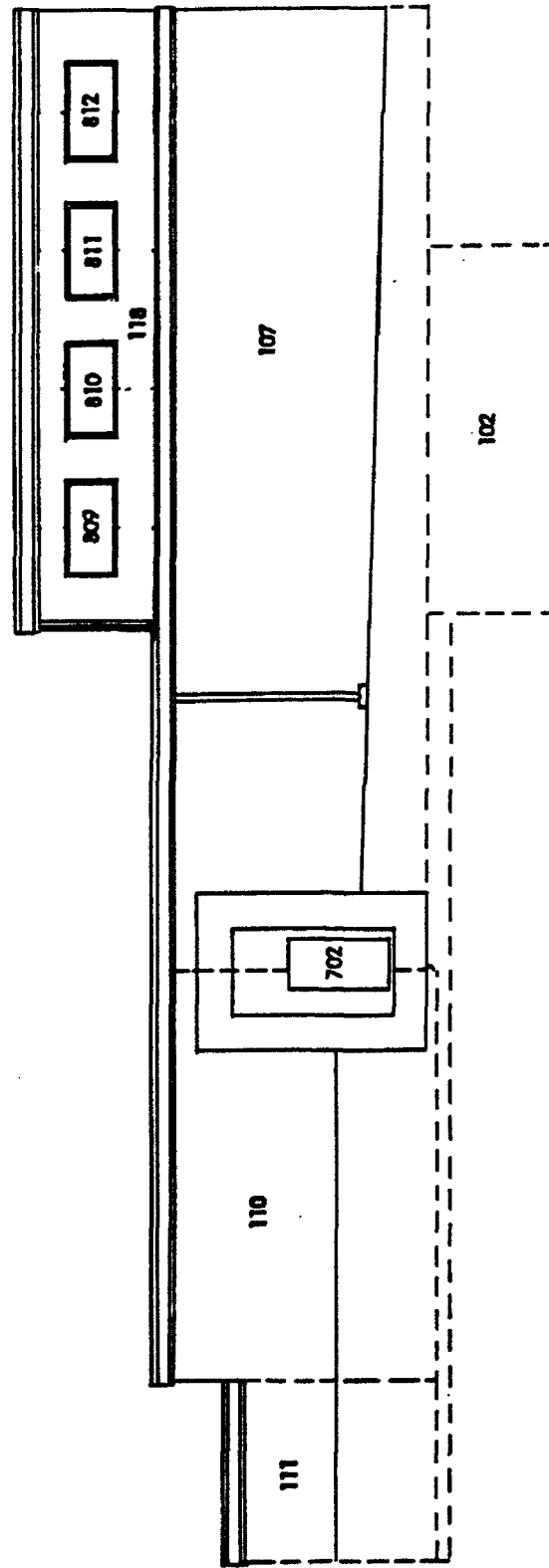


Figure 13. Elevation View of Northeast Side of Building 464.

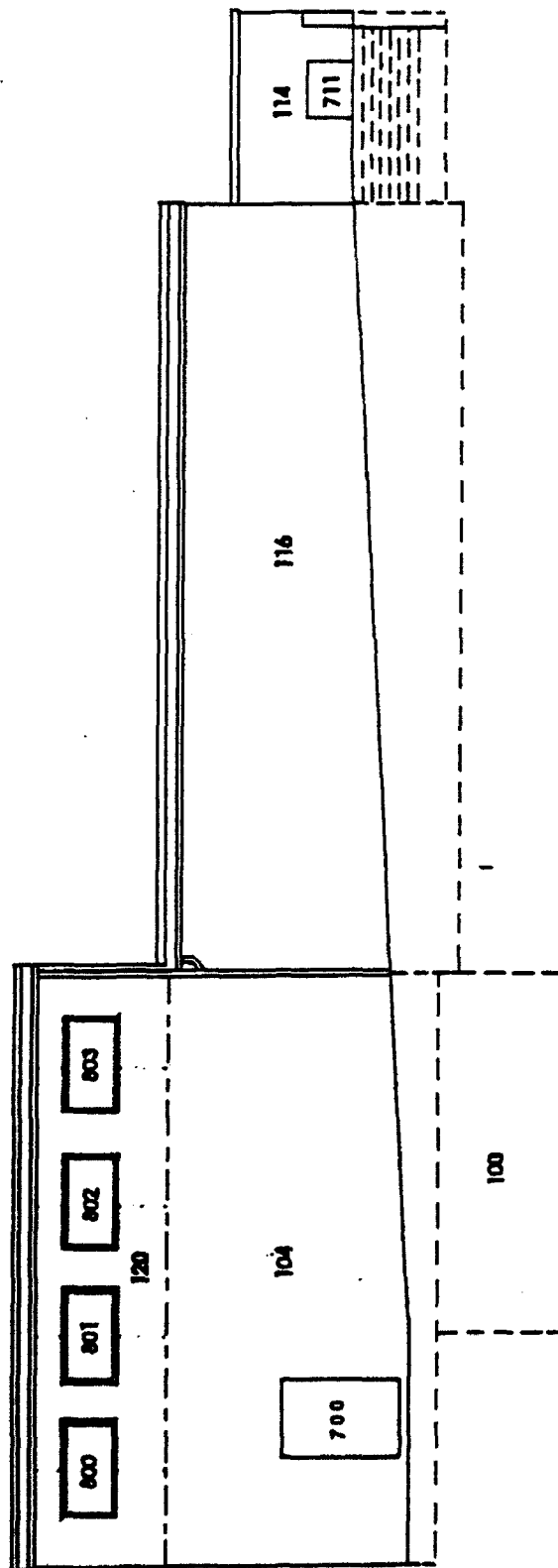


Figure 14. Elevation View of Southwest Side of Building 464.

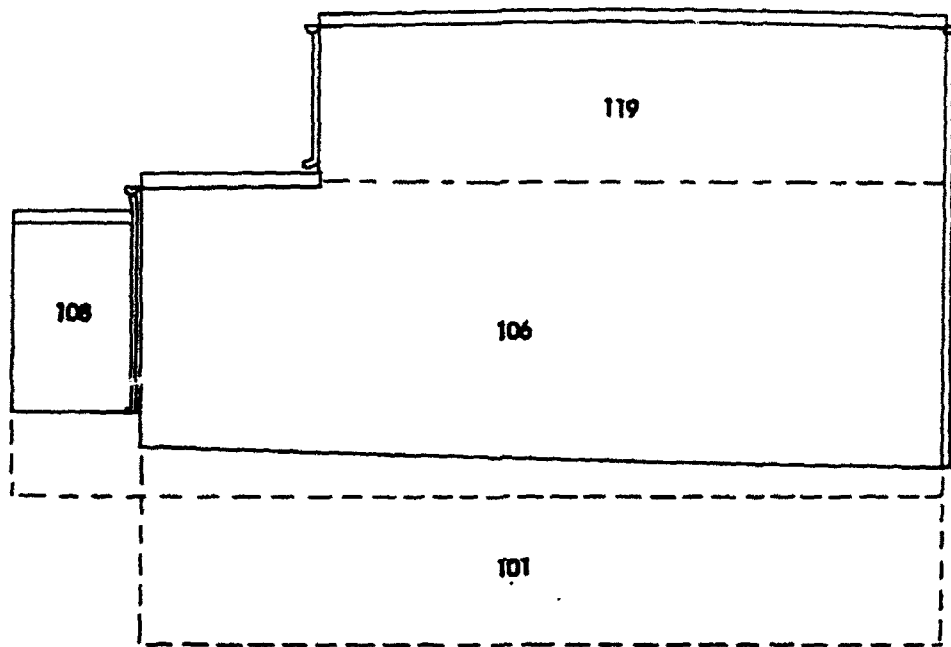


Figure 15. Elevation View of Northwest Side of Building 464.

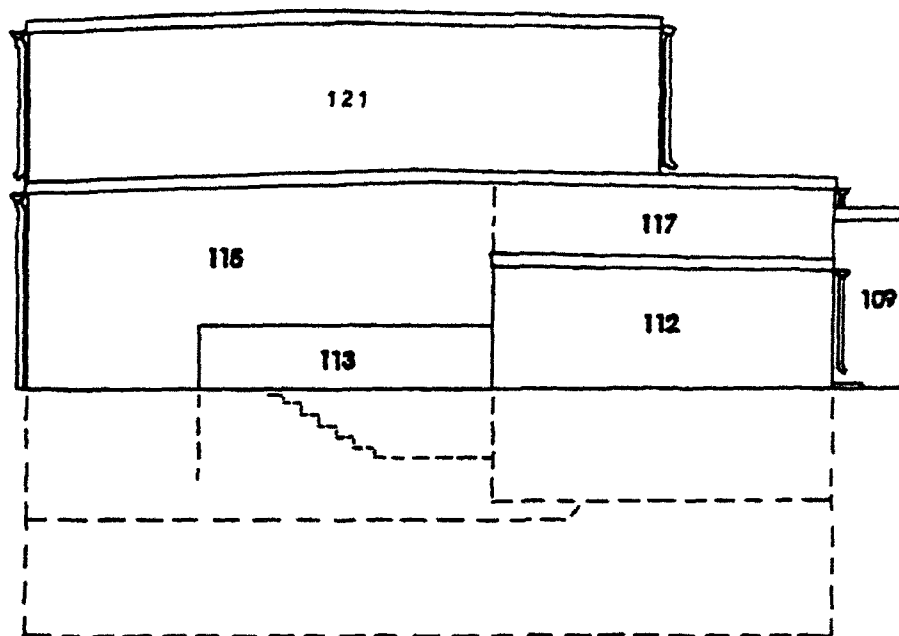


Figure 16. Elevation View of Southeast Side of Building 464.

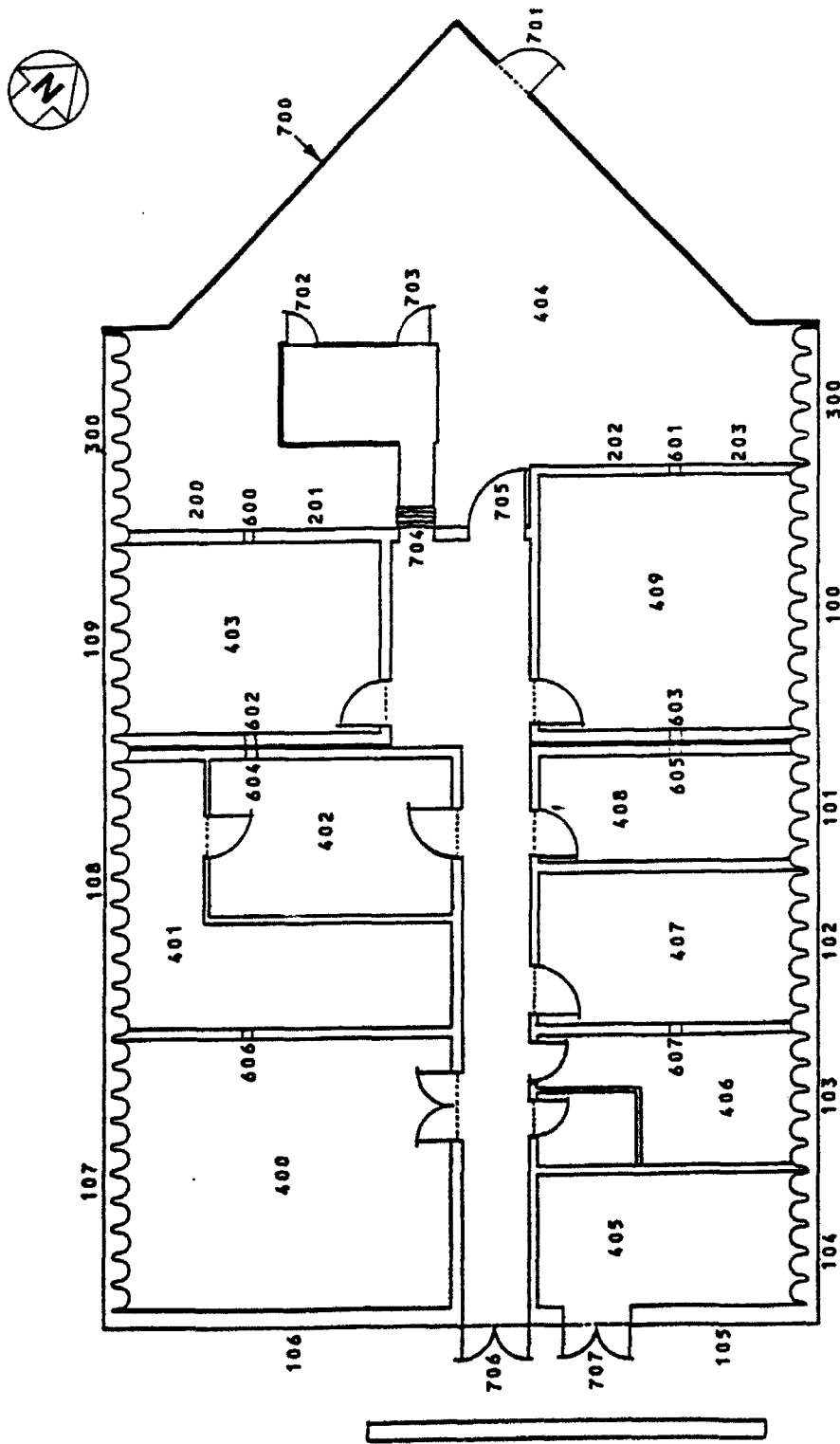


Figure 17. Ground Floor Plan View of Building 4058.

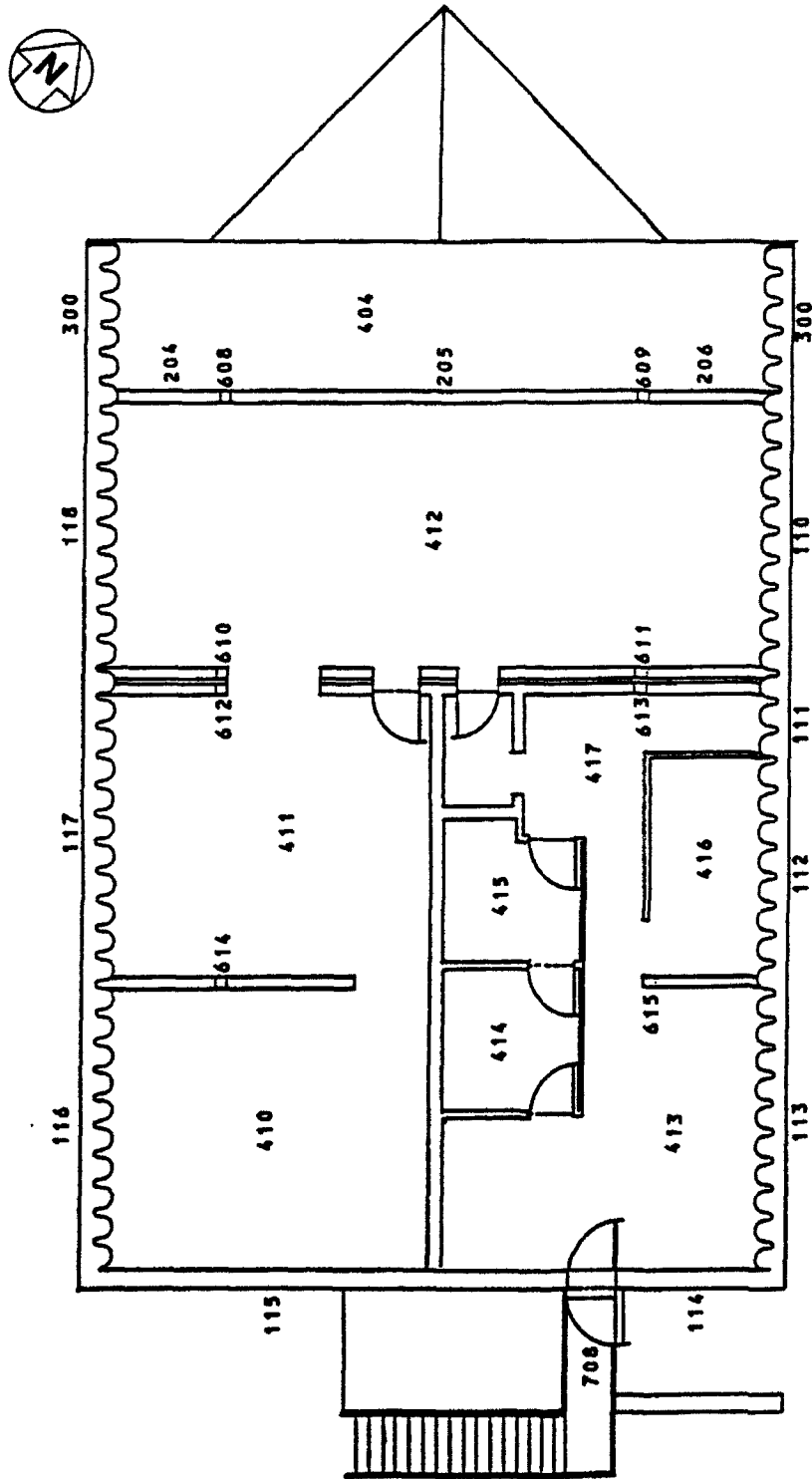


Figure 18. Second Floor Plan View of Building 4058.

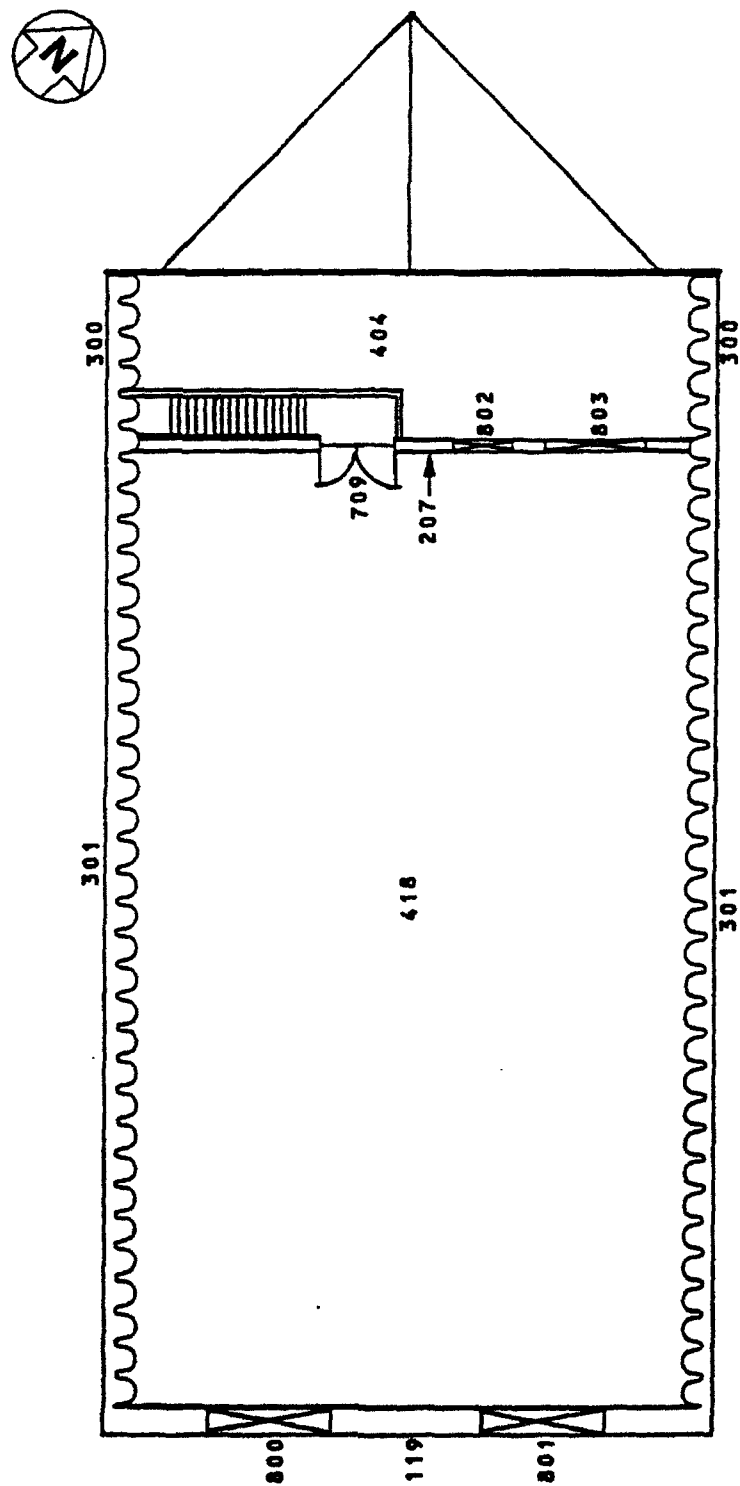


Figure 19. Third Floor Plan View of Building 4058.

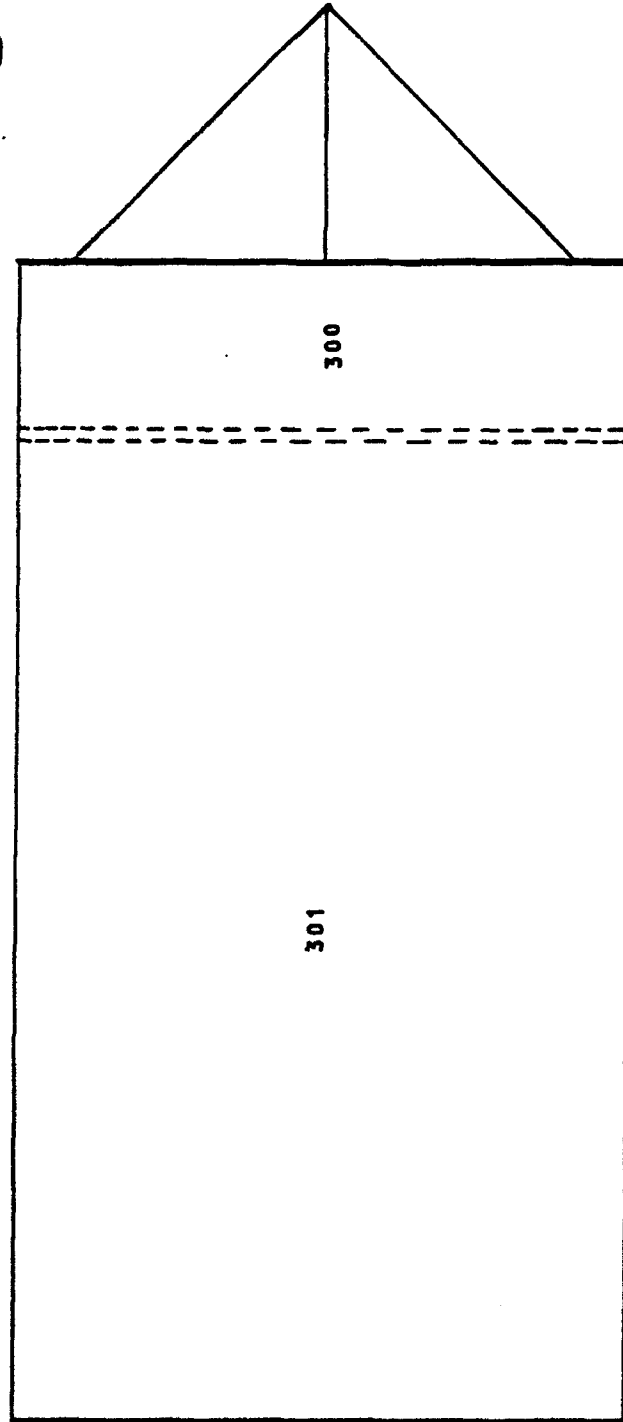


Figure 20. Roof Plan View of Building 4058.

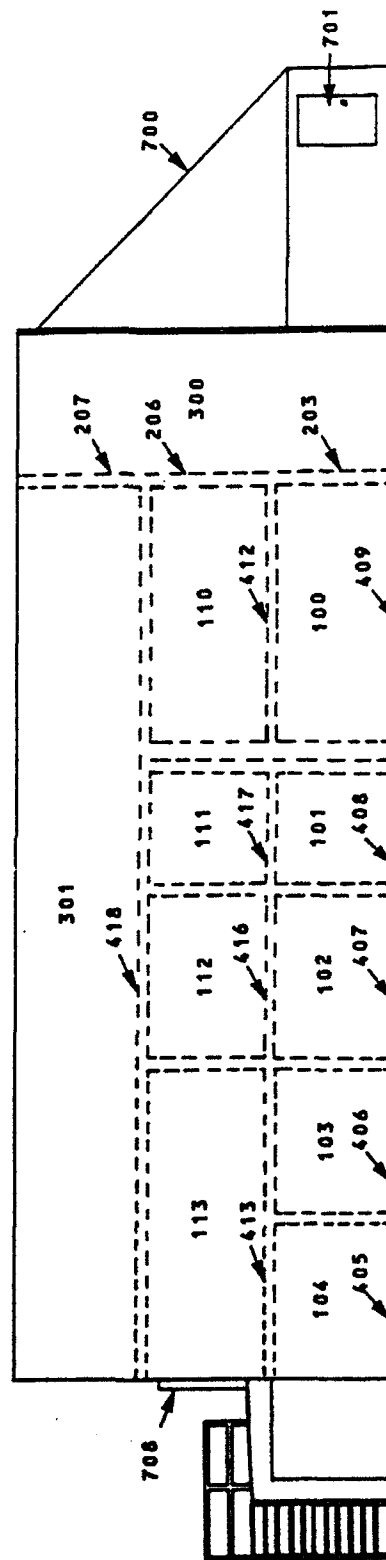


Figure 21. Elevation View of Northeast Side of Building 4058.

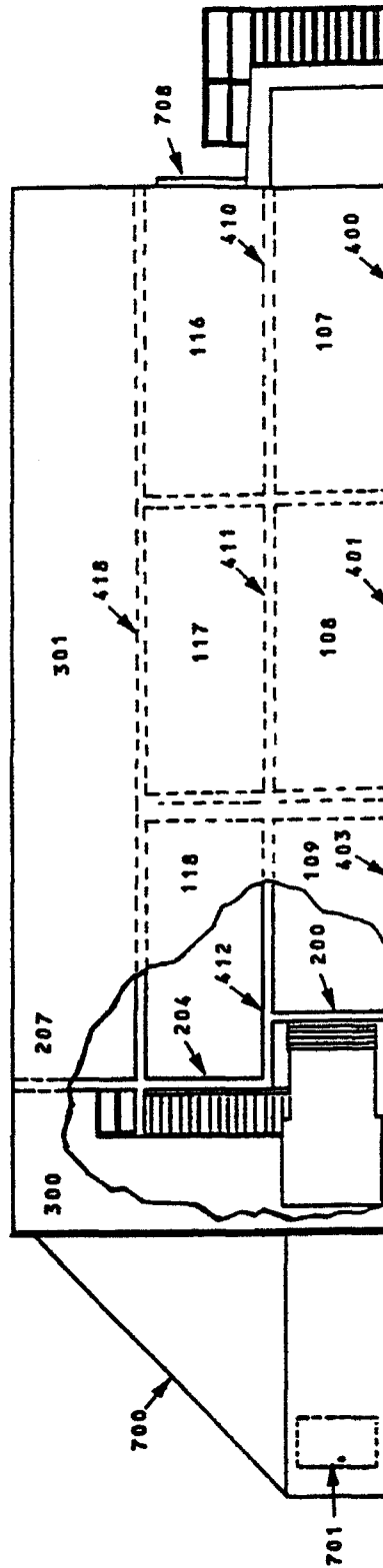


Figure 22. Elevation View of Southwest Side of Building 4058.

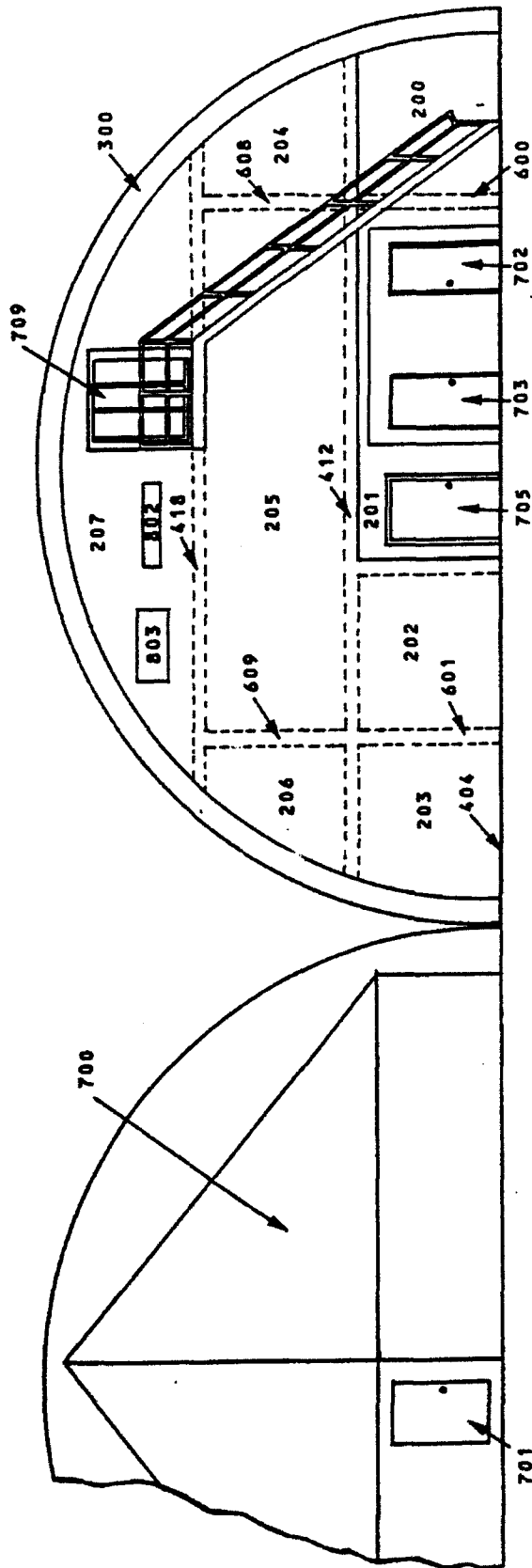


Figure 23. Elevation View of Northwest Side of Building 4058.

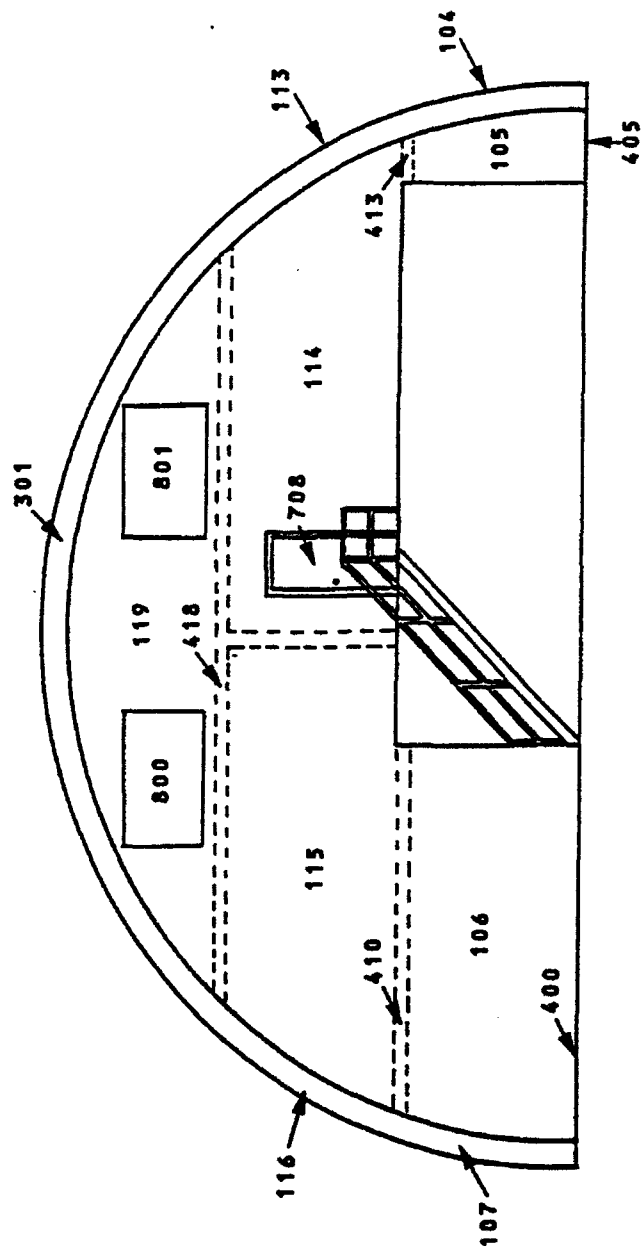


Figure 24. Elevation View of Southeast Side of Building 4058.

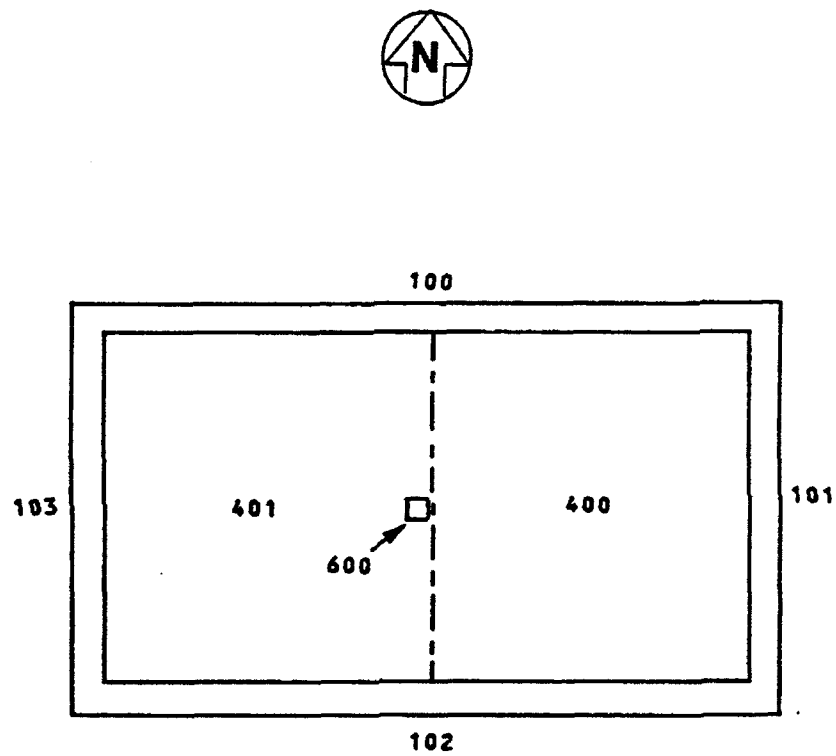


Figure 25. Basement Plan View of Building 9999.

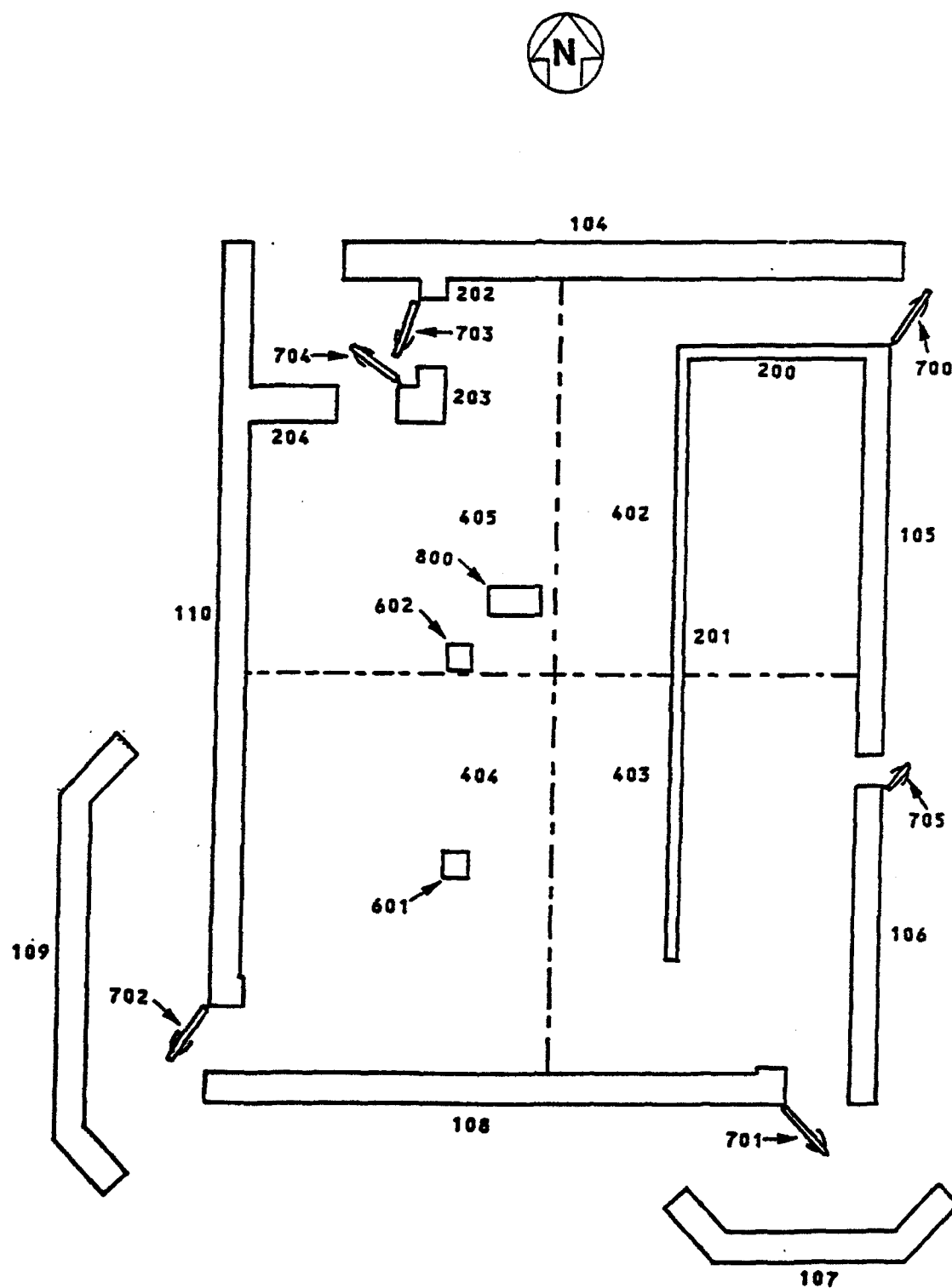


Figure 26. Ground Floor Plan View of Building 9999.

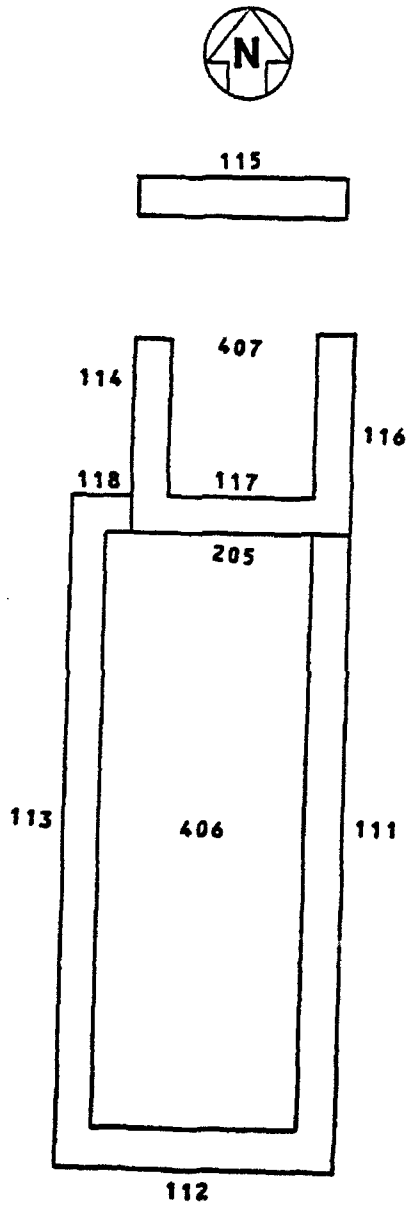


Figure 27. Penthouse Plan View of Building 9999.

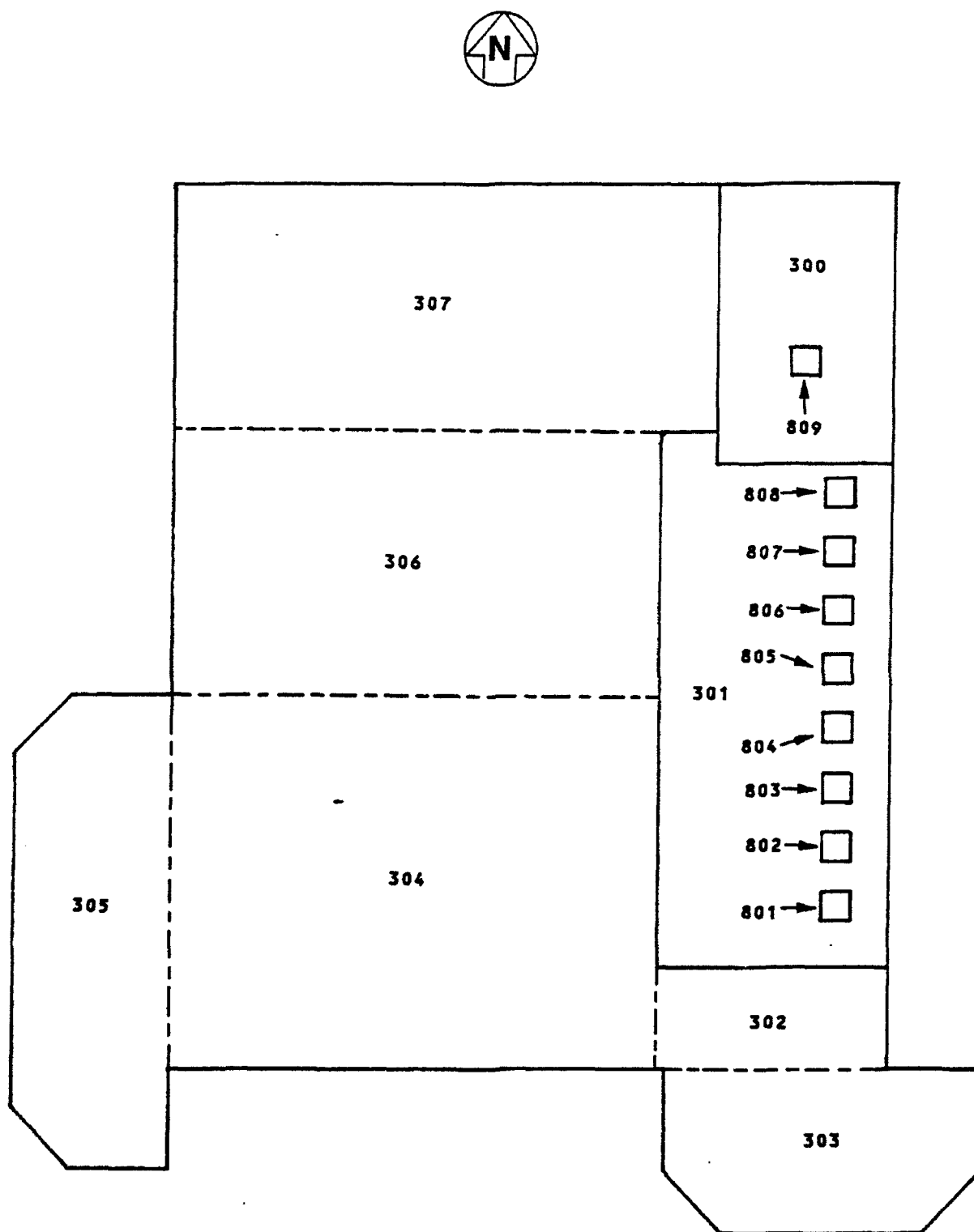


Figure 28. Roof Plan View of Building 9999.

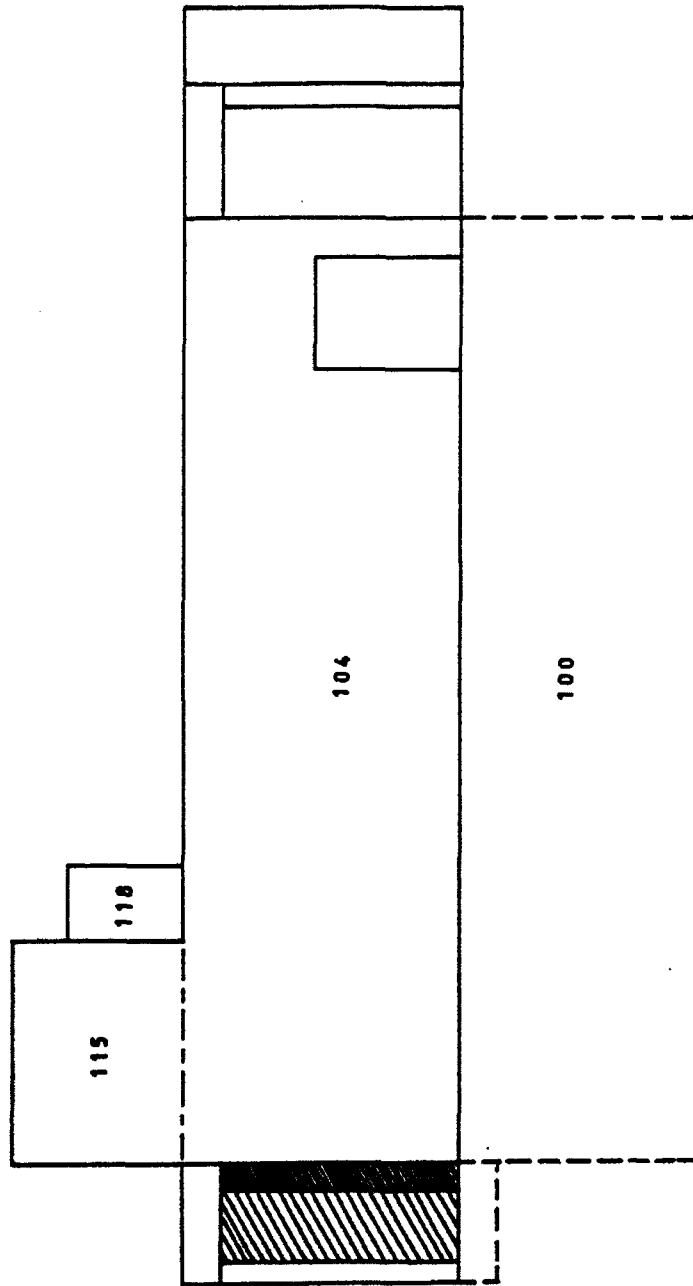


Figure 29. Elevation View of North Side of Building 9999.

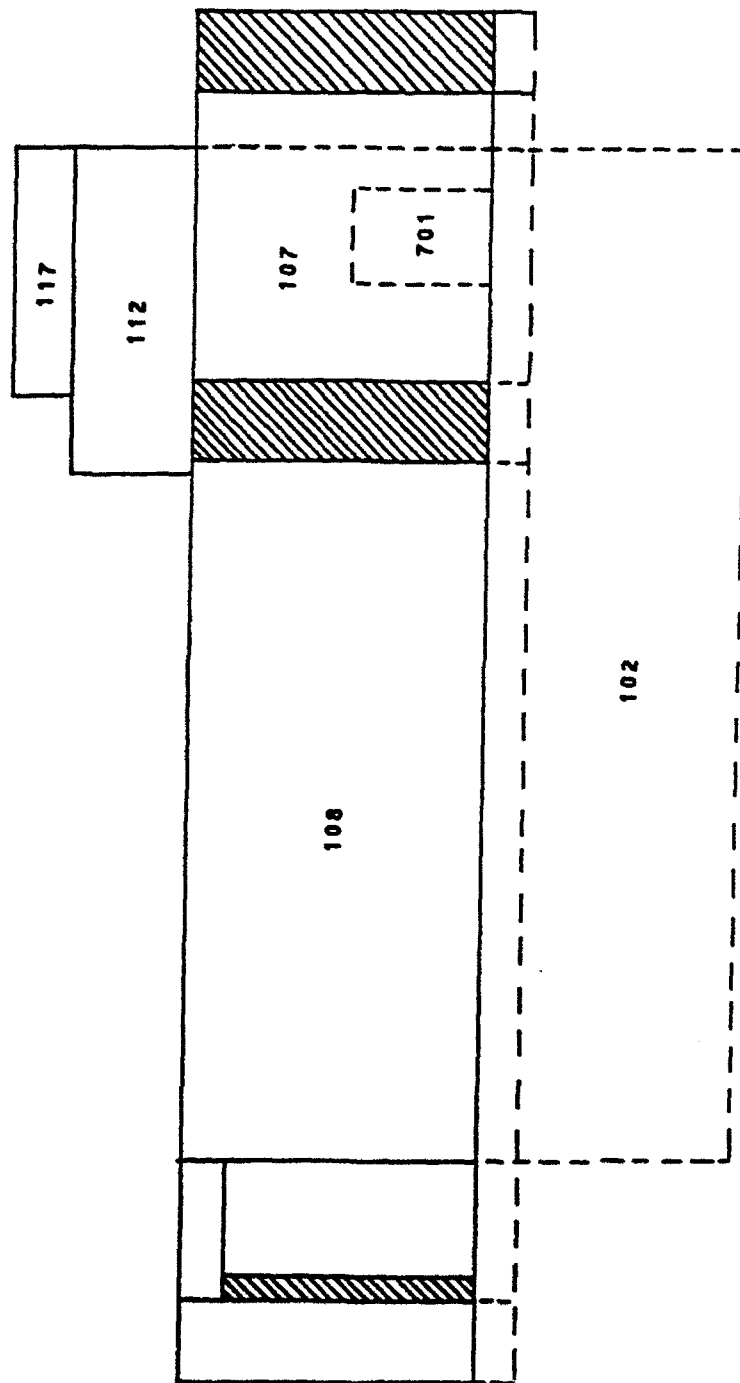


Figure 30. Elevation View of South Side of Building 9999.

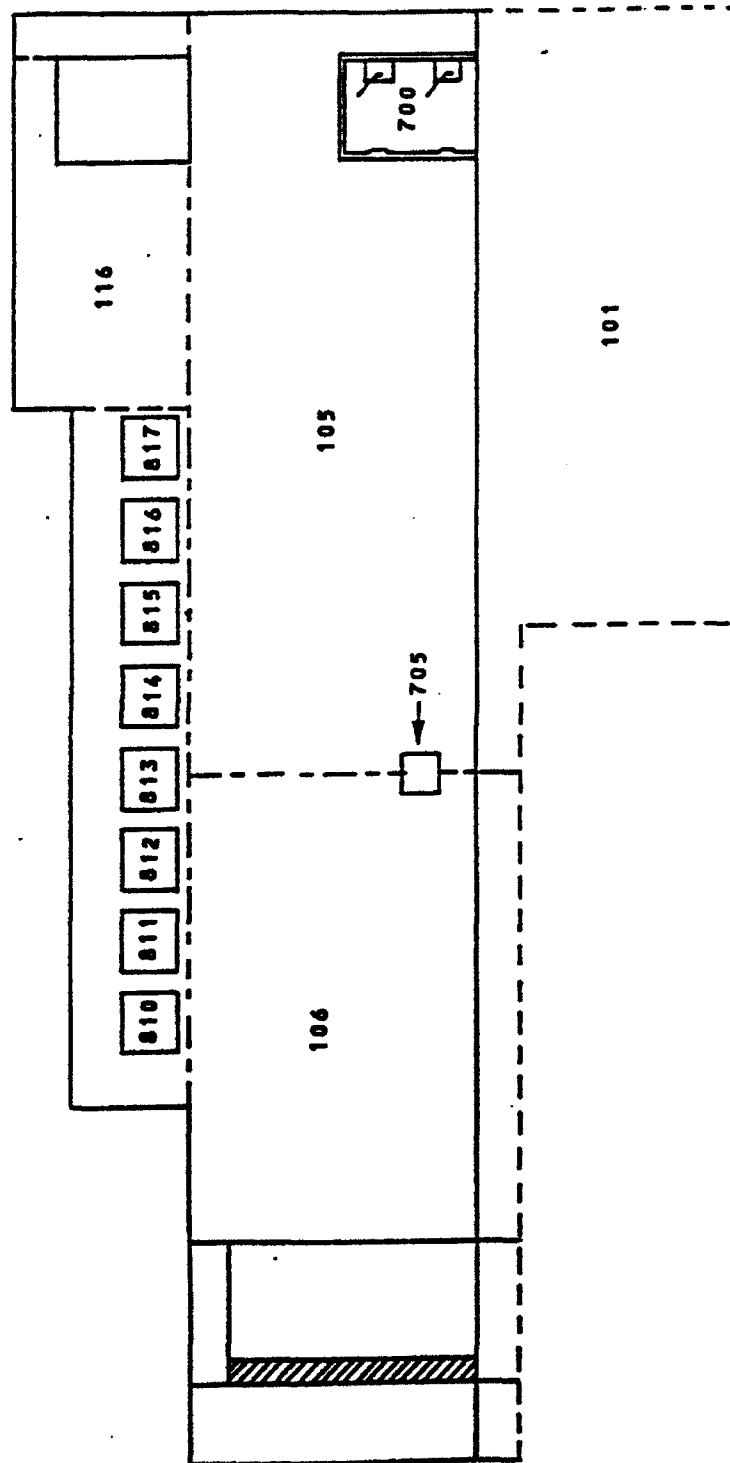


Figure 31. Elevation View of East Side of Building 9999.

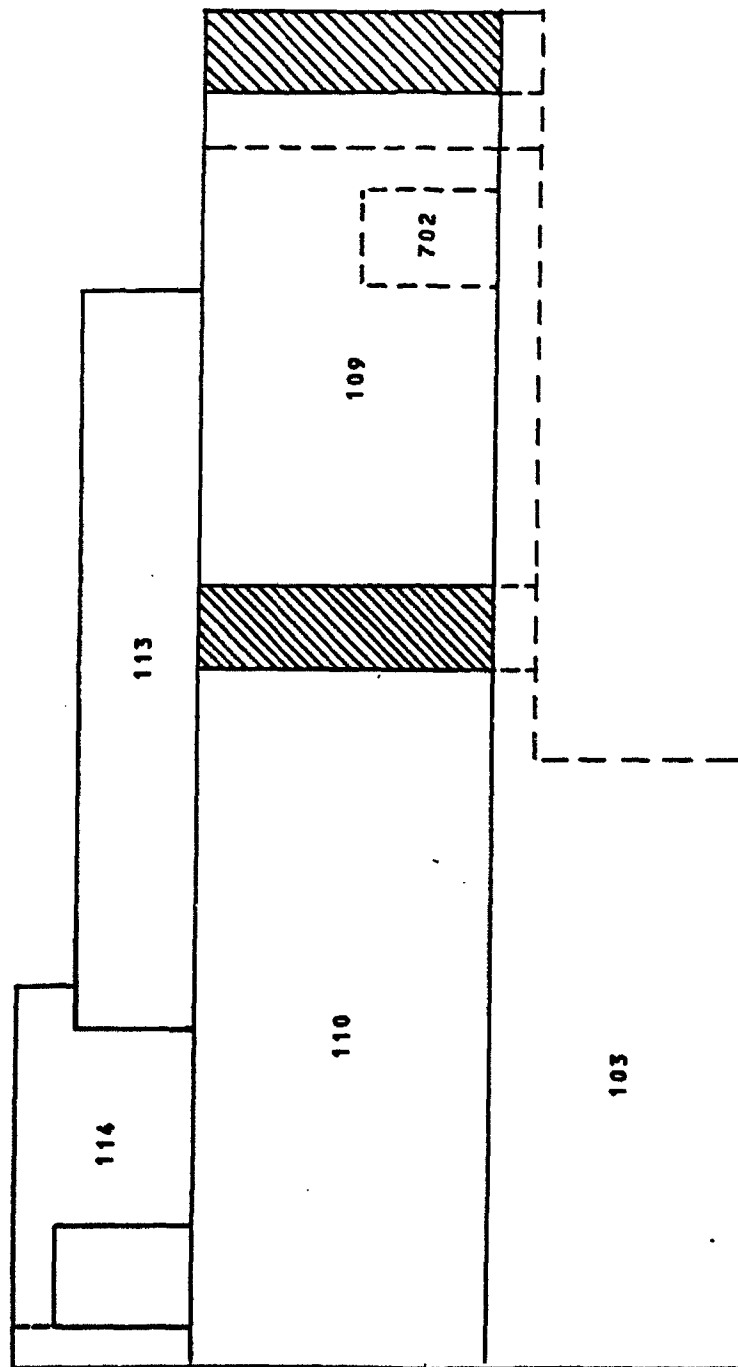


Figure 32. Elevation View of West Side of Building 9999.

APPENDIX A
BUILDING 138 PDES FACILITY-SPECIFIC DATA FILE

(building-header 138 2 "HARDENED RC STRUCTURE" "525 SQ OPS")

(MISSION-CRITICAL-EXTERIOR-WALLS 100 101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118 119
120 121)

(MISSION-CRITICAL-INTERIOR-WALLS 200 201 202 203 204 205 206 207 208 209
210)

(MISSION-CRITICAL-ROOFS 300 301 302 303 304 305 306 307 308)

(MISSION-CRITICAL-FLOORS 400 401 402 403 404 405 406 407 408 409)

(MISSION-CRITICAL-BEAMS)

(MISSION-CRITICAL-COLUMNS 600 601 602)

(MISSION-CRITICAL-DOORS 700 701 702 703 704 705 706 707 708)

(MISSION-CRITICAL-MISCELLANEOUS 800 801 802 803 804 805 806 807 808 809
810 811 812 813 814 815 816)

(EXTERIOR-WALL 100 concrete 0 25.59 0 0 lc)
(EXTERIOR-WALL 101 concrete 0 25.59 0 0 lc)
(EXTERIOR-WALL 102 concrete 0 25.59 0 0 lc)
(EXTERIOR-WALL 103 concrete 0 25.59 0 0 lc)
(EXTERIOR-WALL 104 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 105 concrete 1 25.59 0 0 lc)
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(EXTERIOR-WALL 107 concrete 1 25.59 0 0 lc)
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(EXTERIOR-WALL 109 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 110 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 111 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 112 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 113 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 114 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 115 concrete 1 11.81 0 0 lc)
(EXTERIOR-WALL 116 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 117 concrete 1 25.59 0 0 lc)
(EXTERIOR-WALL 118 concrete 2 25.59 0 0 lc)
(EXTERIOR-WALL 119 concrete 2 25.59 0 0 lc)
(EXTERIOR-WALL 120 concrete 2 25.59 0 0 lc)
(EXTERIOR-WALL 121 concrete 2 25.59 0 0 lc)

(INTERIOR-WALL 200 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 201 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 202 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 203 concrete 1 7.87 0 0 nlc)
(INTERIOR-WALL 204 concrete 1 7.87 0 0 nlc)
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(INTERIOR-WALL 207 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 208 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 209 concrete 1 11.81 0 0 nlc)
(INTERIOR-WALL 210 concrete 1 11.81 0 0 nlc)

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(ROOF 301 concrete 2 25.59 0 0 null)
(ROOF 302 concrete 2 25.59 0 0 null)
(ROOF 303 concrete 2 25.59 0 0 null)
(ROOF 304 concrete 2 25.59 0 0 null)
(ROOF 305 concrete 2 25.59 0 0 null)
(ROOF 306 concrete 2 25.59 0 0 null)
(ROOF 307 concrete 2 9.45 0 0 null)
(ROOF 308 concrete 2 25.59 0 0 null)

(FLOOR 400 concrete 0 25.59 0 0 null)
(FLOOR 401 concrete 0 25.59 0 0 null)
(FLOOR 402 concrete 1 25.59 0 0 null)
(FLOOR 403 concrete 1 25.59 0 0 null)
(FLOOR 404 concrete 1 25.59 0 0 null)
(FLOOR 405 concrete 1 25.59 0 0 null)
(FLOOR 406 concrete 1 25.59 0 0 null)
(FLOOR 407 concrete 1 25.59 0 0 null)
(FLOOR 408 concrete 1 25.59 0 0 null)
(FLOOR 409 concrete 2 25.59 0 0 null)

(COLUMN 600 concrete 0 25.59 25.59 0 0)
(COLUMN 601 concrete 1 25.59 25.59 0 0)
(COLUMN 602 concrete 1 25.59 25.59 0 0)

(DOOR 700 CONCRETE/STEEL 1 8.66 60.24 87.79 GASTIGHT-BLAST-DOOR)
(DOOR 701 CONCRETE/STEEL 1 8.66 60.24 87.79 GASTIGHT-BLAST-DOOR)
(DOOR 702 CONCRETE/STEEL 1 8.66 60.24 87.79 GASTIGHT-BLAST-DOOR)
(DOOR 703 CONCRETE/STEEL 1 8.66 60.24 87.79 GASTIGHT-BLAST-DOOR)
(DOOR 704 CONCRETE/STEEL 1 8.66 60.24 87.79 GASTIGHT-BLAST-DOOR)
(DOOR 705 STEEL 1 1.57 35.43 74.02 GASTIGHT-STEEL-DOOR)
(DOOR 706 STEEL 1 1.57 35.43 74.02 GASTIGHT-STEEL-DOOR)
(DOOR 707 STEEL 1 1.57 35.43 74.02 GASTIGHT-STEEL-DOOR)
(DOOR 708 STEEL 1 1.57 35.43 74.02 GASTIGHT-STEEL-DOOR)

(MISCELLANEOUS 800 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 801 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 802 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 803 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 804 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 805 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 806 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 807 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 808 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 809 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 810 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 811 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 812 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 813 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 814 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 815 STEEL 2 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 816 STEEL 2 0 0 0 BLAST-VALVE)

APPENDIX B
BUILDING 464 PDES FACILITY-SPECIFIC DATA FILE

(building-header 464 2 "HARDENED RC STRUCTURE" "TELECOM FACILITY")

(MISSION-CRITICAL-EXTERIOR-WALLS 100 101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118 119
120 121)

(MISSION-CRITICAL-INTERIOR-WALLS 200 201 202 203 204 205 206 207 208 209
210 211 212 213 214 215 216 217)

(MISSION-CRITICAL-ROOFS 300 301 302 303 304)

(MISSION-CRITICAL-FLOORS 400 401 402 403 404 405 406 407 408 409
410 411 412 413 414 415 416 417 418 419
420 421 422 423 424 425)

(MISSION-CRITICAL-BEAMS)

(MISSION-CRITICAL-COLUMNS 600 601 602 603)

(MISSION-CRITICAL-DOORS 700 701 702 703 704 705 706 707 708 709
710 711)

(MISSION-CRITICAL-MISCELLANEOUS 800 801 802 803 804 805 806 807 808 809
810 811 812)

(EXTERIOR-WALL 100 concrete 0 25.6 0 0 lc)
(EXTERIOR-WALL 101 concrete 0 25.6 0 0 lc)
(EXTERIOR-WALL 102 concrete 0 25.6 0 0 lc)
(EXTERIOR-WALL 103 concrete 0 25.6 0 0 lc)
(EXTERIOR-WALL 104 concrete 1 25.6 0 0 lc)
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(EXTERIOR-WALL 106 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 107 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 108 concrete 1 25.6 0 0 nlc)
(EXTERIOR-WALL 109 concrete 1 25.6 0 0 nlc)
(EXTERIOR-WALL 110 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 111 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 112 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 113 concrete 1 11.8 0 0 nlc)
(EXTERIOR-WALL 114 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 115 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 116 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 117 concrete 1 25.6 0 0 lc)
(EXTERIOR-WALL 118 concrete 2 25.6 0 0 lc)
(EXTERIOR-WALL 119 concrete 2 25.6 0 0 lc)
(EXTERIOR-WALL 120 concrete 2 25.6 0 0 lc)
(EXTERIOR-WALL 121 concrete 2 25.6 0 0 lc)

(INTERIOR-WALL 200 concrete 1 13.8 0 0 nlc)
(INTERIOR-WALL 201 concrete 1 13.8 0 0 nlc)
(INTERIOR-WALL 202 concrete 1 13.8 0 0 nlc)
(INTERIOR-WALL 203 concrete 1 7.9 0 0 nlc)
(INTERIOR-WALL 204 concrete 1 13.8 0 0 nlc)
(INTERIOR-WALL 205 concrete 1 13.8 0 0 nlc)
(INTERIOR-WALL 206 concrete 1 15.8 0 0 nlc)
(INTERIOR-WALL 207 concrete 1 15.8 0 0 nlc)
(INTERIOR-WALL 208 concrete 1 11.8 0 0 nlc)
(INTERIOR-WALL 209 concrete 1 11.8 0 0 nlc)
(INTERIOR-WALL 210 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 211 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 212 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 213 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 214 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 215 concrete 1 5.9 0 0 nlc)
(INTERIOR-WALL 216 concrete 1 11.8 0 0 nlc)
(INTERIOR-WALL 217 concrete 1 11.8 0 0 nlc)

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(ROOF 301 concrete 1 25.6 0 0 null)
(ROOF 302 concrete 1 25.6 0 0 null)
(ROOF 303 concrete 1 25.6 0 0 null)
(ROOF 304 concrete 1 25.6 0 0 null)

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(FLOOR 401 concrete 0 25.6 0 0 null)
(FLOOR 402 concrete 0 25.6 0 0 null)
(FLOOR 403 concrete 0 25.6 0 0 null)
(FLOOR 404 concrete 1 25.6 0 0 null)

(FLOOR 405 concrete 1 25.6 0 0 null)
 (FLOOR 406 concrete 1 13.8 0 0 null)
 (FLOOR 407 concrete 1 25.6 0 0 null)
 (FLOOR 408 concrete 1 25.6 0 0 null)
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 (FLOOR 412 concrete 1 25.6 0 0 null)
 (FLOOR 413 concrete 1 25.6 0 0 null)
 (FLOOR 414 concrete 1 25.6 0 0 null)
 (FLOOR 415 concrete 1 25.6 0 0 null)
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 (FLOOR 421 concrete 1 25.6 0 0 null)
 (FLOOR 422 concrete 1 13.8 0 0 null)
 (FLOOR 423 concrete 2 15.8 0 0 null)
 (FLOOR 424 concrete 2 15.8 0 0 null)
 (FLOOR 425 concrete 2 15.8 0 0 null)

(COLUMN 600 concrete 1 15.8 15.8 0 0)
 (COLUMN 601 concrete 1 15.8 15.8 0 0)
 (COLUMN 602 concrete 2 25.6 25.6 0 0)
 (COLUMN 603 concrete 2 25.6 25.6 0 0)

(DOOR 700 STEEL 1 7.5 61.4 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 701 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 702 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 703 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 704 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 705 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 706 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 707 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 708 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 709 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 710 STEEL 1 4.0 55.1 79.5 PERSONEL-BLAST-DOOR)
 (DOOR 711 STEEL 1 7.5 44.3 79.5 PERSONEL-BLAST-DOOR)

(MISCELLANEOUS 800 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 801 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 802 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 803 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 804 STEEL 2 0 0 0 BLAST-VALVE)
 (MISCELLANEOUS 805 STEEL 2 0 0 0 BLAST-VALVE)
 (MISCELLANEOUS 806 STEEL 2 0 0 0 AIR-DUCT)
 (MISCELLANEOUS 807 STEEL 2 0 0 0 BLAST-VALVE)
 (MISCELLANEOUS 808 STEEL 2 0 0 0 BLAST-VALVE)
 (MISCELLANEOUS 809 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 810 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 811 STEEL 2 0 0 0 STORM-PROOF-LOOVER)
 (MISCELLANEOUS 812 STEEL 2 0 0 0 STORM-PROOF-LOOVER)

APPENDIX C
BUILDING 4058 PDES FACILITY-SPECIFIC DATA FILE

(building-header 4058 1 "HARDENED RC STRUCTURE" "ALTERNATE SRC")

(MISSION-CRITICAL-EXTERIOR-WALLS 100 101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118 119)

(MISSION-CRITICAL-INTERIOR-WALLS 200 201 202 203 204 205 206 207)

(MISSION-CRITICAL-ROOFS 300 301)

(MISSION-CRITICAL-FLOORS 400 401 402 403 404 405 406 407 408 409
410 411 412 413 414 415 416 417 418)

(MISSION-CRITICAL-BEAMS)

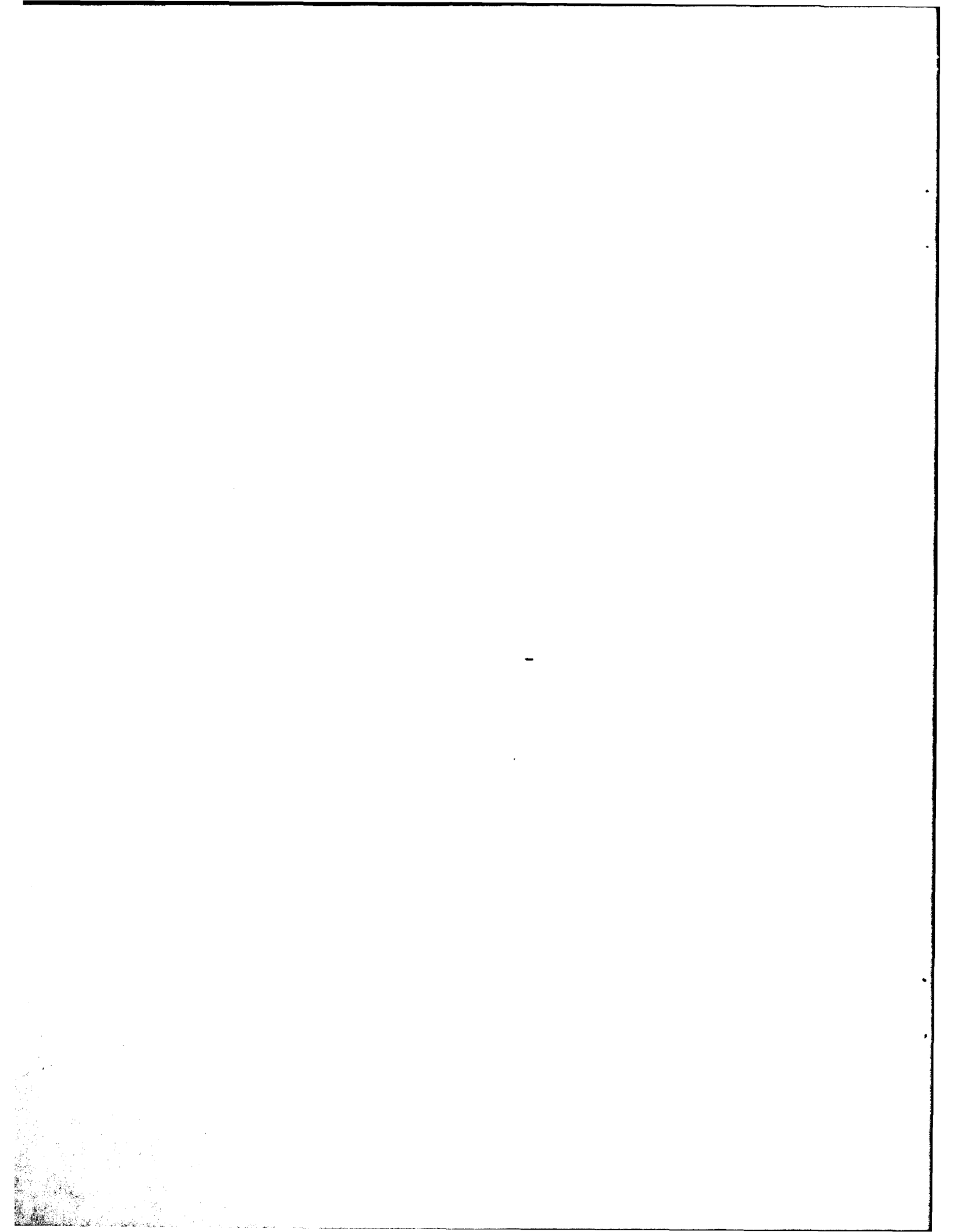
(MISSION-CRITICAL-COLUMNS 600 601 602 603 604 605 606 607 608 609
610 611 612 613 614 615)

(MISSION-CRITICAL-DOORS 700 701 702 703 704 705 706 707 708 709)

(MISSION-CRITICAL-MISCELLANEOUS 800 801 802 803)

(EXTERIOR-WALL 100 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 101 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 102 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 103 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 104 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 105 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 106 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 107 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 108 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 109 CONCRETE 0 32.0 0 0 nlc)
(EXTERIOR-WALL 110 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 111 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 112 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 113 CONCRETE 1 32.0 0 0 nlc)
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(EXTERIOR-WALL 116 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 117 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 118 CONCRETE 1 32.0 0 0 nlc)
(EXTERIOR-WALL 119 CONCRETE 2 32.0 0 0 nlc)
(INTERIOR-WALL 200 MASONRY 0 32.0 0 0 nlc)
(INTERIOR-WALL 201 MASONRY 0 32.0 0 0 nlc)
(INTERIOR-WALL 202 MASONRY 0 32.0 0 0 nlc)
(INTERIOR-WALL 203 MASONRY 0 32.0 0 0 nlc)
(INTERIOR-WALL 204 MASONRY 1 32.0 0 0 nlc)
(INTERIOR-WALL 205 MASONRY 1 32.0 0 0 nlc)
(INTERIOR-WALL 206 MASONRY 1 32.0 0 0 nlc)
(INTERIOR-WALL 207 MASONRY 2 32.0 0 0 nlc)
(ROOF 300 CONCRETE 0 32.0 0 0 null)
(ROOF 301 CONCRETE 2 32.0 0 0 null)
(FLOOR 400 CONCRETE 0 7.9 0 0 null)
(FLOOR 401 CONCRETE 0 7.9 0 0 null)
(FLOOR 402 CONCRETE 0 7.9 0 0 null)
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(FLOOR 408 CONCRETE 0 7.9 0 0 null)
(FLOOR 409 CONCRETE 0 7.9 0 0 null)
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(FLOOR 411 CONCRETE 1 8.7 0 0 null)
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(FLOOR 413 CONCRETE 1 8.7 0 0 null)
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(FLOOR 416 CONCRETE 1 8.7 0 0 null)
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(FLOOR 418 CONCRETE 2 8.7 0 0 null)
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(COLUMN 602 CONCRETE 0 9.5 9.5 99.6 null)
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(COLUMN 604 CONCRETE 0 9.5 9.5 99.6 null)
(COLUMN 605 CONCRETE 0 9.5 9.5 99.6 null)
(COLUMN 606 CONCRETE 0 9.5 9.5 99.6 null)
(COLUMN 607 CONCRETE 0 9.5 9.5 99.6 null)

(COLUMN 608 CONCRETE 1 9.5 9.5 99.6 null)
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(COLUMN 610 CONCRETE 1 9.5 9.5 99.6 null)
(COLUMN 611 CONCRETE 1 9.5 9.5 99.6 null)
(COLUMN 612 CONCRETE 1 9.5 9.5 99.6 null)
(COLUMN 613 CONCRETE 1 9.5 9.5 99.6 null)
(COLUMN 614 CONCRETE 1 9.5 9.5 99.6 null)
(COLUMN 615 CONCRETE 1 9.5 9.5 99.6 null)
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(DOOR 701 STEEL 0 8.0 4.0 .5 PERSONNEL-BLAST-DOOR)
(DOOR 702 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 703 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 704 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 705 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 706 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 707 STEEL 0 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 708 STEEL 1 8.0 4.0 .5 OVERPRESSURE-DOOR)
(DOOR 709 STEEL 2 8.0 4.0 .5 OVERPRESSURE-DOOR)
(MISCELLANEOUS 800 STEEL 2 0 0 0 VENT-BLAST-COVER)
(MISCELLANEOUS 801 STEEL 2 0 0 0 VENT-BLAST-COVER)
(MISCELLANEOUS 802 STEEL 2 0 0 0 VENT-BLAST-COVER)
(MISCELLANEOUS 803 STEEL 2 0 0 0 VENT-BLAST-COVER)



APPENDIX D
BUILDING 9999 PDES FACILITY-SPECIFIC DATA FILE

(building-header 9999 1 "HARDENED RC STRUCTURE" "NATO STRUCTURE")

(MISSION-CRITICAL-EXTERIOR-WALLS 100 101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118)

(MISSION-CRITICAL-INTERIOR-WALLS 200 201 202 203 204 205)

(MISSION-CRITICAL-ROOFS 300 301 302 303 304 305 306 307)

(MISSION-CRITICAL-FLOORS 400 401 402 403 404 405 406 407)

(MISSION-CRITICAL-BEAMS)

(MISSION-CRITICAL-COLUMNS 600 601 602)

(MISSION-CRITICAL-DOORS 700 701 702 703 704 705)

(MISSION-CRITICAL-MISCELLANEOUS 800 801 802 803 804 805 806 807 808 809
810 811 812 813 814 815 816 817)

(EXTERIOR-WALL 100 concrete 0 39.0 0 0 lc)

(EXTERIOR-WALL 101 concrete 0 39.0 0 0 lc)

(EXTERIOR-WALL 102 concrete 0 25.5 0 0 lc)

(EXTERIOR-WALL 103 concrete 0 39.0 0 0 lc)

(EXTERIOR-WALL 104 concrete 1 31.5 0 0 lc)

(EXTERIOR-WALL 105 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 106 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 107 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 108 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 109 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 110 concrete 1 25.5 0 0 lc)

(EXTERIOR-WALL 111 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 112 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 113 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 114 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 115 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 116 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 117 concrete 2 25.5 0 0 lc)

(EXTERIOR-WALL 118 concrete 2 25.5 0 0 lc)

(INTERIOR-WALL 200 concrete 1 12.0 0 0 nlc)

(INTERIOR-WALL 201 concrete 1 12.0 0 0 nlc)

(INTERIOR-WALL 202 concrete 1 25.5 0 0 nlc)

(INTERIOR-WALL 203 concrete 1 31.5 0 0 nlc)

(INTERIOR-WALL 204 concrete 1 31.5 0 0 nlc)

(INTERIOR-WALL 205 concrete 2 25.5 0 0 nlc)

(ROOF 300 concrete 2 25.5 0 0 null)

(ROOF 301 concrete 2 25.5 0 0 null)

(ROOF 302 concrete 2 25.5 0 0 null)

(ROOF 303 concrete 2 25.5 0 0 null)

(ROOF 304 concrete 2 25.5 0 0 null)

(ROOF 305 concrete 2 25.5 0 0 null)

(ROOF 306 concrete 2 25.5 0 0 null)

(ROOF 307 concrete 2 25.5 0 0 null)

(FLOOR 400 concrete 0 39.0 0 0 null)

(FLOOR 401 concrete 0 39.0 0 0 null)

(FLOOR 402 concrete 1 25.5 0 0 null)

(FLOOR 403 concrete 1 25.5 0 0 null)

(FLOOR 404 concrete 1 25.5 0 0 null)

(FLOOR 405 concrete 1 17.5 0 0 null)

(FLOOR 406 concrete 2 25.5 0 0 null)

(FLOOR 407 concrete 2 25.5 0 0 null)

(COLUMN 600 concrete 0 20.0 20.0 0 0)

(COLUMN 601 concrete 1 20.0 20.0 0 0)

(COLUMN 602 concrete 1 20.0 20.0 0 0)

(DOOR 700 CONCRETE/STEEL 1 9.0 55.0 84.0 WES-PERSONEL-BLAST-DOOR)

(DOOR 701 CONCRETE/STEEL 1 5.0 55.0 84.0 WES-PERSONEL-BLAST-DOOR)

(DOOR 702 CONCRETE/STEEL 1 8.75 55.0 84.0 LUMA-PERSONEL-BLAST-DOOR)

(DOOR 703 STEEL 1 3.0 55.0 84.0 TEMET-PERSONEL-BLAST-DOOR)

(DOOR 704 CONCRETE/STEEL 1 11.25 55.0 84.0 ENERGY-PERSONEL-BLAST-DOOR)

(DOOR 705 STEEL 1 2.50 28.0 28.0 ESCAPE-HATCH-BLAST-DOOR)

(MISCELLANEOUS 800 STEEL 0 0 0 0 OPENNING-COVER)

(MISCELLANEOUS 801 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 802 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 803 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 804 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 805 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 806 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 807 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 808 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 809 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 810 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 811 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 812 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 813 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 814 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 815 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 816 STEEL 0 0 0 0 BLAST-VALVE)
(MISCELLANEOUS 817 STEEL 0 0 0 0 BLAST-VALVE)