

OFFICE, CHIEF OF ENGINEERS
CONTRACT NO.

ENGINEERING STUDY
RESISTANT DESIGN
BUILDING

PREP
AMMANN
CONSULTING
NEW

Best Available Copy

AD62575

APPENDIX H

U. S. DEPARTMENT OF THE ARMY
DA 49-129-ENG-317

DESIGN OF ATOMIC BLAST RESISTANT STRUCTURES FOR SEVERAL LOADING TYPES

PREPARED BY

W. H. & WHITNEY

STRUCTURAL ENGINEERS

NEW YORK, N.Y.

MAR 1950

2

OFFICE, CHIEF OF ENGINEERS, C

CONTRACT NO. DA 4

ENGINEERING STUDY RESISTANT DESIGN BUILDING

PREPARED

AMMANN & W
CONSULTING EN
NEW YORK.

DRAWING L

1

DWG NO 60-16-01	PROTECTIVE CONSTRUCTION - ADMINISTRATION BUILDING
SHEETS 1 THRU 3	OF 3 10 PSI BLAST RESISTANT
SHEETS 1 THRU 3	OF 3 20 PSI BLAST RESISTANT
SHEETS 1 THRU 3	OF 3 30 PSI BLAST RESISTANT
DWG NO 60-02-06	PROTECTIVE CONSTRUCTION - COMMUNICATIONS BUILDING
SHEETS 1 THRU 3	OF 3 10 PSI BLAST RESISTANT
SHEETS 1 THRU 3	OF 3 50 PSI BLAST RESISTANT
SHEETS 1 THRU 2	OF 2 30 PSI BLAST RESISTANT
DWG NO 60-17-01	PROTECTIVE CONSTRUCTION - WAREHOUSE
SHEETS 1 THRU 3	OF 3 10 PSI BLAST RESISTANT
SHEET 1	OF 1 20 PSI BLAST RESISTANT
SHEET 1	OF 1 30 PSI BLAST RESISTANT
DWG NO 60-17-02	PROTECTIVE CONSTRUCTION - EARTH COVERED, CONCRETE IGLOO
SHEET 1	OF 1 25 PSI BLAST RESISTANT
SHEET 1	OF 1 50 PSI BLAST RESISTANT
SHEET 1	OF 1 100 PSI BLAST RESISTANT
SHEET 1	OF 1 200 PSI BLAST RESISTANT
DWG NO 60-18-01	PROTECTIVE CONSTRUCTION - EARTH COVERED, RECTANGULAR
SHEETS 1 THRU 2	OF 2 25 PSI BLAST RESISTANT
SHEETS 1 THRU 2	OF 2 50 PSI BLAST RESISTANT
SHEET 1	OF 1 100 PSI BLAST RESISTANT
SHEET 1	OF 1 200 PSI BLAST RESISTANT
DWG NO 60-18-02	PROTECTIVE CONSTRUCTION - EARTH COVERED, DOUBLE BARREL ARCH
SHEET 1	OF 1 50 PSI BLAST RESISTANT
DWG NO 60-18-03	PROTECTIVE CONSTRUCTION - EARTH COVERED, DOME
SHEET 1	OF 1 50 PSI BLAST RESISTANT
SHEET 1	OF 1 100 PSI BLAST RESISTANT
SHEET 1	OF 1 200 PSI BLAST RESISTANT

RS, DEPARTMENT OF THE ARMY
D. DA 49-129-ENG-317

DESIGN OF ATOMIC BLAST PROTECTIVE CONSTRUCTION FOR SEVERAL LOADING TYPES

PREPARED BY
AMMANN & WHITNEY
CONSULTING ENGINEERS
NEW YORK, N.Y.

2

DRAWING LIST

DWG NO 60-18-04	PROTECTIVE CONSTRUCTION - BURIED, RECTANGULAR		
SHEETS 1 THRU 2	OF 2	50 PSI	BLAST RESISTANT
SHEET 1	OF 1	100 PSI	BLAST RESISTANT
SHEET 1	OF 1	200 PSI	BLAST RESISTANT
DWG NO 60-18-05	PROTECTIVE CONSTRUCTION - BURIED, DOUBLE BARREL ARCH		
SHEETS 1 THRU 2	OF 2	50 PSI	BLAST RESISTANT
DWG NO 60-18-06	PROTECTIVE CONSTRUCTION - BURIED, DOME		
SHEETS 1 THRU 2	OF 2	50 PSI	BLAST RESISTANT
SHEET 1	OF 1	100 PSI	BLAST RESISTANT
SHEET 1	OF 1	200 PSI	BLAST RESISTANT
DWG NO 60-18-07	PROTECTIVE CONSTRUCTION - BURIED, CONCRETE 10600		
SHEETS 1 THRU 2	OF 2	50 PSI	BLAST RESISTANT
SHEETS 1 THRU 2	OF 2	100 PSI	BLAST RESISTANT
SHEETS 1 THRU 2	OF 2	200 PSI	BLAST RESISTANT

DATE	11/15/50	PROJECT NO.	60-18-04
DESIGNED BY	PJW	CHECKED BY	PJW
APPROVED BY	[Signature]	DATE	11/15/50
AMMANN & WHITNEY 111 8TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY ENGINEERING CENTER WASHINGTON, D. C.	
TITLE SHEET			
DRAWING NUMBER		SHEET OF	

GE

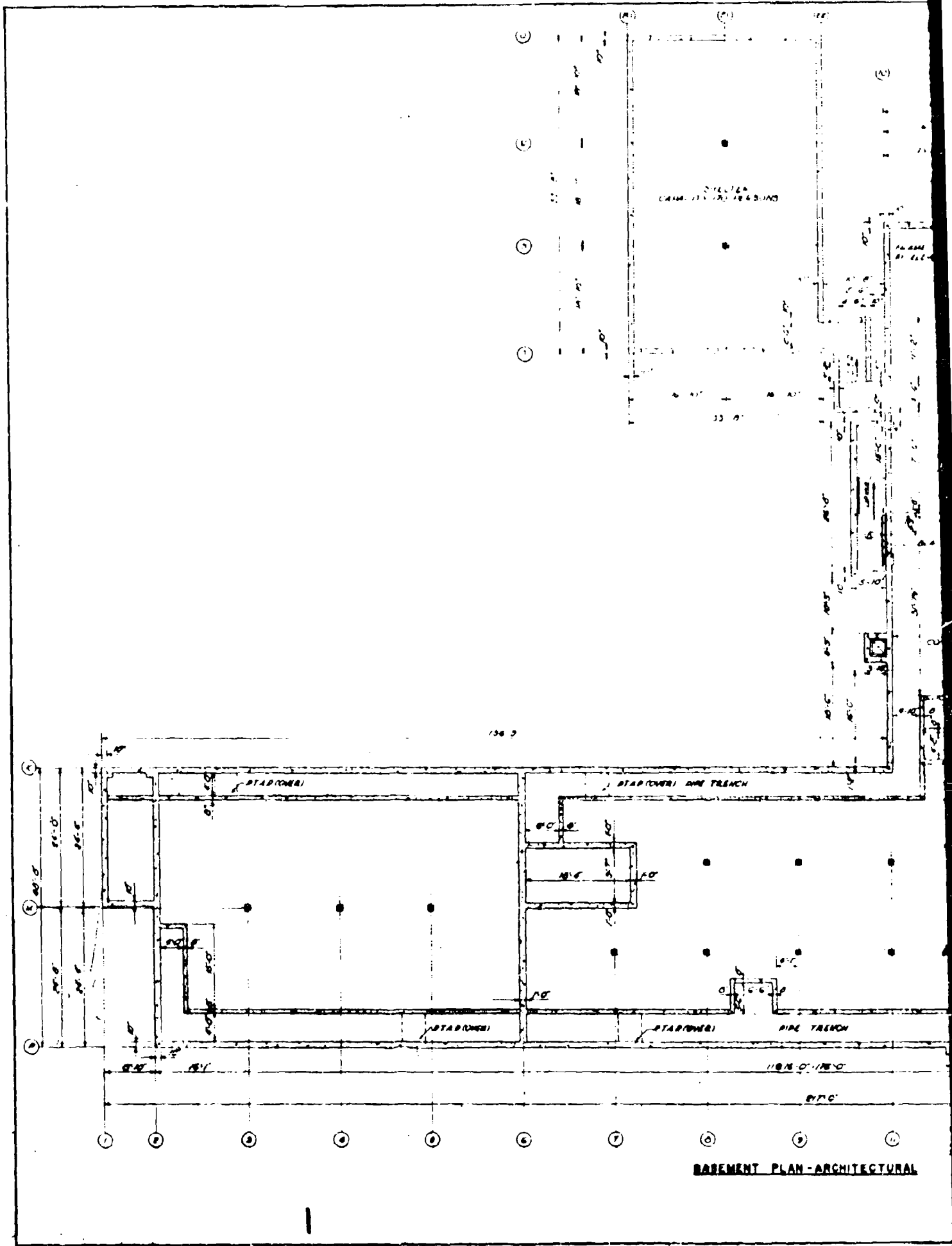
THE FOLLOWING DRAWINGS ARE PART OF A REPORT, "ENGINEERING DESIGN FOR ATOMIC BLAST RESISTANCE AND THE EFFECTS OF ATOMIC WEAPONS", FEBRUARY 1959, SUMMARIZING THE DESIGN PROCEDURES, UNLESS OTHERWISE INDICATED, FOR THE ADMINISTRATION, COMMUNICATIONS AND EXISTING STANDARD TYPE STRUCTURES WITHOUT CHANGING THE NON STANDARD TYPE STRUCTURES, I.E., IGLOO, REPRESCRIBED BY OCE. THE DESIGN PROCEDURES, UNLESS OTHERWISE INDICATED, ARE BASED ON THE DRAFT OF THE CORPS OF ENGINEERS MANUALS EM 1110 - "ENGINEERING DESIGN FOR ATOMIC BLAST RESISTANCE AND THE EFFECTS OF ATOMIC WEAPONS". THESE DRAWINGS ARE INTENDED FOR PLANNING PURPOSES AND ARE NOT INTENDED FOR CONSTRUCTION OF ABOVE GROUND STRUCTURES THE THICKNESS OF THE WALLS AND THEREFORE IN SOME CASES WILL NOT PROVIDE ADEQUATE SHIELDING FROM FALLOUT RADIATION. THE ADMINISTRATION, COMMUNICATION AND WAREHOUSE BUILDINGS WILL REQUIRE ADDITIONAL ANALYSES WHICH WERE NOT

1

GENERAL NOTES

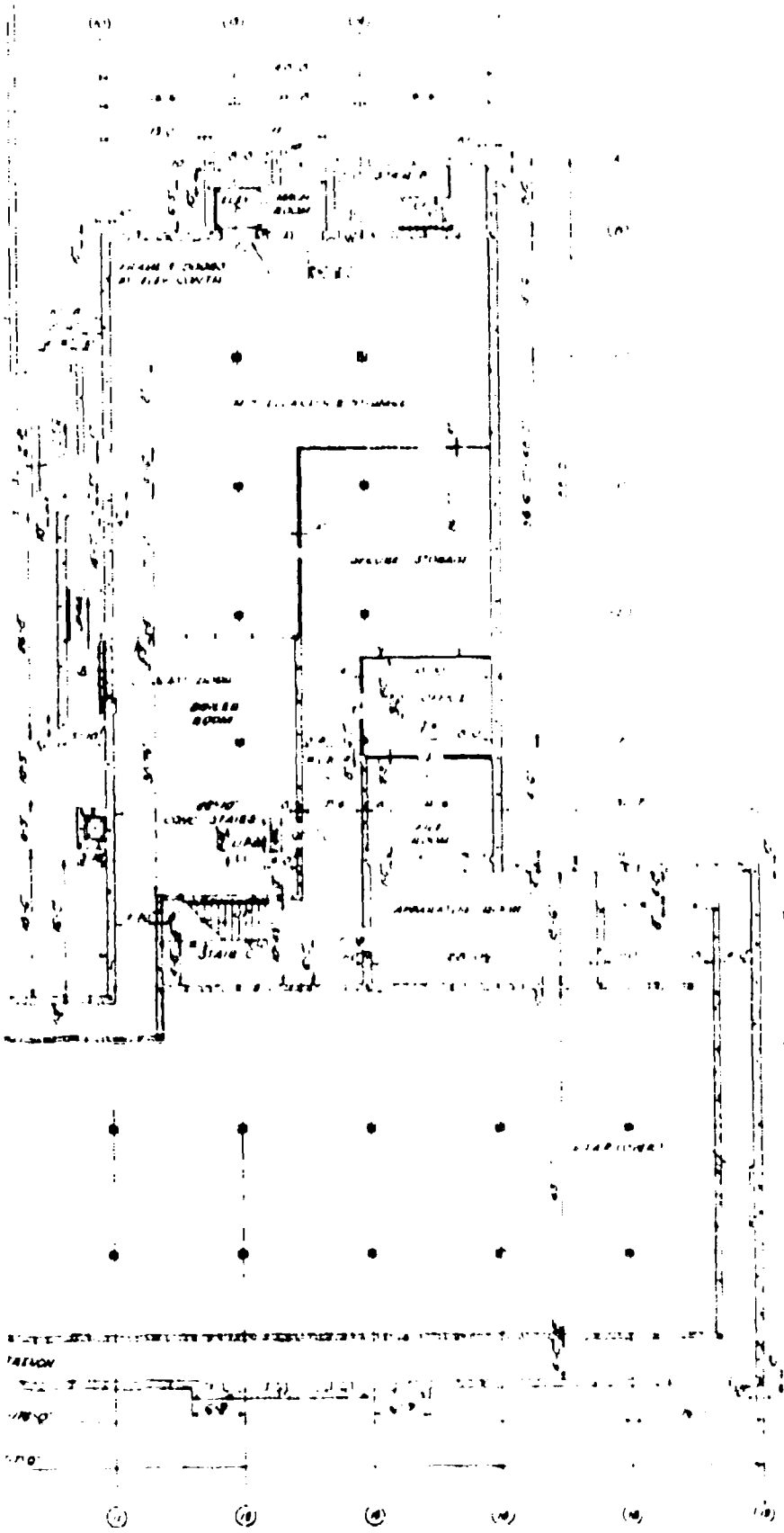
ENGINEERING STUDY OF ATOMIC BLAST RESISTANT DESIGN FOR SEVERAL
ING THE RESULTS OF A STUDY TO DETERMINE THE PRACTICABILITY
ESTIMATED CONSTRUCTION COST FOR A RANGE OF BLAST PRESSURE
WAREHOUSE DRAWINGS ARE BASED UPON THE HARDENING OF
GING THE INTERIOR CONFIGURATIONS. THE INTERIOR CONFIGURATIONS OF
RECTANGULAR, DOUBLE AND DOME, ARE BASED UPON DIMENSIONS
OTHERWISE NOTED IN THE REPORT WERE BASED UPON THE PRELIMINARY
345 - 413 THROUGH 421, "DESIGN OF STRUCTURES TO RESIST THE
NTENDED TO DEPICT THE RESULTS OF THE DESIGN STUDY ONLY THEY
TO REPRESENT RECOMMENDED DESIGN HOWEVER THEY CAN BE USED
VELOPMENT OF REQUIRED DESIGNS. IN THE DESIGN OF EXPOSED ABOVE
ND ROOF WERE DETERMINED BY BLAST RESISTANCE REQUIREMENTS
ADEQUATE SHIELDING FROM FALLOUT ISOLATION HOWEVER, THE EARTH
AREAS IN THE EXPOSED ABOVE GROUND STRUCTURES HAVE BEEN
AR RADIATION AS NOTED ON THE DRAWINGS AND THEREFORE AFFORD
PROVISION OF ADEQUATE THICKNESS IN THE WALLS AND ROOF OF THE
INGS TO PROVIDE THE REQUIRED SHIELDING FROM FALLOUT RADIATION
NOT INCLUDED IN THIS CONTRACT

2



156 3

BASEMENT PLAN-ARCHITECTURAL



DESIGN CONDITIONS

Design Envelope
The building shall be designed for a blast resistance of 100 PSI. The design shall be based on the effects of a 100 PSI blast wave.

Design Blast Wave
The design blast wave shall be based on a peak overpressure of 100 PSI.

Blast Loading on Walls
The blast loading on walls shall be based on a peak overpressure of 100 PSI.

Blast Loading on Wells
The blast loading on wells shall be based on a peak overpressure of 100 PSI.

Loading on Floors
The loading on floors shall be based on a peak overpressure of 100 PSI.

Nuclear Radiation Protection for Shelter Area
The building shall be designed for a nuclear radiation protection level of 100 PSI. The design shall be based on the effects of a nuclear radiation blast wave.

Strength of Materials	Grade	Design
Concrete	4000 PSI	ACI 318
Reinforcing Steel	60,000 PSI	AISC 360
Structural Steel	50,000 PSI	AISC 360
Welding	70,000 PSI	AISC 360

Allowable Stresses and Deflections
The allowable stresses and deflections shall be based on the design conditions. The design shall be based on the effects of a blast wave.

General Notes
1. The building shall be designed for a blast resistance of 100 PSI. The design shall be based on the effects of a blast wave.
2. The design shall be based on the effects of a nuclear radiation blast wave.
3. The design shall be based on the effects of a nuclear radiation blast wave.

ARCHITECTURAL

2

AMMANN & WHITNEY		DEPARTMENT OF THE ARMY	
111 5TH AVENUE NEW YORK N.Y.		OFFICE OF THE CHIEF OF ENGINEERS	
DESIGNED BY		DRAWN BY	
CHECKED BY		APPROVED BY	
DATE		SCALE	
PROTECTIVE CONSTRUCTION			
ADMINISTRATION BUILDING			
10 PSI BLAST RESISTANT			
DRAWING NUMBER		SHEET	
60 18 01		OF 9	



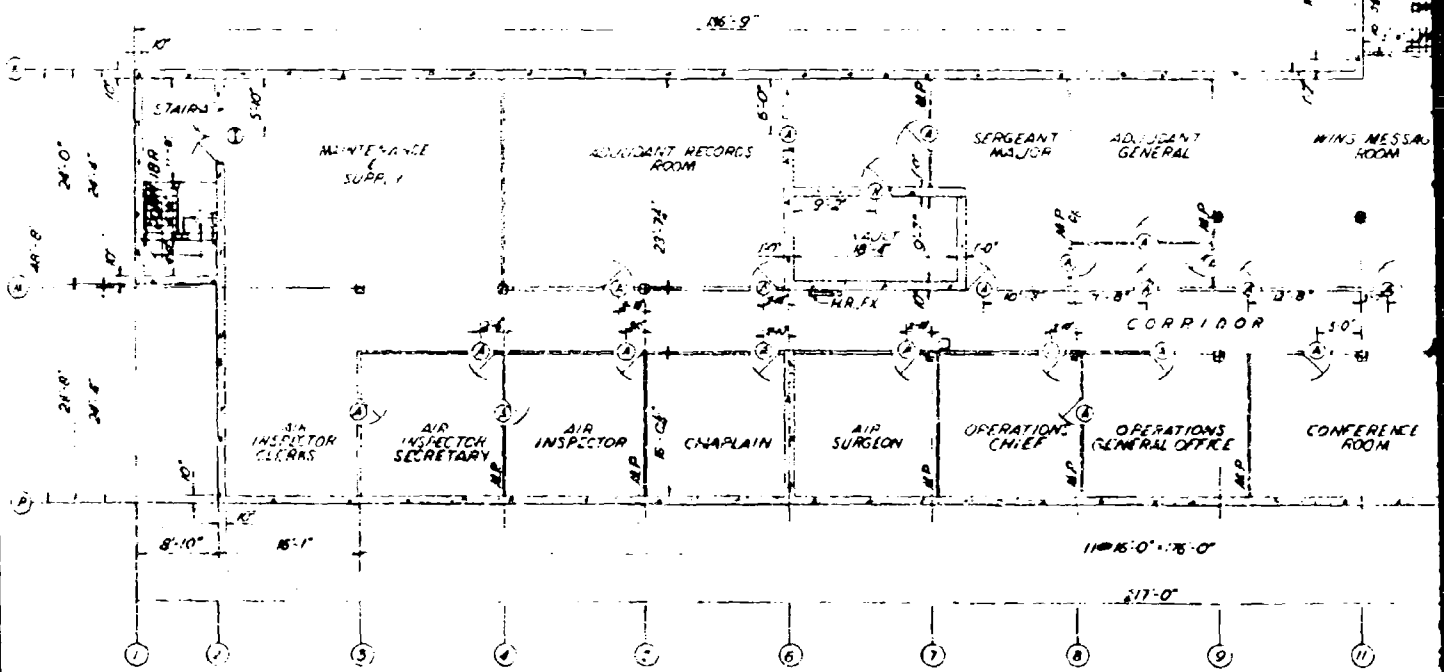
- ADMINISTRATIVE**
- 101
 - 102
 - 103
 - 104
 - 105
 - 106
 - 107
 - 108
 - 109
 - 110
 - 111
 - 112
 - 113
 - 114
 - 115
 - 116
 - 117
 - 118
 - 119
 - 120
 - 121
 - 122
 - 123
 - 124
 - 125
 - 126
 - 127
 - 128
 - 129
 - 130
 - 131
 - 132
 - 133
 - 134
 - 135
 - 136
 - 137
 - 138
 - 139
 - 140
 - 141
 - 142
 - 143
 - 144
 - 145
 - 146
 - 147
 - 148
 - 149
 - 150
 - 151
 - 152
 - 153
 - 154
 - 155
 - 156
 - 157
 - 158
 - 159
 - 160
 - 161
 - 162
 - 163
 - 164
 - 165
 - 166
 - 167
 - 168
 - 169
 - 170
 - 171
 - 172
 - 173
 - 174
 - 175
 - 176
 - 177
 - 178
 - 179
 - 180
 - 181
 - 182
 - 183
 - 184
 - 185
 - 186
 - 187
 - 188
 - 189
 - 190
 - 191
 - 192
 - 193
 - 194
 - 195
 - 196
 - 197
 - 198
 - 199
 - 200
- MATERIALS**
- 101
 - 102
 - 103
 - 104
 - 105
 - 106
 - 107
 - 108
 - 109
 - 110
 - 111
 - 112
 - 113
 - 114
 - 115
 - 116
 - 117
 - 118
 - 119
 - 120
 - 121
 - 122
 - 123
 - 124
 - 125
 - 126
 - 127
 - 128
 - 129
 - 130
 - 131
 - 132
 - 133
 - 134
 - 135
 - 136
 - 137
 - 138
 - 139
 - 140
 - 141
 - 142
 - 143
 - 144
 - 145
 - 146
 - 147
 - 148
 - 149
 - 150
 - 151
 - 152
 - 153
 - 154
 - 155
 - 156
 - 157
 - 158
 - 159
 - 160
 - 161
 - 162
 - 163
 - 164
 - 165
 - 166
 - 167
 - 168
 - 169
 - 170
 - 171
 - 172
 - 173
 - 174
 - 175
 - 176
 - 177
 - 178
 - 179
 - 180
 - 181
 - 182
 - 183
 - 184
 - 185
 - 186
 - 187
 - 188
 - 189
 - 190
 - 191
 - 192
 - 193
 - 194
 - 195
 - 196
 - 197
 - 198
 - 199
 - 200

AMMANN & WHITNEY ARCHITECTS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION DIVISION WASHINGTON, D. C.	
DRAWING NO. 10100 SHEET NO. 10100-01		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT	
DATE: 1950		SCALE: AS SHOWN	

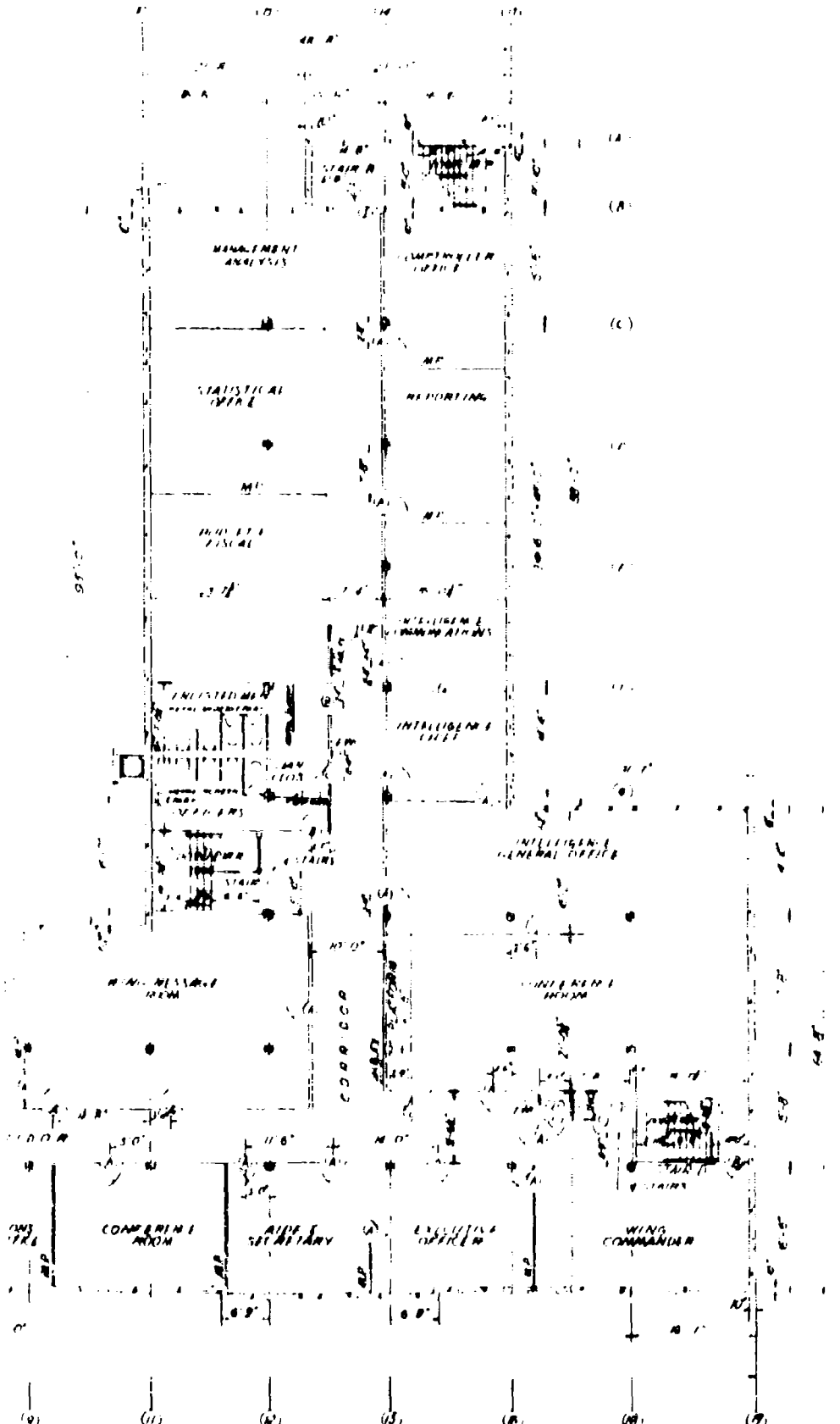
2

ARCHITECTURAL

DOOR SCHEDULE			
NO.	MATERIAL	SIZE	GLASS
INTERIOR			
A	WOOD	3'-0" x 6'-8" x 1/2"	CLEAR
H	WOOD	2'-8" x 6'-8" x 1/2"	
C	WOOD	2'-0" x 6'-8" x 1/2"	
E	KALAMEIN	3'-6" x 6'-8" x 1/2"	CLEAR WIRE
F	WOOD	2'-8" x 6'-8" x 1/2"	CLEAR
G	WOOD	2'-6" x 6'-8" x 1/2"	CLEAR
H	WOOD	3'-0" x 6'-8" x 1/2"	CLEAR
I	KALAMEIN	5'-0" x 6'-8" x 1/2" (PR)	CLEAR WIRE
A	KALAMEIN	3'-0" x 6'-8" x 1/2"	
L	WOOD	5'-0" x 6'-8" x 1/2" (PR)	CLEAR WIRE
M	TIN LAD	3'-0" x 6'-8" x 1/2"	
N	METAL	2'-8" x 6'-6"	
G	KALAMEIN	3'-6" x 6'-8" x 1/2"	
EXTERIOR			
1	WOOD	5'-0" x 6'-8" x 2 1/2" (PR)	CLEAR
2	WOOD	2'-8" x 5'-8" x 2 1/2"	CLEAR
3	WOOD	6'-0" x 7'-1" x 2 1/2" (PR)	CLEAR WIRE
5	WOOD	5'-0" x 7'-1" x 2 1/2" (PR)	CLEAR



SECOND FLOOR PLAN-ARCHITECT



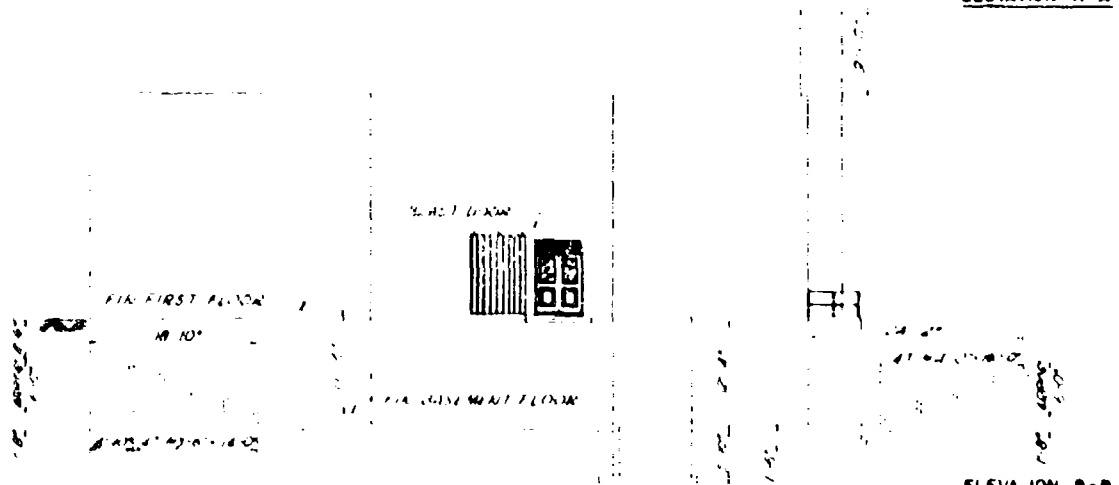
FLOOR PLAN - ARCHITECTURAL

AMMANN & WHITNEY 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY BLDG. CONSTRUCTION DIVISION	
PROJECT NO.		PROJECT TITLE	
DATE		DRAWING NUMBER	
BY		SCALE	
CHECKED BY		DATE	
APPROVED BY		SHEET NO.	
DESIGNED BY		TOTAL SHEETS	
DRAWN BY		PROJECT NO.	
DATE		SHEET NO.	

PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT

DRAWING NUMBER: 80-18-0
SHEET: 2 of 2

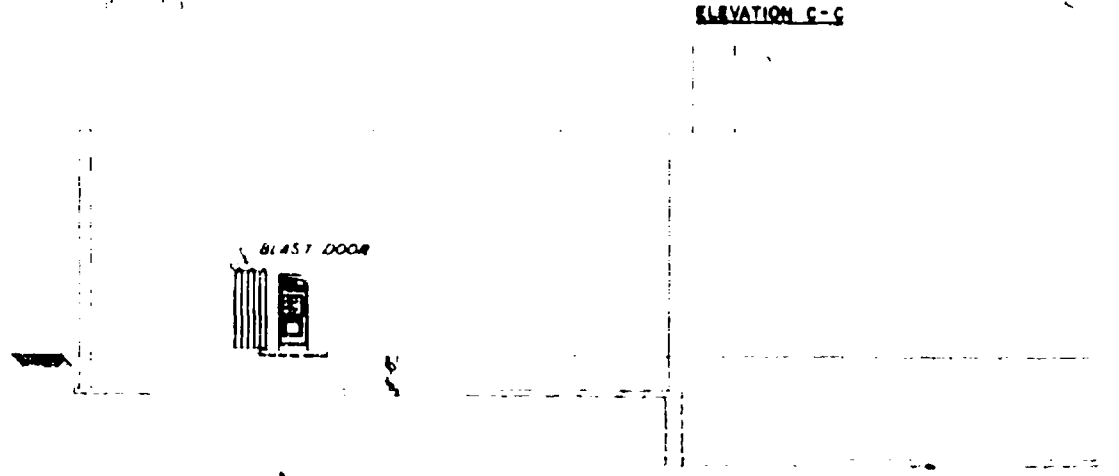
ELEVATION A-A



ELEVATION B-B



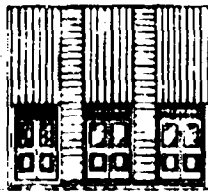
ELEVATION C-C



ELEVATION D-D



BLAST DOORS



TOP OF ROOF

FIN SECOND FLOOR

FIN FIRST FLOOR
GROUND LINE

TOP OF ROOF

FIN SECOND FLOOR

BLAST DOORS
FIN FIRST FLOOR
GROUND LINE

TOP OF ROOF

FIN SECOND FLOOR

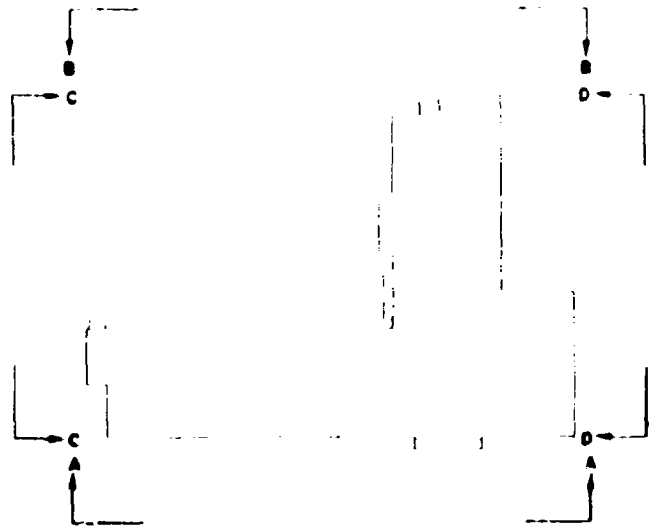
FIN FIRST FLOOR
GROUND LINE

TOP OF ROOF

FIN SECOND FLOOR

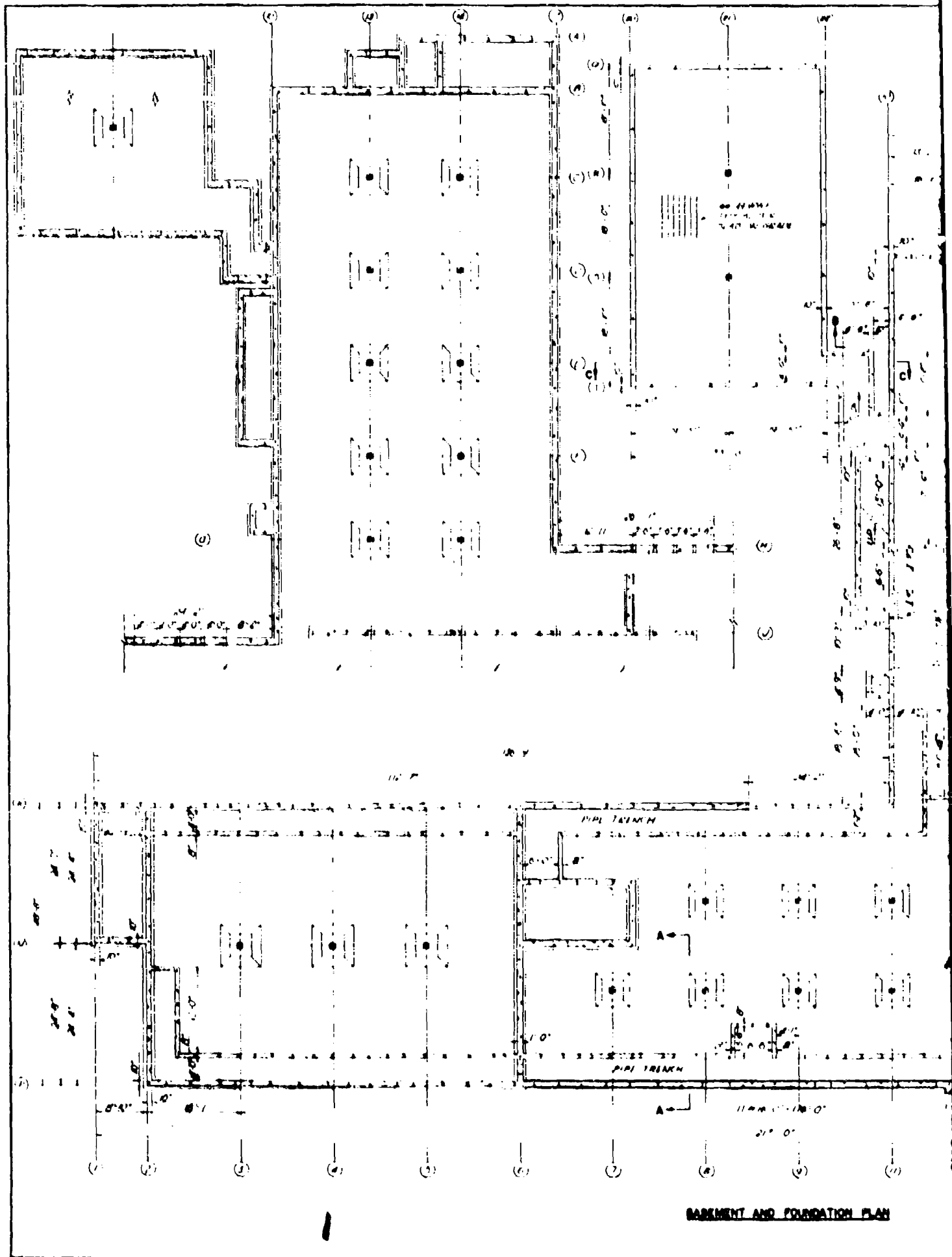
FIN FIRST FLOOR
GROUND LINE

FIN BASEMENT FLOOR - 1

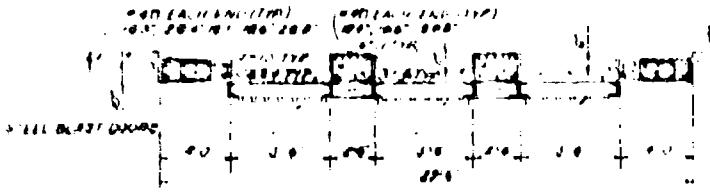


2

AMMANN & WHITNEY 111 6TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS BLAST RESISTANT CONSTRUCTION DIVISION WASHINGTON, D. C.	
PROJECT NO.		PROJECT NAME	
DATE		SCALE	
DRAWN BY		CHECKED BY	
APPROVED BY		DATE	
PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT			
DATE		SCALE	
DRAWN BY		CHECKED BY	
APPROVED BY		DATE	
PROJECT NO.		PROJECT NAME	
DATE		SCALE	
DRAWN BY		CHECKED BY	
APPROVED BY		DATE	



BASMENT AND FOUNDATION PLAN

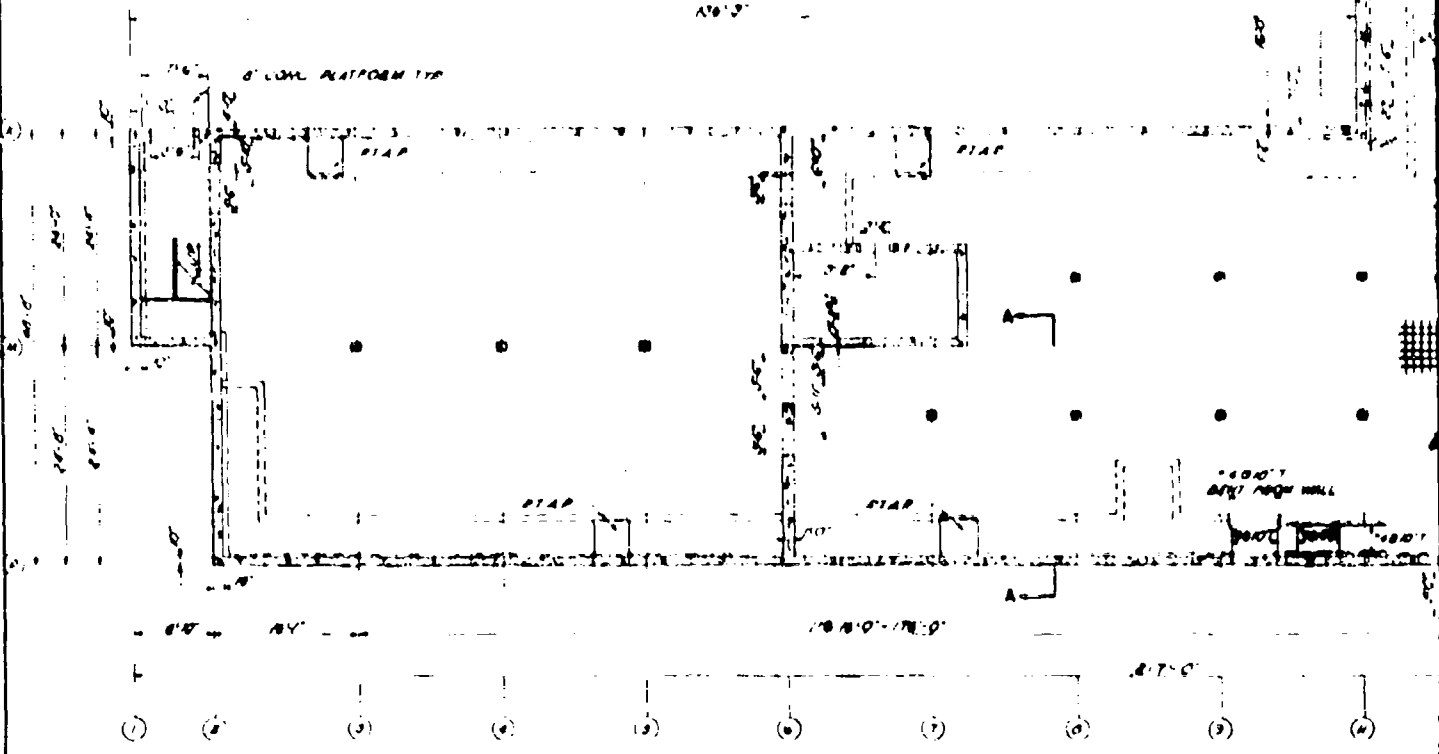
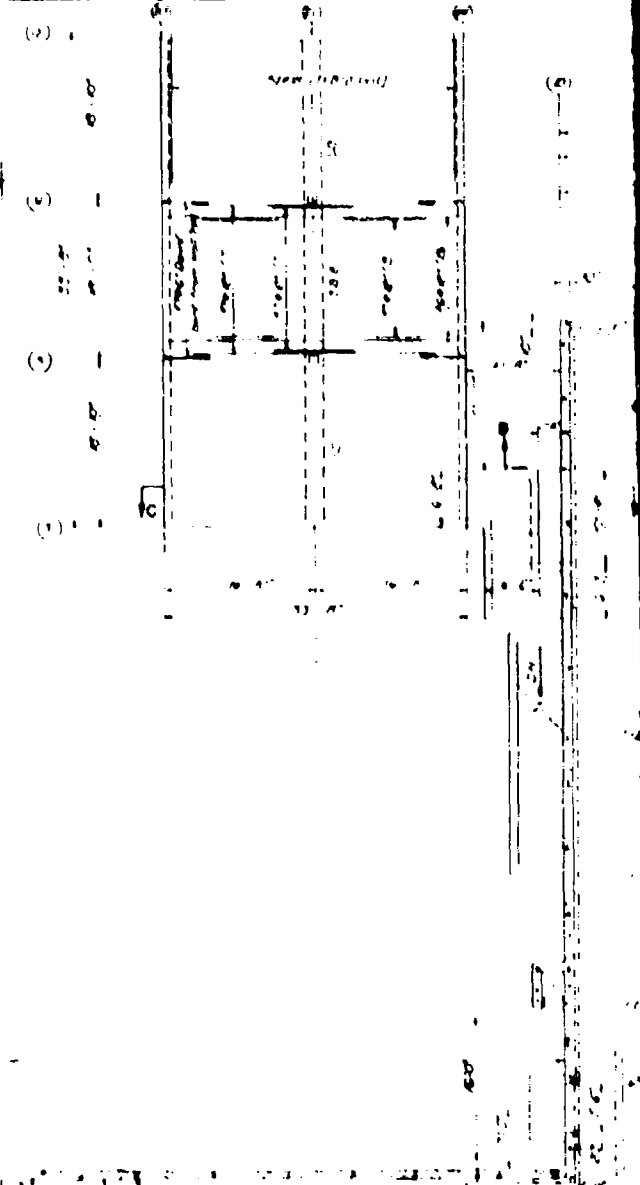


FRAMING DETAIL AT MAIN ENTRANCE
SCALE 1/2"=1'-0"

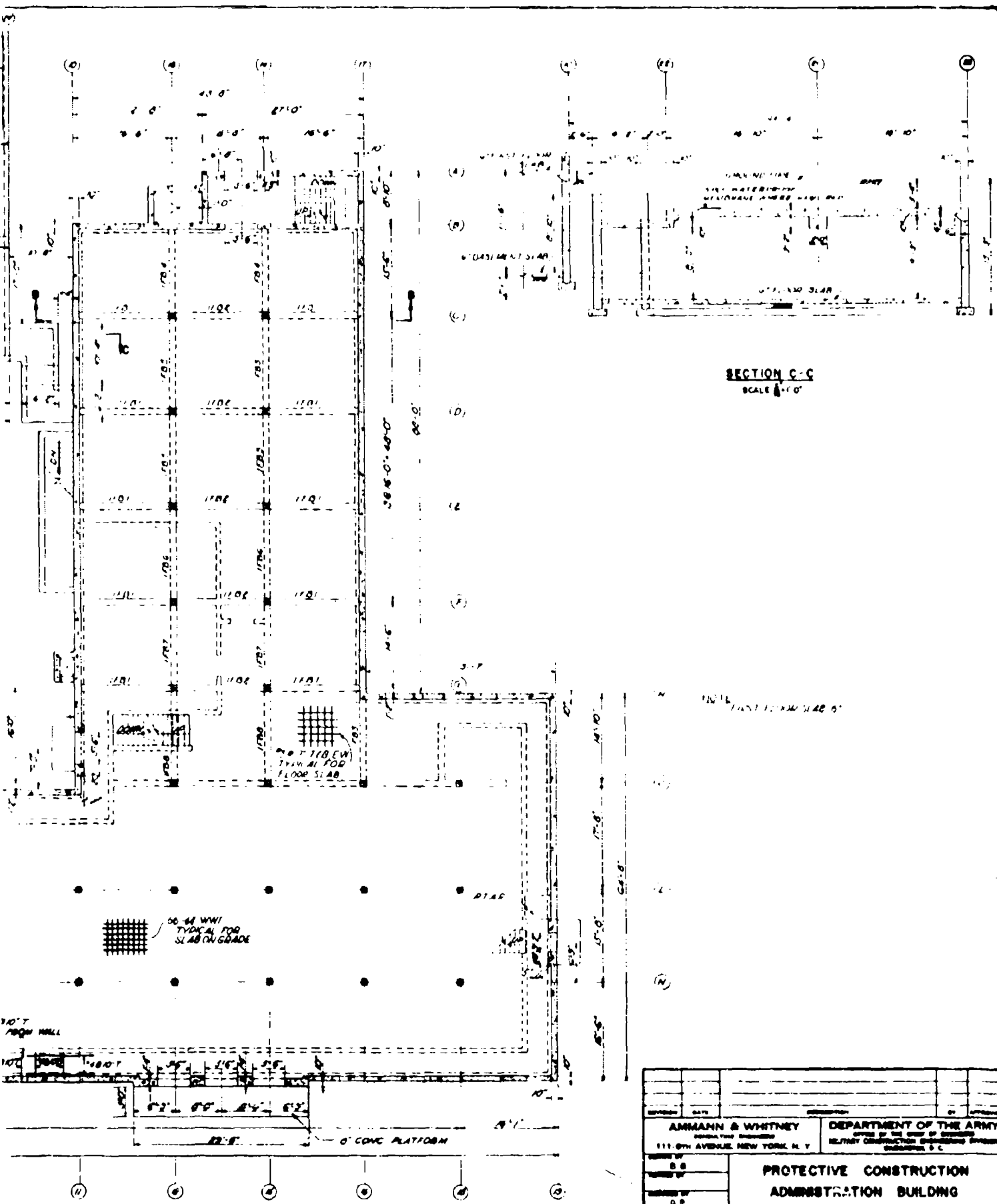
BEAM SCHEDULE

MEMBER	SIZE	1	2	3	4	5	6	7	8
101	10" X 10"								
102	10" X 10"								
103	10" X 10"								
104	10" X 10"								
105	10" X 10"								
106	10" X 10"								
107	10" X 10"								
108	10" X 10"								

200' 0" X 200' 0" 200' 0"



FIRST FLOOR AND SHELTER ROOF FRAMING PLAN
SCALE 1/4"=1'-0"

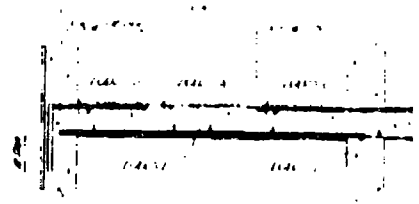
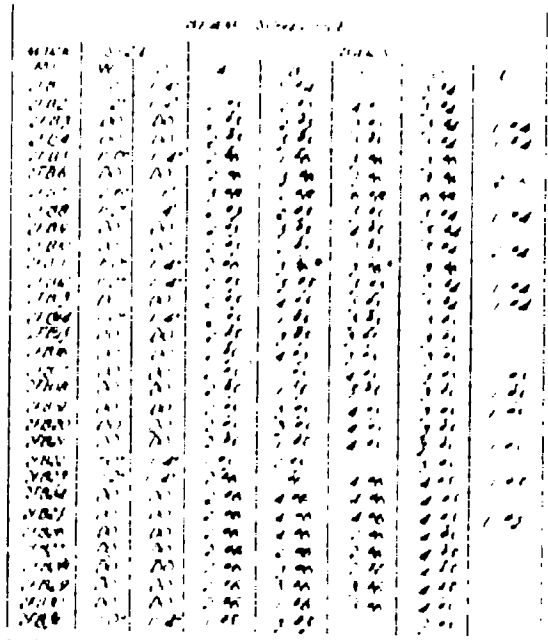


SECTION C-C
SCALE 1/4" = 1'-0"

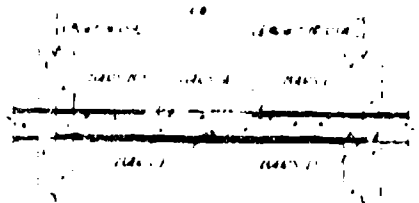
XOF FRAMING PLAN

REVISION	DATE	DESCRIPTION	BY	CHECKED
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.		
DESIGNED BY	PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT			
CHECKED BY	DATE: 60-13-01 DRAWING NUMBER: 60-13-01 SHEET 2 OF 2			

2



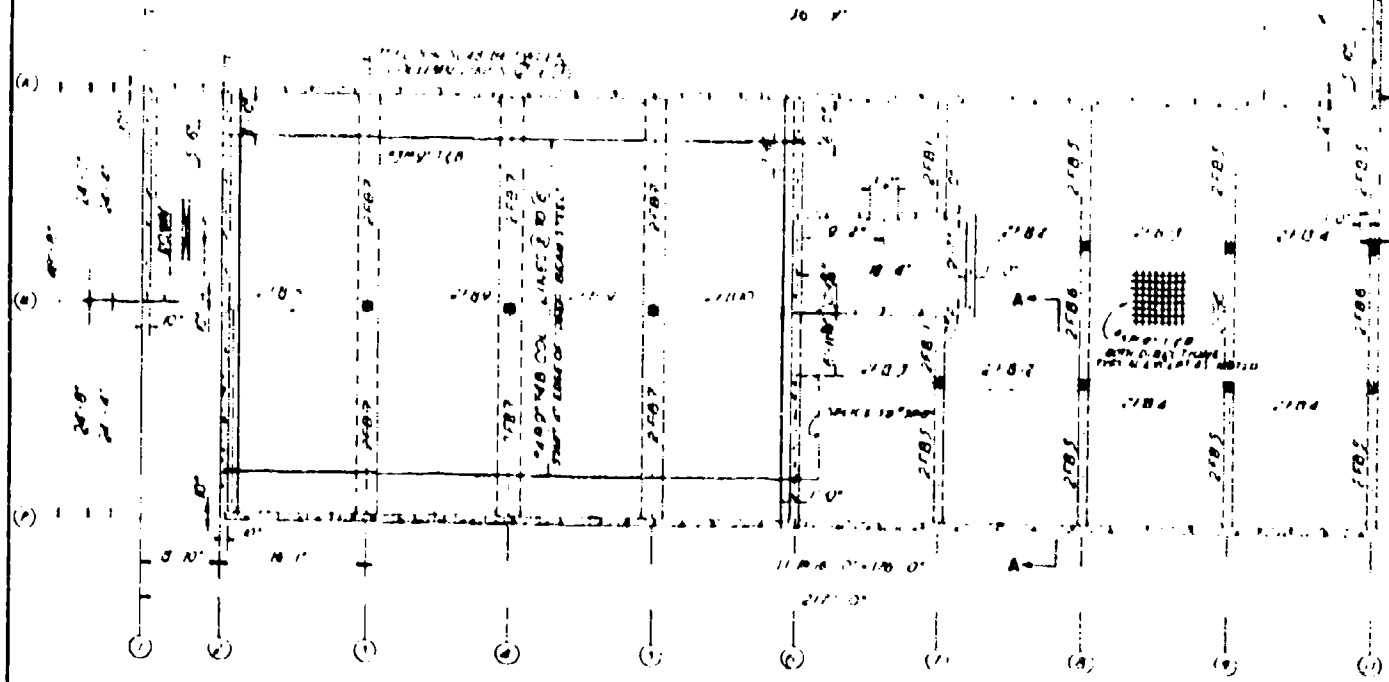
TYPICAL EXTERIOR BEAM DETAILS



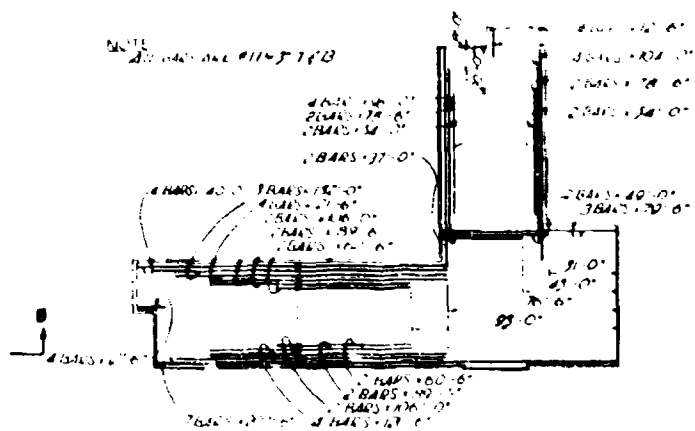
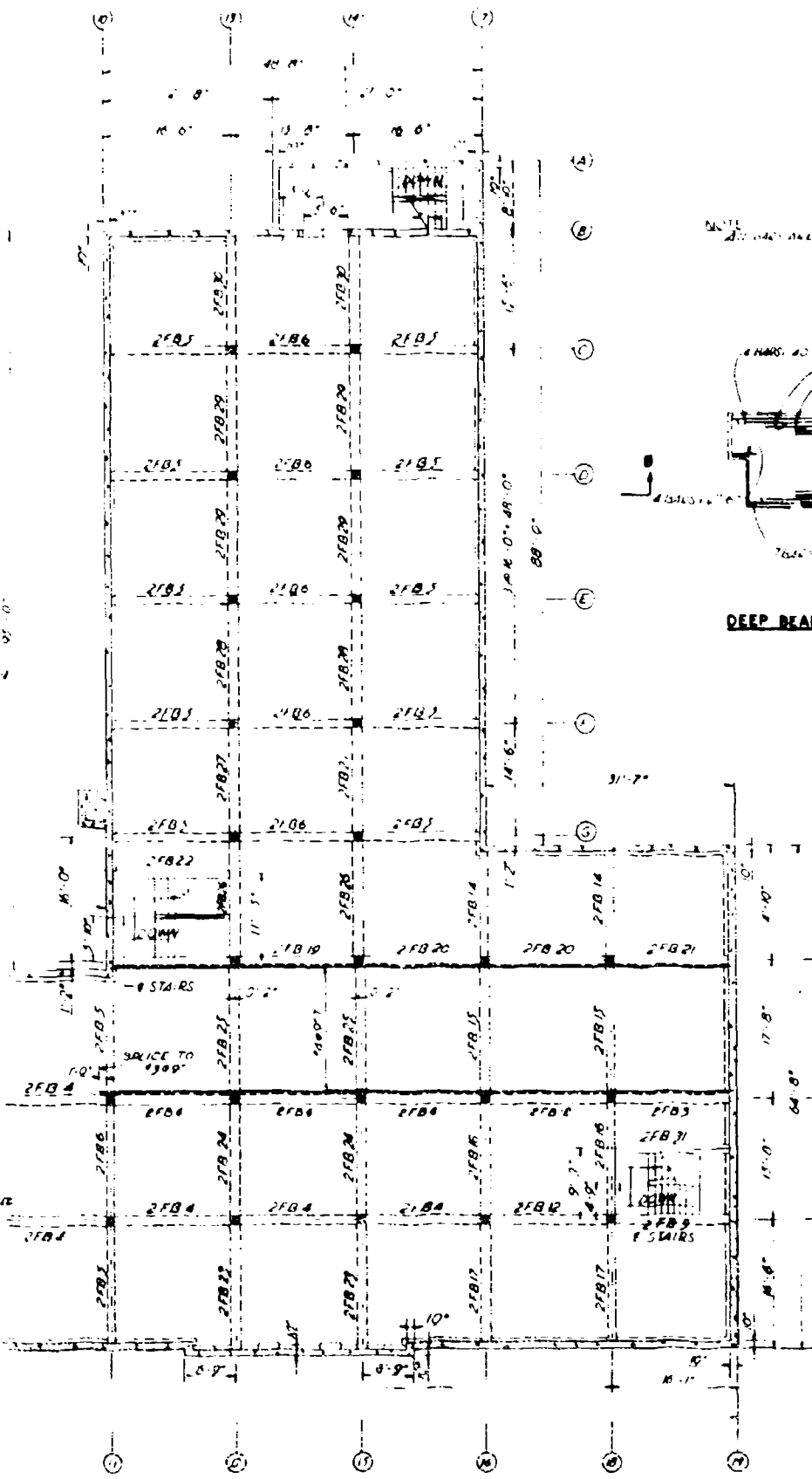
TYPICAL INTERIOR BEAM DETAILS

NOTE:
 1. ALL BEAMS TO BE REINFORCED WITH TOP BARS BENT UP AT 45 DEGREE ANGLE.
 2. ALL BEAMS TO BE REINFORCED WITH BOTTOM BARS BENT UP AT 45 DEGREE ANGLE.

REINFORCEMENT TO BE AS SHOWN IN SECTION DRAWING



SECOND FLOOR FRAMING PLAN



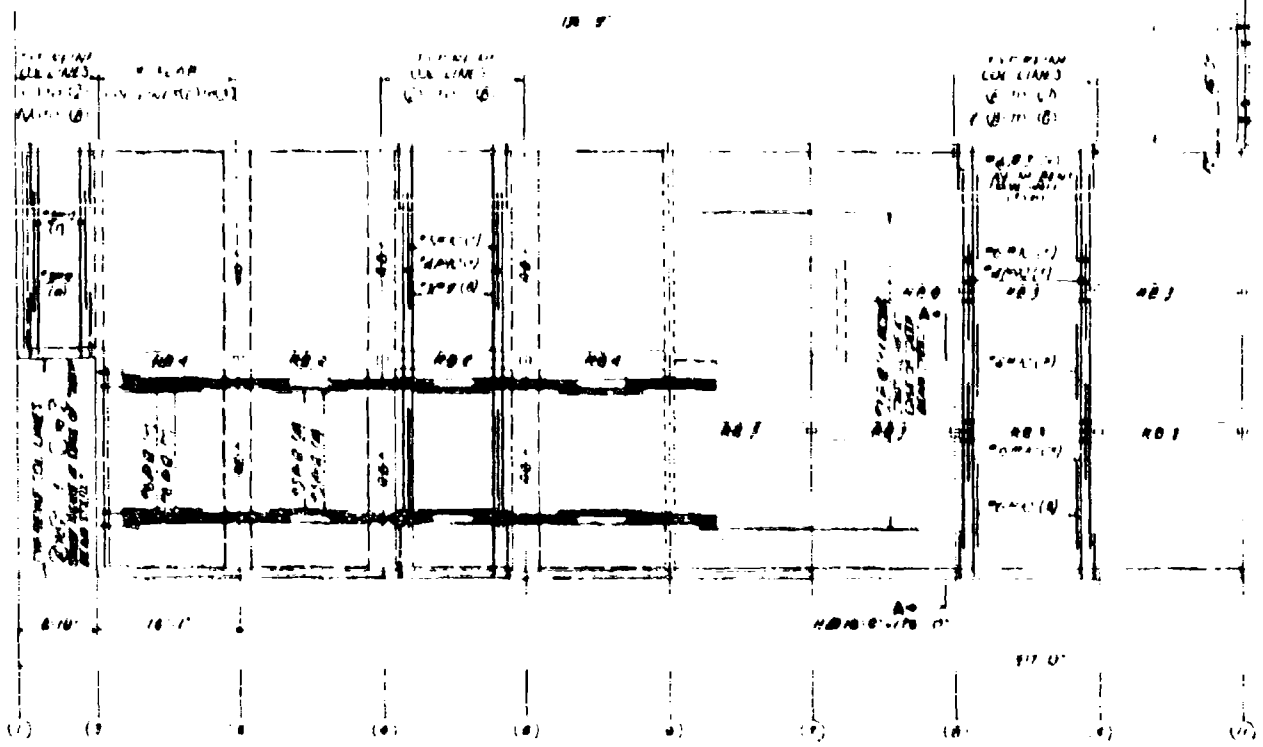
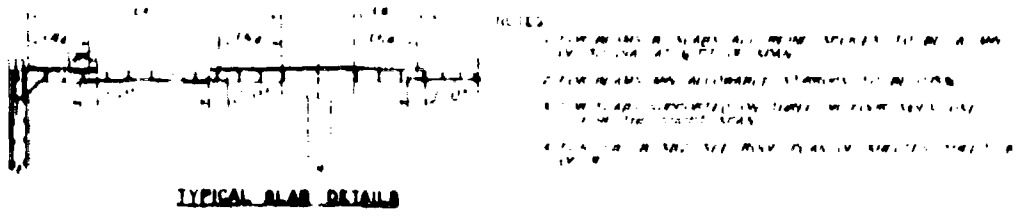
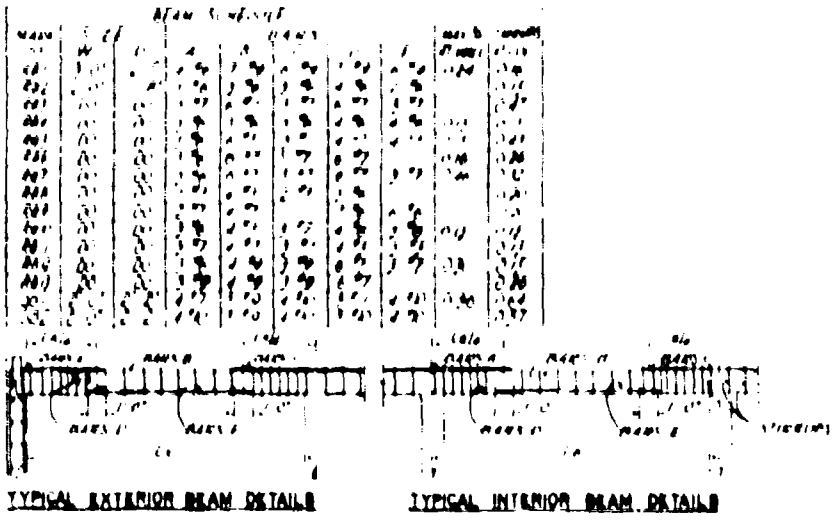
DEEP BEAM REINFORCEMENT - SECOND FLOOR

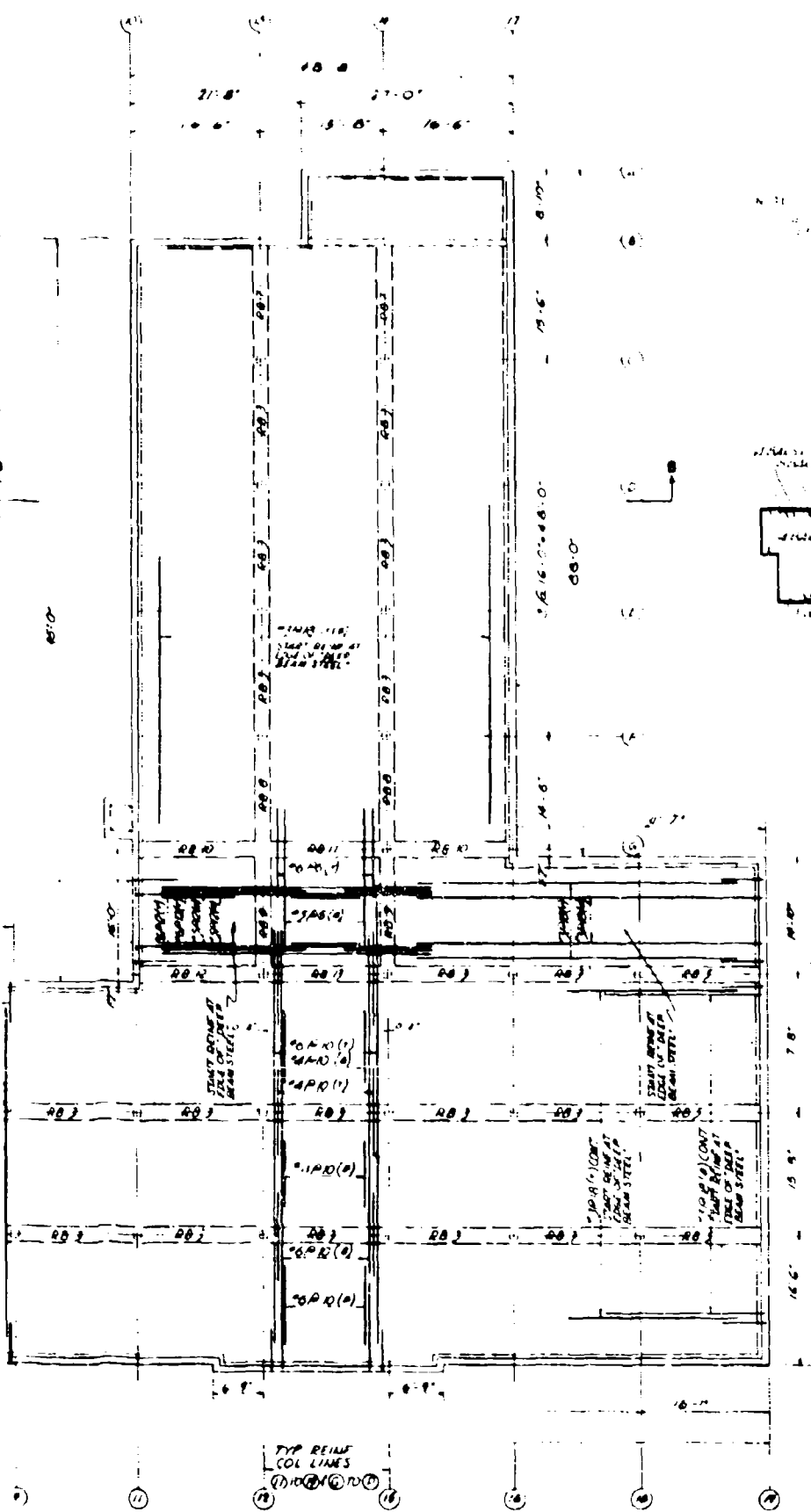
NOTE
SECOND FLOOR SLAB EXCEPT AS NOTED

LINE PLAN

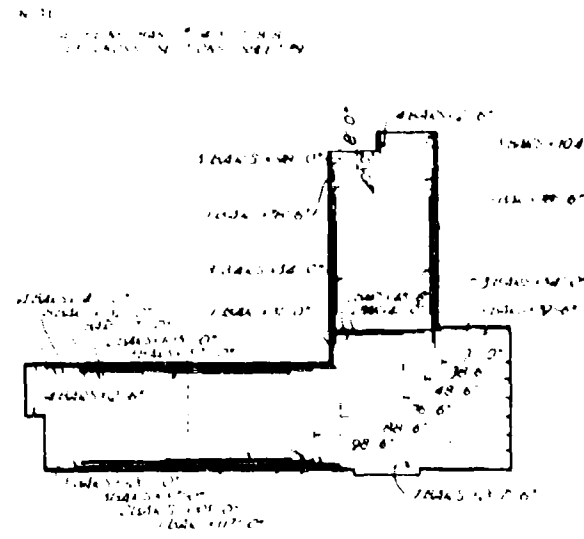
2

AMMANN & WHITNEY CONSULTING ENGINEERS 111-8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY F. W.	PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT		
CHECKED BY G. P.			
DATE 10-1-50	SCALE 1/4" = 1'-0"	SHEET NO. 80-18-0	TOTAL SHEETS 7





PLAN

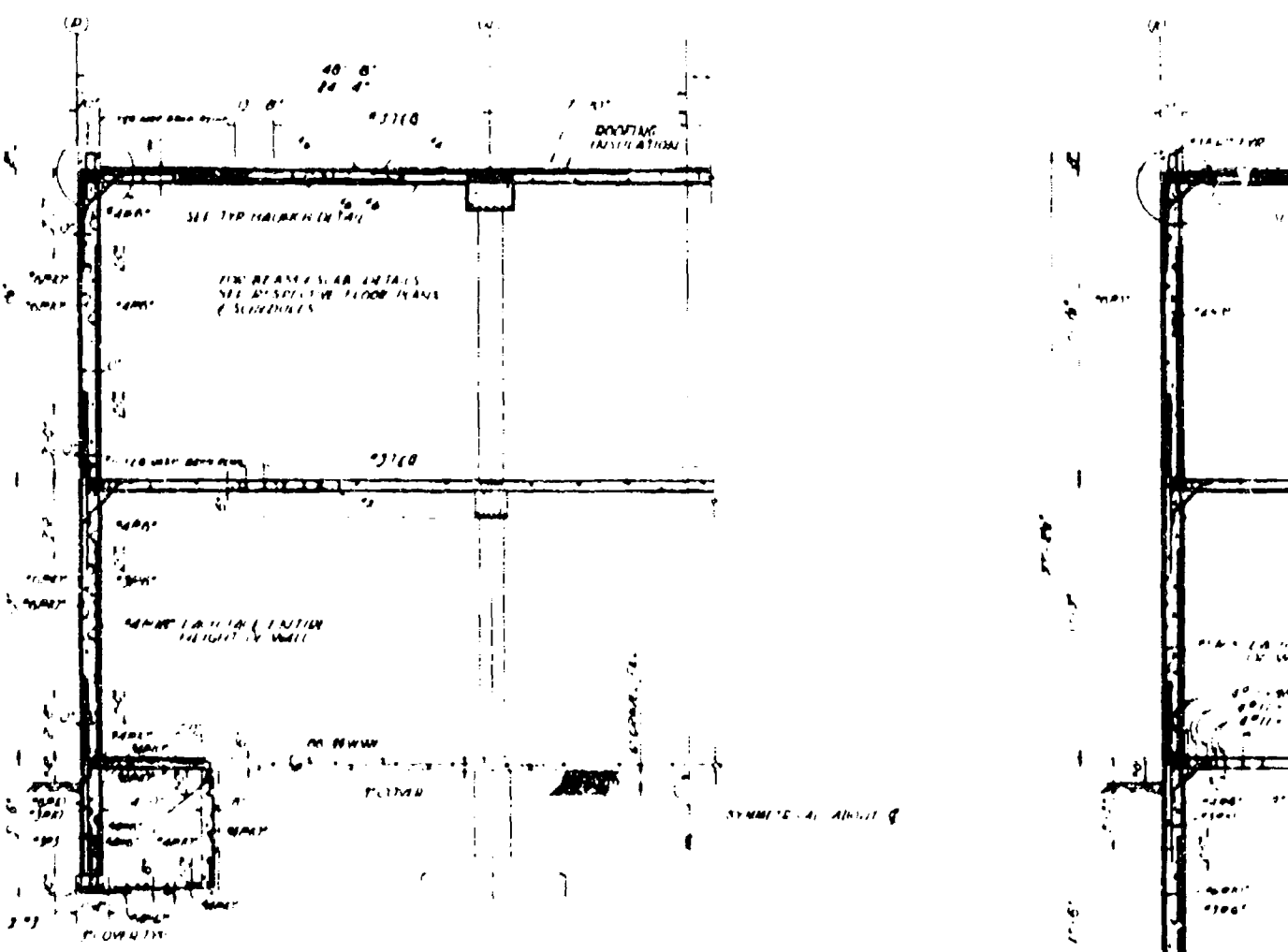


DEEP BEAM REINFORCEMENT - ROOF

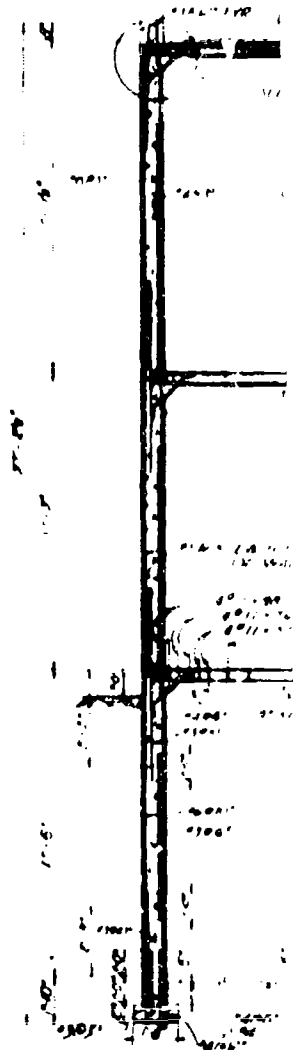
ROOF SLAB 12" EXCEPT AS NOTED

AMMANN & WITNEY GENERAL ENGINEERS 111 GUY AVE. NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION CENTER WASHINGTON, D. C.	
PROJECT NO. DRAWING NO.		TITLE PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT	
DATE		SCALE	

P

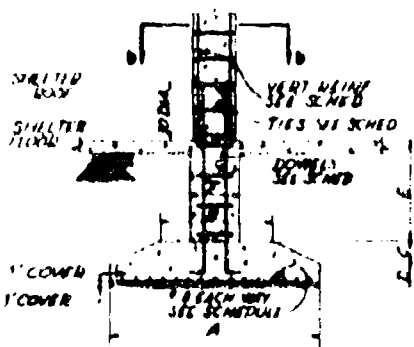


SECTION A-A
SCALE: 1/4" = 1'-0"

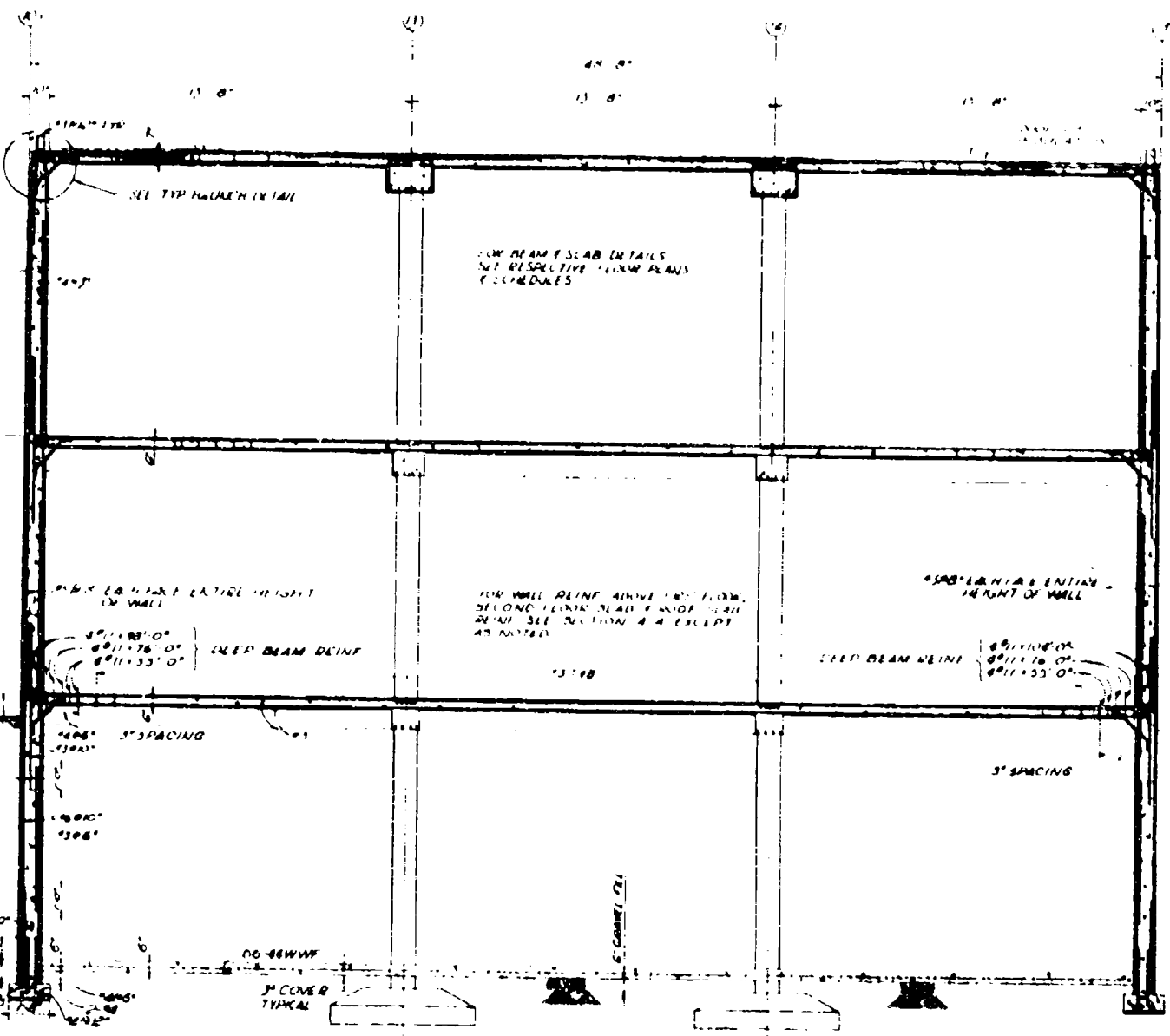


COLUMN / COLUMN FOOTING SCHEDULE

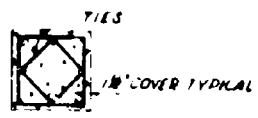
WALL NO.	14 04 34	14 04 14 24 11 11	14 10 11 24 11 10	14 14 11 24 11 11	14 11 10 24 11 10	14 11 11
VERT. REIN. TIES	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"
VERT. REIN. TIES	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"
VERT. REIN. TIES	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"
VERT. REIN. TIES	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"	1'-0" @ 2'-0"
REINFORCING						
DIAPHRAGM	4'-0"	8'-0"	8'-0"		8'-0"	8'-0"
FOOTING	1'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
REIN. EACH WAY	15-#8	11-#8	13-#8	COMB. REIN.	13-#8	10-#8



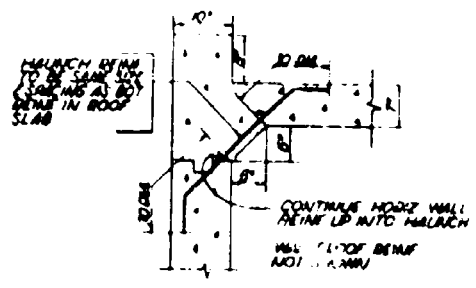
TYPICAL COLUMN FOOTING



SECTION B-B
SCALE: 1/4"=1'-0"



SECTION B-B



TYPICAL HAUNCH DETAIL
SCALE: 1/4"=1'-0"

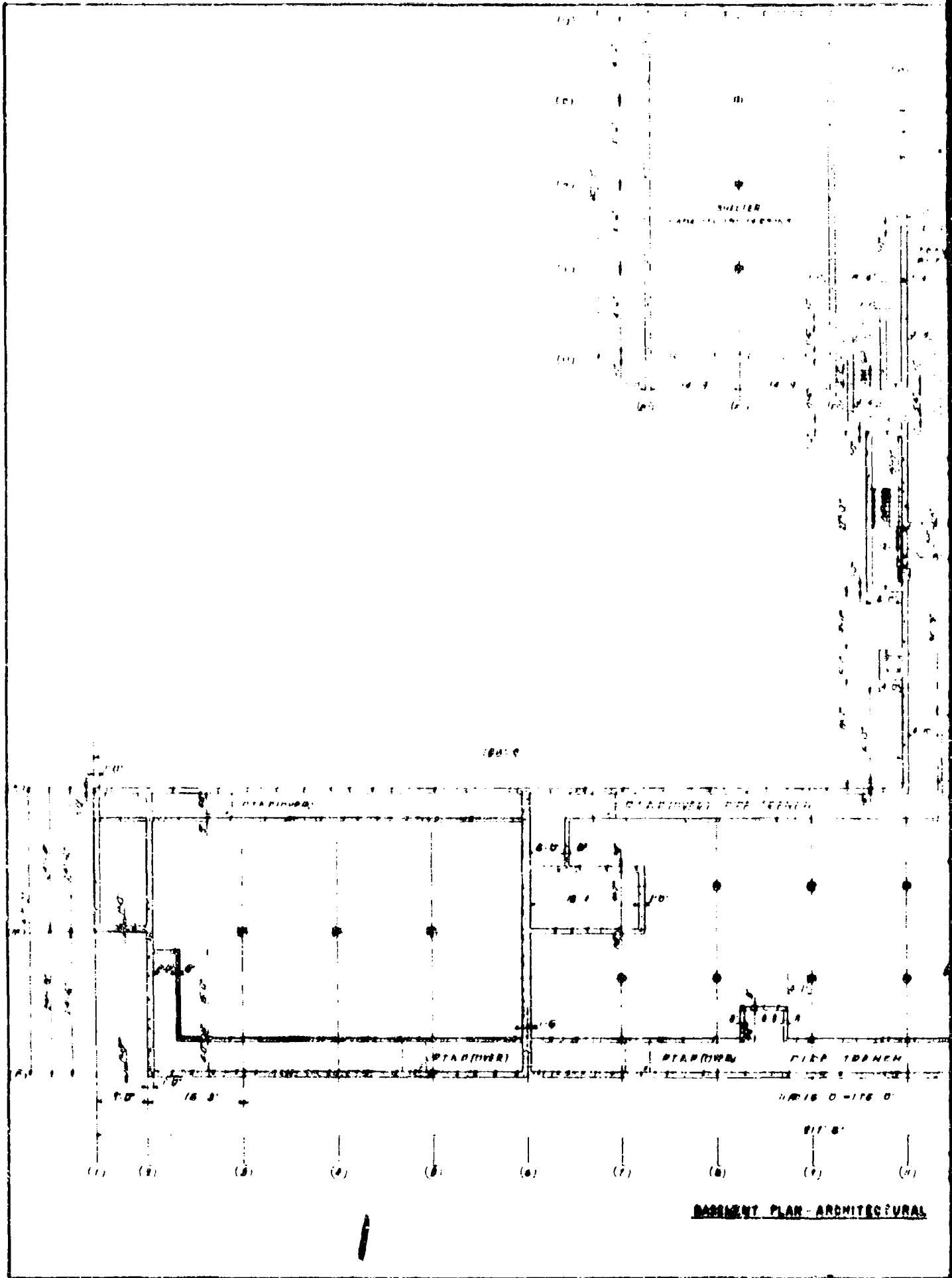
NOTE:
CONCRETE COVER TO REINFORCEMENT BARS IS AS FOLLOWS (EXCEPT AS NOTED)
BEAMS 2" MIN.
SLABS 1" MIN.
EXT. WALLS 2" INSIDE FACE
INT. WALLS 1" OUTSIDE FACE

VERT. REIN. SEE SCHED.
TIES SEE SCHED.
DOWELS SEE SCHED.

DOWELS

AMMANN & WHITNEY 111.0th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY MILITARY CONSTRUCTION DIVISION	
PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 10 PSI BLAST RESISTANT		DRAWING NUMBER 60-10-C1	
DATE: 10/1/50		SHEET 2 OF 2	

2



BASEMENT PLAN - ARCHITECTURAL

DESIGN CONDITIONS

Design Procedure

In accordance with the manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave

Peak internal pressure - 2.5 psi (duration 1/2 sec)

Blast Loading on Roof

Peak pressure (D/4) (duration) 1/2 sec

Blast Loading on Walls

Peak pressure - 20-40 psi (duration) 1/2 sec

Loading on Floors

Office portion - 50 psf, Corridors - 125 psf

Nuclear Radiation Protection for Shelter Area

Total gamma and neutron attenuation is 50. No direct radiation of any position which will produce a peak blast pressure greater than 1.5 psi

Strength of Materials

	Specs	Blast Design
Steel bearing capacity	47,000 psi	47,000 psi
Concrete, f _c	4,000 psi	4,000 psi
Reinforcing steel, yield	47,000 psi	52,000 psi
(in order ASTM A305 S-17)		
Structural steel, yield	38,000 psi	47,000 psi
(ASTM A7-50)		

rated capacity of soil

Allowable Stresses and Deflections

Roof, walls, columns and beams designed for plastic deformation under design blast wave. Slabs designed for elastic behavior under design blast load

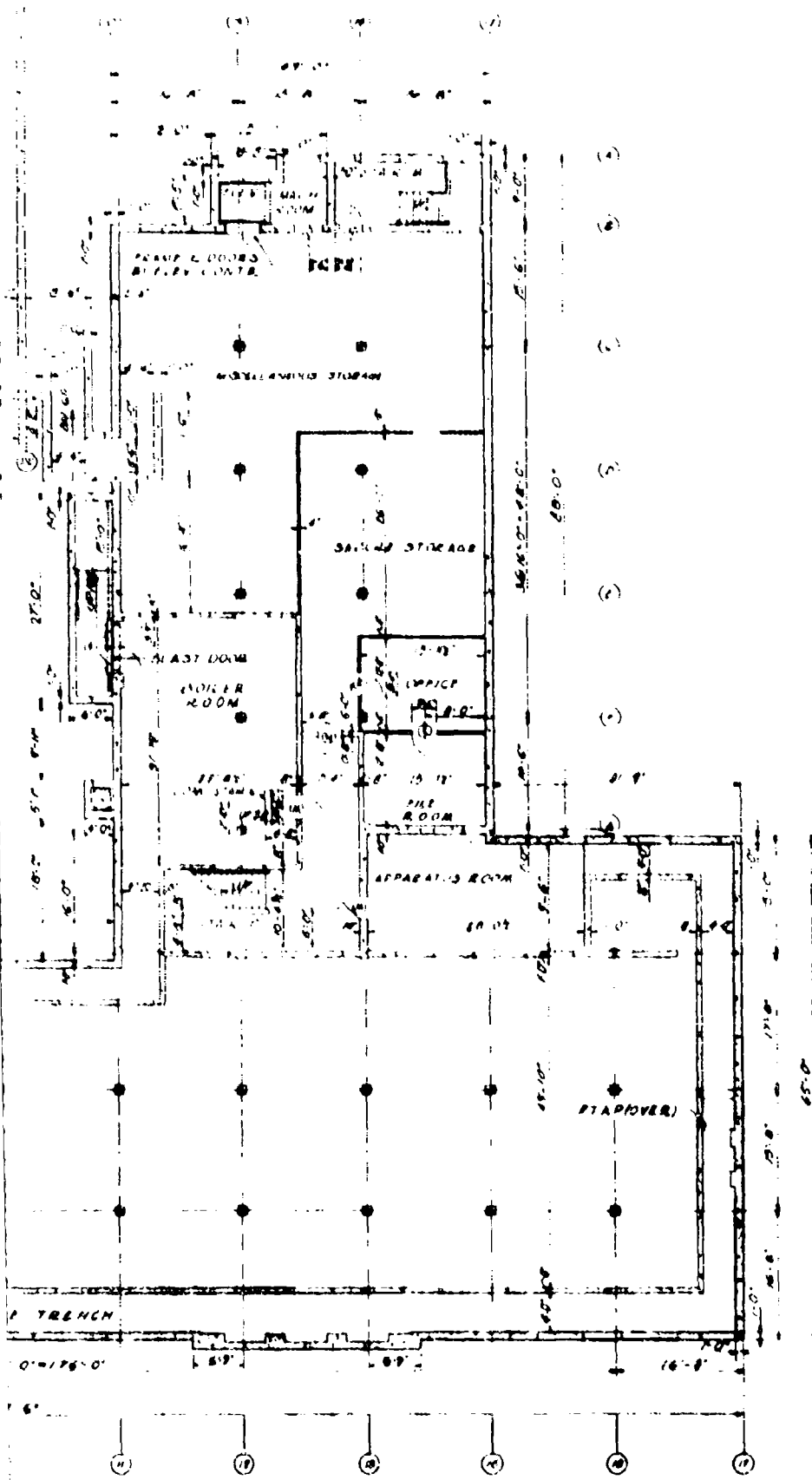
General Notes

1. The following features are not shown and shall be determined in accordance with applicable codes and specifications

Mechanical and electrical equipment

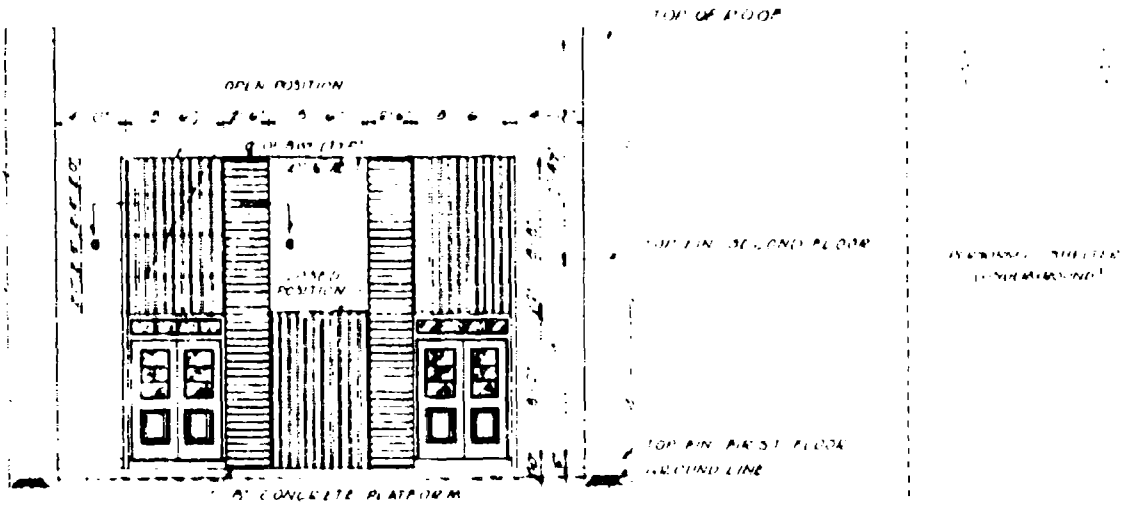
All loads and circumstances mentioned

2. This design study is based upon Dept. of the Army, Protective Construction Manual, AFM (Drawing No. 11-11-11)

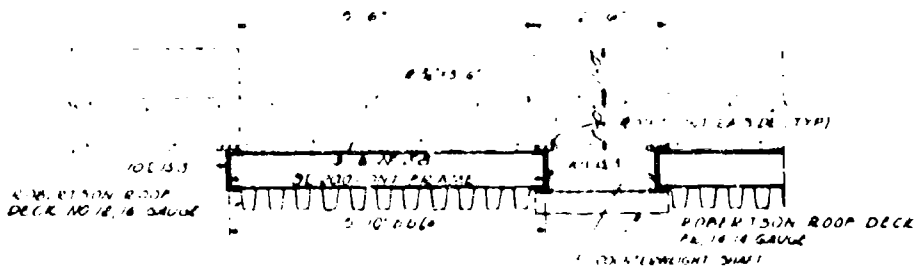


2

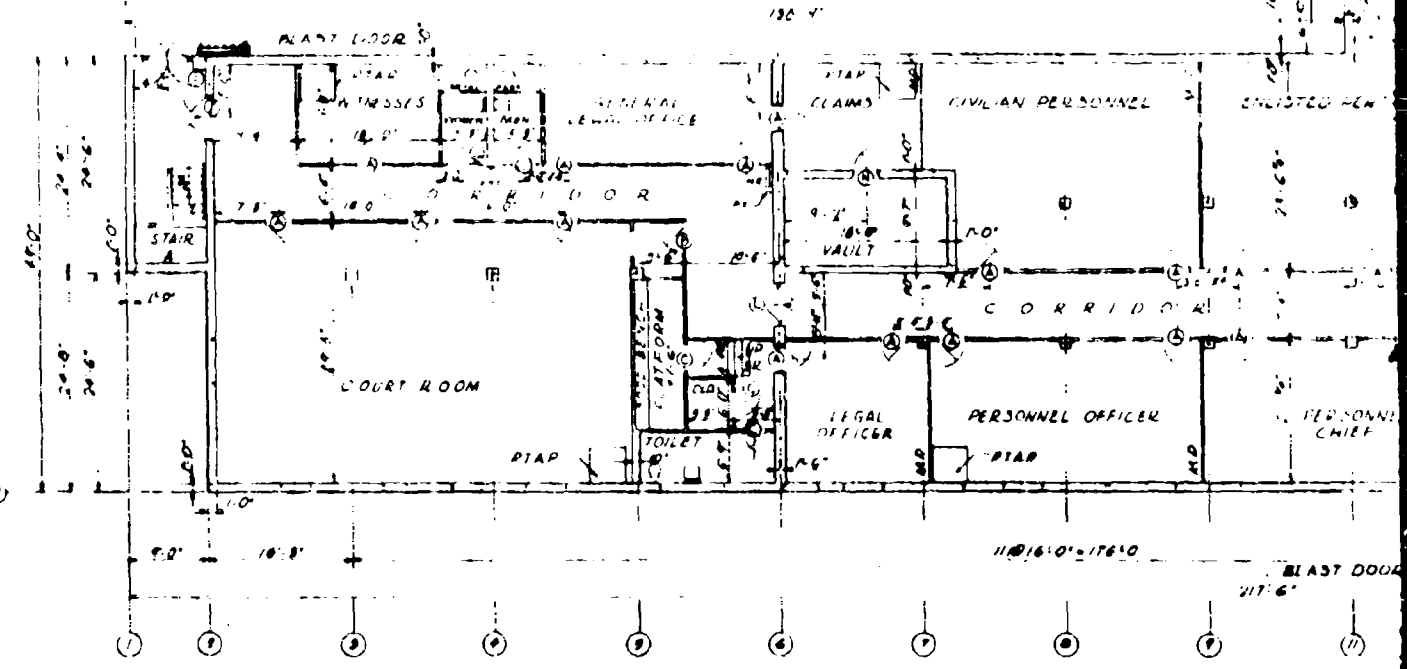
AMMANN & WHITNEY 111 One World Trade Center, N.Y. DEPARTMENT OF THE ARMY 111 One World Trade Center, N.Y.	
DRAWN BY D. H. CHECKED BY G. P. APPROVED BY [Signature] DATE 11/17/51	PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT DRAWING NUMBER 80-16-01 SHEET 1 OF 2



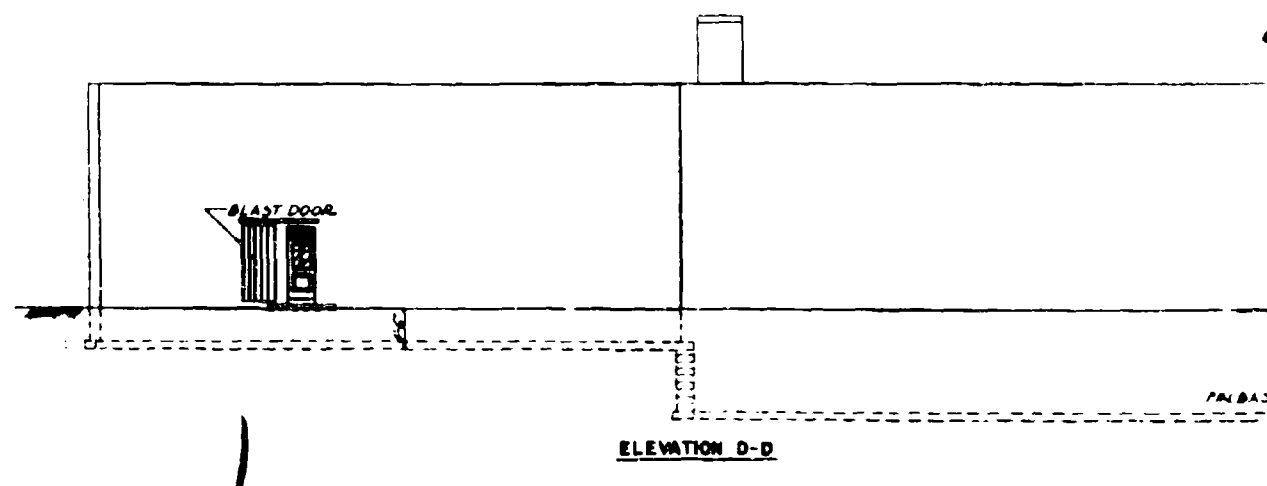
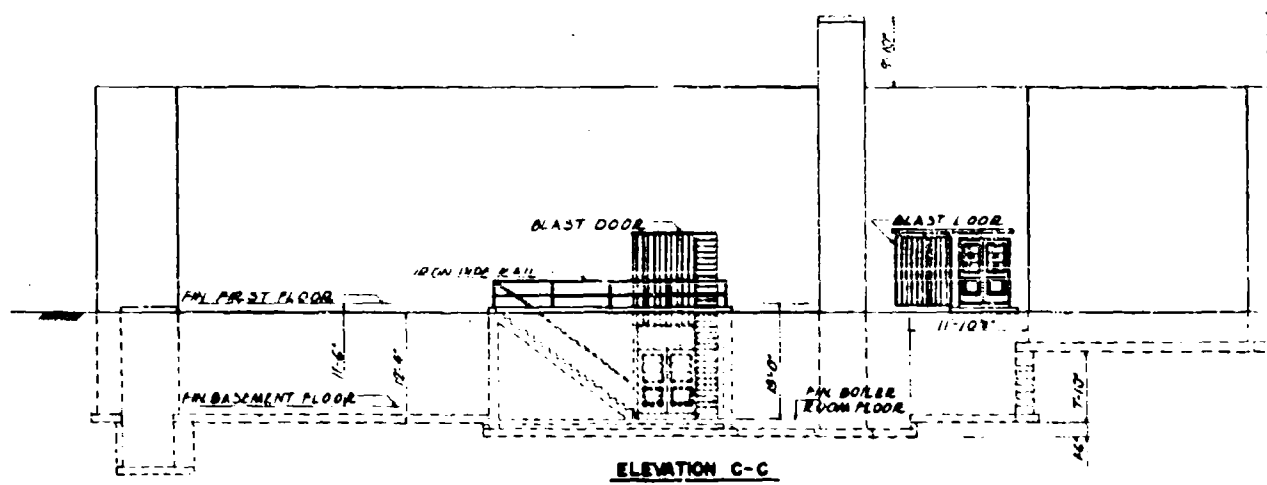
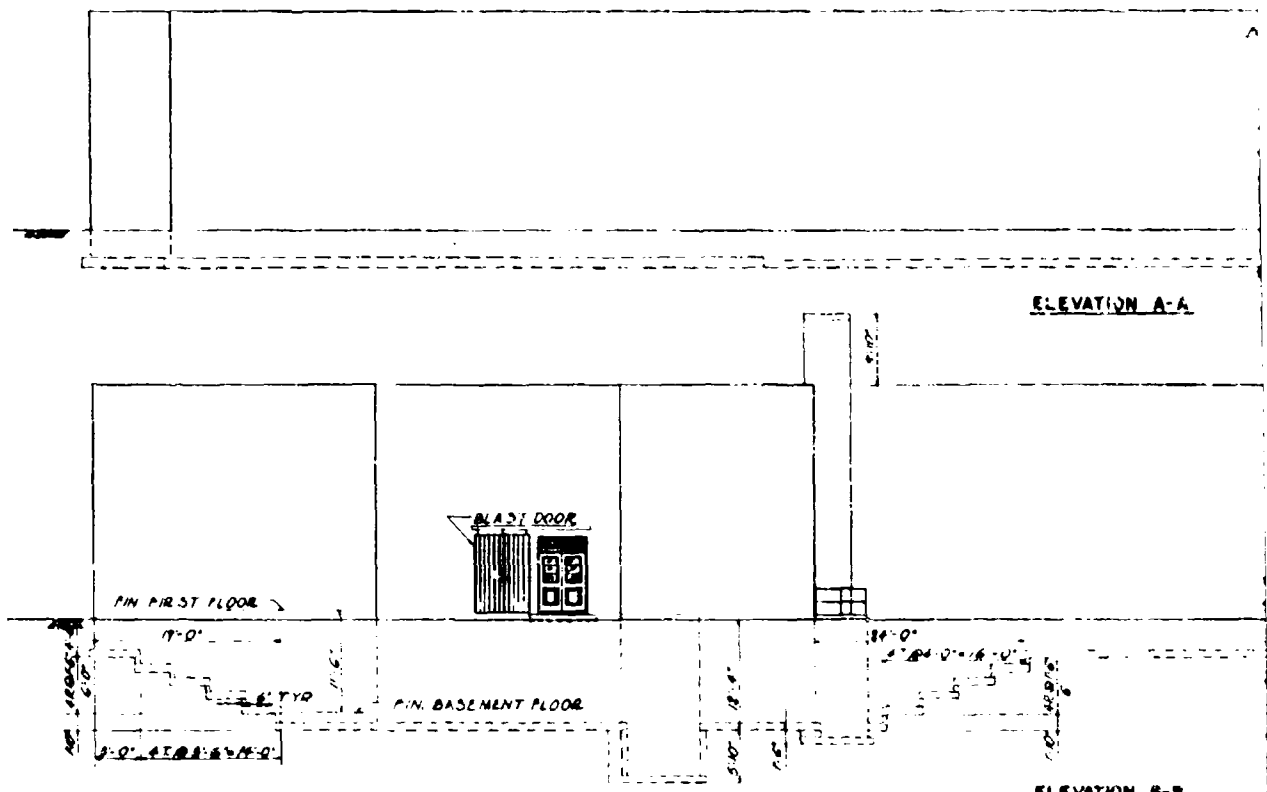
ELEVATION OF MAIN DOORS
SCALE 1/4"=1'-0"



SECTION 0-0
SCALE 1/4"=1'-0"



FIRST FLOOR PLAN - ARCHITECTURAL
SCALE 1/4"=1'-0"



PLAN FLOOR



TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

VATION A-A

TOP OF ROOF

PN SECOND FLOOR

PLAN FIRST FLOOR

GROUND LINE

VATION B-B

TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

TOP OF ROOF

PN SECOND FLOOR

PN FIRST FLOOR

GROUND LINE

PN BASEMENT FLOOR

A
B
C

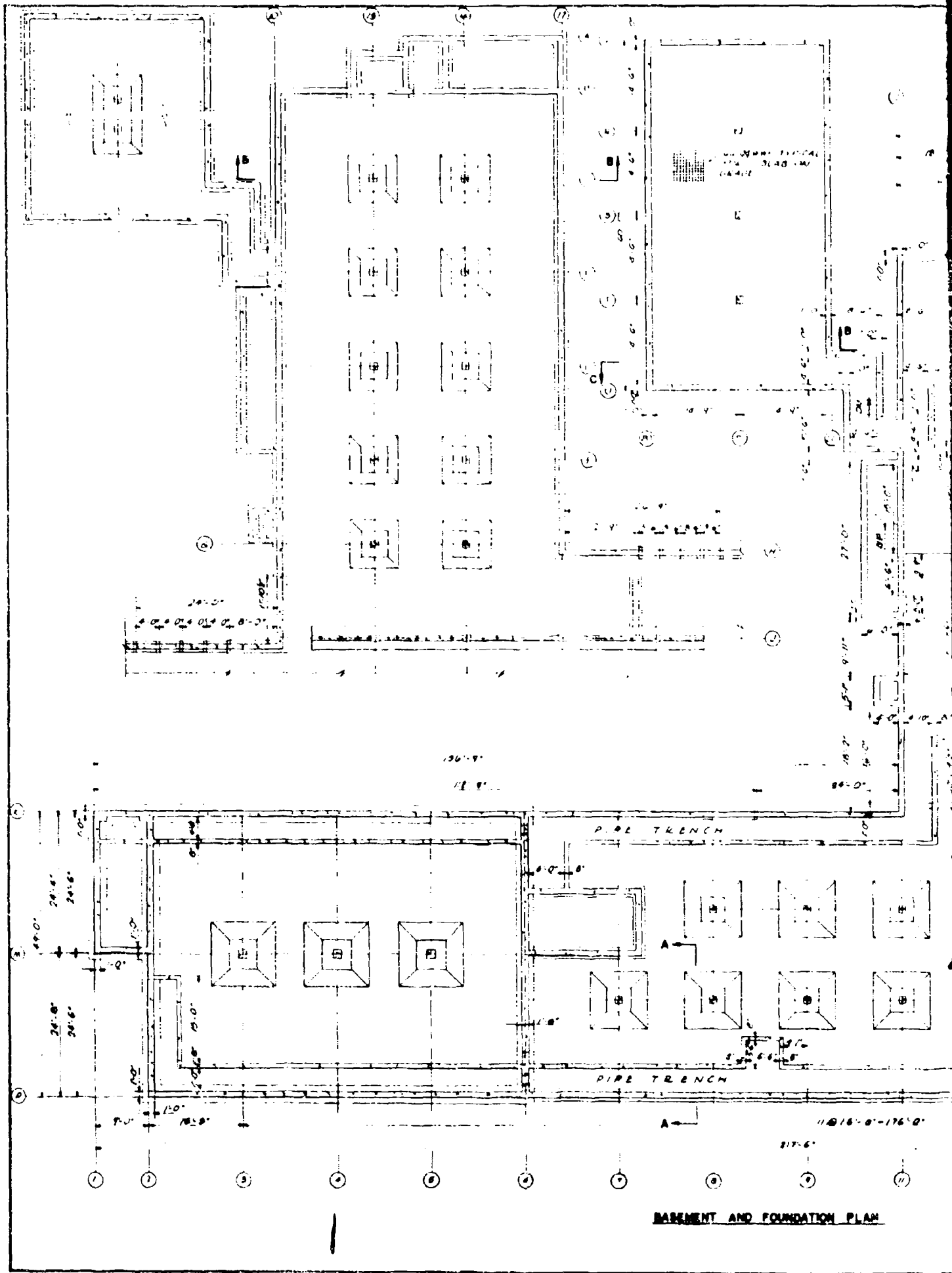
D
E
F

A
B
C

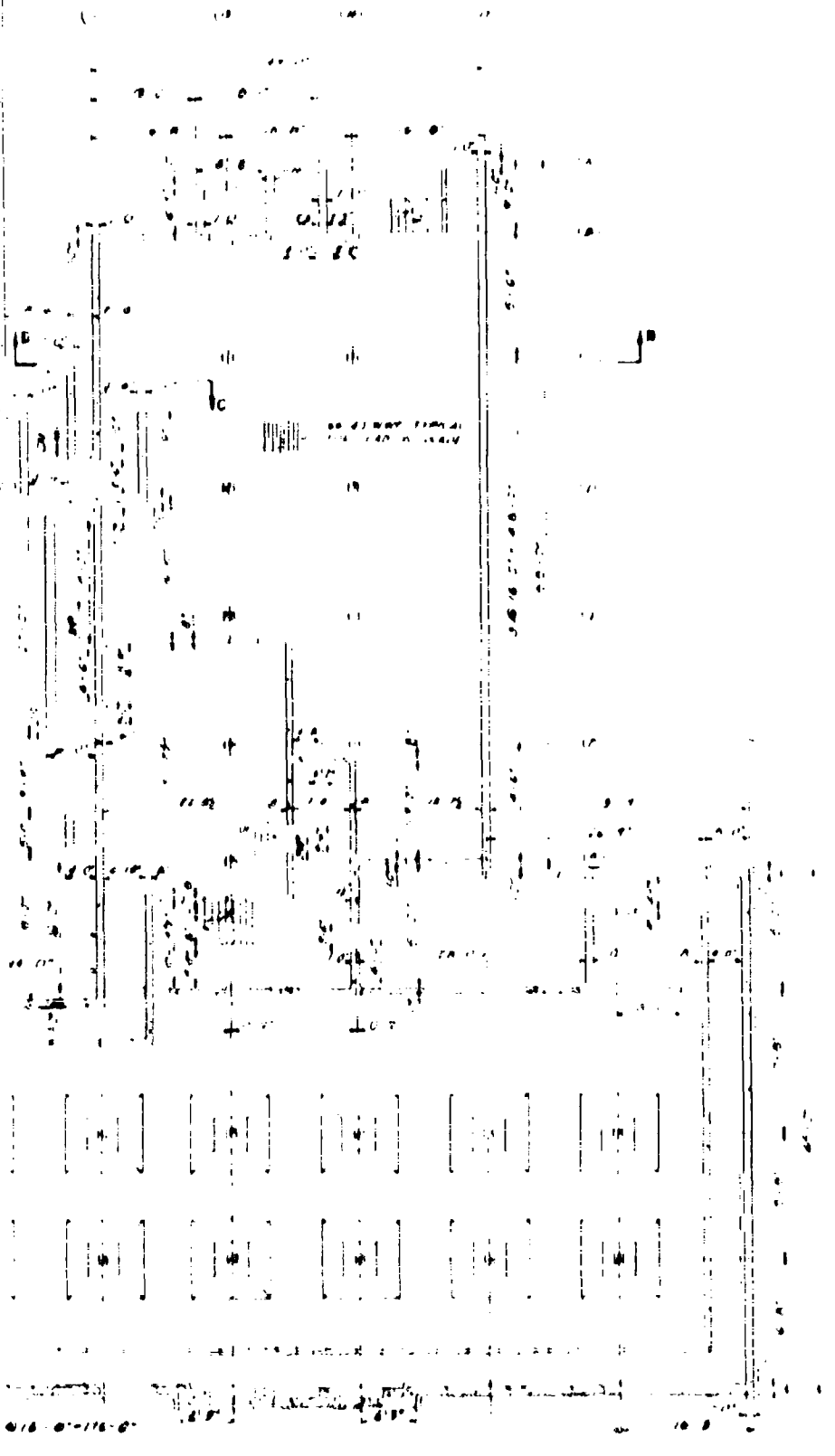
D
E
F

2

ARMANN & WHITNEY 111 6TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY HEADQUARTERS WASHINGTON, D. C.	
DRAWN BY P. M.		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING SO PM BLAST RESISTANT	
CHECKED BY [Signature]			
DATE [Blank]		DRAWING NUMBER 60-16-01	



BASMENT AND FOUNDATION PLAN

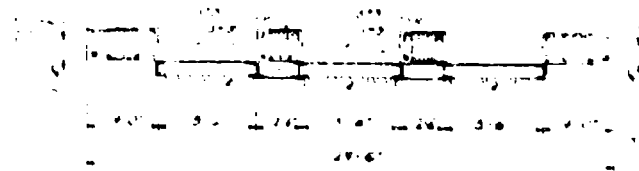


PL PLAN

2

AMMANN & WHITNEY 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY DATE	PROJECT NO. SHEET NO.	PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT	
DATE: _____		SCALE: _____	

STANDARD DRAWING SYMBOLS
 DRAWING BY: [unclear]



FRAMING DETAIL AT MAIN ENTRANCE

SCALE 1/4" = 1'-0"

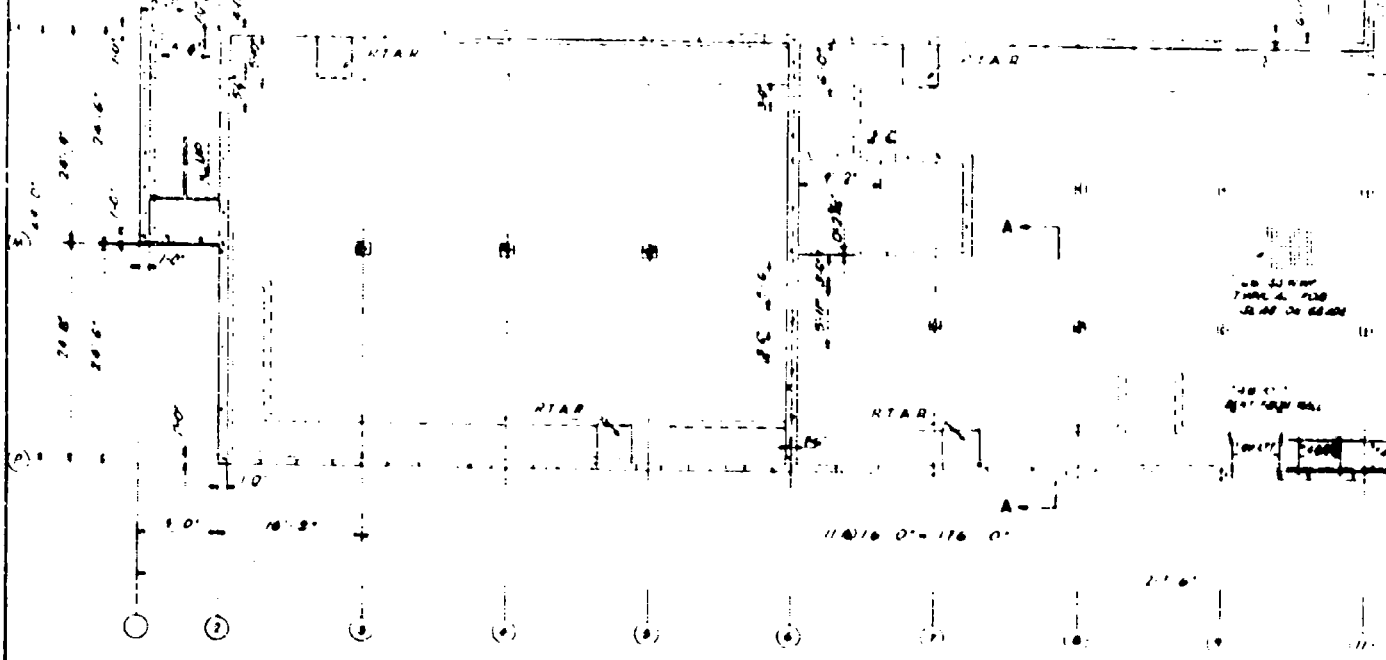
BEAM SCHEDULE

NO.	DESCRIPTION	SPAN	TYPE
1	12" x 16" S&P	12'-0"	1
2	12" x 16" S&P	12'-0"	1
3	12" x 16" S&P	12'-0"	1
4	12" x 16" S&P	12'-0"	1
5	12" x 16" S&P	12'-0"	1
6	12" x 16" S&P	12'-0"	1
7	12" x 16" S&P	12'-0"	1
8	12" x 16" S&P	12'-0"	1
9	12" x 16" S&P	12'-0"	1
10	12" x 16" S&P	12'-0"	1
11	12" x 16" S&P	12'-0"	1
12	12" x 16" S&P	12'-0"	1
13	12" x 16" S&P	12'-0"	1
14	12" x 16" S&P	12'-0"	1
15	12" x 16" S&P	12'-0"	1
16	12" x 16" S&P	12'-0"	1
17	12" x 16" S&P	12'-0"	1
18	12" x 16" S&P	12'-0"	1
19	12" x 16" S&P	12'-0"	1
20	12" x 16" S&P	12'-0"	1
21	12" x 16" S&P	12'-0"	1
22	12" x 16" S&P	12'-0"	1
23	12" x 16" S&P	12'-0"	1
24	12" x 16" S&P	12'-0"	1
25	12" x 16" S&P	12'-0"	1
26	12" x 16" S&P	12'-0"	1
27	12" x 16" S&P	12'-0"	1
28	12" x 16" S&P	12'-0"	1
29	12" x 16" S&P	12'-0"	1
30	12" x 16" S&P	12'-0"	1
31	12" x 16" S&P	12'-0"	1
32	12" x 16" S&P	12'-0"	1
33	12" x 16" S&P	12'-0"	1
34	12" x 16" S&P	12'-0"	1
35	12" x 16" S&P	12'-0"	1
36	12" x 16" S&P	12'-0"	1
37	12" x 16" S&P	12'-0"	1
38	12" x 16" S&P	12'-0"	1
39	12" x 16" S&P	12'-0"	1
40	12" x 16" S&P	12'-0"	1
41	12" x 16" S&P	12'-0"	1
42	12" x 16" S&P	12'-0"	1
43	12" x 16" S&P	12'-0"	1
44	12" x 16" S&P	12'-0"	1
45	12" x 16" S&P	12'-0"	1
46	12" x 16" S&P	12'-0"	1
47	12" x 16" S&P	12'-0"	1
48	12" x 16" S&P	12'-0"	1
49	12" x 16" S&P	12'-0"	1
50	12" x 16" S&P	12'-0"	1
51	12" x 16" S&P	12'-0"	1
52	12" x 16" S&P	12'-0"	1
53	12" x 16" S&P	12'-0"	1
54	12" x 16" S&P	12'-0"	1
55	12" x 16" S&P	12'-0"	1
56	12" x 16" S&P	12'-0"	1
57	12" x 16" S&P	12'-0"	1
58	12" x 16" S&P	12'-0"	1
59	12" x 16" S&P	12'-0"	1
60	12" x 16" S&P	12'-0"	1
61	12" x 16" S&P	12'-0"	1
62	12" x 16" S&P	12'-0"	1
63	12" x 16" S&P	12'-0"	1
64	12" x 16" S&P	12'-0"	1
65	12" x 16" S&P	12'-0"	1
66	12" x 16" S&P	12'-0"	1
67	12" x 16" S&P	12'-0"	1
68	12" x 16" S&P	12'-0"	1
69	12" x 16" S&P	12'-0"	1
70	12" x 16" S&P	12'-0"	1
71	12" x 16" S&P	12'-0"	1
72	12" x 16" S&P	12'-0"	1
73	12" x 16" S&P	12'-0"	1
74	12" x 16" S&P	12'-0"	1
75	12" x 16" S&P	12'-0"	1
76	12" x 16" S&P	12'-0"	1
77	12" x 16" S&P	12'-0"	1
78	12" x 16" S&P	12'-0"	1
79	12" x 16" S&P	12'-0"	1
80	12" x 16" S&P	12'-0"	1
81	12" x 16" S&P	12'-0"	1
82	12" x 16" S&P	12'-0"	1
83	12" x 16" S&P	12'-0"	1
84	12" x 16" S&P	12'-0"	1
85	12" x 16" S&P	12'-0"	1
86	12" x 16" S&P	12'-0"	1
87	12" x 16" S&P	12'-0"	1
88	12" x 16" S&P	12'-0"	1
89	12" x 16" S&P	12'-0"	1
90	12" x 16" S&P	12'-0"	1
91	12" x 16" S&P	12'-0"	1
92	12" x 16" S&P	12'-0"	1
93	12" x 16" S&P	12'-0"	1
94	12" x 16" S&P	12'-0"	1
95	12" x 16" S&P	12'-0"	1
96	12" x 16" S&P	12'-0"	1
97	12" x 16" S&P	12'-0"	1
98	12" x 16" S&P	12'-0"	1
99	12" x 16" S&P	12'-0"	1
100	12" x 16" S&P	12'-0"	1

12" x 16" S&P

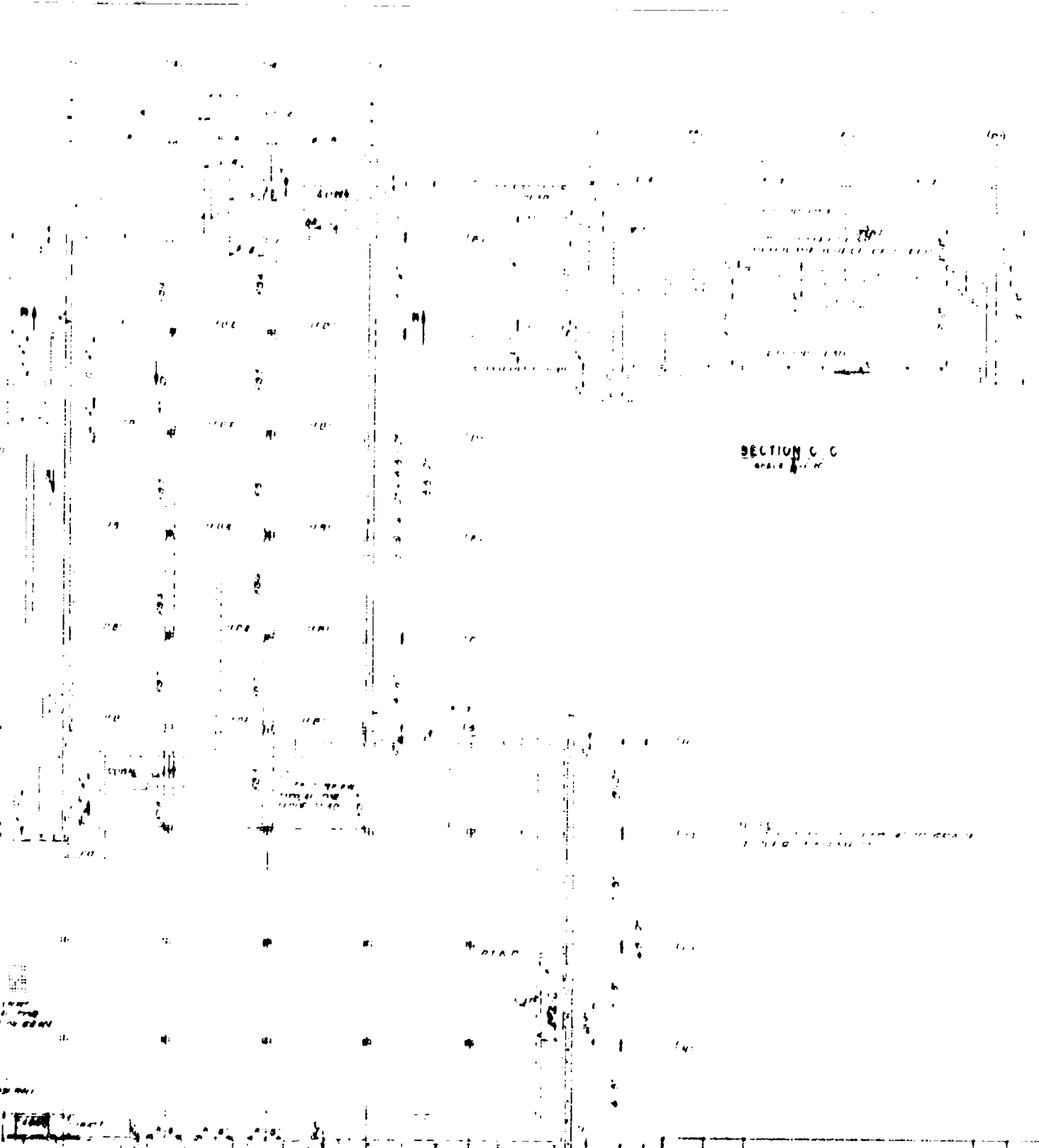
1/36-97

0' LONG PLATFORM TIP



FIRST FLOOR AND SHELTER ROOF FRAMING PLAN

SCALE 1/8" = 1'-0"



SECTION C-C
SCALE 1/8" = 1'-0"

FRAMING PLAN

2

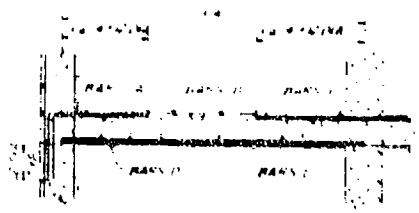
ARCHITECT AMMANN & WHITNEY 111 5TH AVENUE, L.I.C. 11038 N.Y. ENGINEER D. M. REGISTERED STATE OF NEW YORK No. 12345 DATE: 08/01/01	DEPARTMENT OF THE ARMY PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT. 100 FT. DIA.
--	---

BEAM SCHEDULE

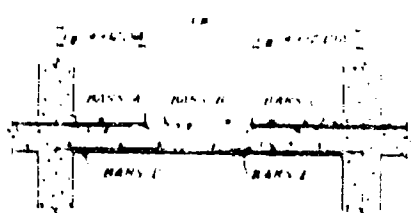
MARK NO.	W	D	A	B	C	D	E
2101	12	18	4	4	4	4	4
2102	12	18	4	4	4	4	4
2103	12	18	4	4	4	4	4
2104	12	18	4	4	4	4	4
2105	12	18	4	4	4	4	4
2106	12	18	4	4	4	4	4
2107	12	18	4	4	4	4	4
2108	12	18	4	4	4	4	4
2109	12	18	4	4	4	4	4
2110	12	18	4	4	4	4	4
2111	12	18	4	4	4	4	4
2112	12	18	4	4	4	4	4
2113	12	18	4	4	4	4	4
2114	12	18	4	4	4	4	4
2115	12	18	4	4	4	4	4
2116	12	18	4	4	4	4	4
2117	12	18	4	4	4	4	4
2118	12	18	4	4	4	4	4
2119	12	18	4	4	4	4	4
2120	12	18	4	4	4	4	4
2121	12	18	4	4	4	4	4
2122	12	18	4	4	4	4	4
2123	12	18	4	4	4	4	4
2124	12	18	4	4	4	4	4
2125	12	18	4	4	4	4	4
2126	12	18	4	4	4	4	4
2127	12	18	4	4	4	4	4
2128	12	18	4	4	4	4	4
2129	12	18	4	4	4	4	4
2130	12	18	4	4	4	4	4
2131	12	18	4	4	4	4	4
2132	12	18	4	4	4	4	4
2133	12	18	4	4	4	4	4
2134	12	18	4	4	4	4	4
2135	12	18	4	4	4	4	4
2136	12	18	4	4	4	4	4
2137	12	18	4	4	4	4	4
2138	12	18	4	4	4	4	4
2139	12	18	4	4	4	4	4
2140	12	18	4	4	4	4	4
2141	12	18	4	4	4	4	4
2142	12	18	4	4	4	4	4
2143	12	18	4	4	4	4	4
2144	12	18	4	4	4	4	4
2145	12	18	4	4	4	4	4
2146	12	18	4	4	4	4	4
2147	12	18	4	4	4	4	4
2148	12	18	4	4	4	4	4
2149	12	18	4	4	4	4	4
2150	12	18	4	4	4	4	4

BEAM SCHEDULE

MARK NO.	W	D	A	B	C	D	E
2151	12	18	4	4	4	4	4
2152	12	18	4	4	4	4	4
2153	12	18	4	4	4	4	4
2154	12	18	4	4	4	4	4
2155	12	18	4	4	4	4	4
2156	12	18	4	4	4	4	4
2157	12	18	4	4	4	4	4
2158	12	18	4	4	4	4	4
2159	12	18	4	4	4	4	4
2160	12	18	4	4	4	4	4
2161	12	18	4	4	4	4	4
2162	12	18	4	4	4	4	4
2163	12	18	4	4	4	4	4
2164	12	18	4	4	4	4	4
2165	12	18	4	4	4	4	4
2166	12	18	4	4	4	4	4
2167	12	18	4	4	4	4	4
2168	12	18	4	4	4	4	4
2169	12	18	4	4	4	4	4
2170	12	18	4	4	4	4	4
2171	12	18	4	4	4	4	4
2172	12	18	4	4	4	4	4
2173	12	18	4	4	4	4	4
2174	12	18	4	4	4	4	4
2175	12	18	4	4	4	4	4
2176	12	18	4	4	4	4	4
2177	12	18	4	4	4	4	4
2178	12	18	4	4	4	4	4
2179	12	18	4	4	4	4	4
2180	12	18	4	4	4	4	4
2181	12	18	4	4	4	4	4
2182	12	18	4	4	4	4	4
2183	12	18	4	4	4	4	4
2184	12	18	4	4	4	4	4
2185	12	18	4	4	4	4	4
2186	12	18	4	4	4	4	4
2187	12	18	4	4	4	4	4
2188	12	18	4	4	4	4	4
2189	12	18	4	4	4	4	4
2190	12	18	4	4	4	4	4
2191	12	18	4	4	4	4	4
2192	12	18	4	4	4	4	4
2193	12	18	4	4	4	4	4
2194	12	18	4	4	4	4	4
2195	12	18	4	4	4	4	4
2196	12	18	4	4	4	4	4
2197	12	18	4	4	4	4	4
2198	12	18	4	4	4	4	4
2199	12	18	4	4	4	4	4
2200	12	18	4	4	4	4	4



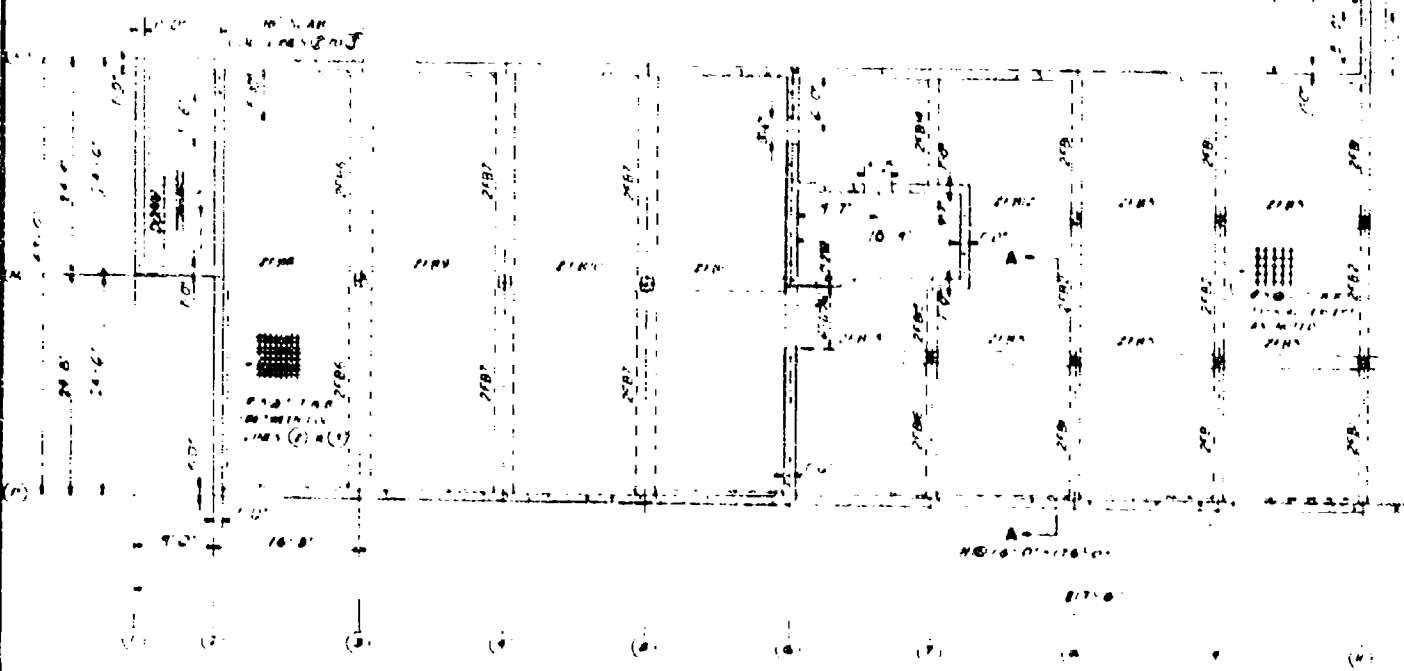
TYPICAL EXTERIOR BEAM DETAILS



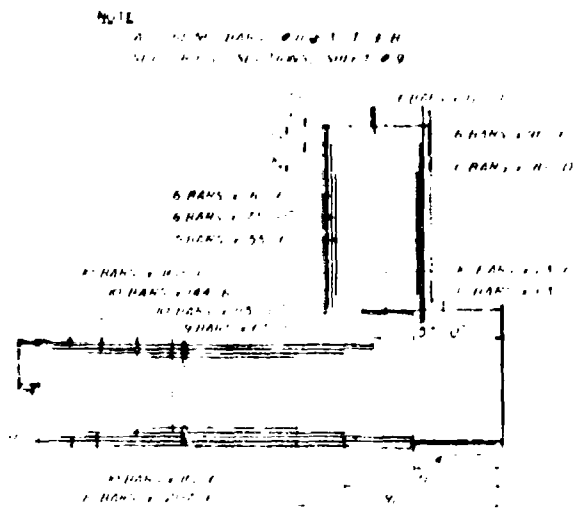
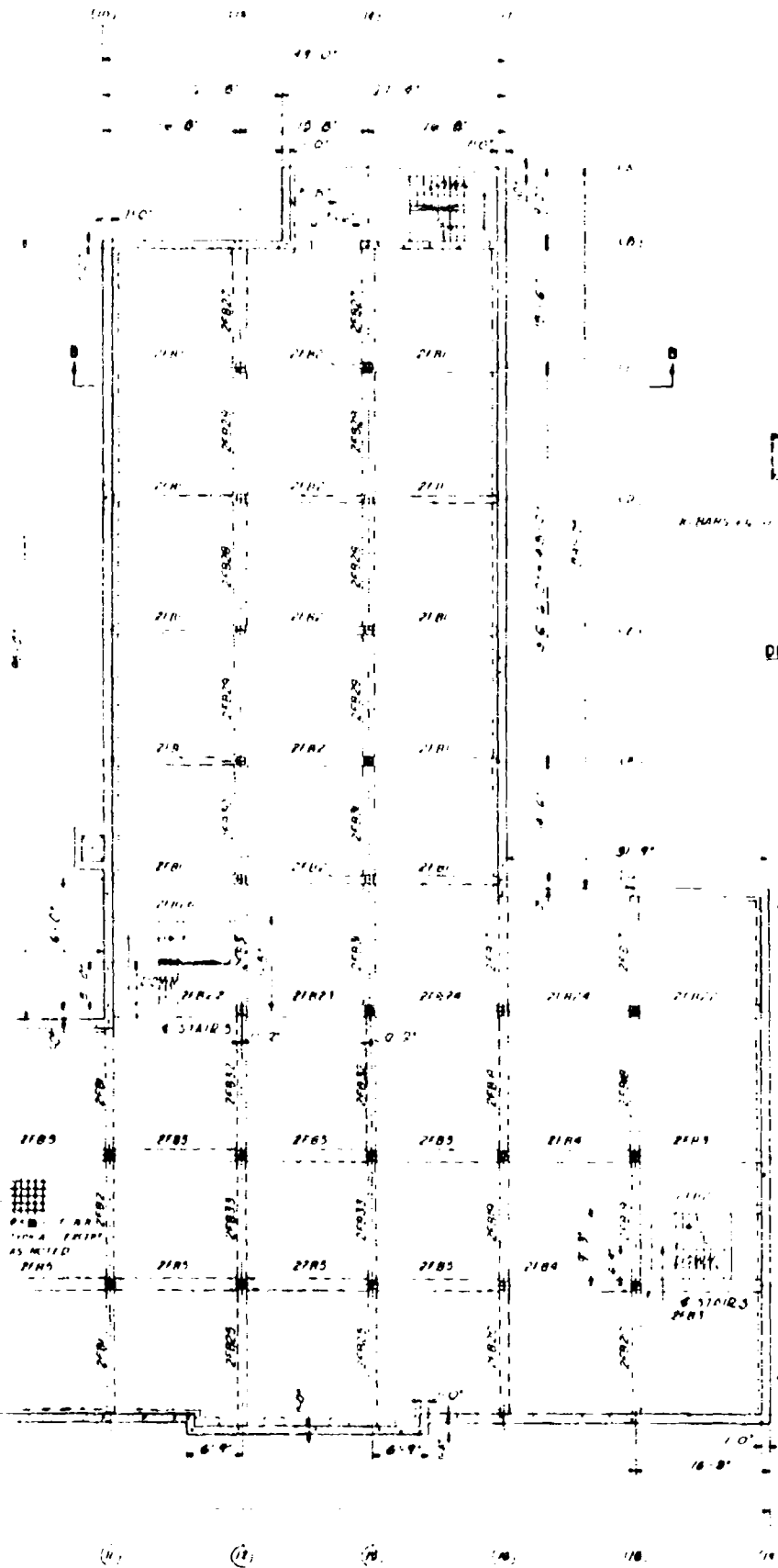
TYPICAL INTERIOR BEAM DETAILS

NOTE
 ALL BEAMS TO BE A MIN. OF 12" DEEP
 WITH TOP BARS AT 6" FROM TOP AND BOTTOM
 BARS AT 6" FROM EACH

2-7



SECOND FLOOR FRAMING PLAN



DEEP BEAM REINFORCEMENT - SECOND FLOOR

NOTE
 ALL DIMENSIONS SHOWN IN THIS
 DRAWING SHALL BE TAKEN FROM THE
 CENTERLINE UNLESS OTHERWISE NOTED

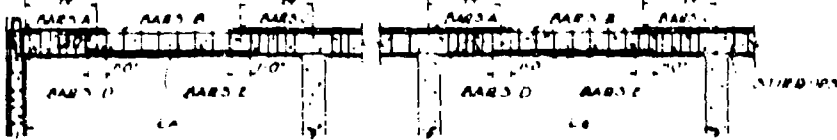
ALL DIMENSIONS
 UNLESS OTHERWISE
 SPECIFIED
 SHALL BE IN FEET
 AND INCHES

2

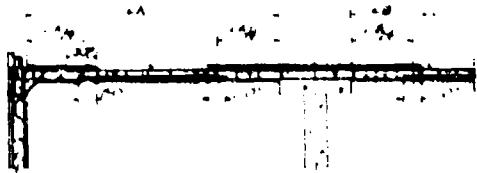
AMMANN & WHITNEY 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS HEADQUARTERS OF THE DISTRICT OF COLUMBIA WASHINGTON, D. C.	
DRAWN BY D.M. V.S. CHECKED BY O.P. DATE 8-18-51		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT	
APPROVED BY DATE 8-18-51		THE CHIEF OF ENGINEERS OFFICE OF THE CHIEF OF ENGINEERS HEADQUARTERS OF THE DISTRICT OF COLUMBIA WASHINGTON, D. C.	
DATE 8-18-51		SHEET 7 OF 8	

BEAM SCHEDULE

BEAM NO.	SIZE	D	A	B	C	D	E	SPAN AT WALL	SPAN AT COL
101	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
102	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
103	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
104	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
105	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
106	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
107	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
108	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
109	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
110	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
111	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
112	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
113	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
114	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
115	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
116	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
117	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
118	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
119	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
120	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
121	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
122	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
123	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
124	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
125	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
126	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
127	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
128	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
129	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
130	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
131	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
132	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
133	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
134	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
135	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
136	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
137	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
138	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
139	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
140	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
141	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
142	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
143	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
144	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
145	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
146	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
147	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
148	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
149	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
150	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
151	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
152	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
153	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
154	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
155	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
156	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
157	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
158	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
159	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
160	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
161	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
162	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
163	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
164	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
165	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
166	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
167	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
168	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
169	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
170	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
171	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
172	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
173	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
174	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
175	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
176	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
177	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
178	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
179	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
180	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
181	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
182	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
183	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
184	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
185	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
186	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
187	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
188	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
189	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
190	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
191	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
192	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
193	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
194	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
195	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
196	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
197	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
198	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
199	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'
200	12" x 16"	16'	0'	0'	0'	0'	0'	12'	12'

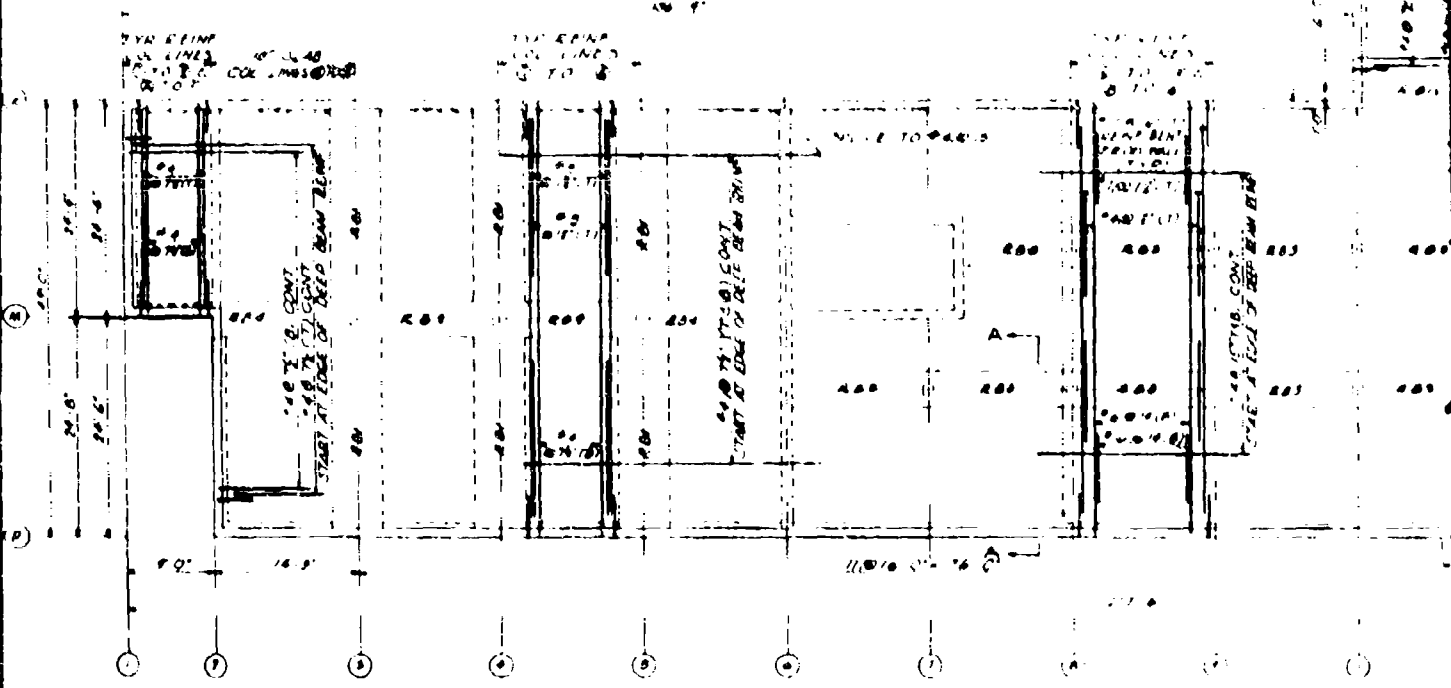


TYPICAL EXTERIOR BEAM DETAILS TYPICAL INTERIOR BEAM DETAILS

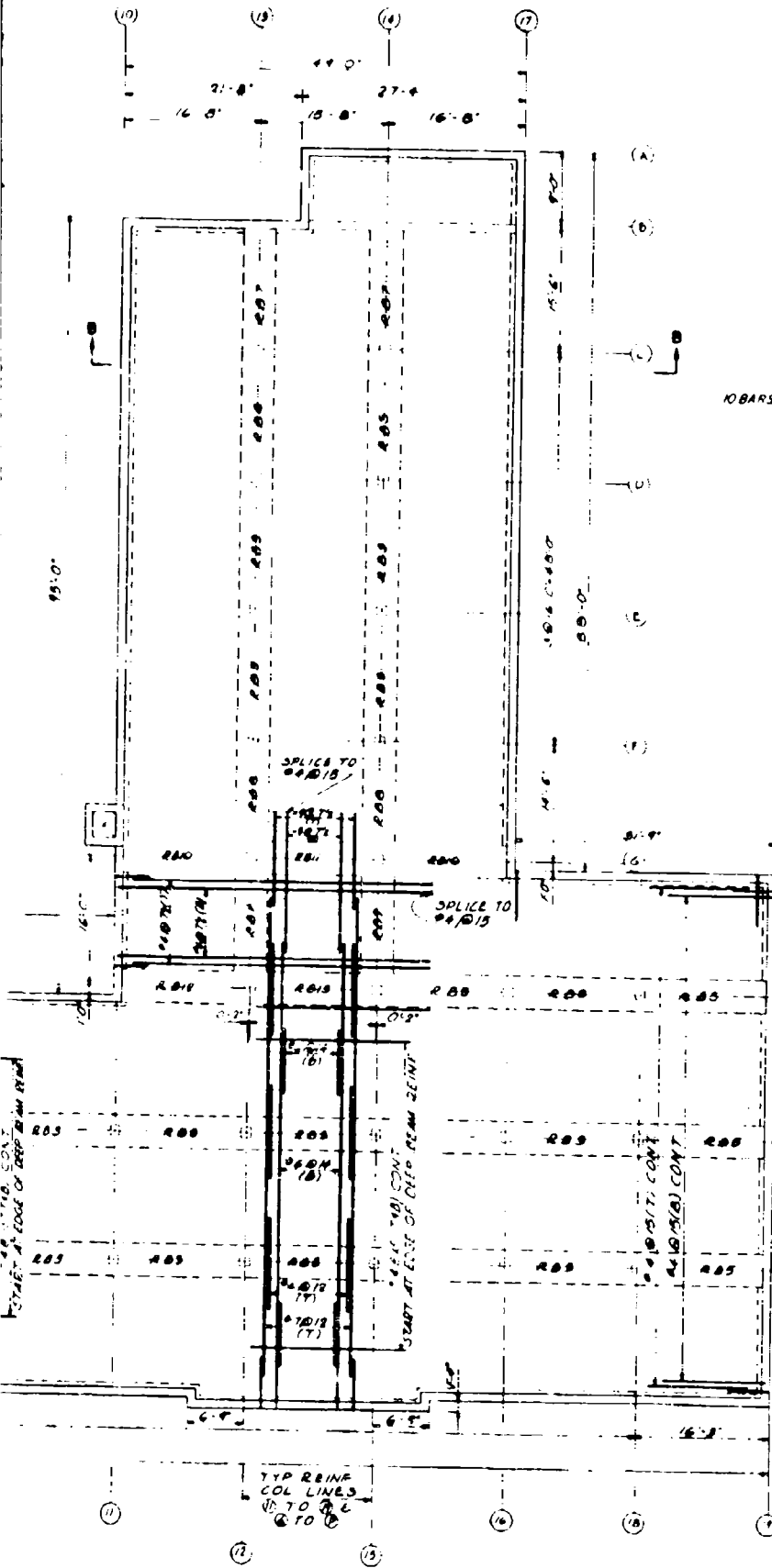


TYPICAL SLAB DETAILS

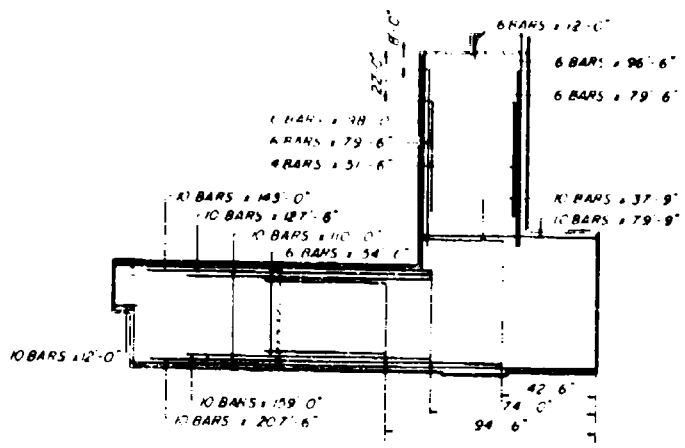
- NOTES:
- 1. FOR BEAMS & SLABS ALL BEING CASTED TO BE A MINIMUM OF 30 MPA AT 60°C IN SLAB.
 - 2. FOR BEAMS AND ALLOWABLE STRENGTH TO BE 100.
 - 3. FOR SLABS SUPPORTED ON THREE OR FOUR SIDES USE L FOR THE SHORT SPAN.
 - 4. FOR THE USE OF ANY PLAN OR SECTION SHEET 6009.



ROOF FRAMING PLAN



NOTE
 ALL REIN BARS #11 @ 5" T & B
 SEE CROSS-SECTIONS, SHEET #9



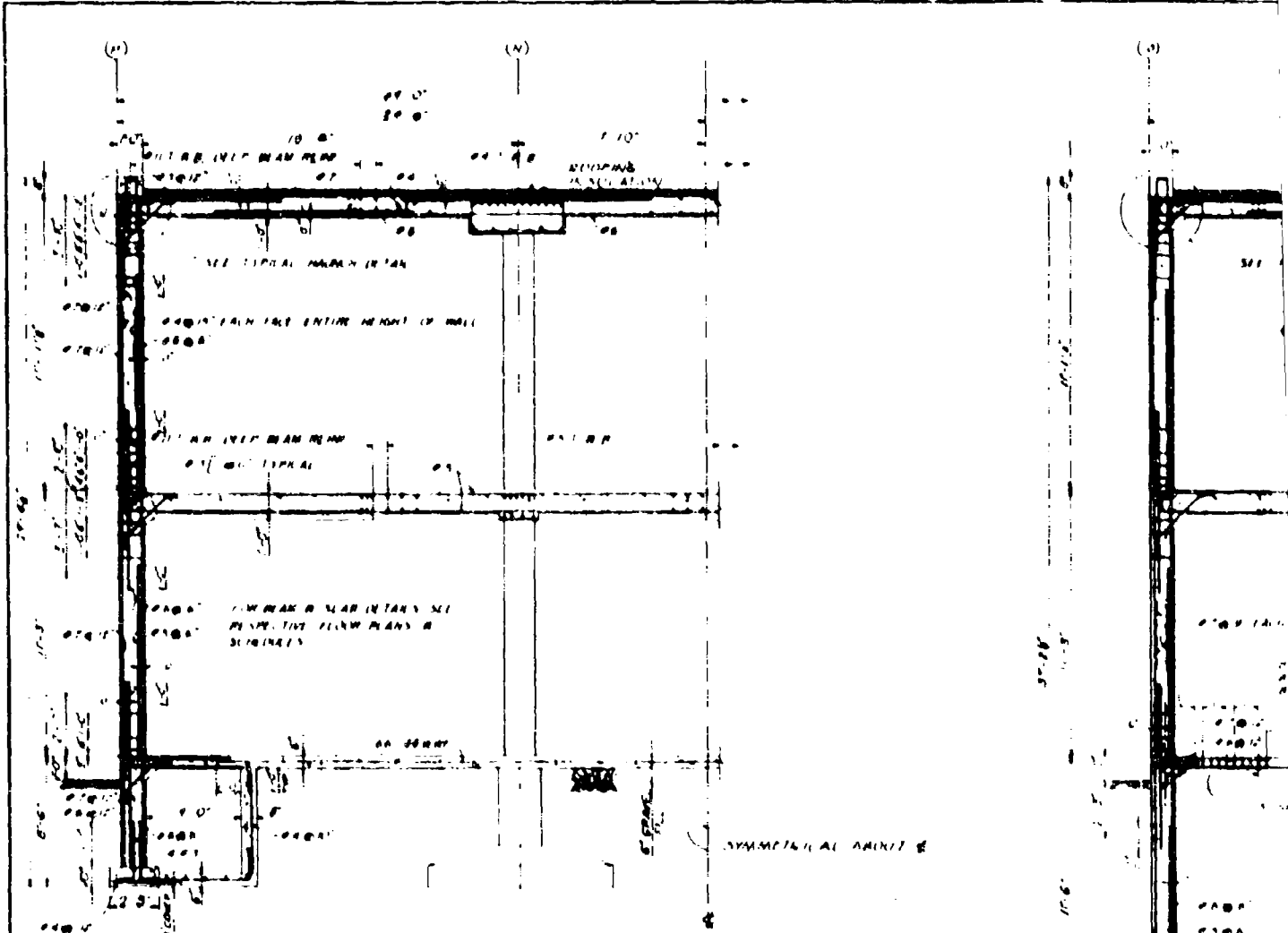
DEEP BEAM REINFORCEMENT - ROOF

NOTE. ROOF SLAB 11"
 EXCEPT AS NOTED

PLAN

2

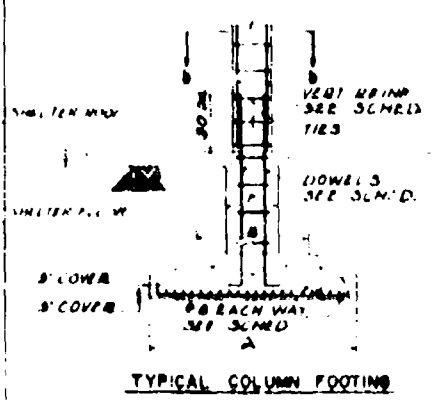
ARMANN & WHITNEY ARCHITECTS AND ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS BUREAU OF CONSTRUCTION, WASHINGTON, D. C.	
DRAWN BY CHECKED BY APPROVED BY	TITLE PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT	SCALE 1/4" = 1'-0"	SHEET NO. 60-15-01 PART 2 OF 2



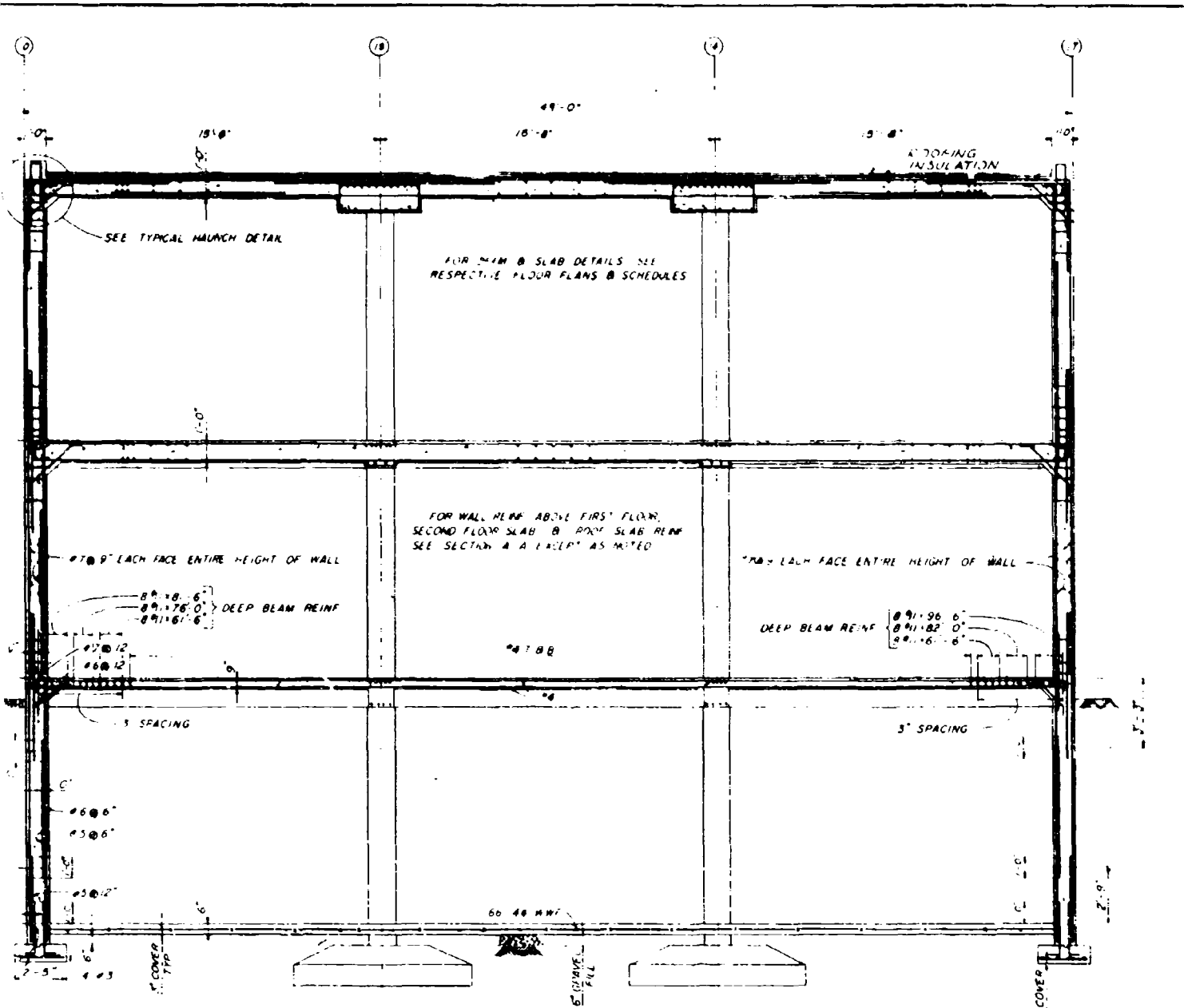
SECTION A-A
SCALE 1/4" = 1'-0"

COLUMN & COLUMN FOOTING SCHEDULE

MARK NO.	BA, SA, MA	1ST FL. 1ST FLOOR 2ND FL. 2ND FLOOR 3RD FL. 3RD FLOOR	1ST FL. 1ST FLOOR 2ND FL. 2ND FLOOR 3RD FL. 3RD FLOOR	1ST FL. 1ST FLOOR 2ND FL. 2ND FLOOR 3RD FL. 3RD FLOOR	1ST FL. 1ST FLOOR 2ND FL. 2ND FLOOR 3RD FL. 3RD FLOOR	FIN. FLOOR
R200						
SIZE VERT REIN	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	
2ND FL.						
SIZE VERT REIN	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	
3RD FL.						
SIZE VERT REIN	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	1'-0" x 1'-0" 8-#8	
BASEMENT FL.						
DOWELS	8-#8	8-#8	8-#8		8-#8	
FOOTINGS	A B C D E	7'-0" 6'-0" 6'-0" 6'-0" 6'-0"	8'-0" 8'-0" 8'-0" 8'-0" 8'-0"	8'-0" 8'-0" 8'-0" 8'-0" 8'-0"	8'-0" 8'-0" 8'-0" 8'-0" 8'-0"	8'-0" 8'-0" 8'-0" 8'-0" 8'-0"
REINFC EACH WAY	35-#8	31-#8	33-#8	COMBINED FOOTING	33-#8	20-#8

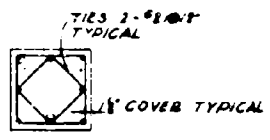


TYPICAL COLUMN FOOTING

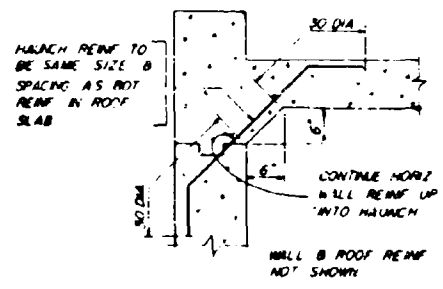


SECTION B-B
SCALE: 1/4" = 1'-0"

NOTE
 CONCRETE COVER TO REINFORCING BARS IS AS FOLLOWS EXCEPT AS NOTED:
 BEAMS 2"
 FLOOR SLABS 1 1/2"
 EXTERIOR WALLS 2" OVER 10# 1 1/2" OVER 10#
 INTERIOR WALLS 1 1/2"



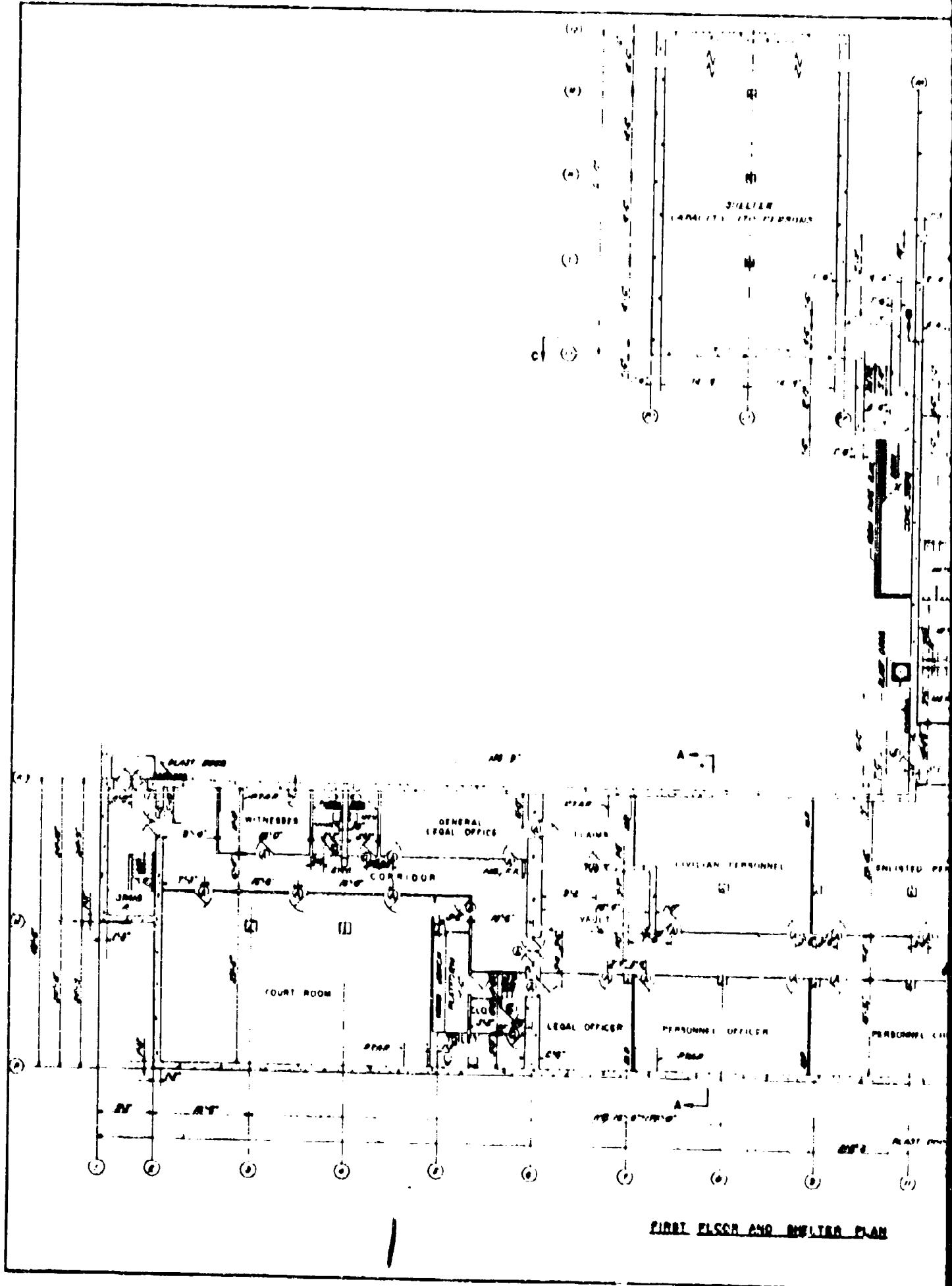
SECTION B-B



TYPICAL HAUNCH DETAIL
SCALE: 1/4" = 1'-0"

DESIGNED BY D. H. J. S.	DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.
CHECKED BY G. P.	PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 20 PSI BLAST RESISTANT
DATE 6-4-58	AS NOTED 60-16-01 SHEET 2 OF 2

2



FIRST FLOOR AND SHELTER PLAN

DESIGN CONDITIONS

Design Procedure
As according with ACE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
Peak initial pressure = 30psi Duration = 1.05 sec

Blast Loading on Roof
Peak pressure = 30psi Duration = 1.05 sec

Blast Loading on Walls
Peak pressure = 30psi Duration = 1.05 sec

Nuclear Radiation Protection for Shelter Area
Total gamma and neutron attenuation to 5% for a 20kT weapon at any position which will produce a peak blast pressure equal to 30psi

Strength of Materials	Stalls	Blast Design
Soil bearing capacity	8,000psf	45,000psf
Concrete, f _c	4,000psi	5,500psi
Reinf. steel, lower yield	47,700psi	52,000psi
Int. Grade, ASTM A36 S3T1		
Structural steel, lower yield	35,000psi	41,600psi
(ASTM A7 S3T)		
*rated capacity of soil		

Allowable Stresses and Deflections
Rein. walls, columns and lintels designed for plastic deformation under design blast load. Blast doors designed for maximum elastic deformation under design blast load.

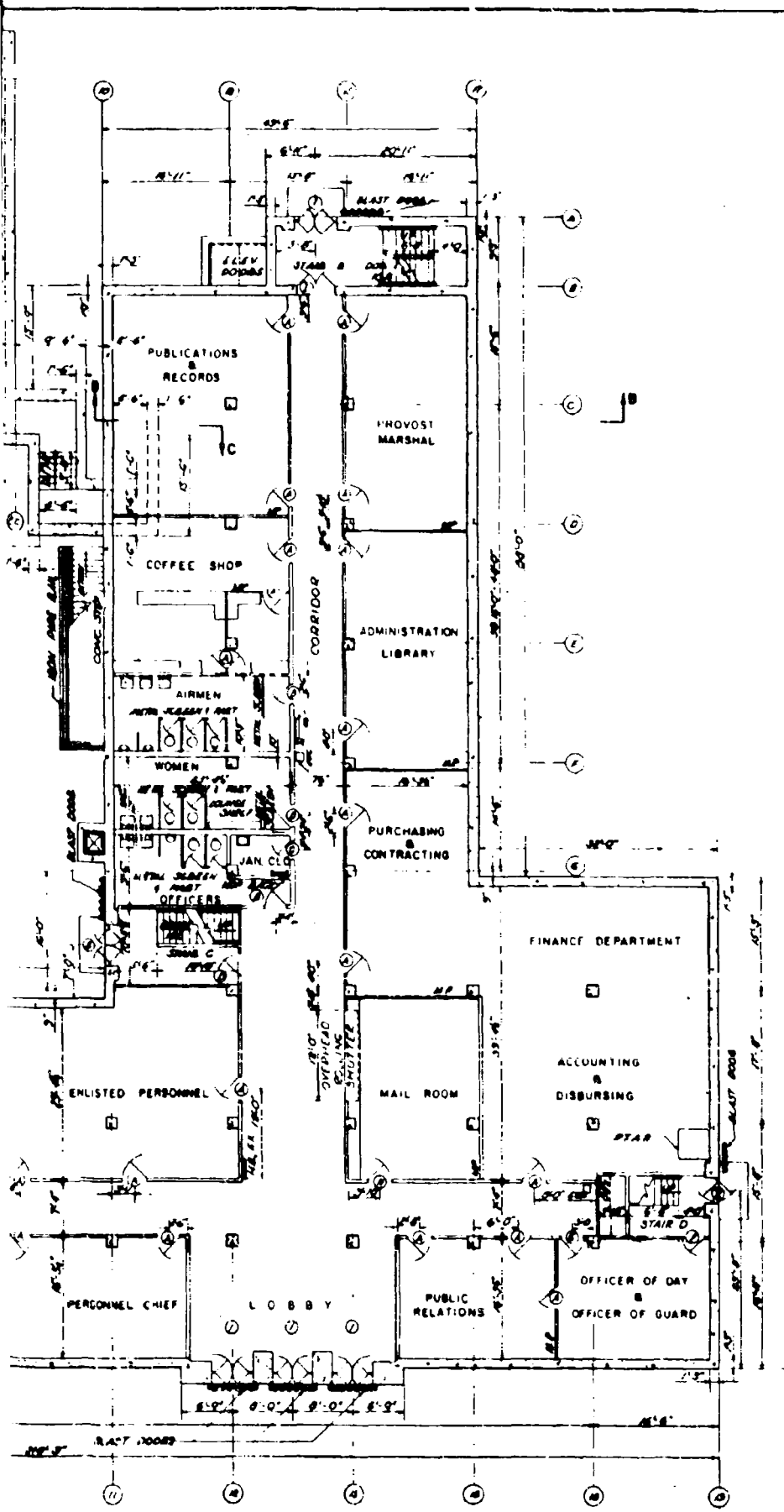
General Notes
1. The following features are not shown and shall be determined to suit use requirements:
Mechanical and electrical equipment
Air locks and decontamination facilities
2. This design study is based upon Dept. of the Air Force definitive Drawing No. 30 DE 08, Westover AFB Drawing No. 30-12-02

ABBREVIATIONS

CLO	CLOSET
CONC	CONCRETE
ELEV	ELEVATOR
EWC	ELECTRIC WATER COOLER
FIN	FINISHED
FE	FIRE EXTINGUISHER
HQ	HQS. RACK
MP	MOVABLE PARTITION
MBT	PARTITION
PTAP	Pipe TRENCH ACCESS PANEL
R	RISERS

MATERIAL LEGEND

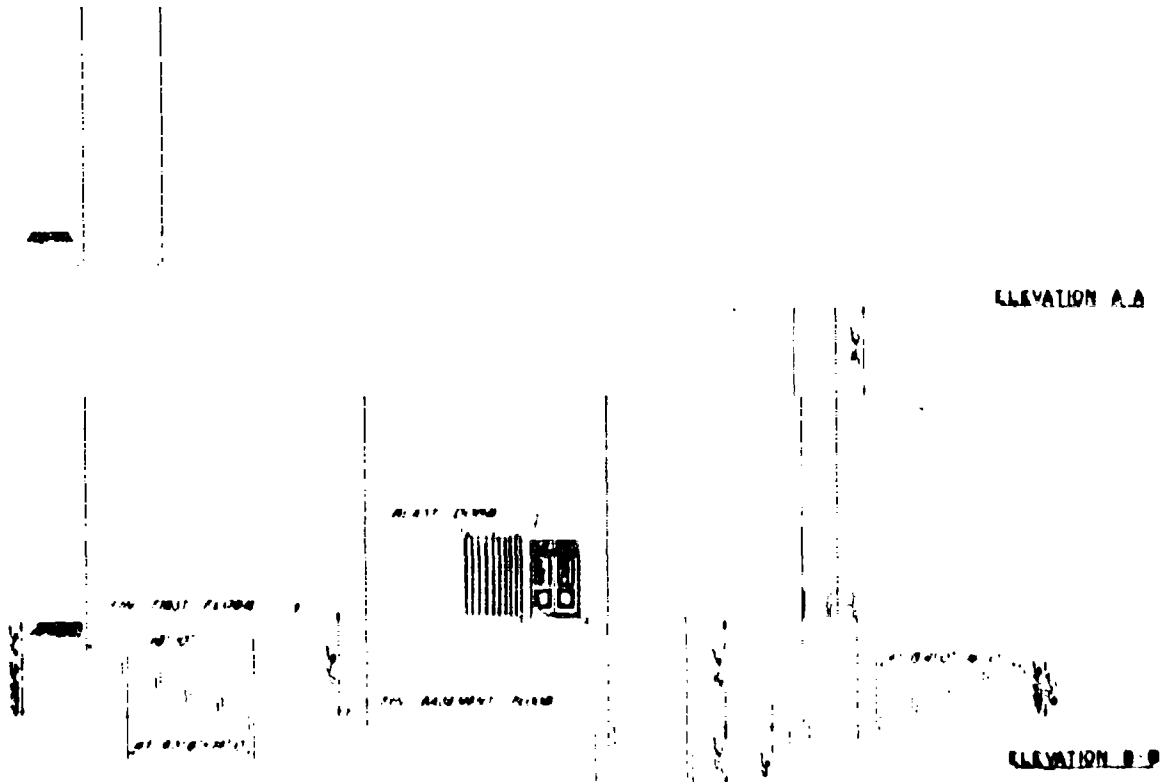
	CONCRETE
	WOOD STUD PARTITION
	MOVABLE PARTITION



AMMANN & WHITNEY 111-8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS HEADQUARTERS, WASHINGTON, D. C.	
PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 30 PSI BLAST RESISTANT			
DRAWN BY CHECKED BY DATE	PROJECT NO. SHEET NO.	SCALE 1/4" = 1'-0"	DATE 60-16-01
1 OF 3		2	

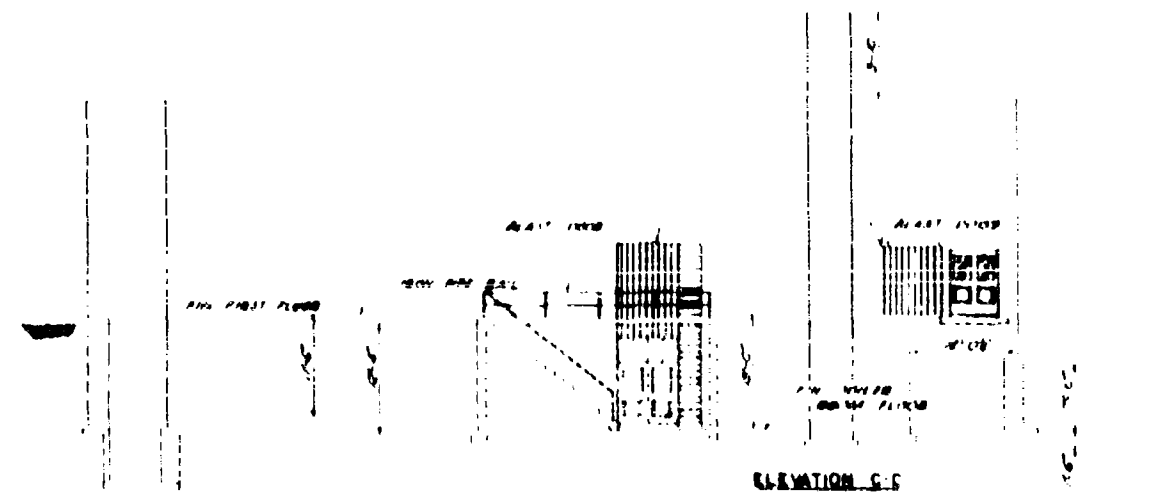
ER PLAN

ELEVATION A-B

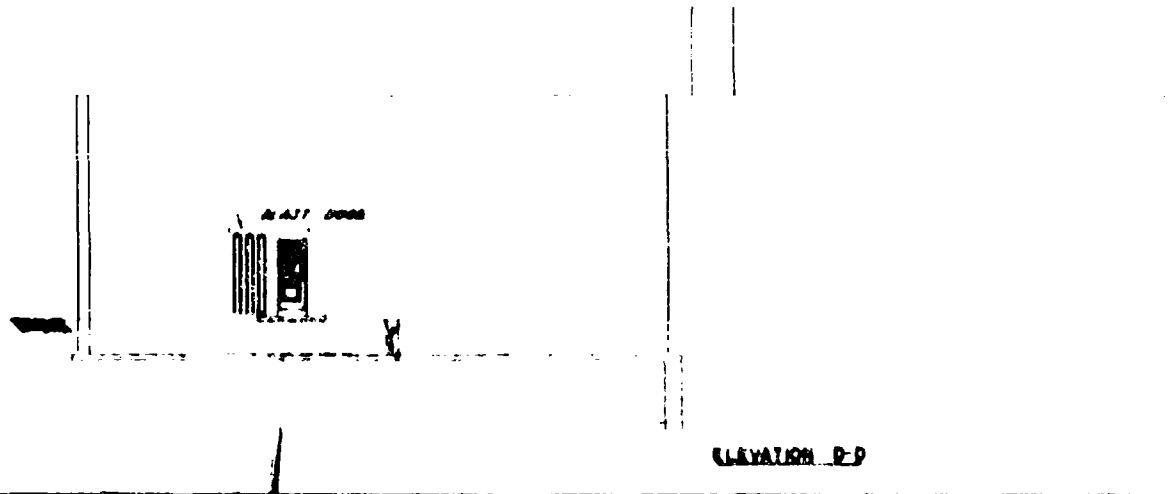


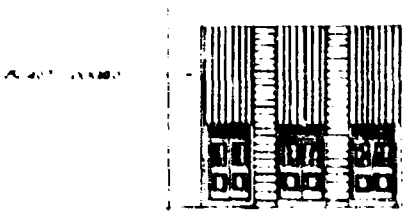
ELEVATION B-B

ELEVATION C-C



ELEVATION D-D





TOP OF ROOF
 FIN SECOND FLOOR
 FIN FIRST FLOOR
 GROUND LINE

SECTION A-A

SECTION A-A

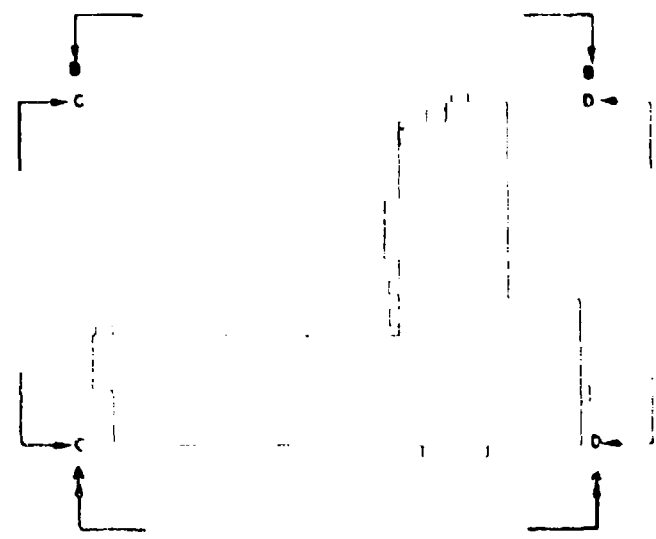
TOP OF ROOF
 FIN SECOND FLOOR
 FIN FIRST FLOOR
 GROUND LINE

SECTION B-B

SECTION B-B

TOP OF ROOF
 FIN SECOND FLOOR
 FIN FIRST FLOOR
 GROUND LINE

SECTION C-C

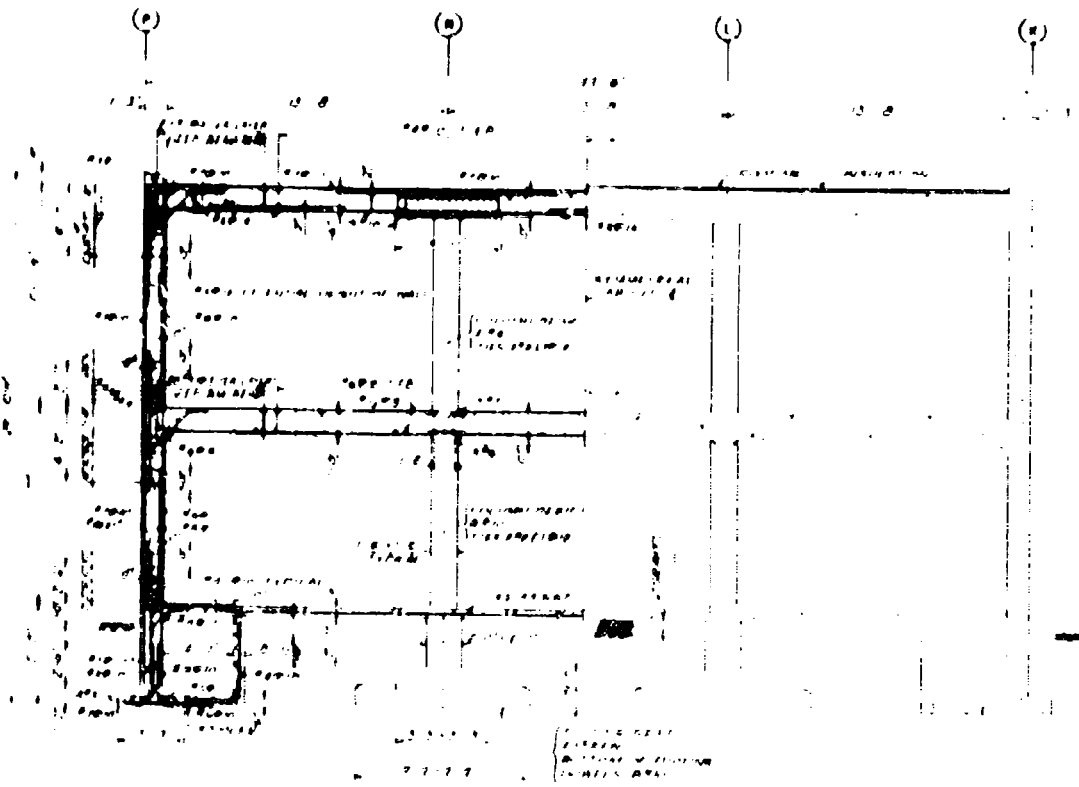


TOP OF ROOF
 FIN SECOND FLOOR
 FIN FIRST FLOOR
 GROUND LINE
 FIN BASEMENT FLOOR

SECTION D-D

2

AMMANN & WHITNEY <small>ENGINEERS ARCHITECTS</small> 111 5TH AVENUE, 10TH FLOOR, N. Y.		DEPARTMENT OF THE <small>ARMY</small> ENGINEERING CENTER <small>WASHINGTON, D. C.</small>	
PROJECT NO. DRAWING NO. DATE:		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 50 PSI BLAST RESISTANT	
SHEET NO. OF SHEETS		DRAWING SCALE: 1" = 12'-0" 80-16-01 SHEET 2 OF 3	

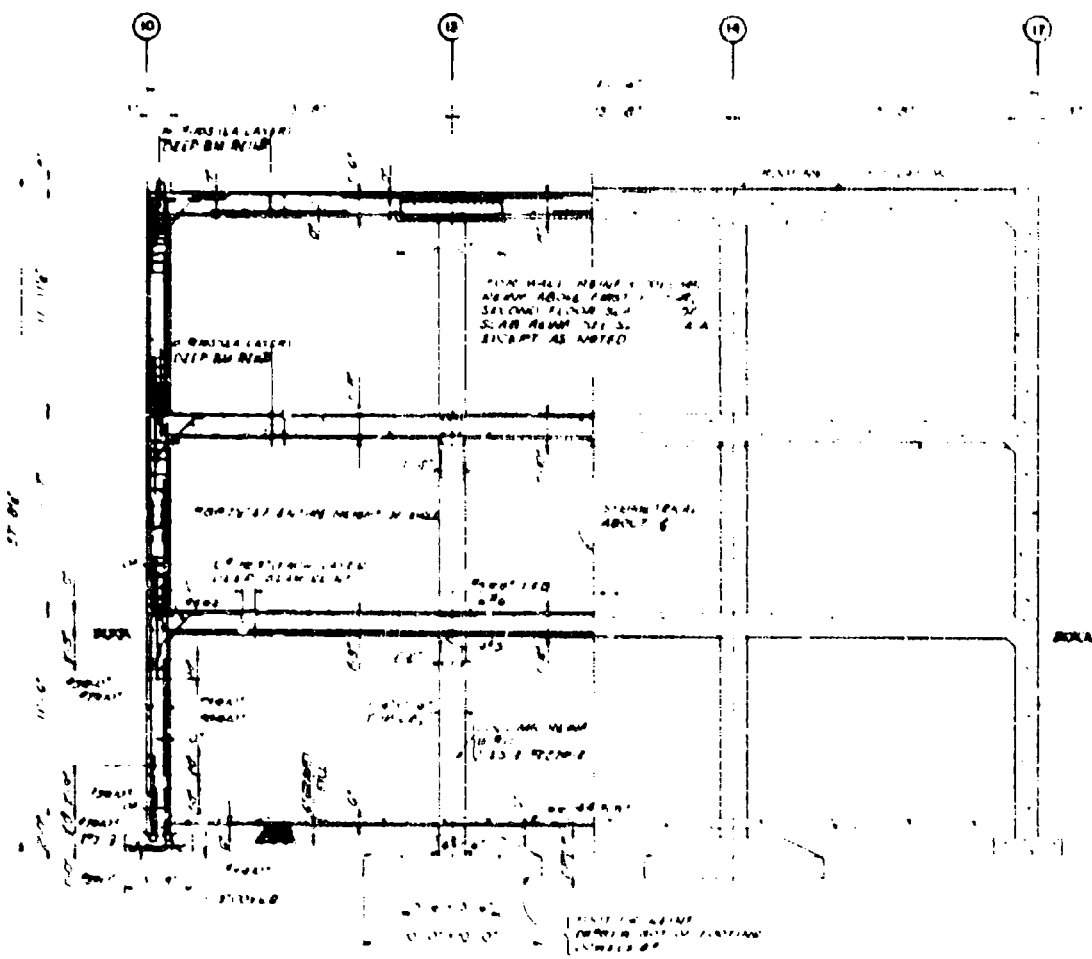


SECTION A-A



SECTION C-C

1



SECTION B-B

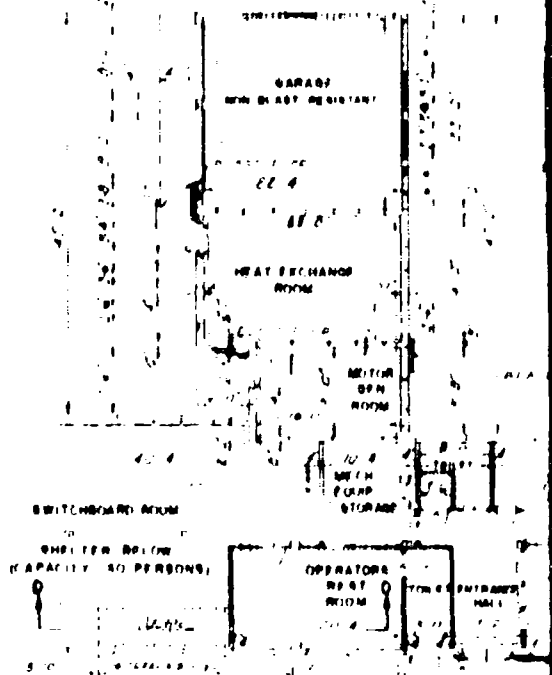
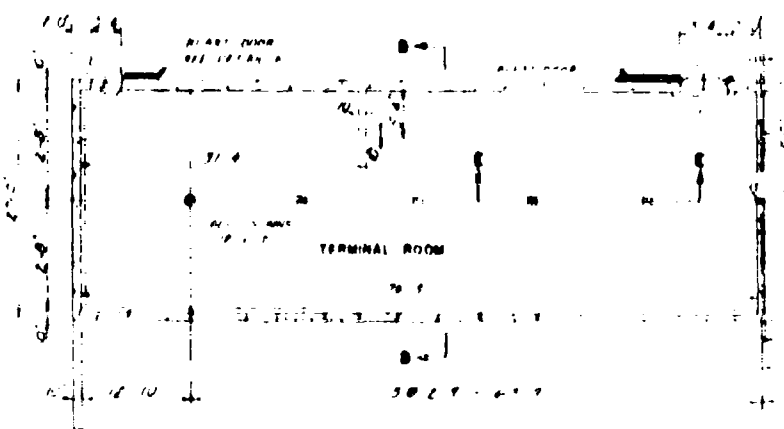
NOTE

- CONCRETE COVER TO REINFORCING SHALL BE AS NOTED
- STEEL DECK ABOVE FLOOR SLAB
- SLAB ABOVE FLOOR SLAB
- SLAB AS NOTED
- EXTERIOR WALLS 1/2" OUTSIDE TOL
- INTERIOR WALLS 1/2" INSIDE TOL

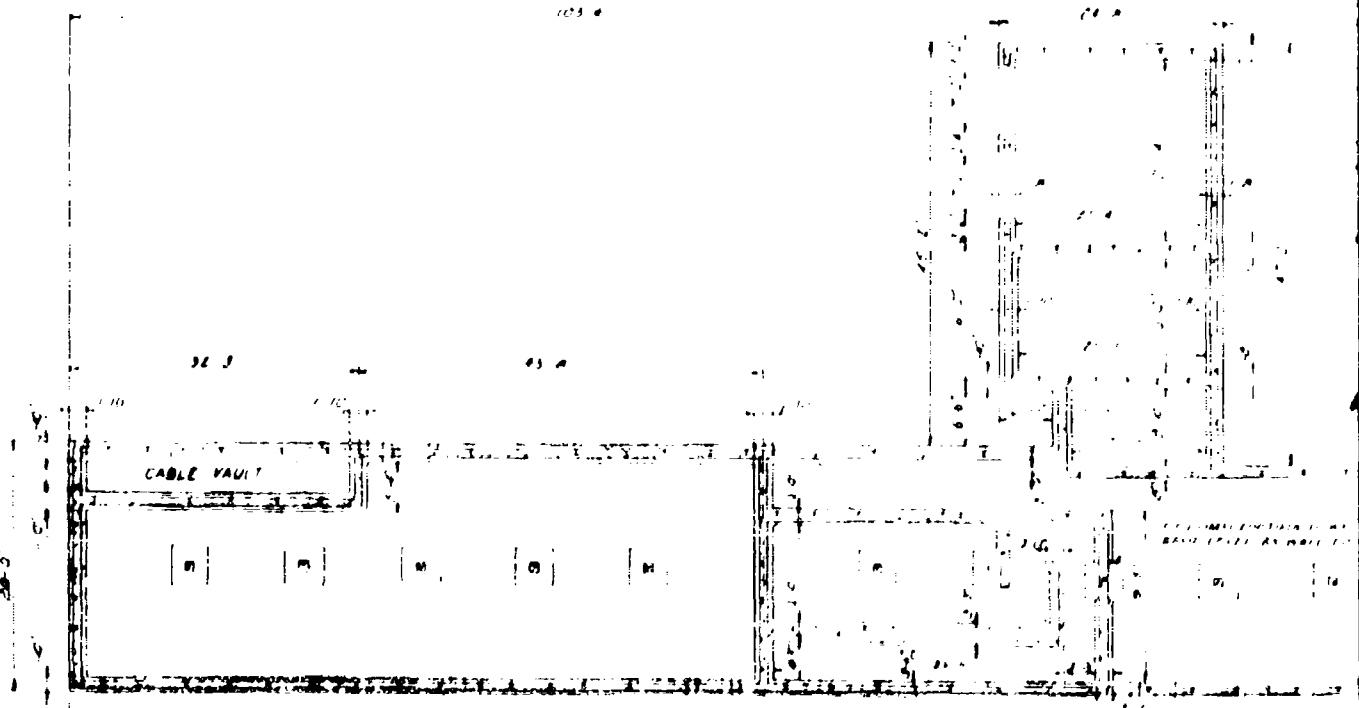
2

AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS BULWARK (CHIEF OF ENGINEERS) & VESSEL SECTION 3	
DRAWN BY CHECKED BY APPROVED BY DATE		PROTECTIVE CONSTRUCTION ADMINISTRATION BUILDING 30 PSI BLAST RESISTANT	
DATE: 08 1950		SHEET 3 OF 3	

NOTE
SEE SHEET NO. 5
FOR CABLE RENEWALS

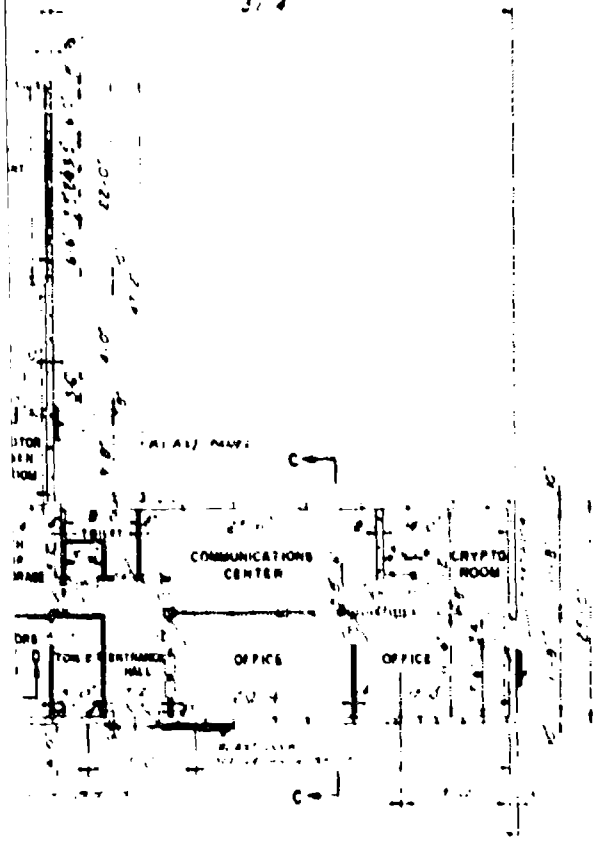


FLOOR PLAN



FOUNDATION PLAN

314



DESIGN CONDITIONS

Design Practices

Design practices shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

Design Blast Wave

Design blast wave shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

Blast Loading on Roof

Blast loading on roof shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

Blast Loading on Walls

Blast loading on walls shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

Nuclear Radiation Protection for Shelter Area

Design practices shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

Strength of Materials

Strength of Materials	Steel	Steel Design
Yield Strength	50 ksi	50 ksi
Tensile Strength	60 ksi	60 ksi
Modulus of Elasticity	29,000 ksi	29,000 ksi
Welding Electrode	E70XX	E70XX
Welding Process	Shielded Metal Arc Welding	Shielded Metal Arc Welding

Allowable Stresses and Deflections

Allowable stresses and deflections shall conform with the provisions of the American Institute of Steel Construction, Inc. Specification for Structural Steel Buildings, 1989 Edition.

General Notes

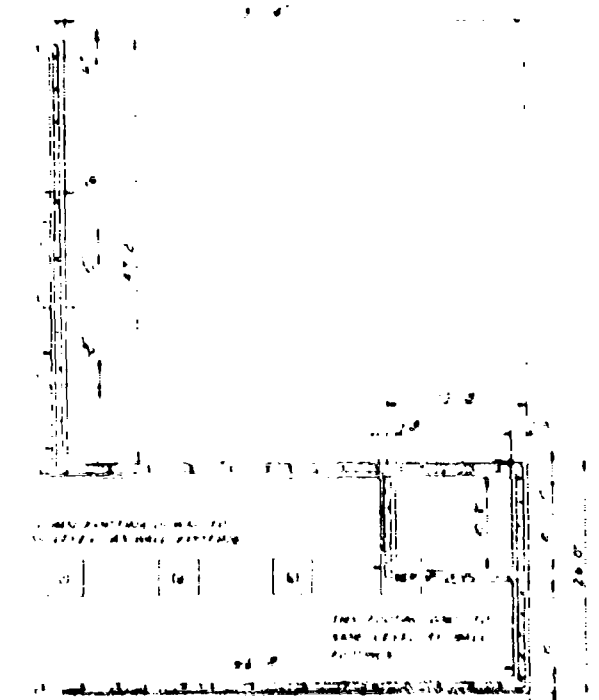
1. This drawing is for the design of the structure only. It does not include the design of the equipment to be housed in the structure.

2. All dimensions are in feet and inches.

3. The structure shall be designed for a blast resistance of 10 PSI.

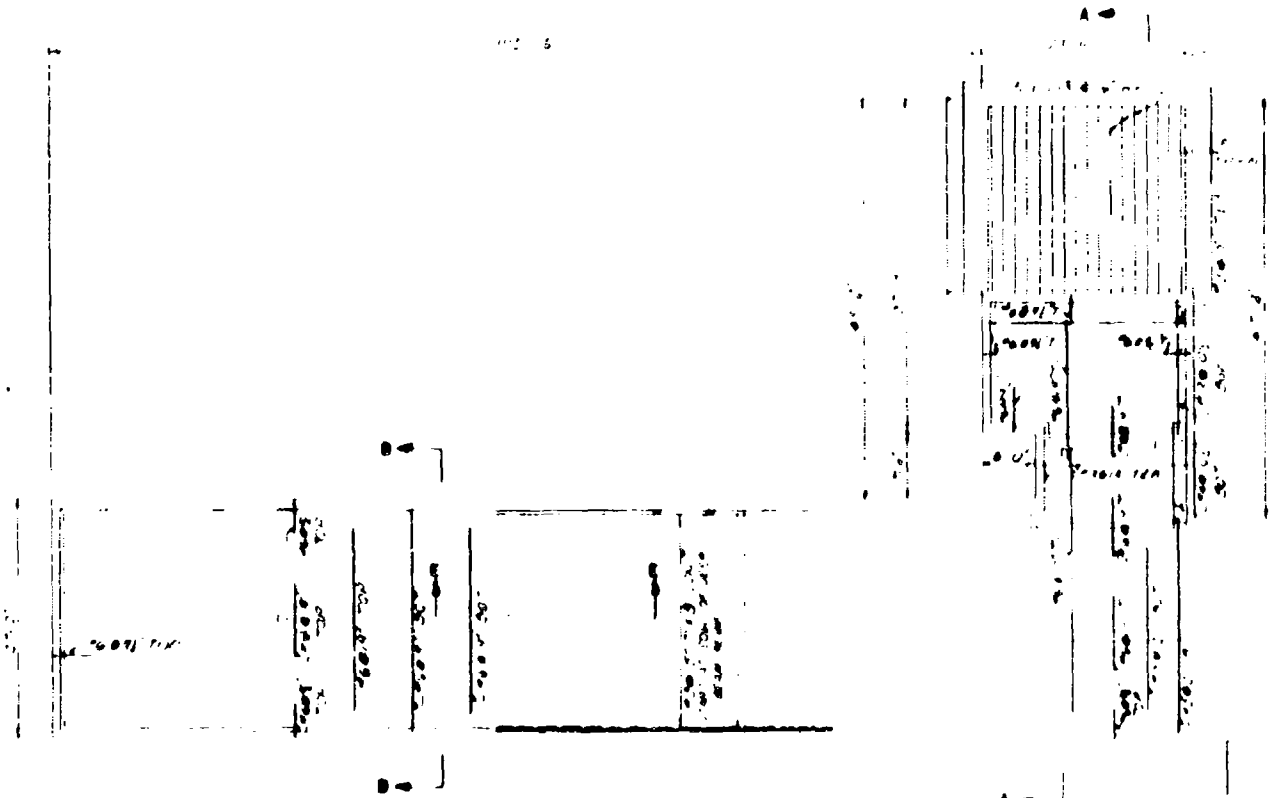
4. The structure shall be designed for a blast resistance of 10 PSI.

DATE: 10/10/84
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]

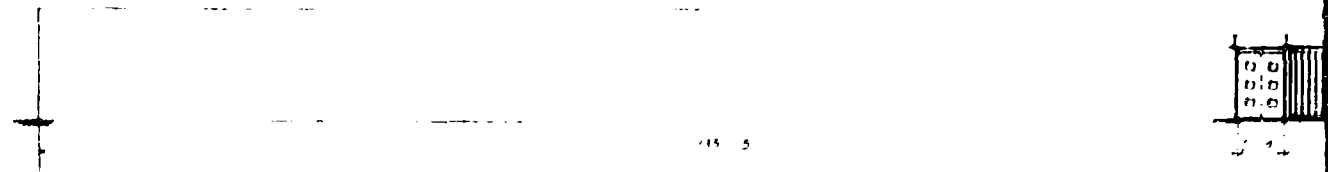


ANNMANN & WHITNEY 111 5th AVENUE, NEW YORK, N.Y.		DEPARTMENT OF THE ARMY 1115 20th ST., WASHINGTON, D.C.	
PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 10 PSI BLAST RESISTANT			
DRAWN BY: [Signature] CHECKED BY: [Signature]		DATE: 10/10/84	
PROJECT NO. 100-100		SHEET NO. 100-100	

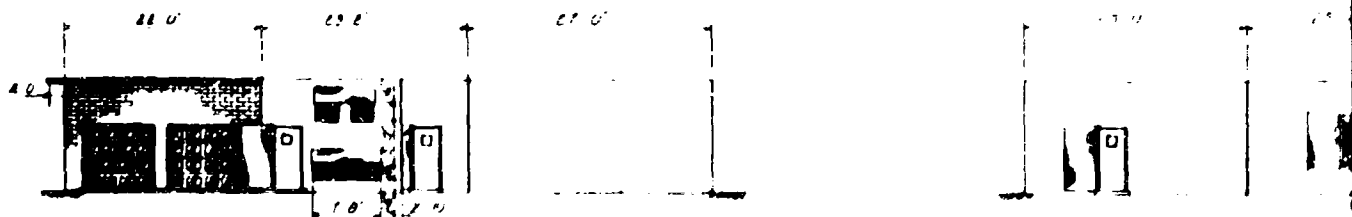
2



ROOF PLAN
SCALE 1/8" = 1'-0"

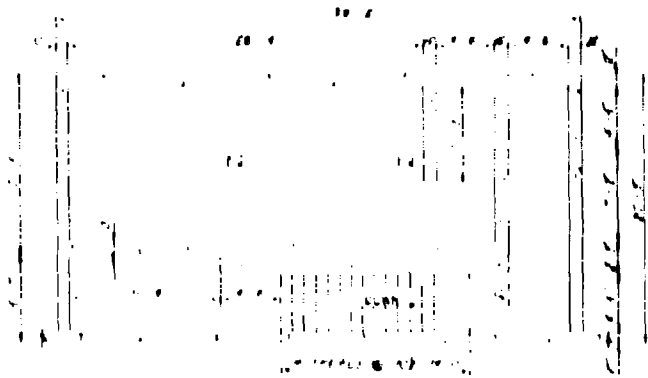


ELEVATION A
SCALE 1/8" = 1'-0"

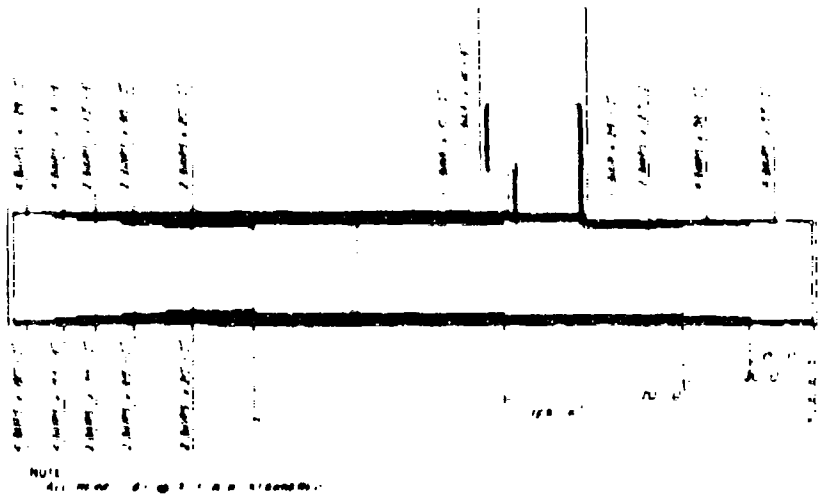
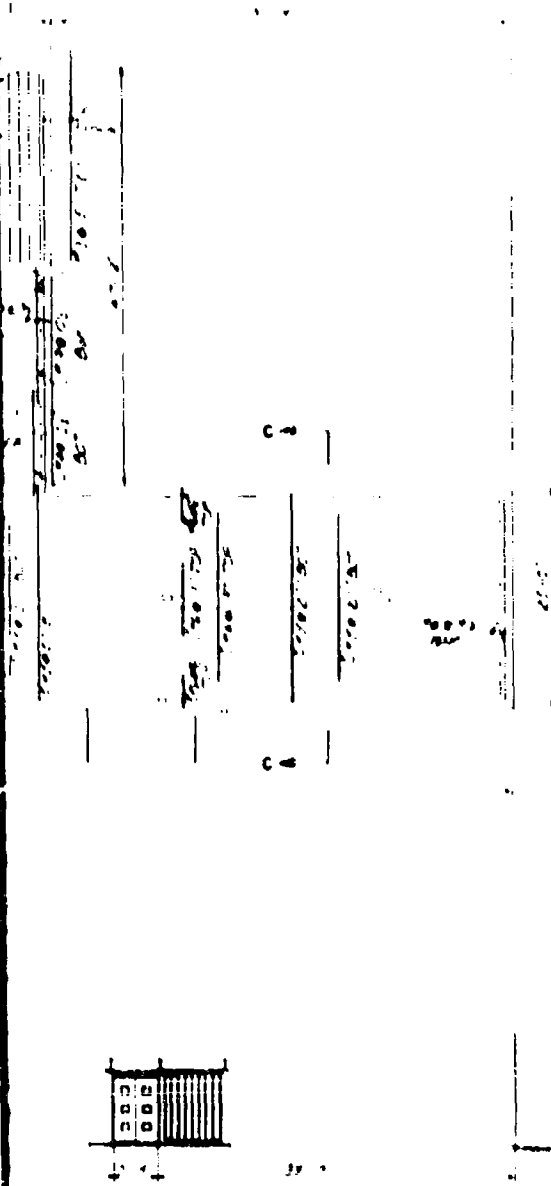


ELEVATION B
SCALE 1/8" = 1'-0"

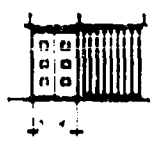
ELEVATION C
SCALE 1/8" = 1'-0"



PLAN OF SHELTER
SCALE: 1/4" = 1'-0"



ROOF SLAB
DEEP BEAM REINFORCEMENT



ELEVATION C
SCALE: 1/4" = 1'-0"

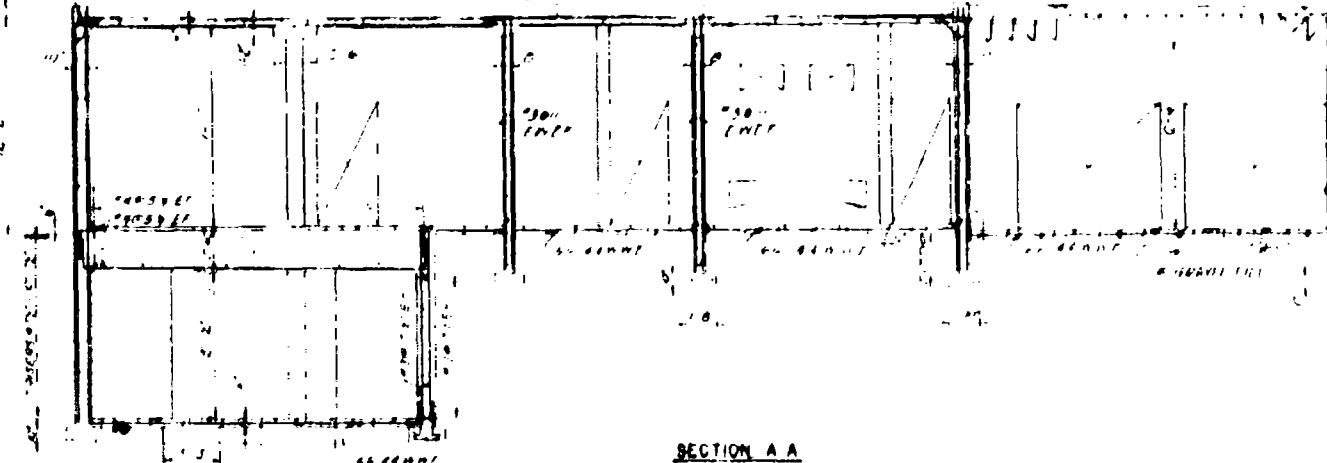
2

AMMANN & WHITNEY 111 Broadway, New York, N.Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF ENGINEER WASHINGTON, D.C.	
DRAWING NO. 100-100-100 PROJECT NO. 100-100-100		PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 10 PSI BLAST RESISTANT	
DATE OF THIS DRAWING: 10-1-50 DRAWN BY: [Signature]		CHECKED BY: [Signature] APPROVED BY: [Signature]	
60-61-83		60-61-83	

SEE PLAN OR SEE TYPICAL BEAM REIN.

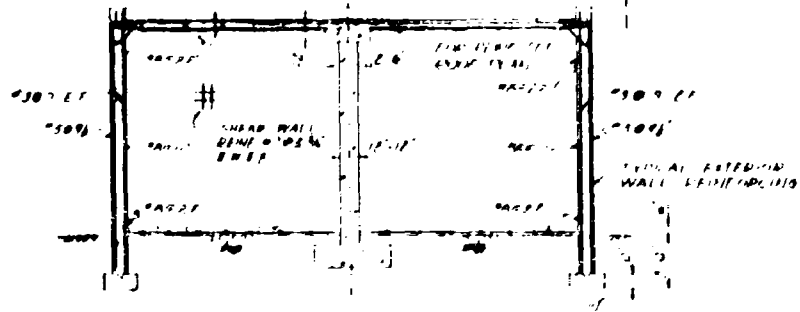
FOR ROOF REIN. SEE ROOF PLAN

SEE PLAN OR SEE TYPICAL BEAM REIN.



SECTION A A
SCALE 1/4" = 1'-0"

SEE PLAN OR SEE TYPICAL BEAM REIN.

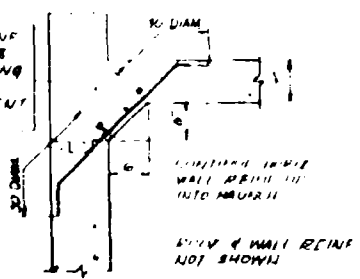


SECTION B-B & C-C
SCALE 1/4" = 1'-0"

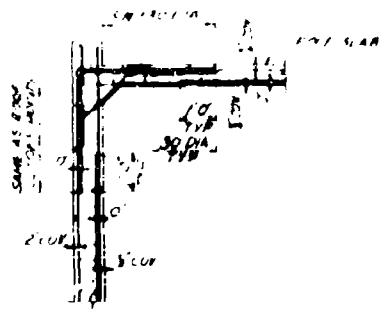


SECTION D D
SCALE 1/4" = 1'-0"

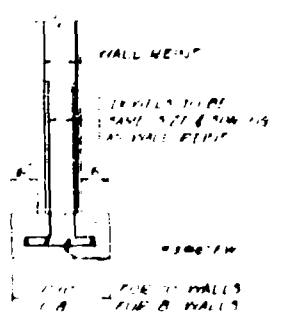
WALL REIN. TO BE SAME SIZE & SPACING AS BOTTOM REINFORCEMENT



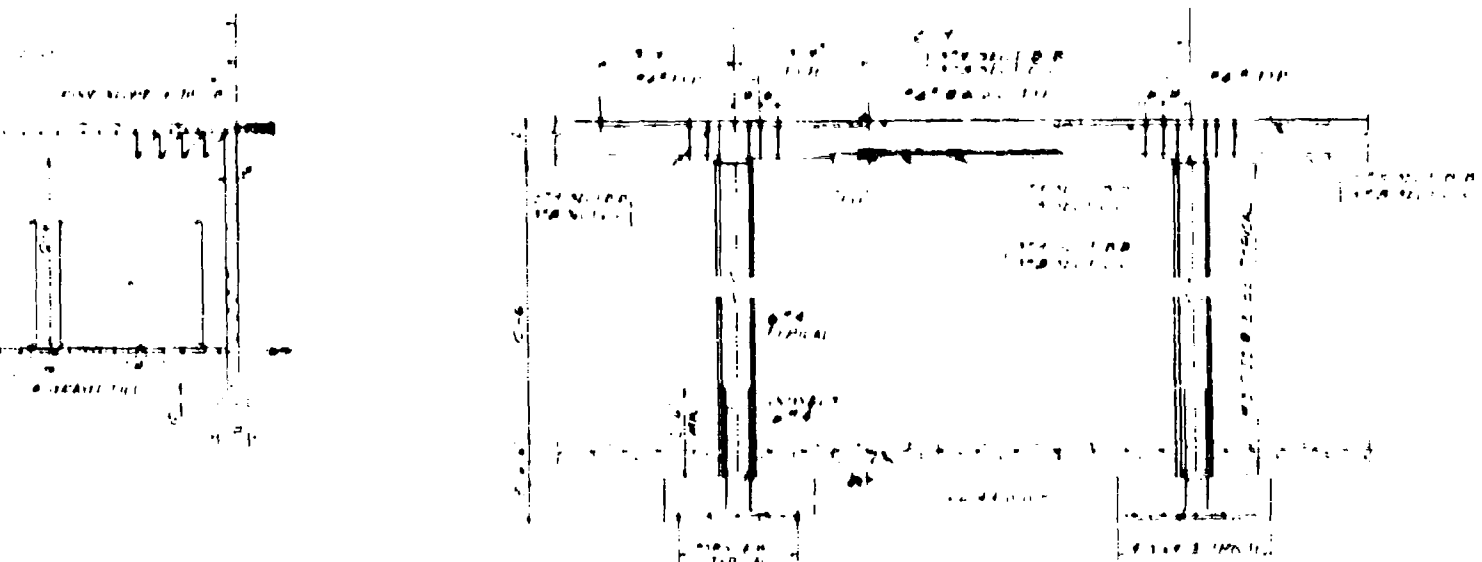
TYPICAL HAUNCH DETAIL
SCALE 1/4" = 1'-0"



TYPICAL CORNER DETAIL
SCALE 1/4" = 1'-0"



TYPICAL WALL FOOTING
SCALE 1/4" = 1'-0"



SECTION A-B
SCALE 1/4" = 1'-0"



DETAIL A
TYPICAL
SCALE 1/4" = 1'-0"

DETAIL B
TYPICAL
SCALE 1/4" = 1'-0"

NOTES:
1. ALL DOORS AND WINDOWS SHALL BE BLAST RESISTANT TO 10 PSI.
2. ALL DOORS AND WINDOWS SHALL BE 10 PSI BLAST RESISTANT.

DOOR SCHEDULE

PLAN SYMBOL	SIZE	MATERIAL
1	3'-0" x 7'-0"	STEEL
2	3'-0" x 7'-0"	STEEL
3	3'-0" x 7'-0"	STEEL
4	3'-0" x 7'-0"	STEEL
5	3'-0" x 7'-0"	STEEL
6	3'-0" x 7'-0"	STEEL
7	3'-0" x 7'-0"	STEEL
8	3'-0" x 7'-0"	STEEL
9	3'-0" x 7'-0"	STEEL
10	3'-0" x 7'-0"	STEEL

ARMANN & WHITNEY **DEPARTMENT OF THE ARMY**

111 5TH AVENUE, NEW YORK, N.Y.

PROTECTIVE CONSTRUCTION
COMMUNICATIONS BUILDING
10 PSI BLAST RESISTANT

NOV 20 1955



DESIGN CONDITIONS

Design Procedure
 The design of this building is based on the following design conditions:

Design Wind Speed
 The design wind speed is based on the following conditions:

Design Loading on Roof
 The design loading on the roof is based on the following conditions:

Design Loading on Walls
 The design loading on the walls is based on the following conditions:

Nuclear Radiation Protection for Shelter Area
 The design of this building is based on the following conditions:

Strength of Materials	Risk	Shelter Group
Concrete	High	Group 1
Steel	High	Group 1
Reinforcing Steel	High	Group 1
Structural Steel	High	Group 1
Structural Steel	High	Group 1
Structural Steel	High	Group 1

Atmospheric Processes and Diffusions
 The design of this building is based on the following conditions:

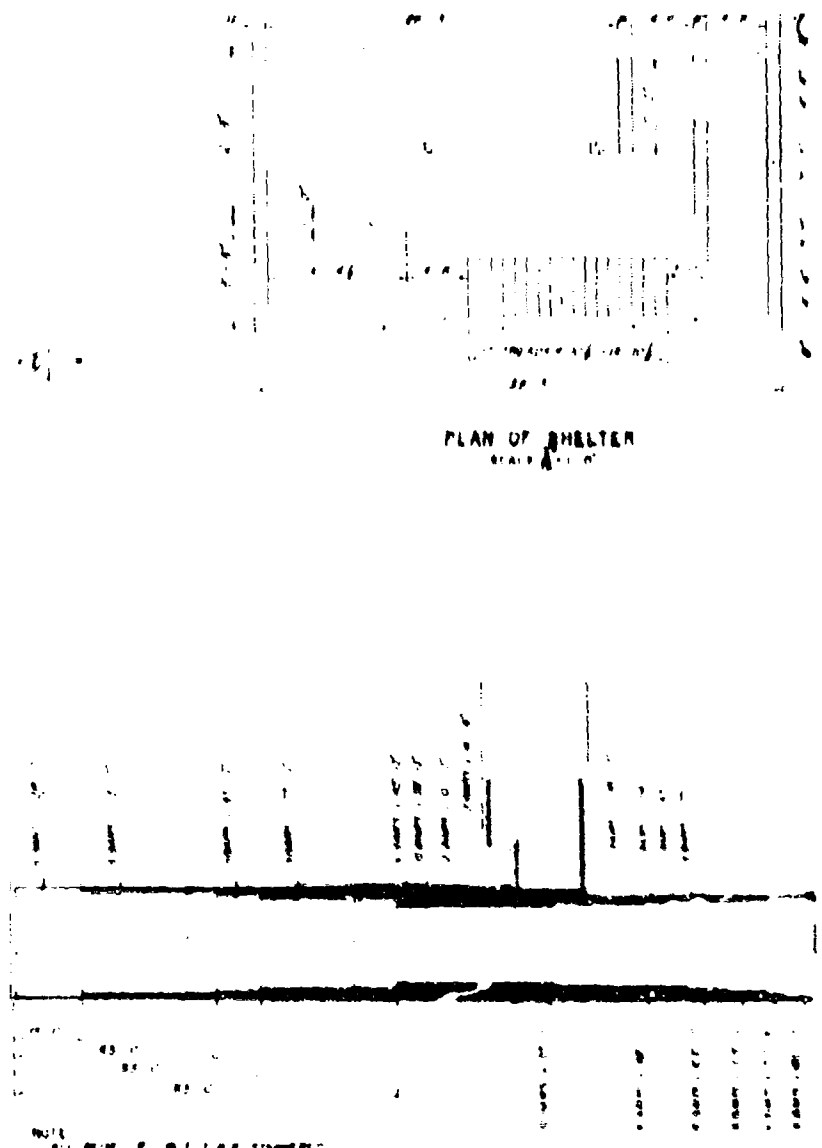
General Notes
 The design of this building is based on the following conditions:

DATE: 11/11/55
 DRAWN BY: [Name]
 CHECKED BY: [Name]

2

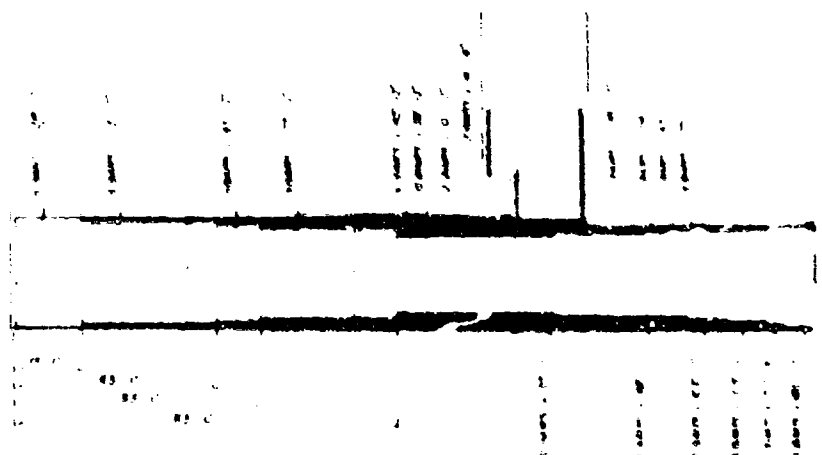
AMMANN & WHITNEY 111 5TH AVENUE NEW YORK 11		DEPARTMENT OF THE ARMY 111 5TH AVENUE NEW YORK 11	
PROJECT NO. 111-111-111 DRAWING NO. 111-111-111		PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 20 PSI BLAST RESISTANT	
APPROVED BY: [Signature] DATE: 11/11/55		APPROVED BY: [Signature] DATE: 11/11/55	

PLAN OF SHELTER

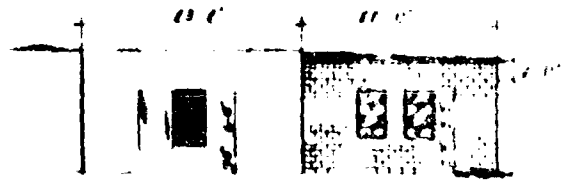


NOTE: ALL BEAMS TO BE 18" x 24" CONCRETE

DEEP BEAM REINFORCEMENT

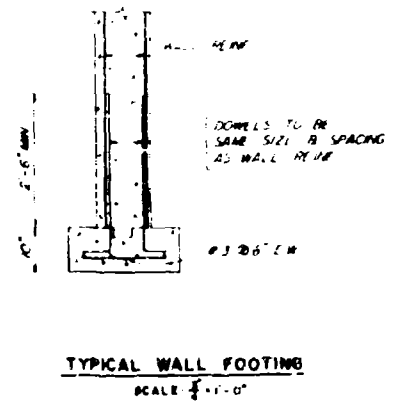
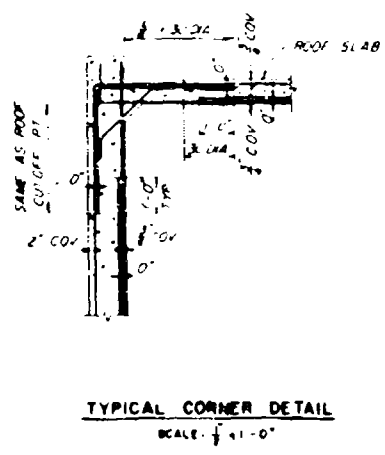
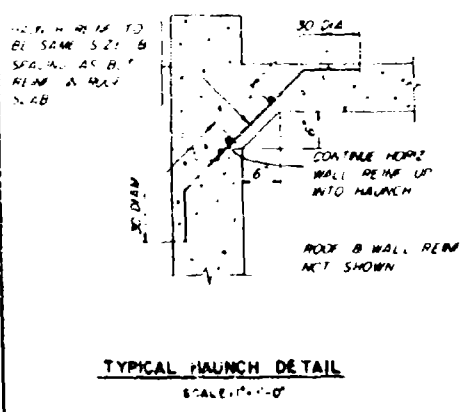
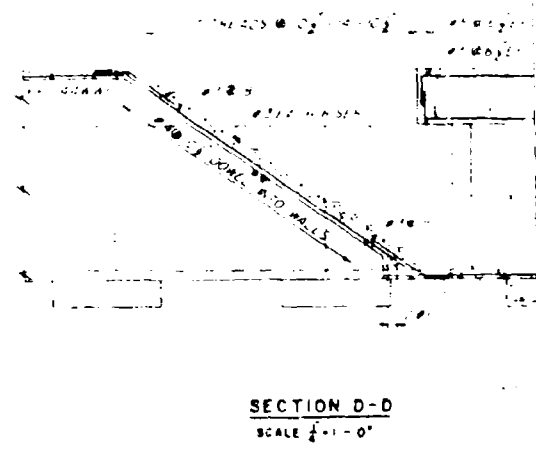
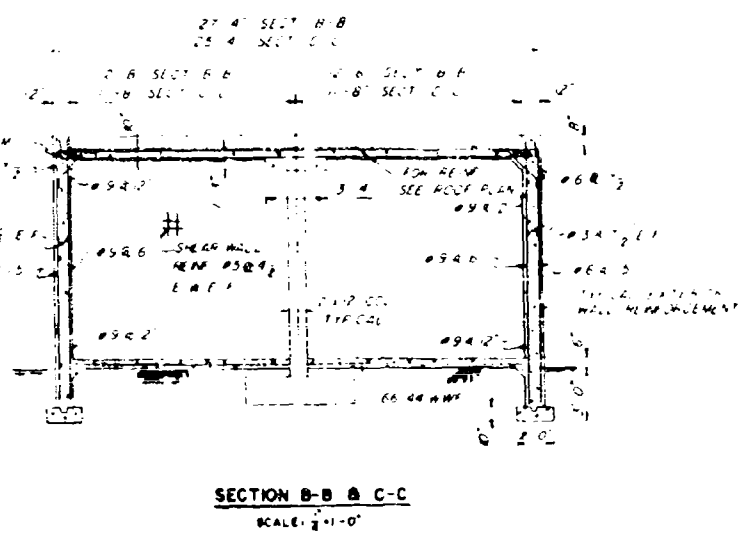
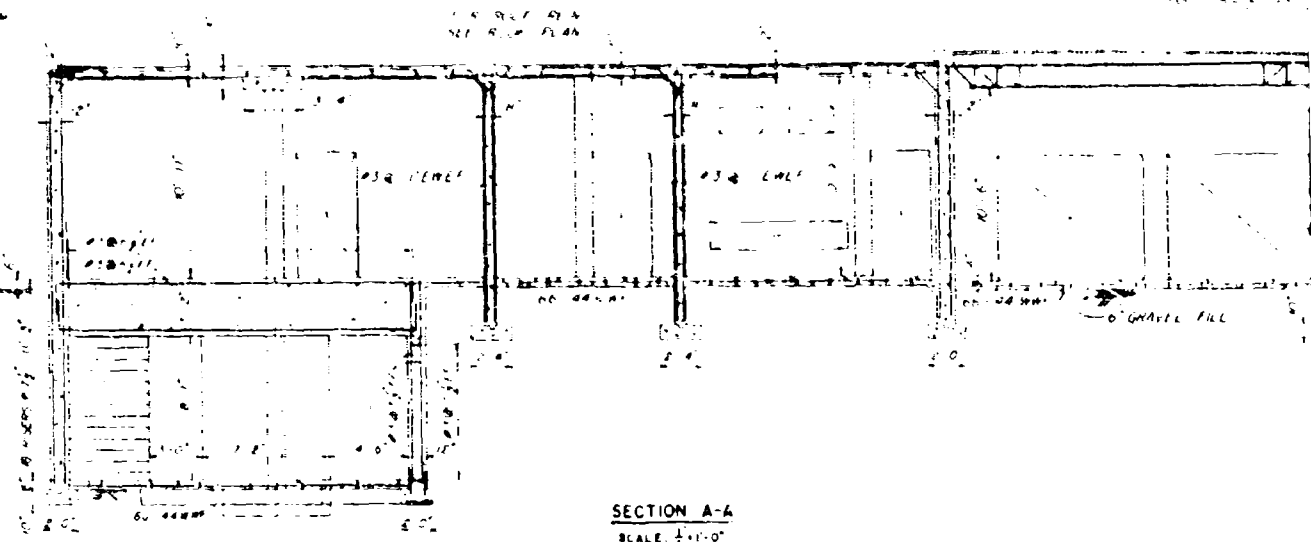


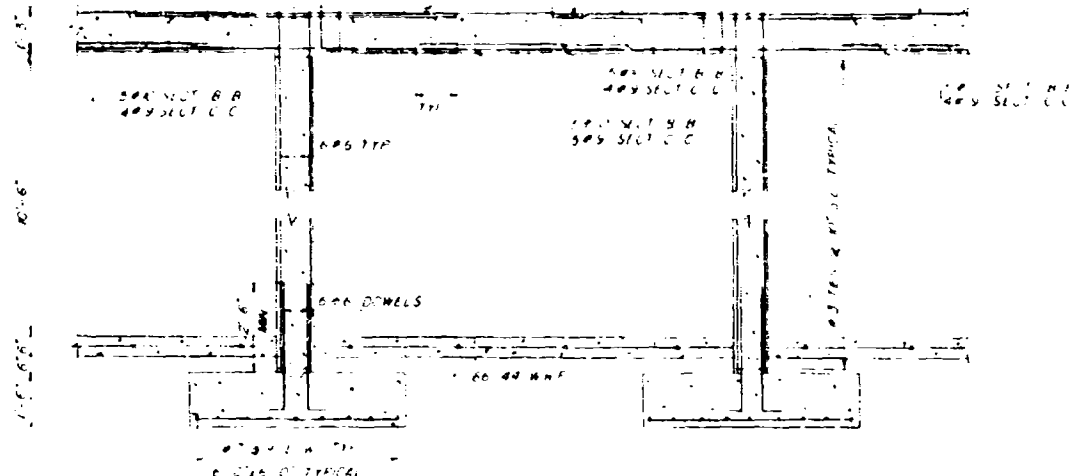
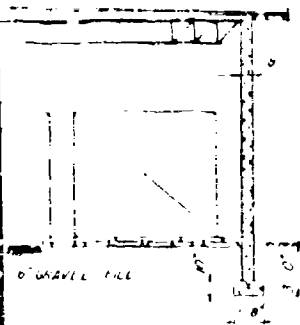
ELEVATION D



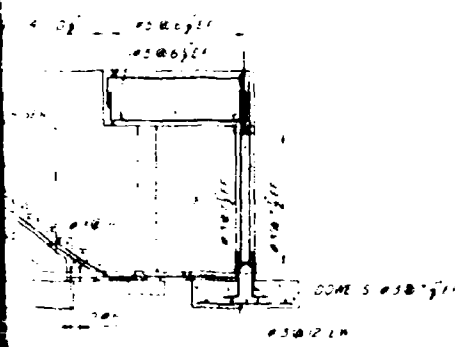
ARCHITECT ARMANDO & WHITNEY 111 WALL STREET NEW YORK N. Y.	DEPARTMENT OF THE ARMY ENGINEERING CENTER WASHINGTON, D. C.
DRAWING NO. PROJECT NO. SHEET NO.	PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 80 PSI BLAST RESISTANT
DATE SCALE	1950

2





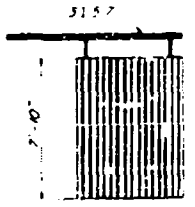
SECTION E-E
SCALE 1/4" = 1'-0"



N D-D
SCALE 1/4" = 1'-0"

DOOR SCHEDULE		
PLAN SYMBOL	SIZE	MATERIAL
A	2'-2" x 6'-7 1/2"	WP SOLID CORE
B	3'-0" x 7'-0"	DO
C	2'-0" x 6'-7 1/2"	DO
D	3'-0" x 7'-0"	DO
E	3'-0" x 6'-6"	ARCH METAL CORE
F	2'-6" x 6'-6"	DO
G	2'-6" x 6'-0"	DO
H	1'-0" x 6'-0"	CLUMP METAL
I	6'-0" x 7'-0"	WHEEL
J	3'-0" x 6'-0"	HALLOW METAL
K	2'-6" x 6'-0"	DO

- NOTES
1. FOR BEAMS AND SLABS ALL REINFT SPICES TO BE A MIN OF 3" OR AT 1/4" PT OF SPAN
 2. FOR BEAMS MIN ALLOWABLE STIRRUPS TO BE 7-15 PERCENT

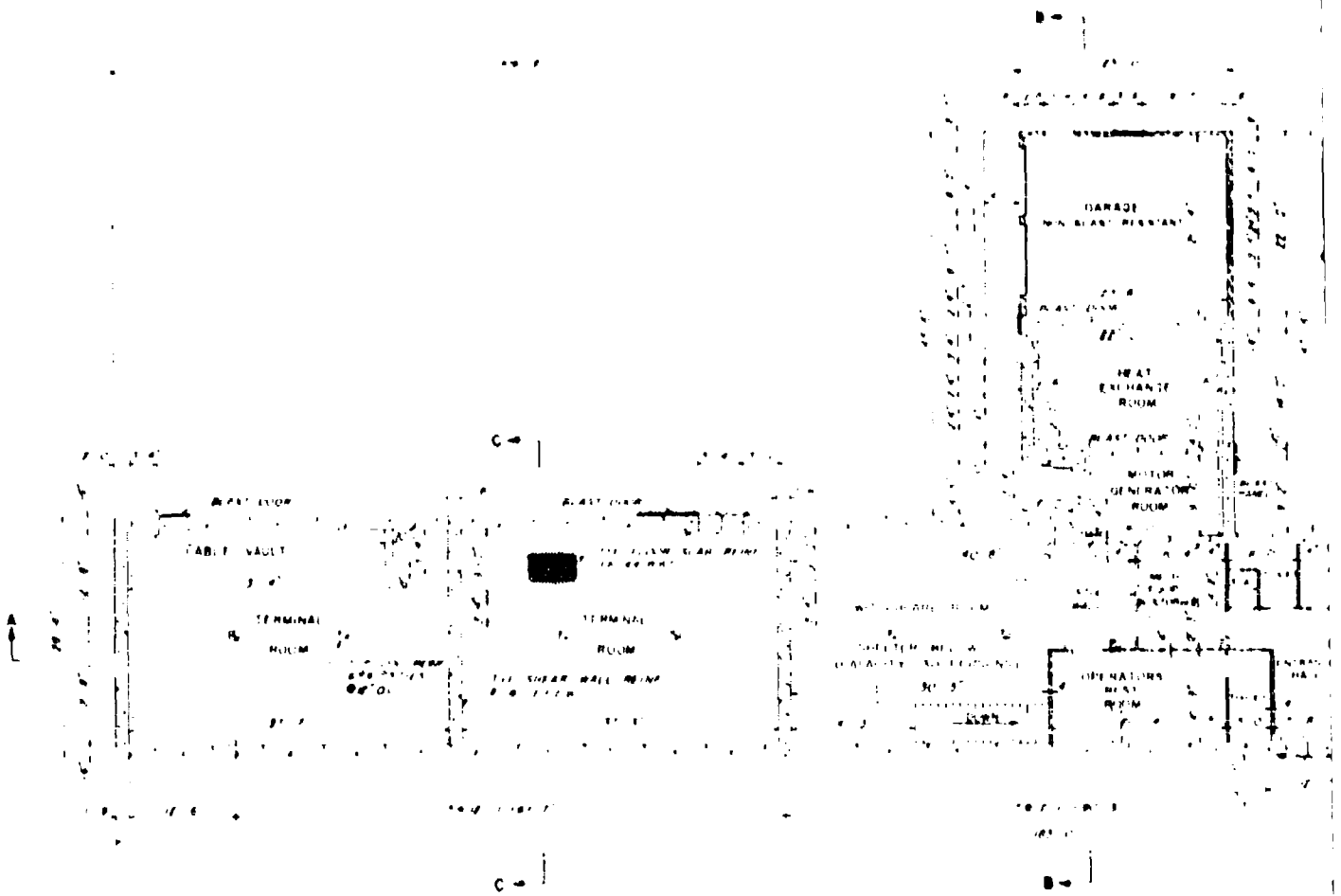


DETAIL A
TYPICAL
SCALE 1/4" = 1'-0"

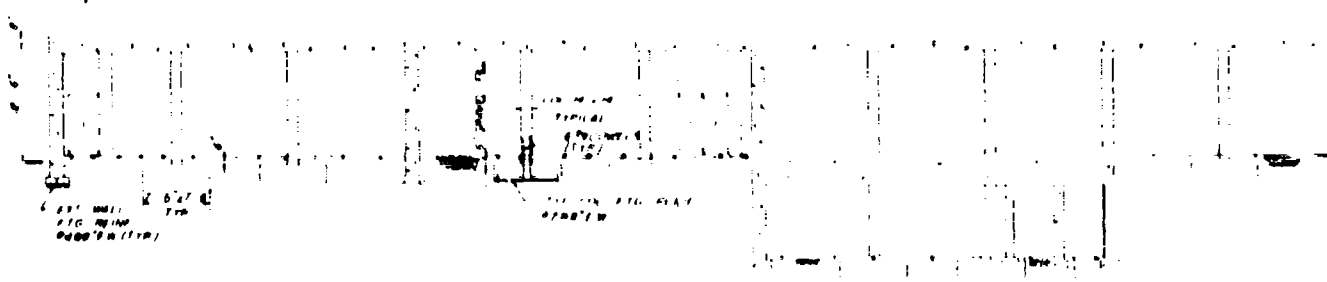


DETAIL B
TYPICAL
SCALE 1/4" = 1'-0"

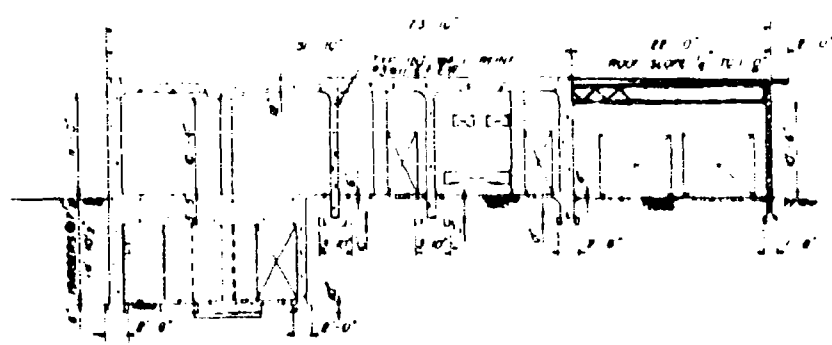
DESIGNED BY	DATE	DESCRIPTION	BY
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY J.S.	CHECKED BY J.E.	PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 20 PSI BLAST RESISTANT	
APPROVED BY [Signature]	DATE		
DATE		AS NOTED	DATE
60-02-55		SHEET 3 OF 3	



FLOOR PLAN



SECTION A-A



SECTION B-B

Design Procedure
 1. Determine the design loadings.
 2. Determine the design loadings for the structure.

Design Blast Wave
 1. Determine the design loadings for the structure.

Blast Loading on Roof
 1. Determine the design loadings for the structure.

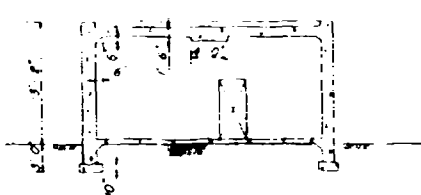
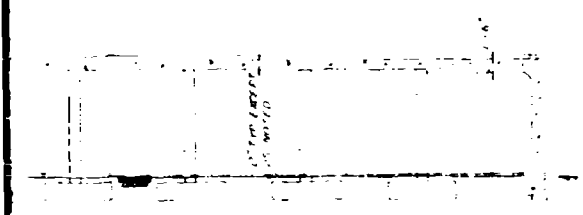
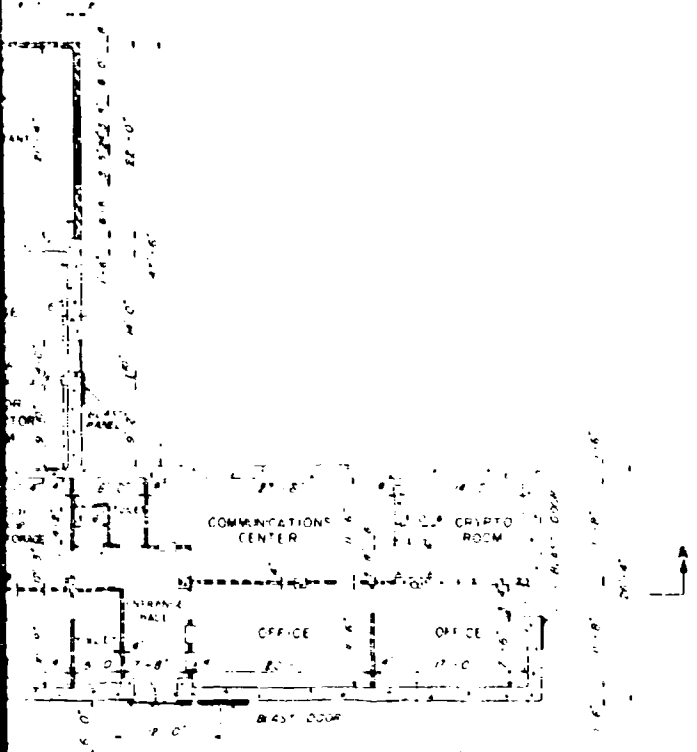
Blast Loading on Walls
 1. Determine the design loadings for the structure.

Nuclear Radiation Protection for Shelter Area
 1. Determine the design loadings for the structure.

Strength of Materials	Static	Blast Design
Steel Reinforcing Bars	40,000 PSI	40,000 PSI
Concrete	4,000 PSI	4,000 PSI
Aluminum	15,000 PSI	15,000 PSI
Structural Steel	36,000 PSI	36,000 PSI
Structural Steel	36,000 PSI	36,000 PSI

Allowable Stresses and Deflections
 1. Determine the design loadings for the structure.

General Notes
 1. The design loadings are based on the design loadings for the structure.

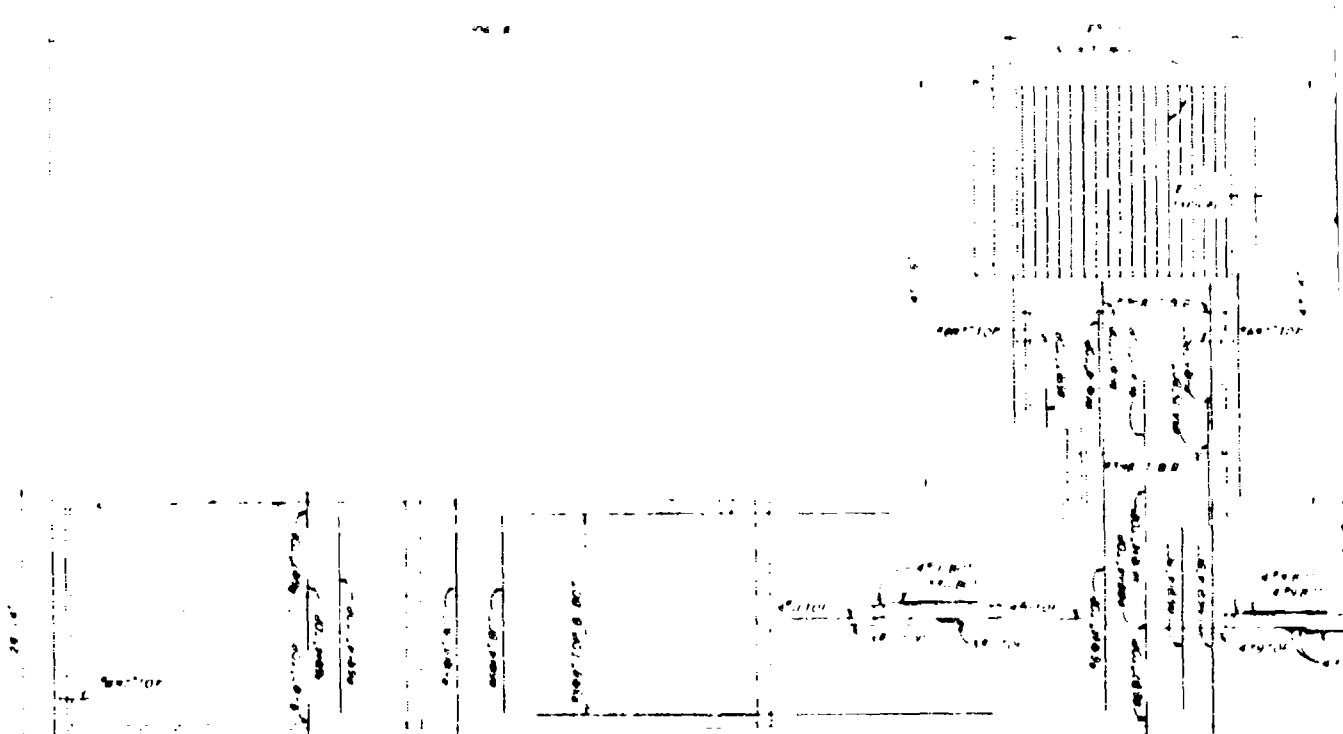


SECTION C-C

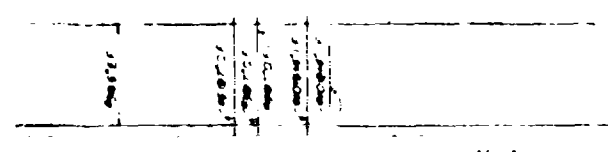
2

LEGEND
 [Symbol] ADA WALL [Symbol] EARTH
 [Symbol] CONCRETE BLOCK [Symbol] GLASS

AMMANN & WHITNEY 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY J. S.		PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 30 PSI BLAST RESISTANT	
DRAWN BY J. P.			
CHECKED BY [Signature]		DATE [Blank]	
SCALE 1/8" = 1'-0"		SHEET NO. 60-02-56	
DATE [Blank]		SHEET 1 of 2	

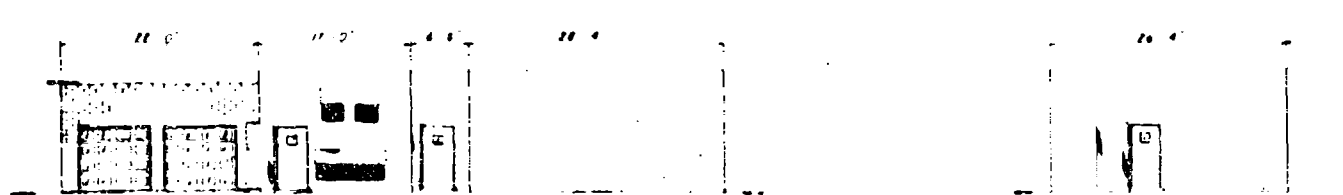


ROOF PLAN
SCALE 1/4" = 1'-0"



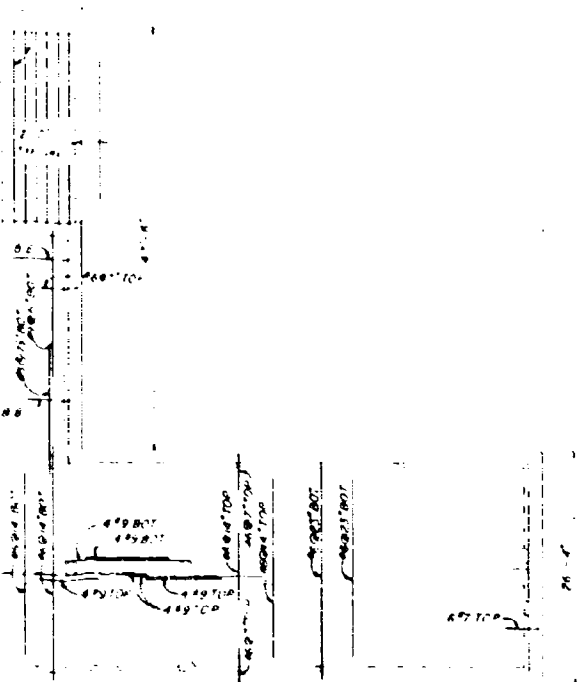
NOTE WALL BEING BUILT IS
TYPICAL FOR ALL EXTERIOR WALLS

ELEVATION A
SCALE 1/4" = 1'-0"

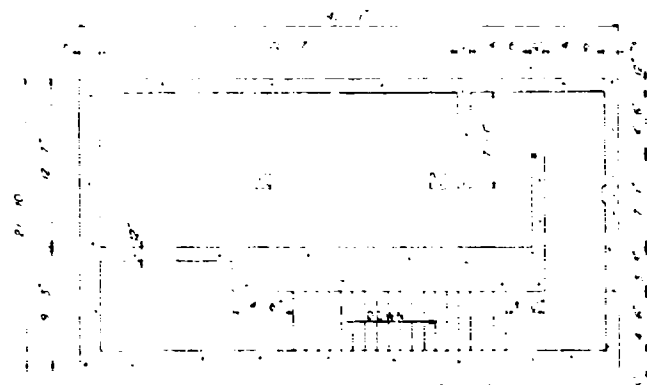


ELEVATION B
SCALE 1/4" = 1'-0"

ELEV
SCALE

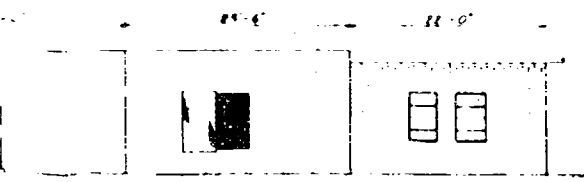


WALL CLEARANCE (STAIRS) NOT SHOWN



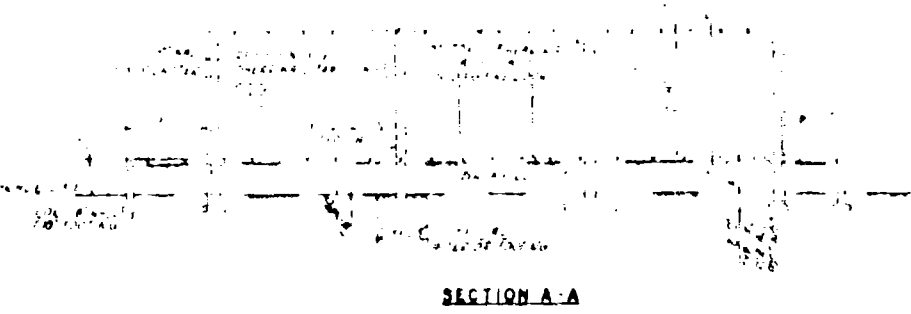
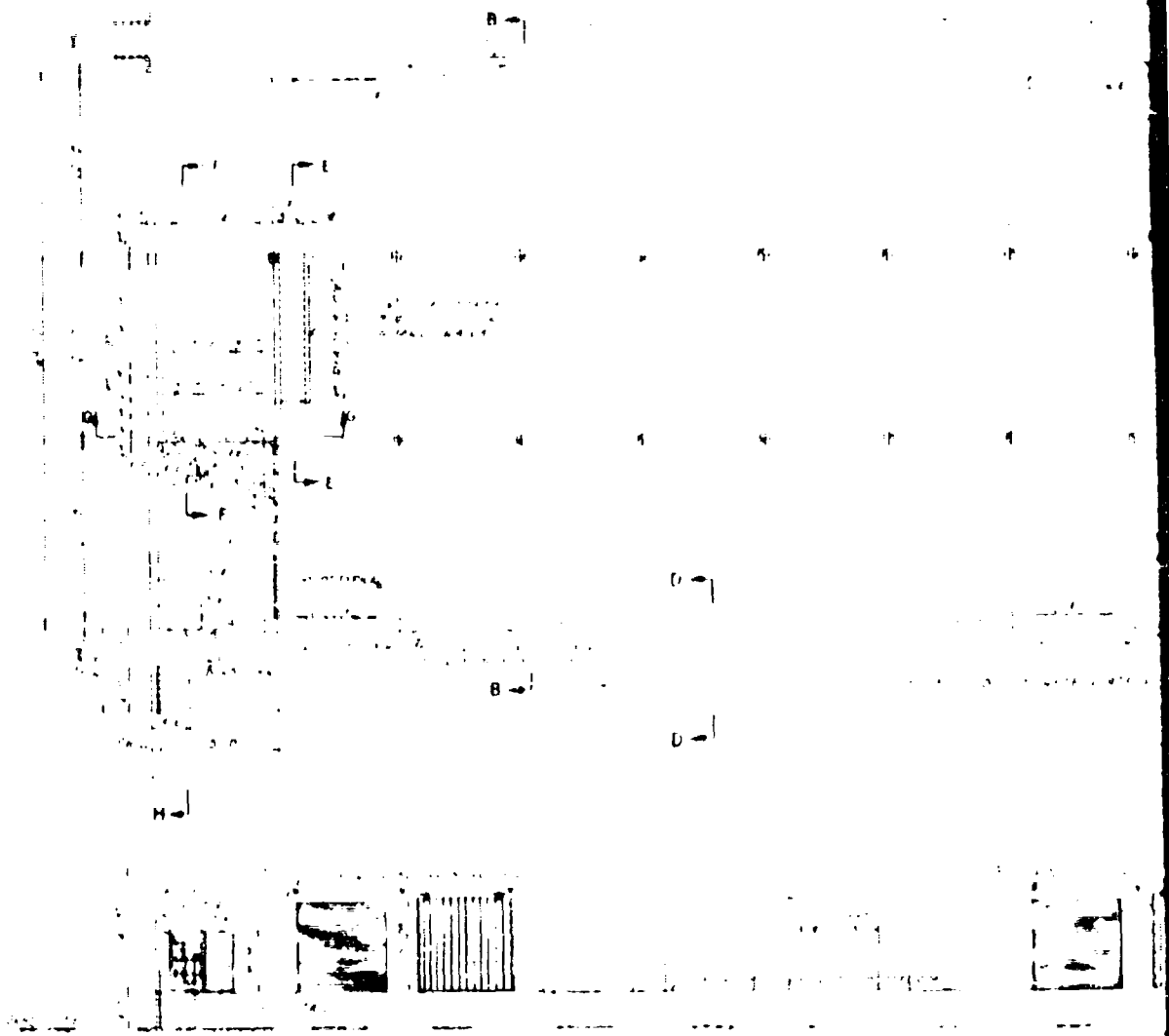
NOTE: BEING THE SHELTER IS IN A WALL OF AN EXISTING BUILDING FOR EXTERIOR WALL.

PLAN OF SHELTER
SCALE 1/8" = 1'-0"



ELEVATION C
SCALE 1/4" = 1'-0"

AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGN BY J. S.	PROTECTIVE CONSTRUCTION COMMUNICATIONS BUILDING 30 PSI BLAST RESISTANT		
DRAWN BY J. S.	CHECKED BY J. S.	DATE 60-02-56	SHEET NO. 2 OF 2
APPROVED J. S.	APPROVED J. S.	TITLE AS SHOWN	DRAWING NUMBER 60-02-56



Design Procedure
 in accordance with
 Division 10 of the
 Design Steel Work
 (Load in ultimate stress)
 Steel Loading on Roof
 (see section 10.1.1)
 Steel Loading on Walls
 (see section 10.1.2)
 Roofing, Radiation Protection,
 etc. (see section 10.1.3)
 Strength of Materials
 (see section 10.1.4)
 etc. (see section 10.1.5)
 Structural Steel (see section 10.1.6)
 (see section 10.1.7)
 Rated capacity of the

FLOOR PLAN

ELEVATION

NOTE
THE 20 AND 30 PSI WAREHOUSES HAVE SHEAR WALLS
14 AND 20" THICK RESPECTIVELY ON COLUMN
LINES 7 AND 12

Design Procedure
As indicated with C.E. Manual "Design of Structures for
Protection Against Effects of Atomic Weapons"

Design Blast Wave
Peak incident pressure = 10 psi Duration = 150 ms

Blast Loading on Roof
Peak pressure = 10 psi Duration = 150 ms

Blast Loading on Walls
Peak pressure = 25 psi Duration = 150 ms

Nuclear Radiation Protection for Shelter Area
Total gamma and neutron attenuated to 5% for a blast
position at any position which will produce a peak blast
pressure equal to 10 psi

Strength of Material	Elastic	Steel Design
2000 Working (psi)	40,000 psi	70,000 psi
Concrete (f)	4,000 psi	5,000 psi
Reinforcing Steel (Fy)	47,000 psi	52,000 psi
Structural Steel (Fy)	36,000 psi	46,000 psi

* rated capacity of bar

Allowable Stresses and Deflections

Allowable stresses and deflections are based on the
requirements of the design code and blast wave
loading for maximum elastic deformation under
design blast load

General Notes

- The building features are not shown and
shall be determined to suit use requirements
within the structural envelope.
All steel and concrete reinforcement shall
be in accordance with the design code.
- The design shall be in accordance with the
Allowable Stress Design No. 33 of the
AIA Building Code No. 33 of the
AIA Building Code No. 33 of the

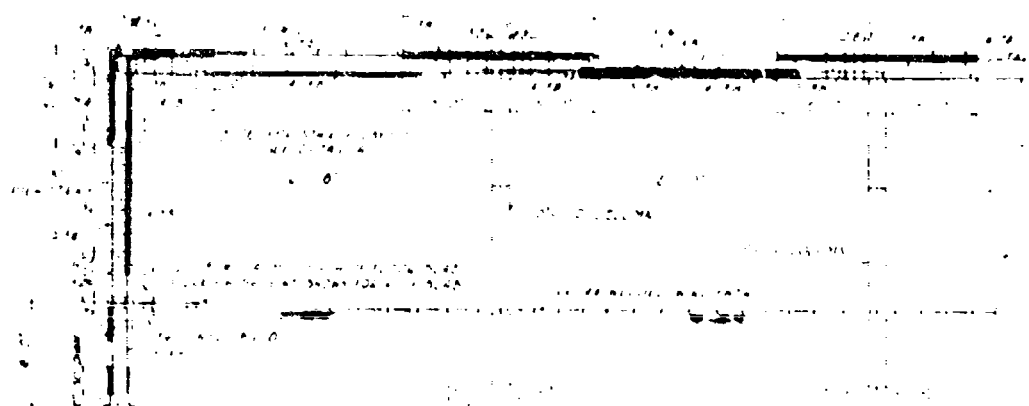
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY U.S.		PROTECTIVE CONSTRUCTION WAREHOUSE 10 PSI BLAST RESISTANT	
CHECKED BY			
DATE		DATE	
BY		BY	
FOR		FOR	
DRAWN BY		DRAWN BY	
SCALE		SCALE	
PROJECT NO.		PROJECT NO.	
SHEET NO.		SHEET NO.	

2



ROOF FRAMING

SCALE 1/8" = 1'-0"



SECTION B-B

SCALE 1/8" = 1'-0"

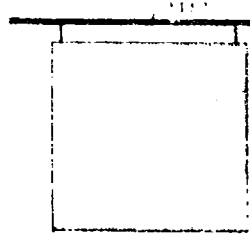
TYPICAL HAUNCHED

NOTE



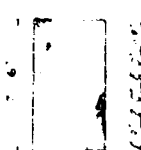
DETAIL A (TYPICAL)

SCALE 1/8" = 1'-0"



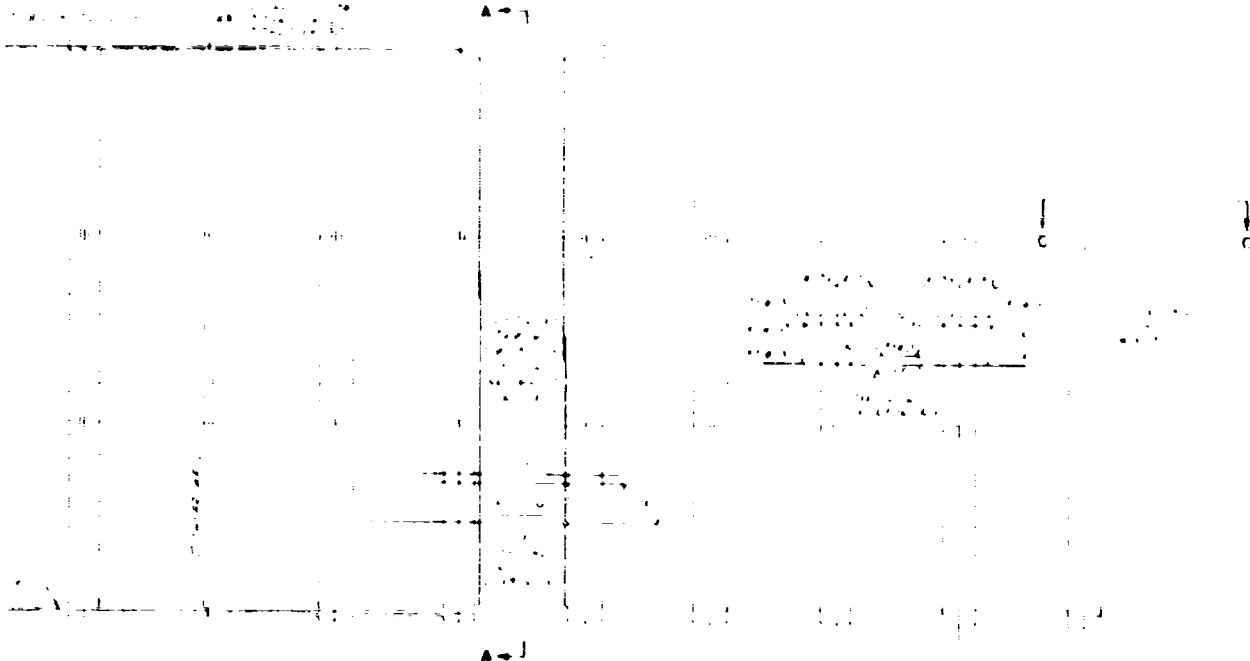
DETAIL B (TYPICAL)

SCALE 1/8" = 1'-0"

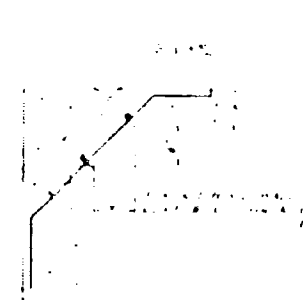


DETAIL C

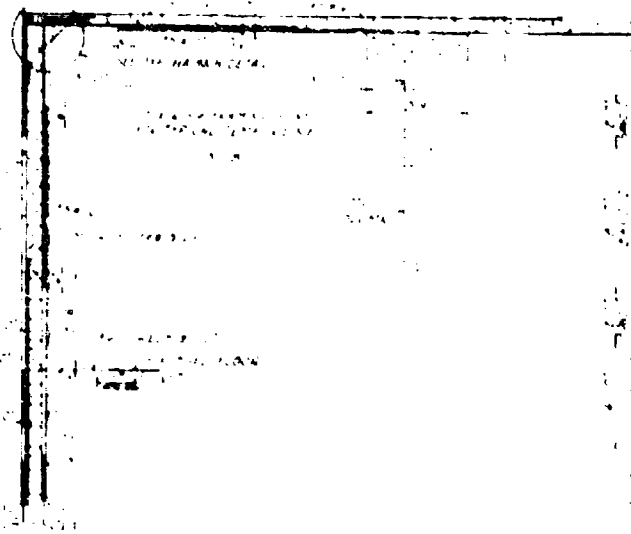
SCALE 1/8" = 1'-0"



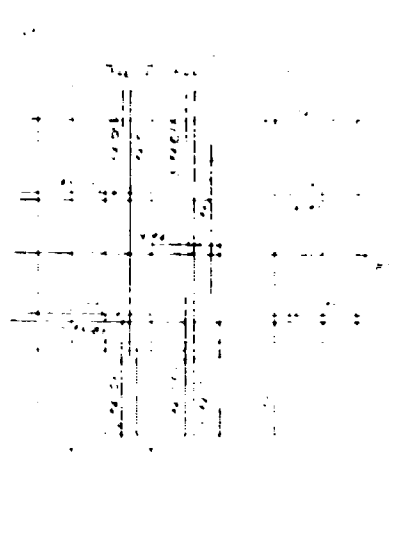
ROOF FRAMING PLAN
SCALE: 1/4" = 1' 0"



TYPICAL HAUNCH DETAIL
SCALE: 1/2" = 1' 0"



SECTION C-C
SCALE: 1/4" = 1' 0"



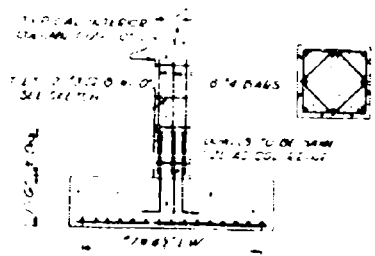
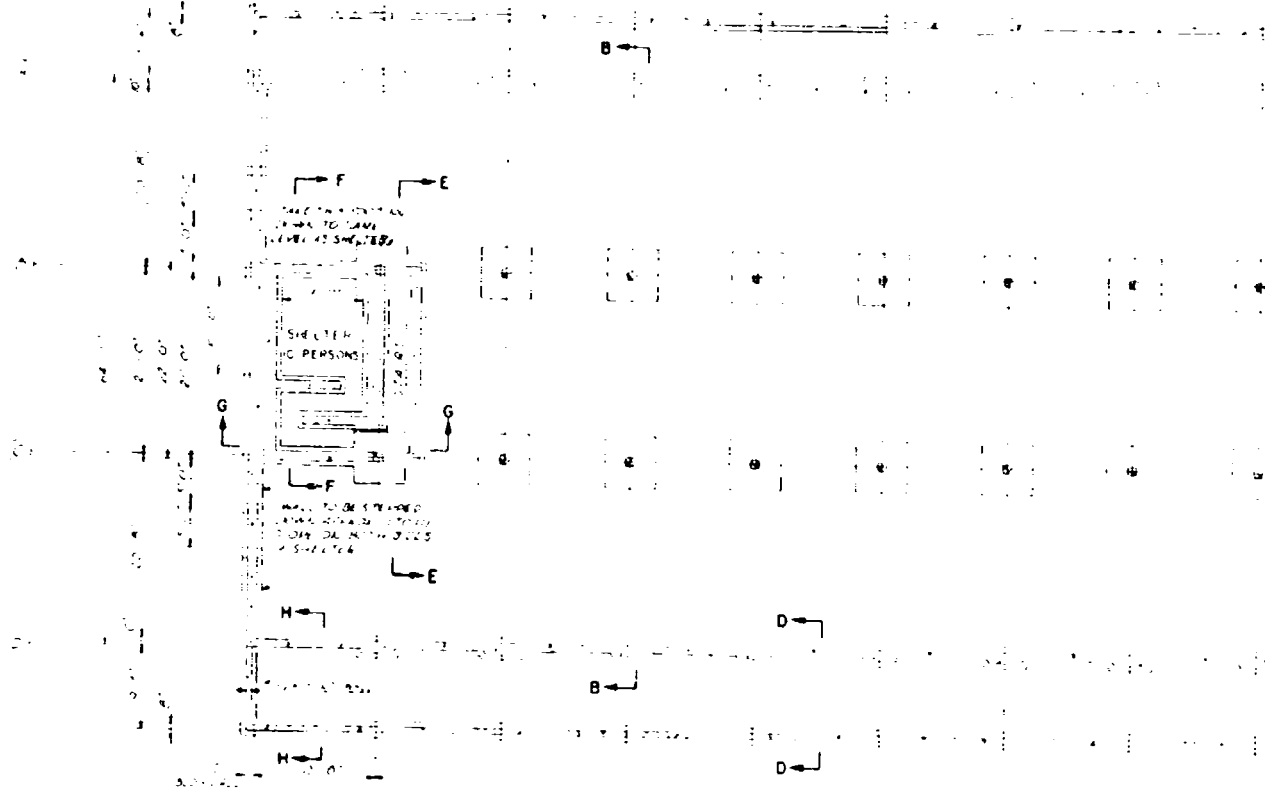
FRONT WALL PANEL
SCALE: 1/4" = 1' 0"



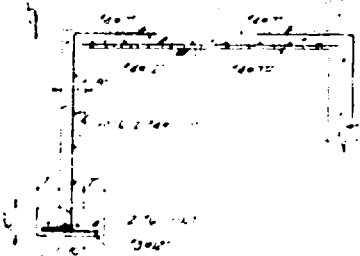
DETAIL A (TYPICAL)
SCALE: 1/2" = 1' 0"

2

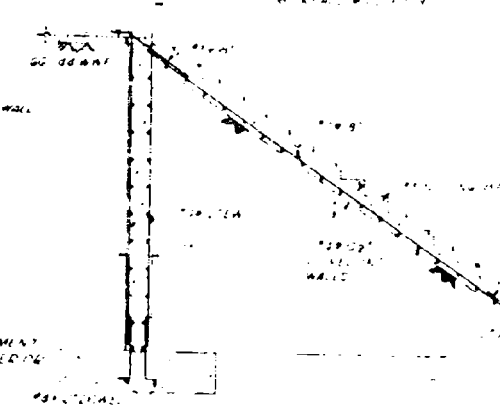
AMMANN & WHITNEY ARCHITECTS 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY CONSTRUCTION DIVISION WASHINGTON, D. C.	
PROJECT: PROTECTIVE CONSTRUCTION NO. 10 PBI		NAME OF BUILDING: WAREHOUSE LOCATION: EAST RIVER, NY	
DATE: MAY 1950		DRAWING NO.: 6017	



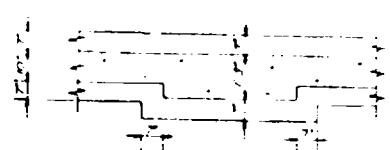
TYPICAL INTERIOR COLUMN & FOOTING
SCALE: 1/4"=1'-0"



SECTION D-D
SCALE: 1/4"=1'-0"



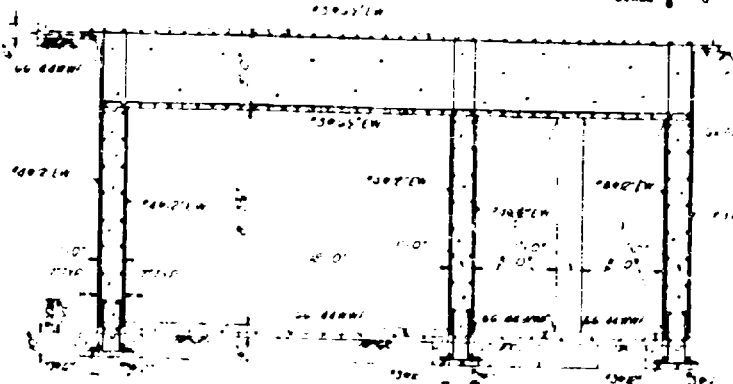
SECTION E-E
SCALE: 1/4"=1'-0"



DETAIL D
SCALE: 1/4"=1'-0"

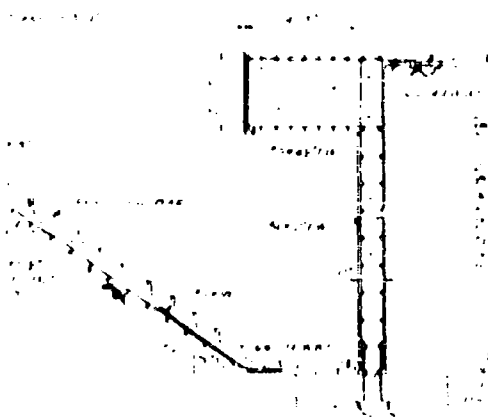
TYPE	SIZE
1	10" Ø (R-1)
2	8" Ø (R-2)
3	6" Ø (R-3)
4	4" Ø (R-4)
5	2" Ø (R-5)

STANDARD TYPE LOOP & NODULE

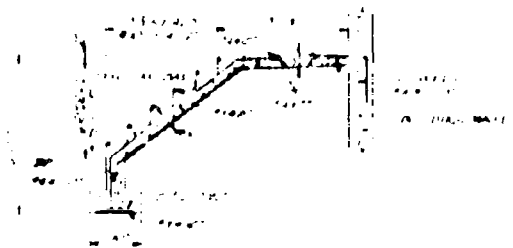


SECTION F-F
SCALE: 1/4"=1'-0"

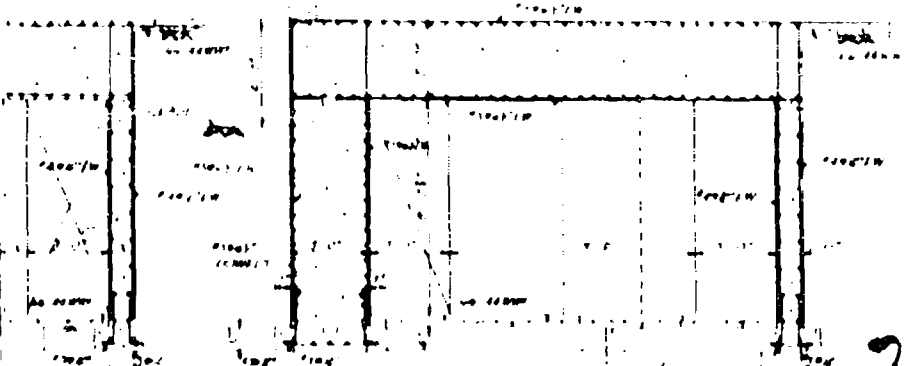
FOUNDATION PLAN
SCALE 1/4" = 1' 0"



SECTION M-M
SCALE 1/4" = 1' 0"



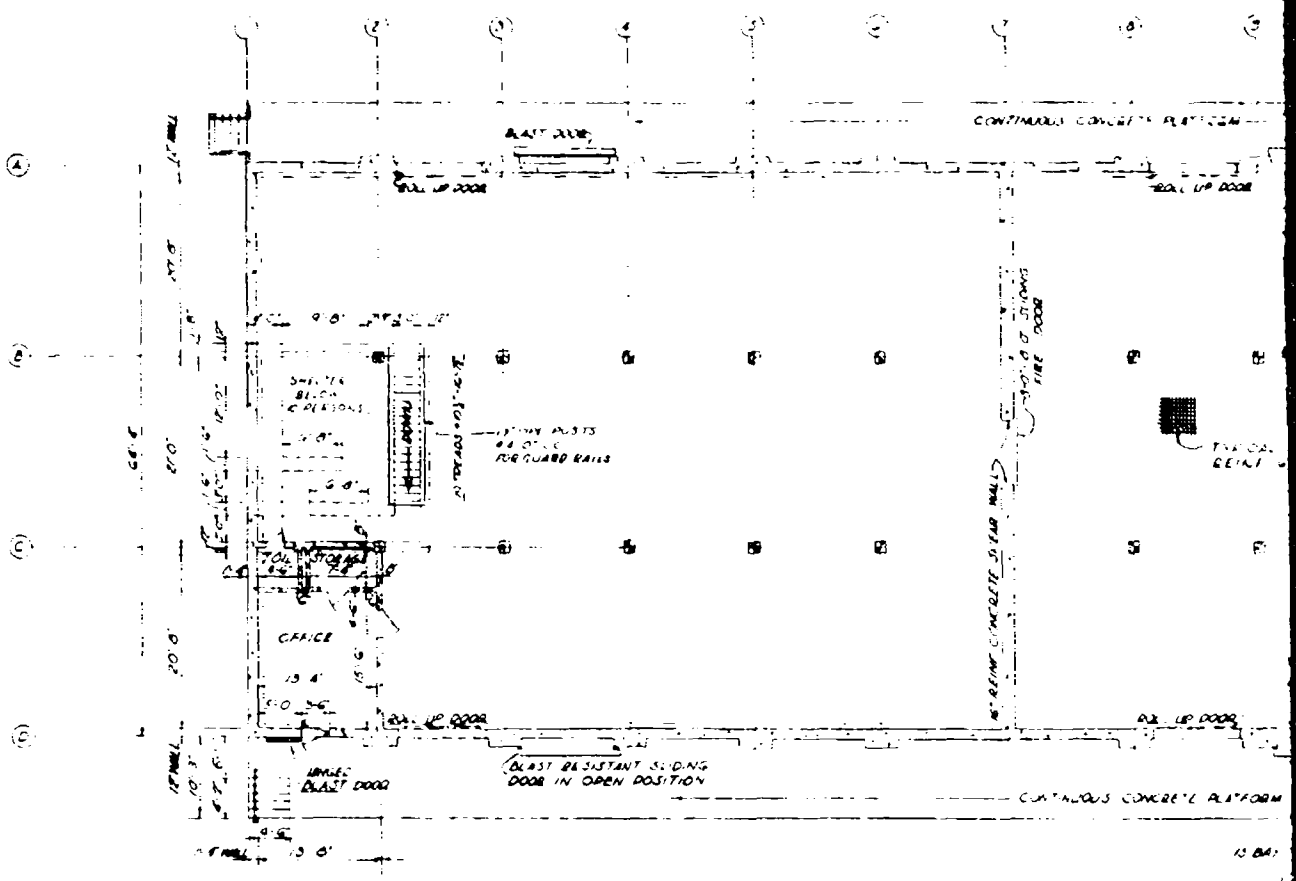
SECTION R-R
SCALE 1/4" = 1' 0"



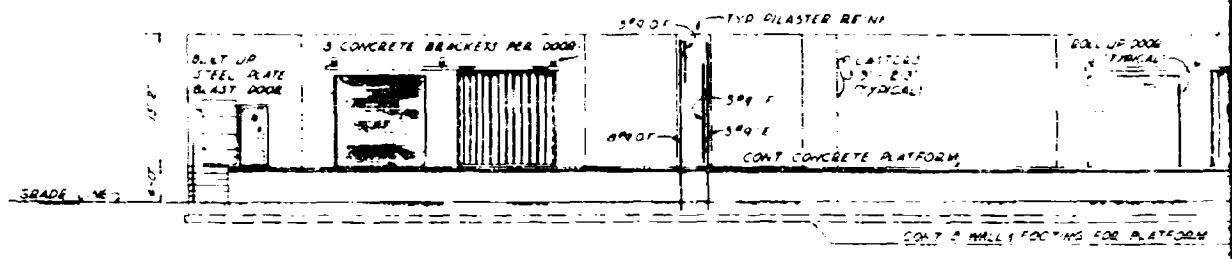
SECTION Q-Q
SCALE 1/4" = 1' 0"

2

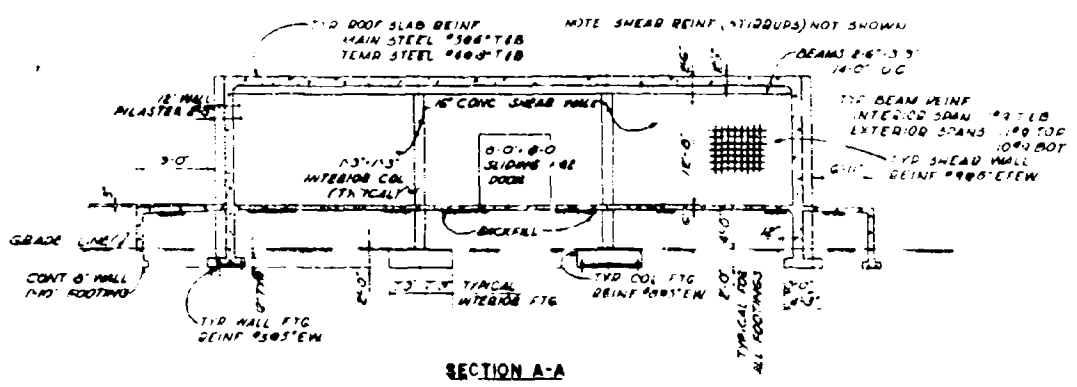
AMMANN & WHITNEY 111 5TH AVENUE, NEW YORK, N. Y.	DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.
DRAWN BY CHECKED BY DATE	PROTECTIVE CONSTRUCTION WAREHOUSE 10 PSI BLAST RESISTANT
DATE	60-17-01 SHEET 2 OF 2



FLOOR PLAN

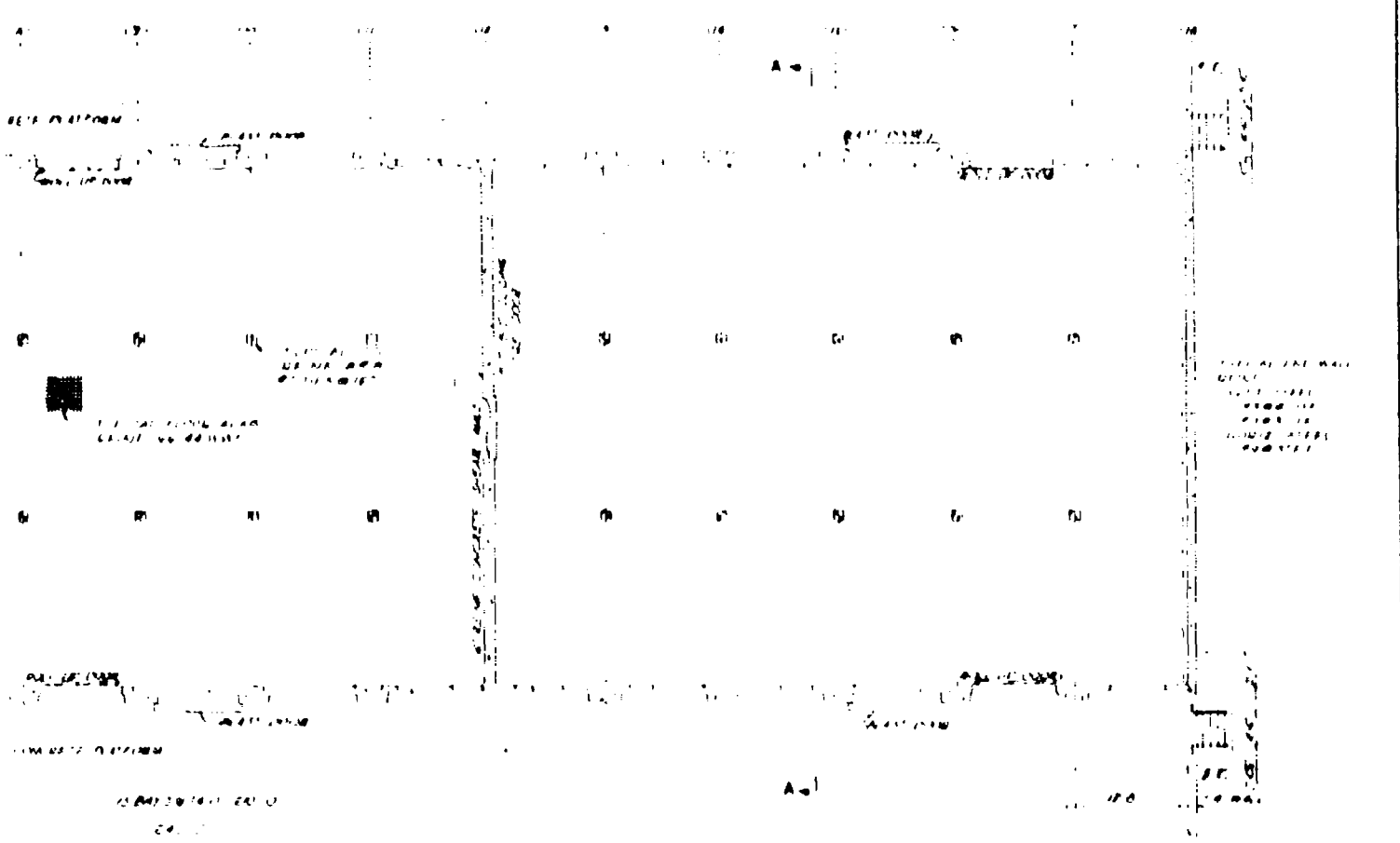


ELEVATION

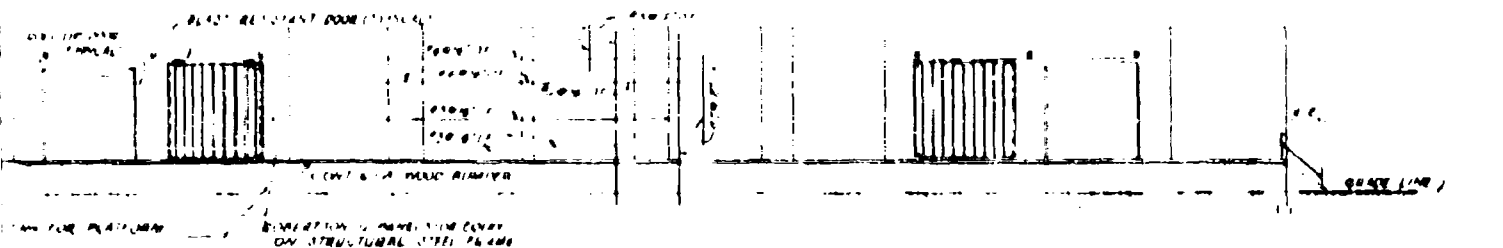


SECTION A-A

Design Procedure
 in accordance
 for Protection of
 Design Basis
 Post nuclear
 Blast Loading
 Post blast
 Blast Loading
 Post blast
 Nuclear Radiation
 Total gamma
 20 ft. diameter
 door post press
 Strength of Blast
 Soil bearing cap
 Concrete
 Rein. Steel
 Structural Steel
 ASTM A 572
 50 ksi yield



FLOOR PLAN



ELEVATION

DESIGN CONDITIONS

Design Procedure

In accordance with the current design of 1951 for Protection from the Effects of Atomic Weapons Design Steel Ware

Peak internal pressure: 20 psi. Duration: 10 sec

Steel Lacking on Roof

The peak internal pressure is 20 psi

Steel Lacking on Walls

Peak pressure: 20 psi. Duration: 10 sec

Roofing Protection for Shells: Area

The peak internal pressure is 20 psi for a 10 sec duration at any position which will produce a peak net pressure equal to 20 psi

Strength of Material	Grade	Steel Design
Steel Lacking capacity	50,000 psi	15,000 psi
Concrete	4,000 psi	5,000 psi
Steel Lacking on Roof	60,000 psi	18,000 psi
Roofing	20,000 psi	6,000 psi
Roofing	20,000 psi	6,000 psi
Roofing	20,000 psi	6,000 psi
Roofing	20,000 psi	6,000 psi

Allowable Stresses and Deflections

The following stresses and deflections are permitted for the design of the structure under the above design conditions

General Notes

The following features are not shown and shall be determined by the user's representative

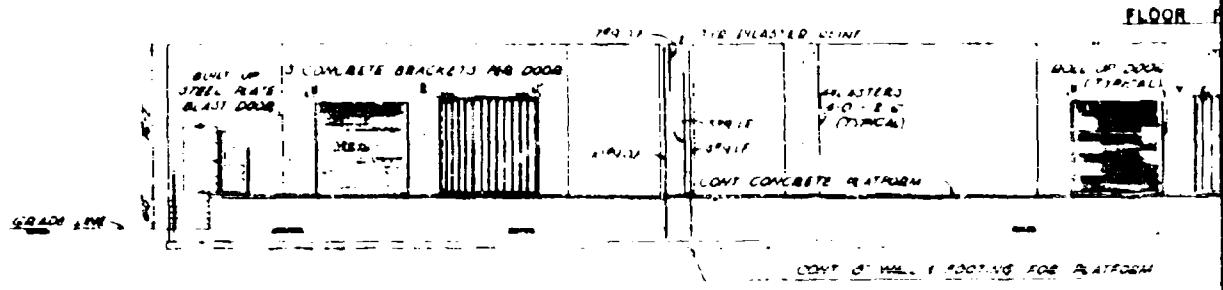
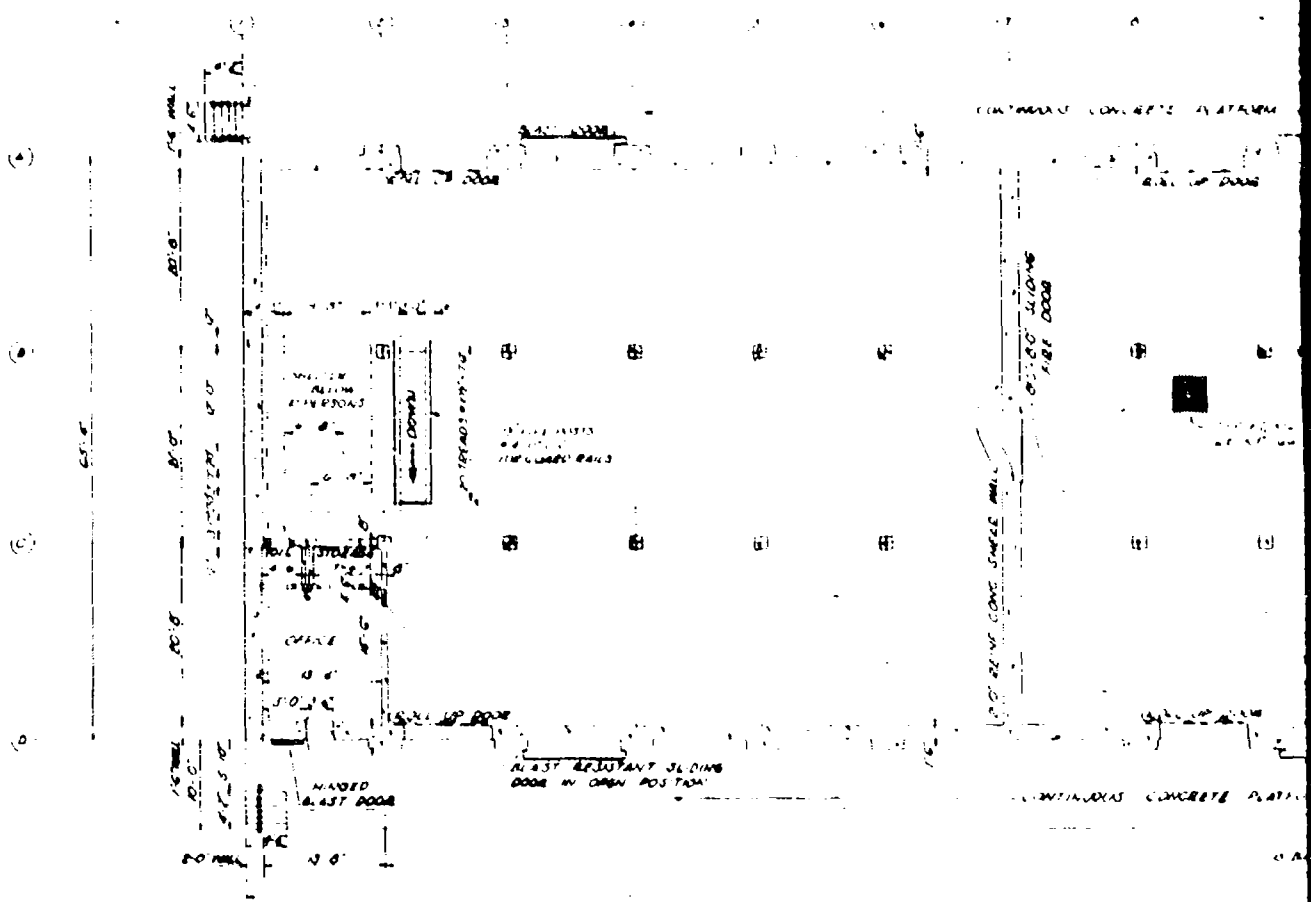
Appropriate and adequate equipment

As noted and recommended drawings

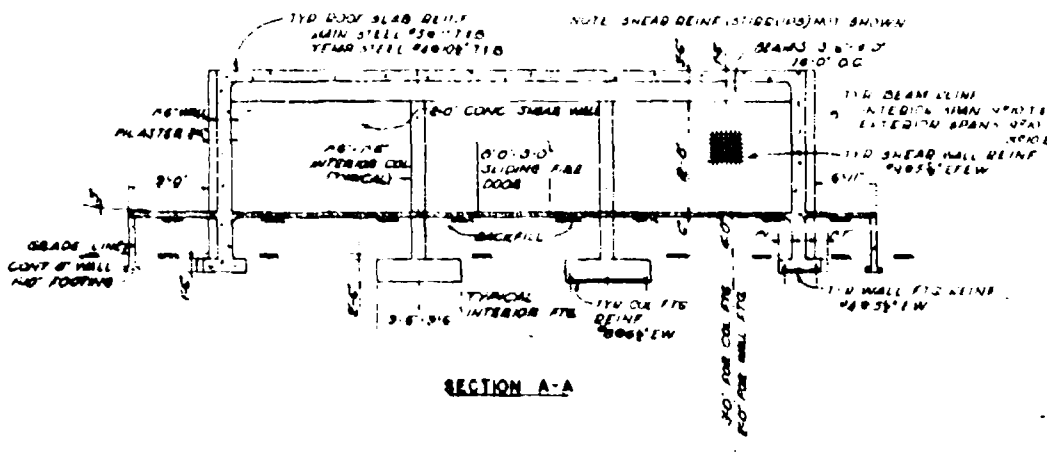
The design is based on the use of the design conditions listed in the design conditions

2

AMMANN & WHITNEY	DEPARTMENT OF THE ARMY
111 6TH AVENUE, NEW YORK, N. Y.	MILITARY CONSTRUCTION ENGINEERING DIVISION
DESIGNED BY	PROTECTIVE CONSTRUCTION
CHECKED BY	WAREHOUSE
APPROVED BY	20 PSI BLAST RESISTANT
DATE	NOV 1951
SHEET	OF 1

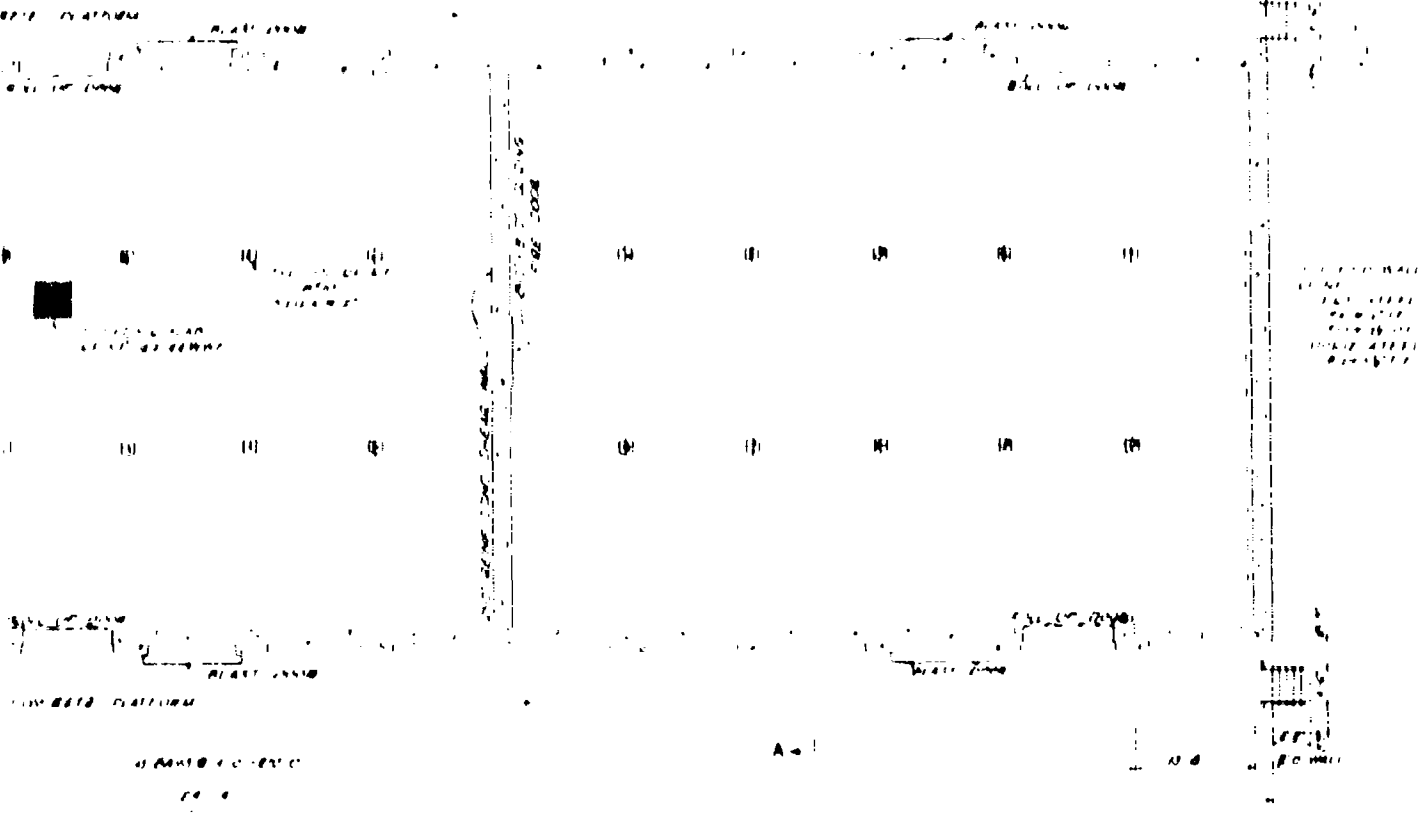


ELEVATION

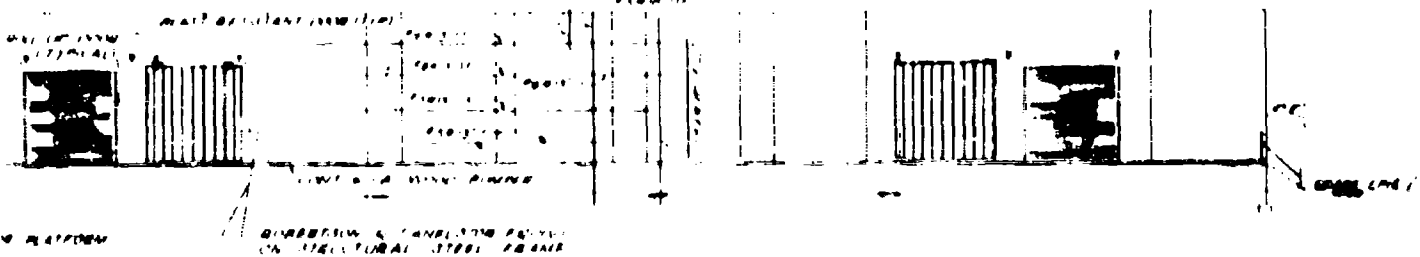


SECTION A-A

- Design Procedure
- In accordance with OCA for Protection from Effects of
- Design Blast Wave
- Peak overpressure
- Blast Loading on Roof
- Peak pressure
- Blast Loading on
- Peak pressure
- Nuclear Radiation Protection
- Total gamma and neutron
- 20 BT weight of any beam
- peak blast pressure
- Strength of Materials
- Bar bearing capacity
- Concrete
- Steel
- 101 Grade ASTM A308 S.C.
- Structure of Steel, lower part
- (ASTM A7-90)
- rated capacity of bar



FLOOR PLAN



ELEVATION

DESIGN CONDITIONS

Design Procedure
 In accordance with the Manual Design of Structures
 - Protection from Effects of Atomic Weapons

High Blast Wave
 Peak maximum pressure - 87 psi Duration - 0.8 sec

Wind Loading on Roof
 Peak pressure - 12.5 psf Duration - 1.0 sec

Wind Loading on Walls
 Peak pressure - 12.5 psf Duration - 1.0 sec

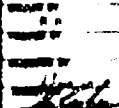

Interior Radiation Protection for Shelter Area
 Total gamma and neutron dose rate is 500 r/hr at
 2 ft beyond all shielding which will produce a
 peak pressure equal to 100 psf

Weight of Materials	Steel	Steel Design
Roofing capacity	8000 psf	16,000 psf
Walls	4,000 psf	8,000 psf
Wind load on roof	12,500 psf	25,000 psf
at grade at 100 ft	12,500 psf	25,000 psf
Interior blast load peak	16,000 psf	32,000 psf
at 10 ft		
at 20 ft		
at 30 ft		
at 40 ft		
at 50 ft		
at 60 ft		
at 70 ft		
at 80 ft		
at 90 ft		
at 100 ft		

Allowable Stresses and Deflections
 All steel members and fastenings designed to resist
 the maximum static design loads. All steel members designed
 to resist maximum static design loads plus design blast loads.

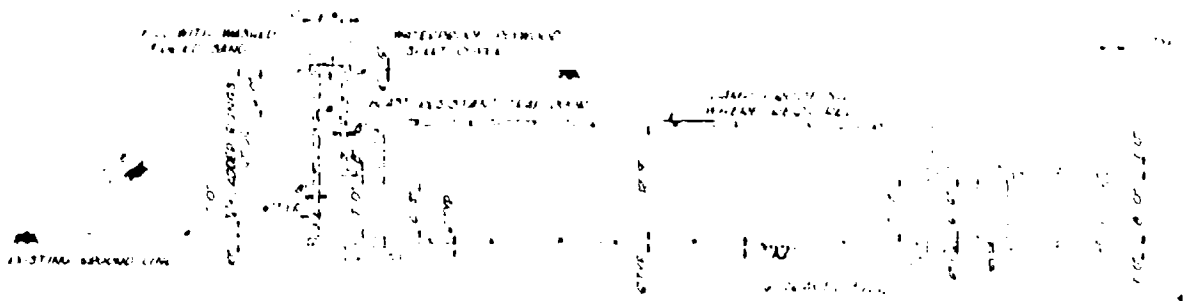
General Notes
 1. The following members are not shown and shall
 be determined by the user.
 a. Columns and bracing members
 b. Joists and cross-bracing members
 c. Diaphragms and floor slabs
 d. All other members including all steel connections
 e. All other members including all steel connections
 f. All other members including all steel connections

2

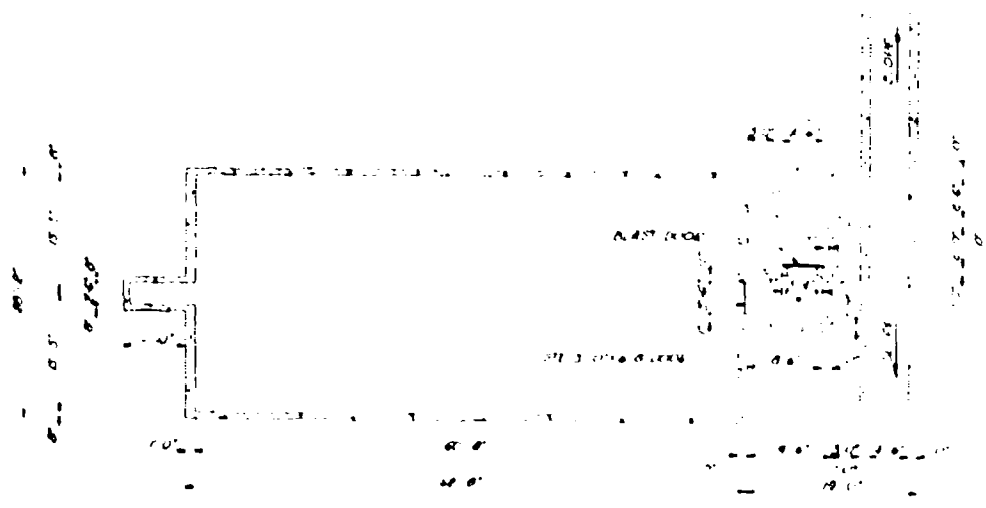
AMMANN & WHITNEY 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY MILITARY CONSTRUCTION ENGINEERING DIVISION	
PROTECTIVE CONSTRUCTION WAREHOUSE 50 PSI BLAST RESISTANT			
DRAWN BY 	CHECKED BY 	DATE 60-11-31	DRAWING NUMBER 60-11-31



ROOF PLAN
SCALE 1/8" = 1'-0"



SECTION A-A
SCALE 1/8" = 1'-0"



FLOOR PLAN
SCALE 1/8" = 1'-0"

1

DESIGN CONDITIONS

Design Procedure

The structure was designed in accordance with the provisions of the ACI Code for concrete structures for blast loads from the effects of direct hit bombs.

Design Blast Wave

Reference is made to the design conditions on page 10 of this report.

Blast Loading on Arch Surface

Reference is made to page 10 of this report.

Nuclear Radiation Protection

The structure was designed to provide a minimum of 100 Rads of protection for the personnel occupying the structure.

Strength of Materials

	Static	Blast Design
Concrete	3,000 psi	6,500 psi
Reinforcing Steel	40,000 psi	50,000 psi
Structural Steel, lower yield	30,000 psi	40,000 psi
Welding	70,000 psi	70,000 psi

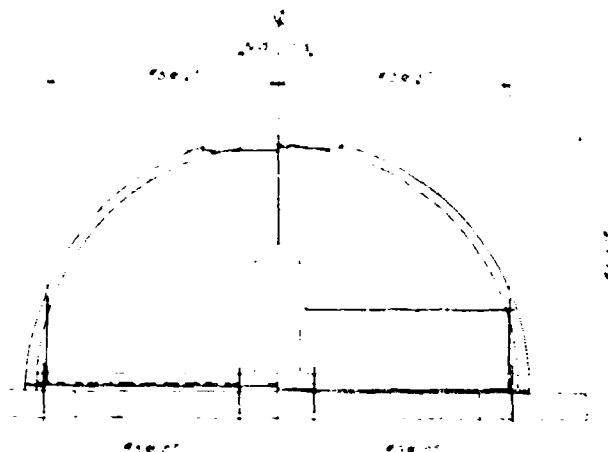
Allowable Stresses and Deflections

The foundation and walls and entrance was designed for stresses in accordance with the provisions of the ACI Code. The maximum deflection of the structure was limited to 1/40 of the span length and the entrance was designed for maximum deflection of 1/40 of the span length.

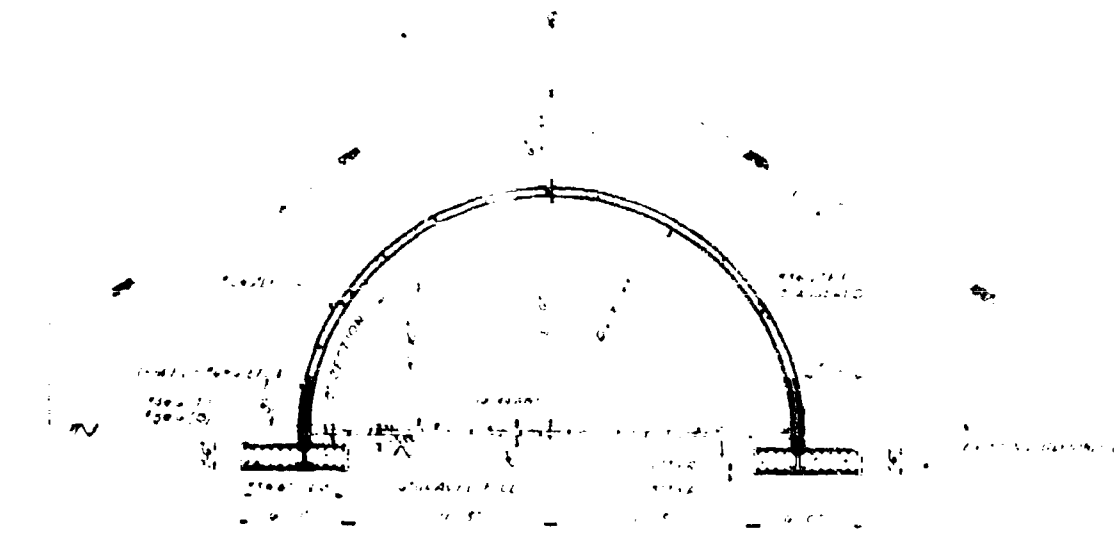
General Notes

1. The structure was designed for a blast load of 100 Rads.

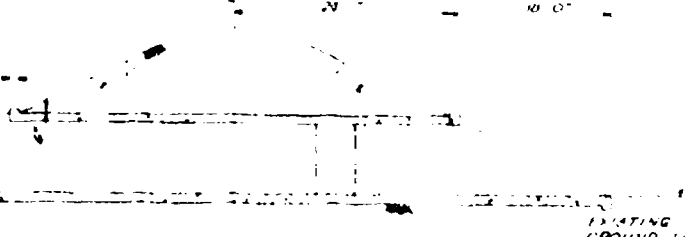
- 2. The structure was designed for a blast load of 100 Rads.
- 3. The structure was designed for a blast load of 100 Rads.
- 4. The structure was designed for a blast load of 100 Rads.
- 5. The structure was designed for a blast load of 100 Rads.
- 6. The structure was designed for a blast load of 100 Rads.
- 7. The structure was designed for a blast load of 100 Rads.
- 8. The structure was designed for a blast load of 100 Rads.
- 9. The structure was designed for a blast load of 100 Rads.
- 10. The structure was designed for a blast load of 100 Rads.



SECTION C-C
SCALE 1/4"=1'-0"



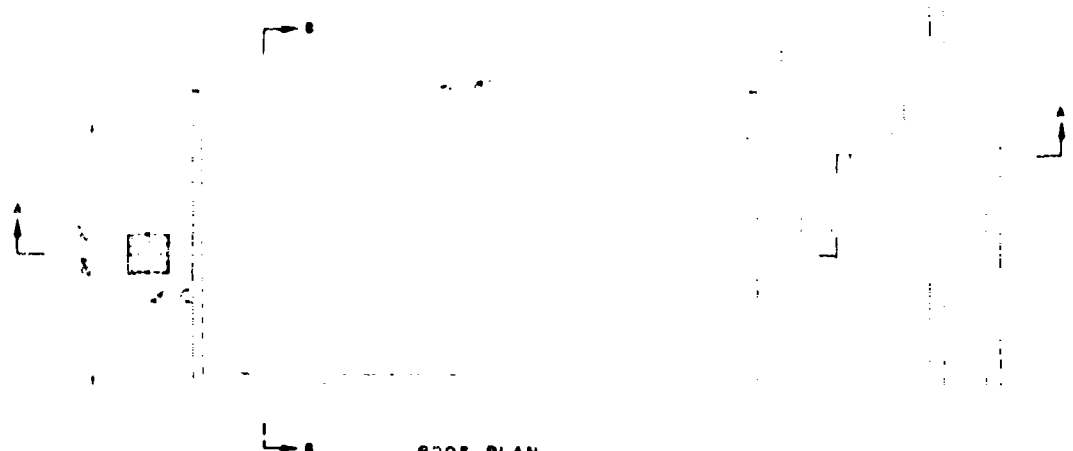
SECTION B-B
SCALE 1/4"=1'-0"



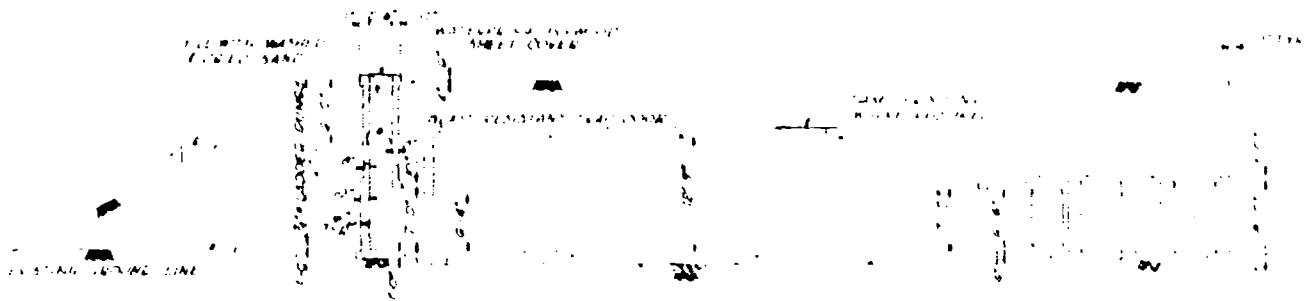
SECTION D-D
SCALE 1/4"=1'-0"

2

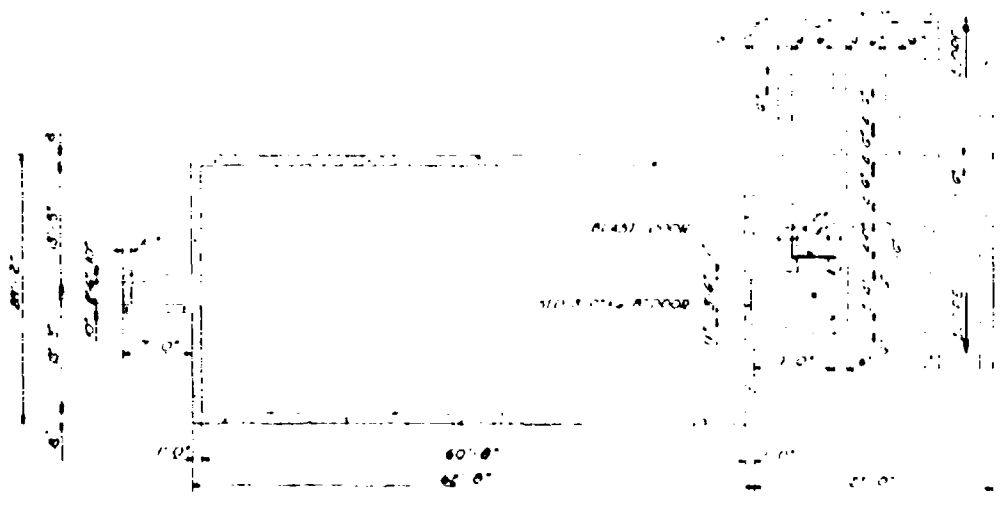
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY: F.W. CHECKED BY: L.S. DATE: 6-17-62	PROTECTIVE CONSTRUCTION EARTH COVERED CONCRETE IGLOO MAGAZINE 25 PSI BLAST RESISTANT		
PROJECT NO.: 60-17-02 DRAWING NO.: 60-17-02	DATE: 6-17-62	DRAWN BY: F.W. CHECKED BY: L.S.	DATE: 6-17-62



ROOF PLAN
SCALE 1/4" = 1'-0"



SECTION A-A
SCALE 1/4" = 1'-0"



FLOOR PLAN
SCALE 1/4" = 1'-0"

1

DESIGN CONDITIONS

Design Procedure

The structure will be designed in accordance with the provisions of the "Manual of Design for Structures for Blast Loading" published by the Department of Defense.

Design Blast Wave

The design blast wave is based on the following data:

Blast Loading on Arch Surface

The blast loading is based on the following data:

Nuclear Radiation Protection

The structure is designed to provide protection for the personnel and equipment located within the structure against the effects of nuclear radiation.

Strength of Materials

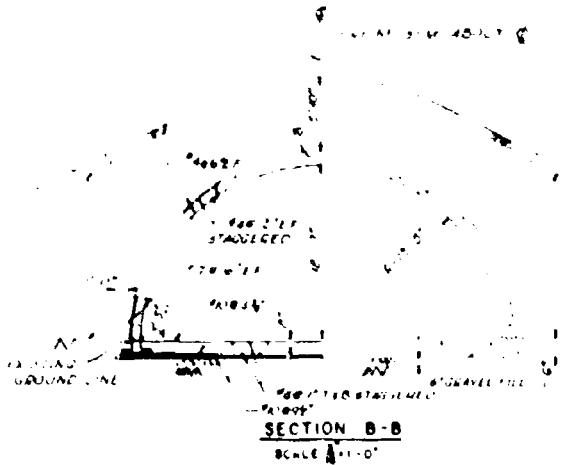
	Static	Blast Design
Concrete	4000 PSI	6000 PSI
Reinforcing Steel	40,000 PSI	60,000 PSI
Structural Steel	A36	A572-50
Welding	E70	E70

Allowable Stresses and Deflections

The structure and walls shall be designed to resist the maximum blast loading. The design shall be based on the maximum allowable deflection of the structure. The structure shall be designed to resist the maximum blast loading under design blast load.

General Notes

- The structure shall be designed to resist the maximum blast loading.
- The structure shall be designed to resist the maximum blast loading.
- The structure shall be designed to resist the maximum blast loading.
- The structure shall be designed to resist the maximum blast loading.
- The structure shall be designed to resist the maximum blast loading.

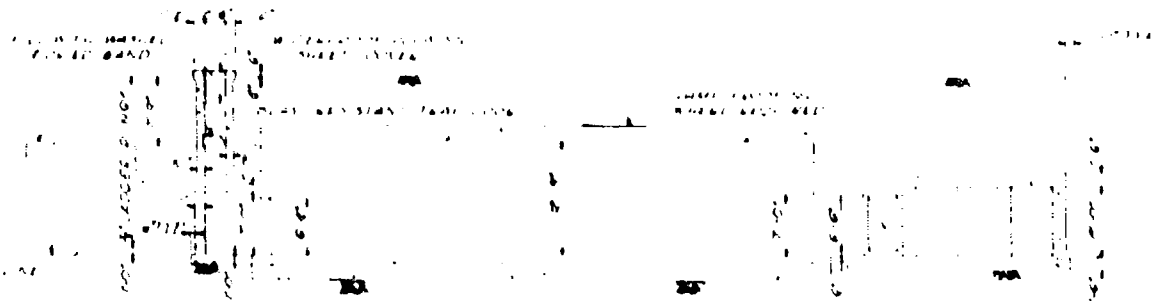


AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION	
DESIGN BY: P. W. DRAWN BY: D. CHECKED BY: [Signature] DATE: [Blank]		PROTECTIVE CONSTRUCTION EARTH COVERED CONCRETE 1000 MAGAZINE 50 PSI BLAST RESISTANT	
DATE: [Blank]		AS NOTED 60-17-02	

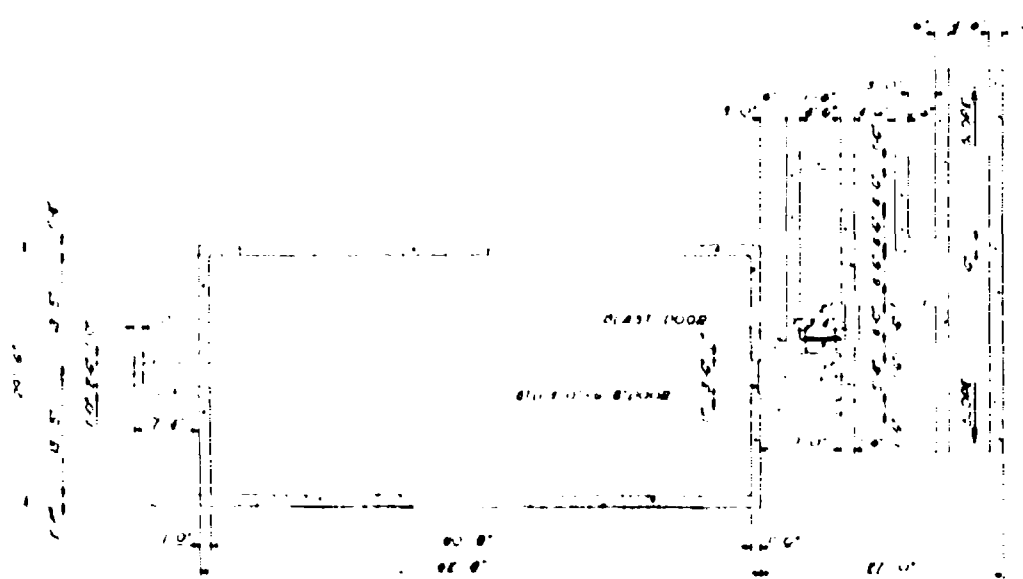
2



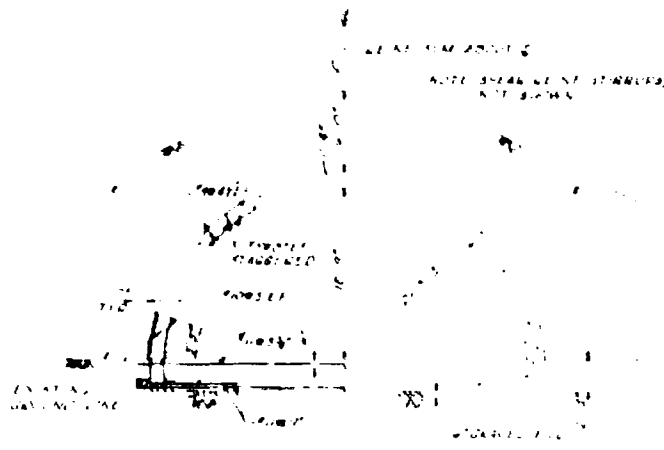
ROOF PLAN
SCALE: 1/4" = 1'-0"



SECTION A-A
SCALE: 1/4" = 1'-0"



FLOOR PLAN
SCALE: 1/4" = 1'-0"



SECTION B-B
SCALE 1/4" = 1' 0"

Design Procedure

The structure is designed to meet the following requirements:

Design Blast Wave

Blast Loading on Arch Surface

Nuclear Radiation Protection

Strength of Materials

Allowable Stresses and Deflections

General Notes

1. The structure is designed to meet the following requirements:
2. The structure is designed to meet the following requirements:
3. The structure is designed to meet the following requirements:
4. The structure is designed to meet the following requirements:

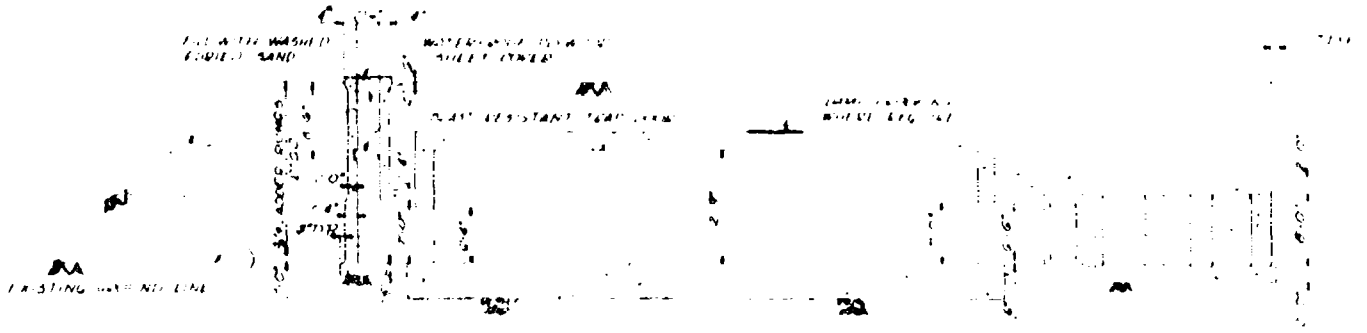
Item	Design
1. Blast Wave	AS 100
2. Blast Loading	AS 100
3. Nuclear Radiation	AS 100
4. Strength of Materials	AS 100
5. Allowable Stresses	AS 100

2

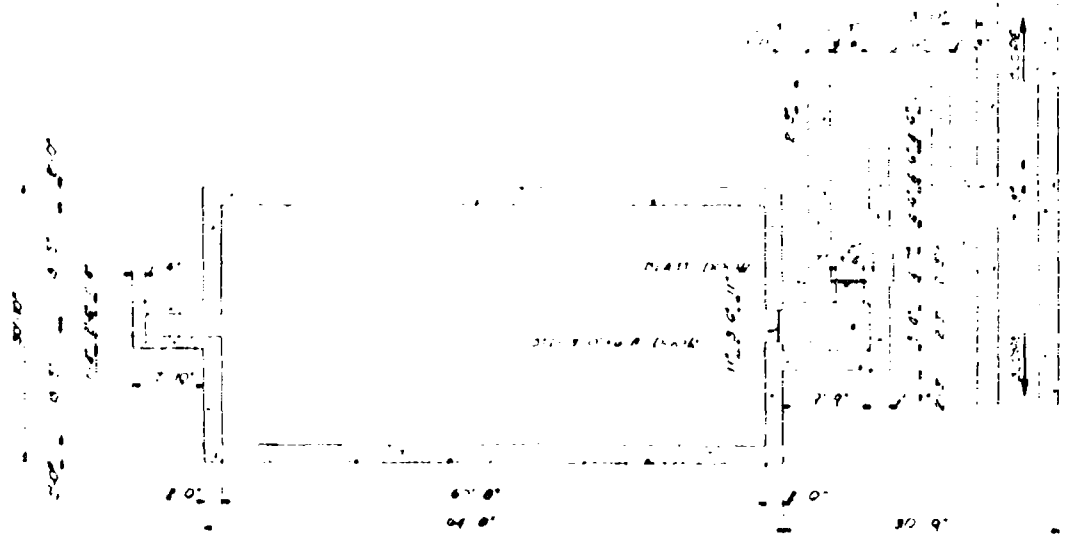
AMMANN & WHITNEY CONSULTING ENGINEERS 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY HEADQUARTERS WASHINGTON, D. C.	
DRAWN BY: FJR CHECKED BY: L.B. DATE: 10/1/54	PROTECTIVE CONSTRUCTION EARLY COVERED CONCRETE IGLOO MAGAZINE 100 PSI SLAB RESISTANT		
DATE: 10/1/54	SHEET 1 OF 1		



ROOF PLAN
SCALE 1/4"=1'-0"



SECTION A-A
SCALE 1/4"=1'-0"



FLOOR PLAN
SCALE 1/4"=1'-0"

1

DESIGN CONDITIONS

Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave

Peak incident pressure = 200 psi; Duration = 0.45 sec

Blast Loading on Arch Surface

Peak pressure = 4.2 psi

Nuclear Radiation Protection

Total gamma and neutrons attenuated to 50r for a 5000T weapon at 100 yards which will produce a peak blast pressure equal to 200 psi

Strength of Materials

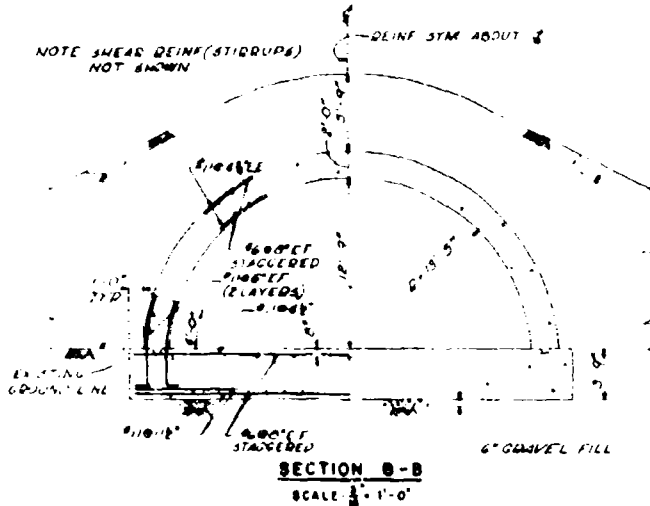
	Static	Blast Design
Supporting capacity	8,000 psi	16,000 psi
Concrete f_c	5,000 psi	6,000 psi
Rein. steel, lower yield (1st Grade, ASTM A305-50T)	47,000 psi	52,000 psi
Rein. steel, lower yield (ASTM A7-50)	36,000 psi	41,600 psi
Plated capacity of soil		

Allowable Stresses and Deflections

The foundation, end walls and entrance may be designed for plastic deformation under design blast load. Arch designed for maximum allowable horizontal deflection at crown equal to R/50. Blast door and escape hatch door designed for maximum elastic deformation under design blast load.

General Notes

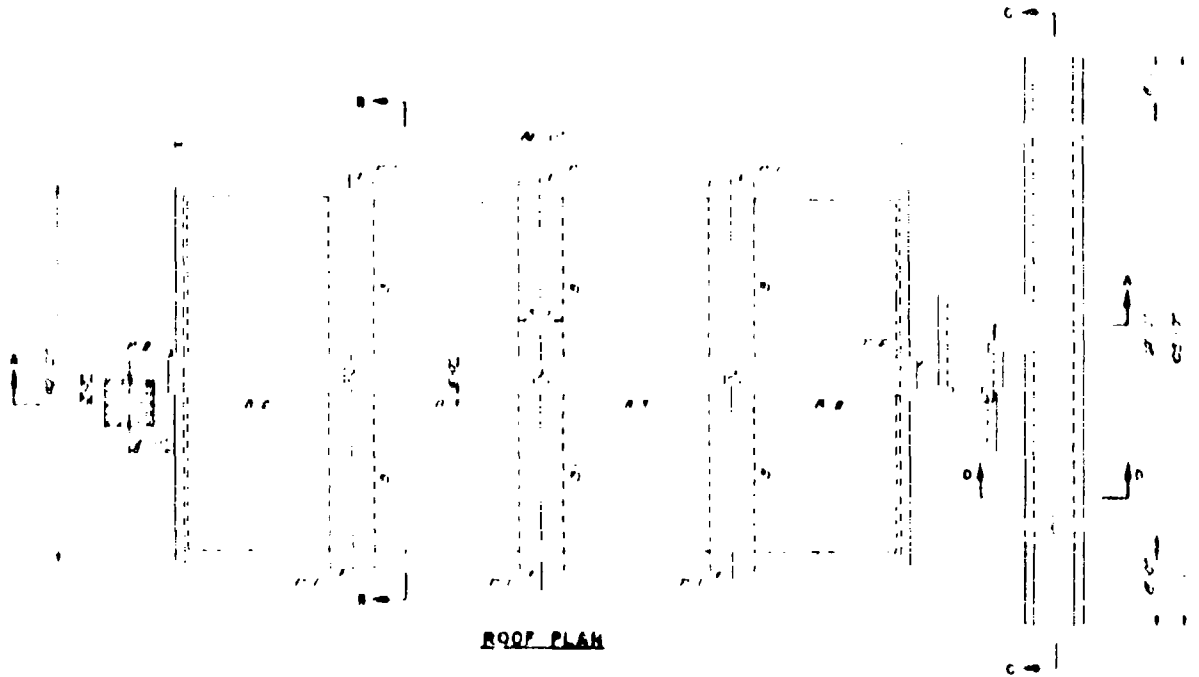
- The following features are not shown and shall be determined to suit use requirements:
 - Interior partitions
 - Mechanical and electrical equipment
 - Air locks and decontamination facilities
- Access ramps may be provided if required for vehicles
- Thermal protection to be applied to all exterior doors
- Structure may be lowered to balance cut and fill if desired



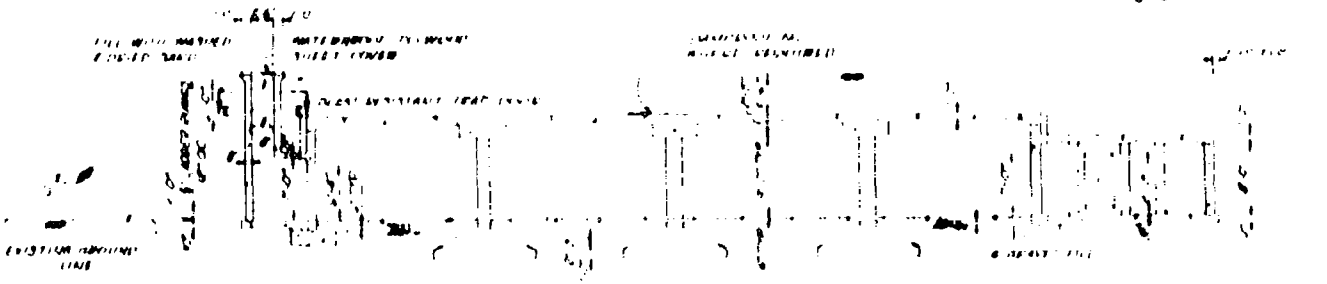
SECTION C-B
SCALE 1/4" = 1'-0"

APPROVED	DATE	DESIGNATION	BY	APPROVAL
AMMANN & WHITNEY CONSULTING ENGINEERS 111-67th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS ARMY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.		
DRAWN BY F.J.M.		PROTECTIVE CONSTRUCTION EARTH COVERED CONCRETE 1800 MAGAZINE 200 PSI BLAST RESISTANT		
CHECKED BY L.S.				
DATE MAY 1962		SHEET 1 OF 1		

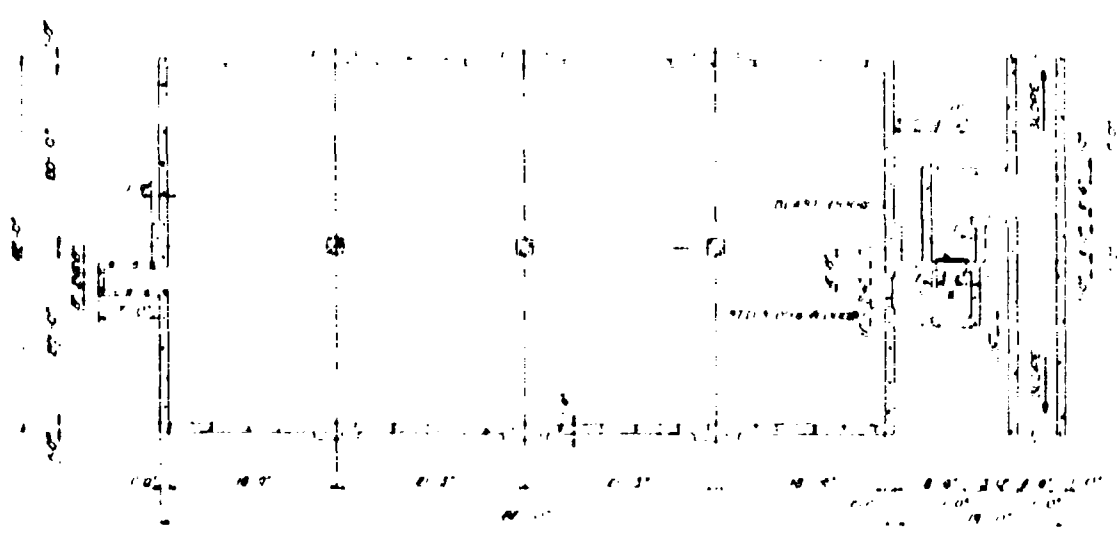
2



ROOF PLAN



SECTION A A



FLOOR PLAN

DESIGN CONDITIONS

Design Procedure
in accordance with DCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
Peak incident pressure = 25psi Duration = 1.2 sec

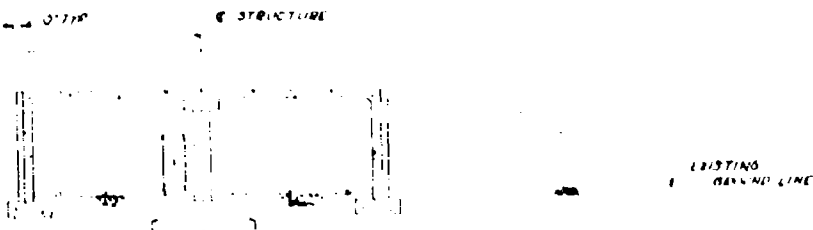
Blast Loading on Roof and Walls
Peak pressure = 17psi Duration = 1.2 sec

Nuclear Radiation Protection
Total gamma and neutron attenuated to 30% for a 20kT weapon at any position which will produce a peak blast pressure not to exceed

Strength of Materials	Blast	Blast Design
Soil bearing capacity	4,000psf	4,000psf
Concrete, f _c	4,000psi	3,800psi
Rebar steel, yield strength	47,500psi	32,000psi
(Int. Grade, ASTM A 307)		
Structural steel, local yield	38,000psi	41,600psi
(ASTM A 7-50)		
Treated capacity of soil		

Allowable Stresses and Deflections
Roofs, walls, foundation and exterior walls designed for static deformation under design blast load. Blast doors and escape hatch doors designed for minimum static deformation under design blast load.

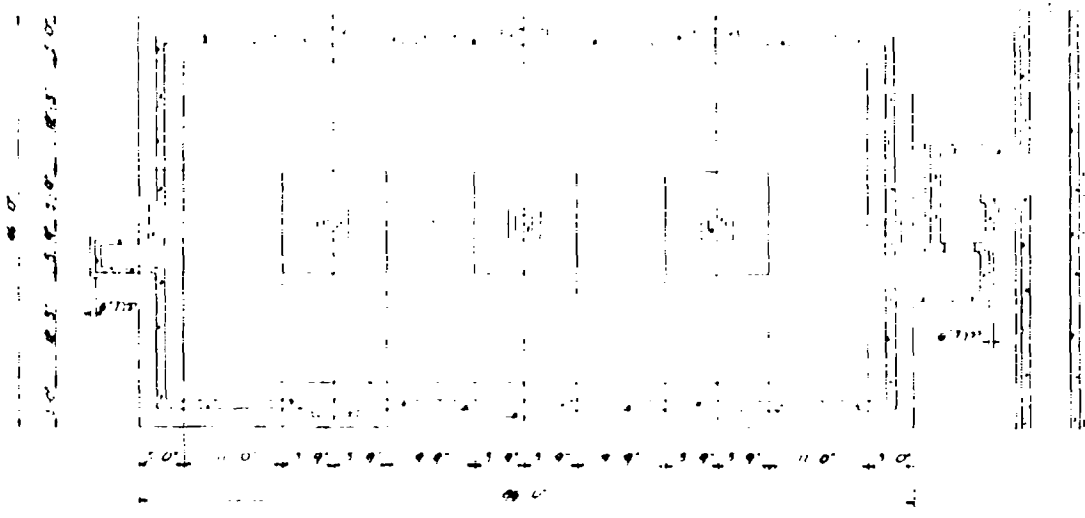
- General Notes**
- The following features are not shown and shall be determined to suit user requirements:
Interior partitions
Mechanical and electrical equipment
Air locks and decontamination facilities
 - All openings may be provided if required for vehicles
 - Structure may be covered to provide cut and fill if desired



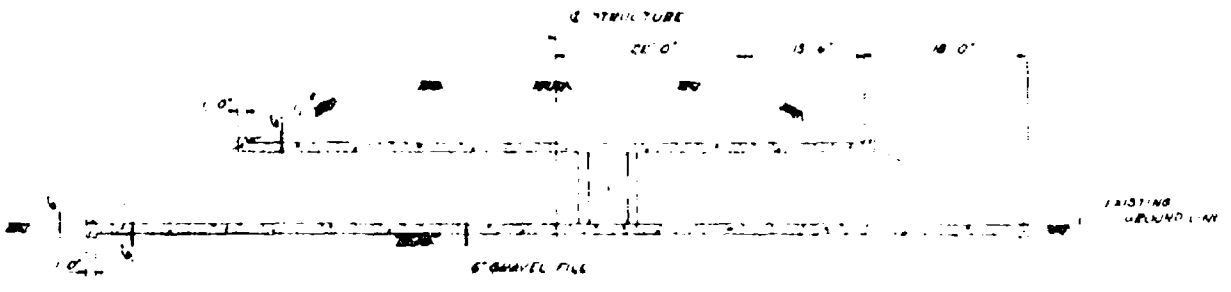
SECTION 0-0

2

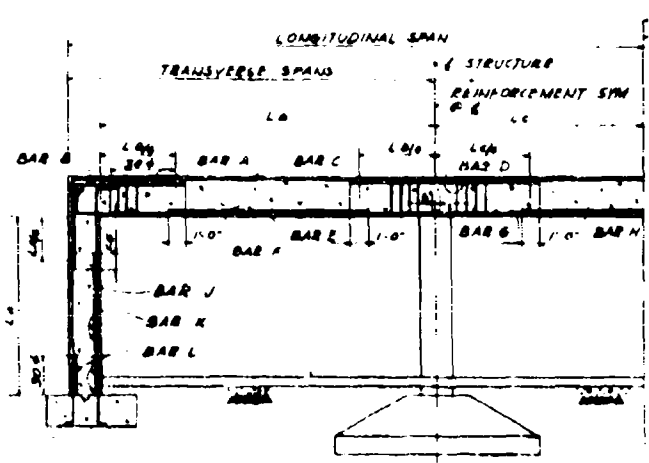
AMMANN & WHITNEY <small>INCORPORATED</small> 111 6TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY <small>OFFICE OF THE CHIEF OF ENGINEERS</small> MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 25 PSI BLAST RESISTANT			
DRAWN BY CHECKED BY DATE	PROJECT NO. DRAWING NUMBER SHEET NO.	TITLE SCALE DATE	DRAWING NUMBER 60-18-01 SHEET 1 OF 2



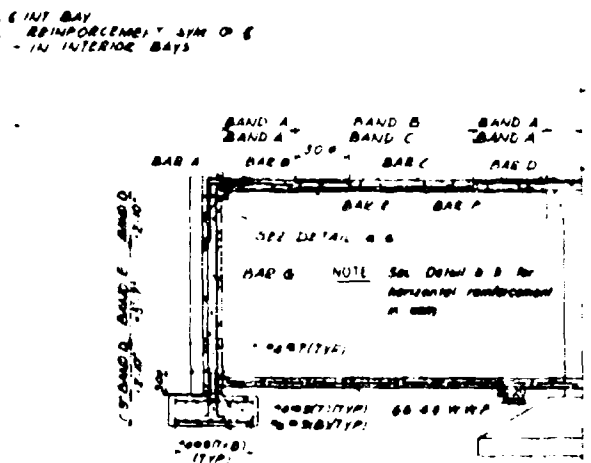
FOUNDATION PLAN
SCALE: $\frac{1}{4}$ " = 1'-0"



SECTION C-C
SCALE: $\frac{1}{4}$ " = 1'-0"



TYPICAL BEAM & PILE DETAIL
SCALE: $\frac{1}{4}$ " = 1'-0"



TYPICAL ROOF & WALL DETAIL
SCALE: $\frac{1}{4}$ " = 1'-0"

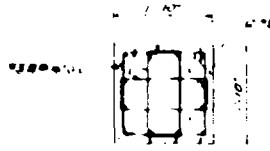


DETAIL OF COLUMN FOOTING

SCALE 1/4" = 1'-0"

BEAM & PILASTER SCHEDULE															
MARK	SIZE		BARS											MAX % STEEL'S	
	W	D	A	B	C	D	E	F	G	H	J	R	L	AT WALL OR PIER	AT COL
H 1	60"	27"	409	409	409	409	409	409						0.38	0.38
B 2	48"	27"	409	409	409	409	409							0.33	0.33
B 3	48"	27"			409	409	409								
P 1	60"	27"	409	409							407	407	407	0.23	
P 2	48"	27"	409	409							405		405	0.17	

NOTE: A minimum of 0.17% net reinforcement is required in all beams and pilasters.

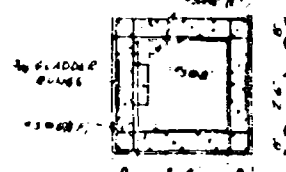


DETAIL OF COLUMN

SCALE 1/4" = 1'-0"

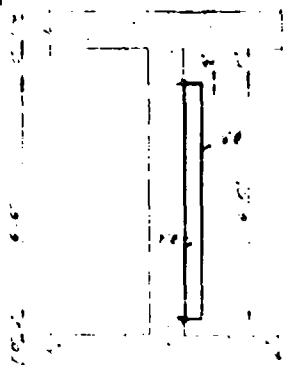
ROOF SLAB & WALL SCHEDULE															
MARK	BAND	BARS													
		A	B	C	D	E	F	G	H	J	R				
ROOF	1A	409													
	1B	409	409	409	409	409	409								
	1C	409	409	409	409	409	409								
	1D	409	409	409	409	409	409								
WALL	2A	409							409						
	2B	409	409						409						
	2C	409	409	409	409	409	409		409						
	2D	409	409	409	409	409	409		409						
SLAB	3A	409							409						
	3B	409	409						409						
	3C	409	409	409	409	409	409		409						
	3D	409	409	409	409	409	409		409						

NOTE: Outer layer of steel.



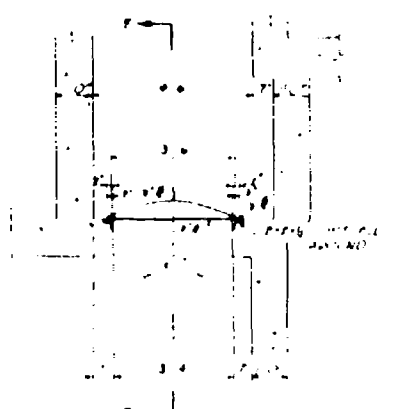
SECTION E-E

SCALE 1/4" = 1'-0"



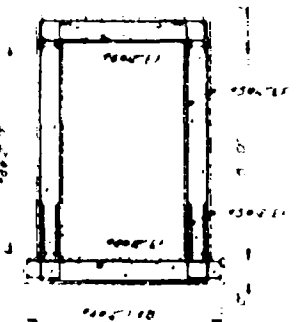
SECTION F-F

SCALE 1/4" = 1'-0"



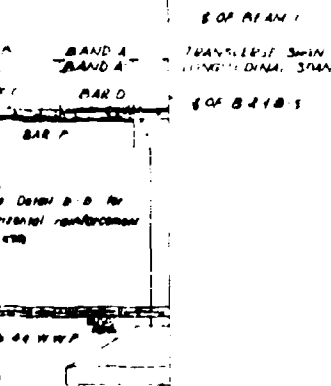
DETAIL OF STEEL BLAST DOOR AND FRAME

SCALE 1/4" = 1'-0"



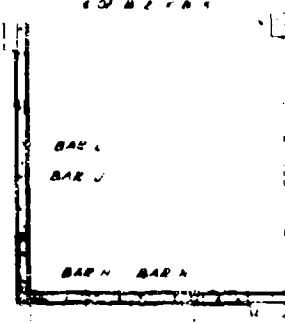
SECTION D-D

SCALE 1/4" = 1'-0"



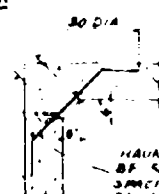
WALL DETAIL

SCALE 1/4" = 1'-0"



DETAIL G-G

SCALE 1/4" = 1'-0"

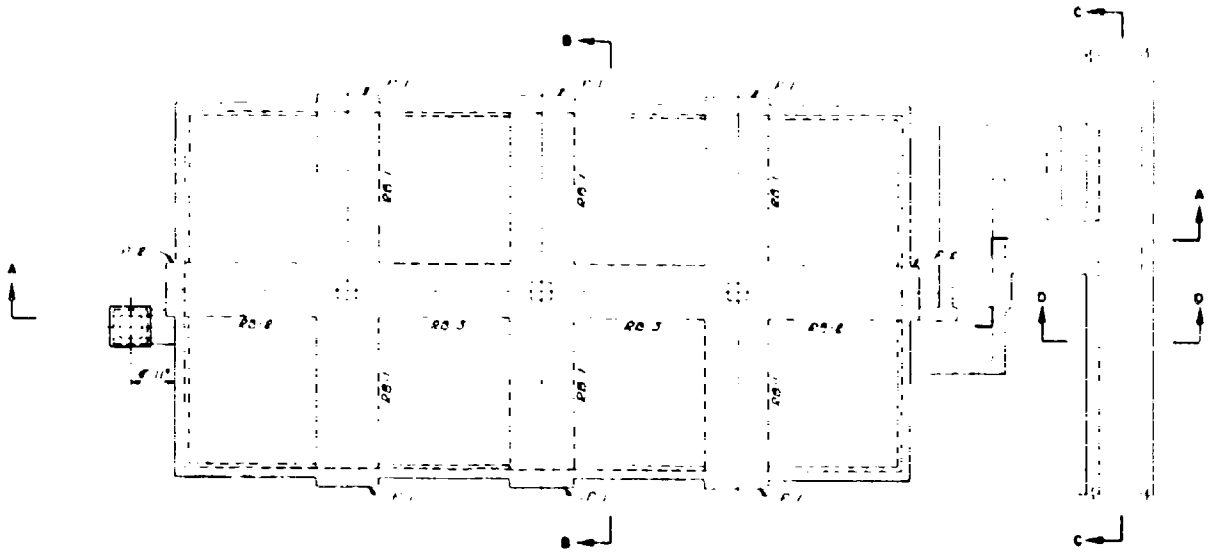


DETAIL H-H

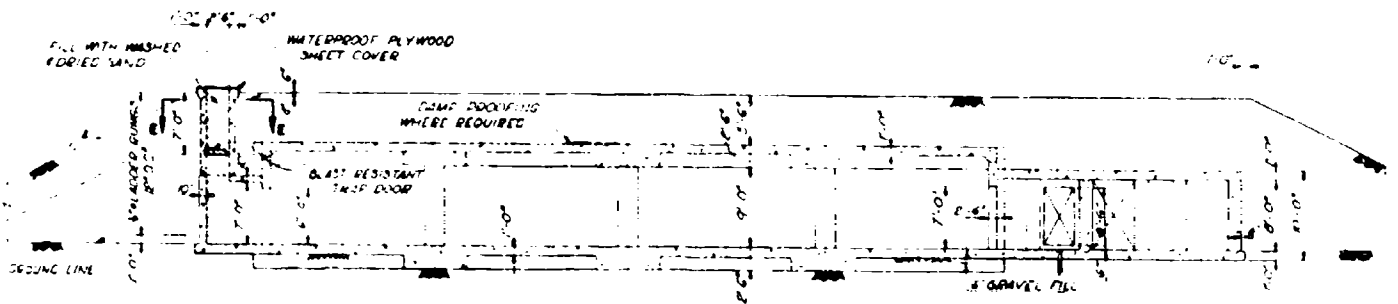
SCALE 1/4" = 1'-0"

ANNMANN & WHITNEY ENGINEERS, ARCHITECTS 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. _____ DRAWING NO. _____ SHEET NO. _____		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 25 PSI BLAST RESISTANT	
DATE: _____			
SCALE: _____		DRAWN BY: _____ CHECKED BY: _____ DATE: _____	

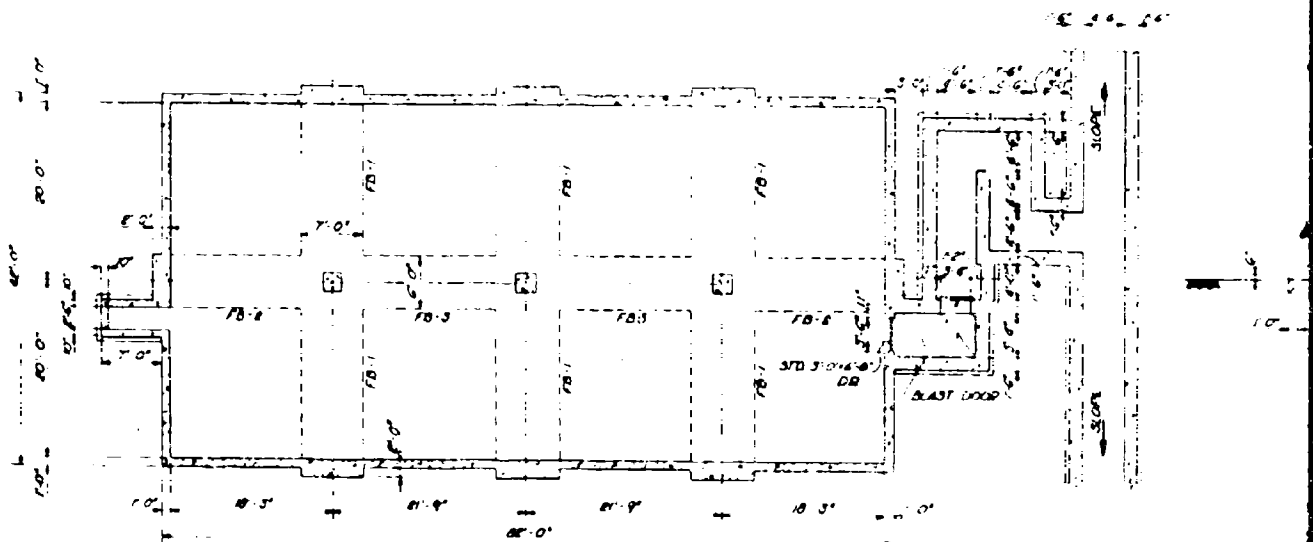
2



ROOF PLAN



SECTION A-A



FLOOR PLAN

DESIGN CONDITIONS

Design Procedure
 In accordance with the manual, Design of Structures for Protection from the Effects of Atomic Weapons.

Design Blast Wave
 Peak incident pressure - 100 psi. Duration - 0.05 sec.

Steel Loading on Roof
 Peak pressure - 50 psi. Duration - 0.05 sec.

Steel Loading on Walls
 Peak pressure - 40 psi. Duration - 0.05 sec.

Nuclear Radiation Protection for Shelter Area
 Total gamma and neutron attenuation to 5% for a 4000 ft. radius at any position which will produce a peak blast pressure of 50 psi.

Strength of Materials	Stiffness	Steel Design
Yield strength - 36,000 psi	ASCE 7-10	ASCE 7-10
Ultimate strength - 58,000 psi	ASCE 7-10	ASCE 7-10
Modulus of elasticity - 29,000,000 psi	ASCE 7-10	ASCE 7-10
Minimum yield strength - 36,000 psi	ASCE 7-10	ASCE 7-10
ASTM A36	ASCE 7-10	ASCE 7-10
Transverse yield strength		

Allowable Stress and Deflections
 Allowable stress and deflection may be designed for plastic deformation under design blast wave. Total allowable deflection may be designed for maximum elastic deformation under design blast wave.

General Notes
 1. The following features are not shown but shall be determined by the user requirements:
 - Mechanical systems
 - Mechanical and electrical equipment
 - Air conditioning and ventilation facilities
 2. All materials shall be provided in quantities required for delivery.
 3. Structure may be located in, above, or below ground as desired.

A
 D

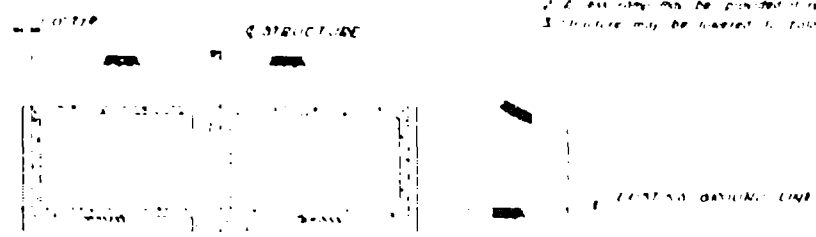
12-01-61
 10-0-0

10-0-0

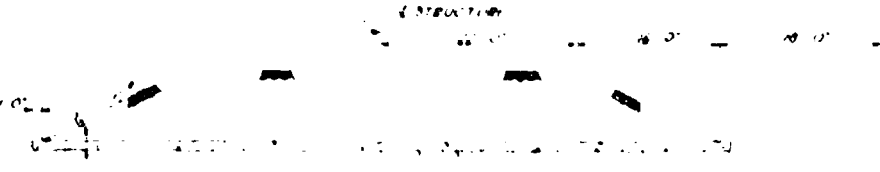
10-0-0

10-0-0

10-0-0



SECTION B-B

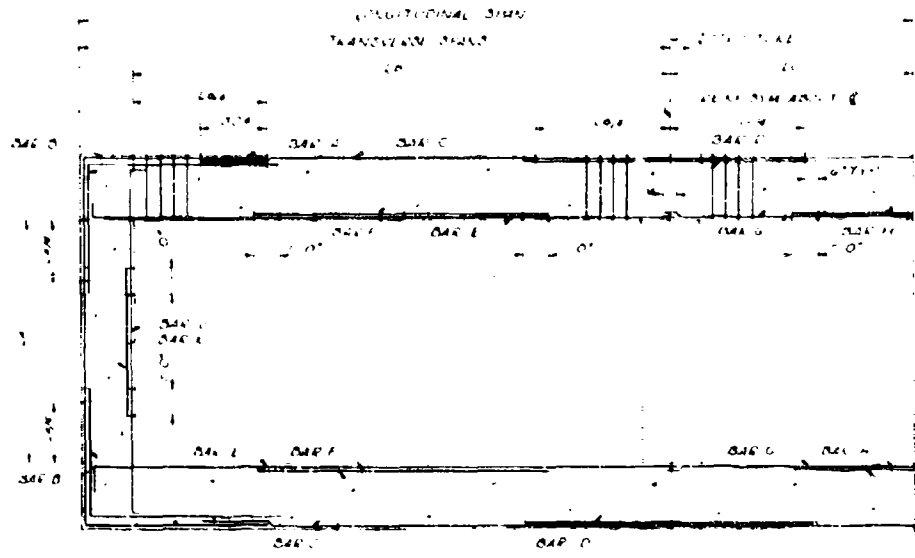


SECTION C-C

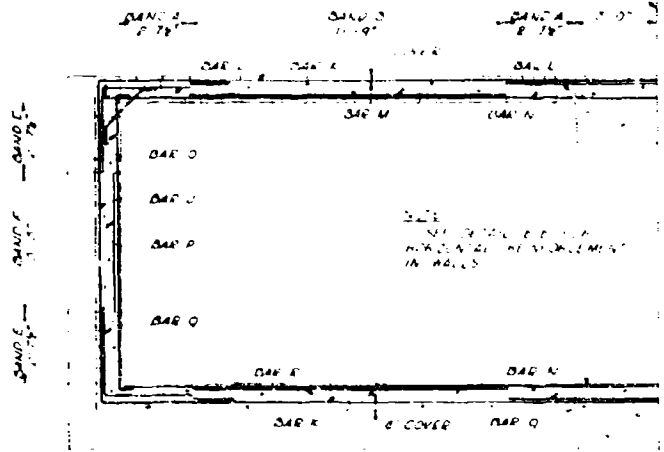
REVISION	DATE	DESCRIPTION	BY	APPROVED
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS SALARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.		
DESIGNED BY F. J. W.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 80 PSI BLAST RESISTANT			
CHECKED BY V. S.				
DATE OF ISSUE 10-0-0	DATE OF REVIEW 10-0-0	DATE OF REVISION 10-0-0	DATE OF APPROVAL 10-0-0	DATE OF CLOSURE 10-0-0
SHEET 2		OF 2		

2

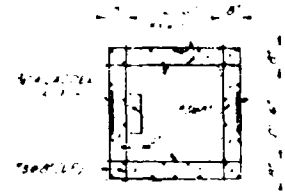
SECTION D-D
 AT THE CORNER
 OF THE WALL



TYPICAL BEAM & PILASTER DETAIL
 SCALE 1/4" = 1'-0"

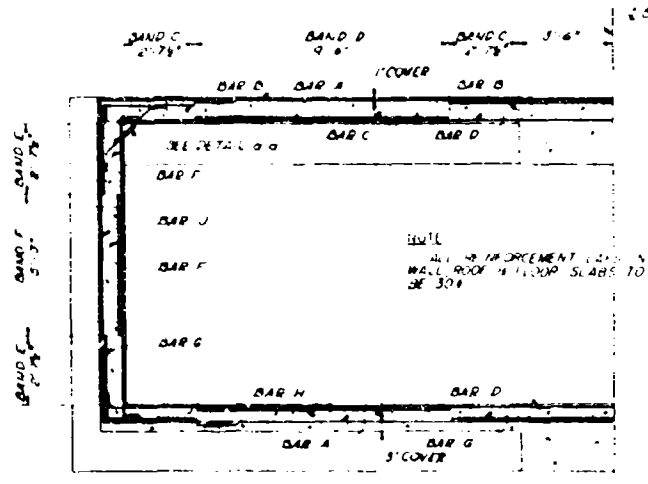


TYPICAL TRANSVERSE SECTION
 SCALE 1/4" = 1'-0"

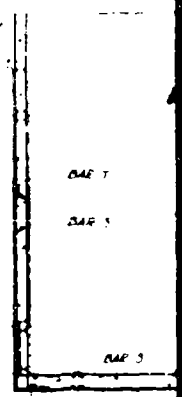


SECTION E-E
 SCALE 1/4" = 1'-0"

DETAIL
 SCALE



TYPICAL LONGITUDINAL SECTION
 SCALE 1/4" = 1'-0"

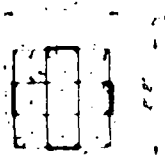


DETA
 SCALE

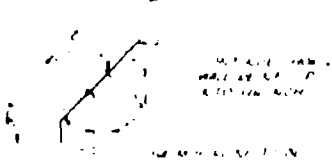
		ROOF, FLOOR & WALL SLAB SCHEDULE																				
PANEL	BAND	BAR																		MAX % STIRRUPS		
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S		
ROOF	A	●	●	●	●																	0.50
	B	●	●	●	●																	0.50
	C	●	●	●	●																	0.50
FLOOR	A	●	●	●	●																	0.50
	B	●	●	●	●																	0.50
	C	●	●	●	●																	0.50
FRONT WALL	A					●	●	●	●													
	B					●	●	●	●													
	C					●	●	●	●													
SIDE WALL	A									●	●	●	●									
	B									●	●	●	●									
	C									●	●	●	●									

BEAM & PILASTER SCHEDULE															
MARK	SIZE		BAR										MAX % STIRRUPS		
	NO	W	D	A	B	C	D	E	F	G	H	J	K	AT WALL OR ROOF	AT COL
HW 1	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 2	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 3	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 4	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 5	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 6	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50
HW 7	18"	12"	18"	●	●	●	●	●	●	●	●			0.50	0.50

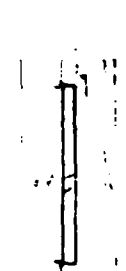
NOTE: ALL REINFORCEMENT SHALL BE PLACED WITHIN THE DESIGNATED PERIMETER OF ALL BEAMS AND PILLARS.



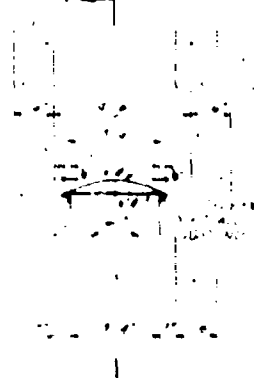
DETAIL OF COLUMN
SCALE 1/4" = 1'-0"



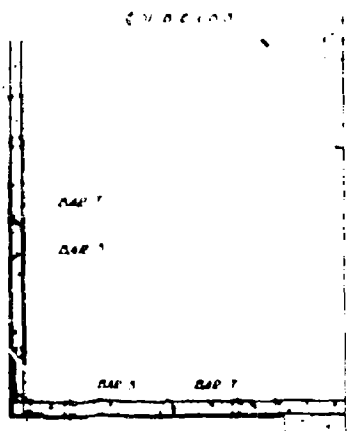
DETAIL R-G
SCALE 1/4" = 1'-0"



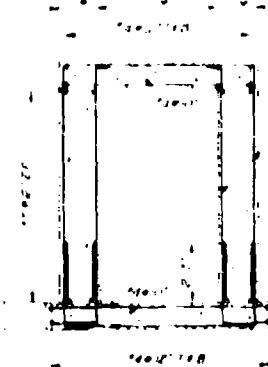
SECTION F-F
SCALE 1/4" = 1'-0"



DETAIL OF STEEL BLAST DOOR AND FRAME
SCALE 1/4" = 1'-0"



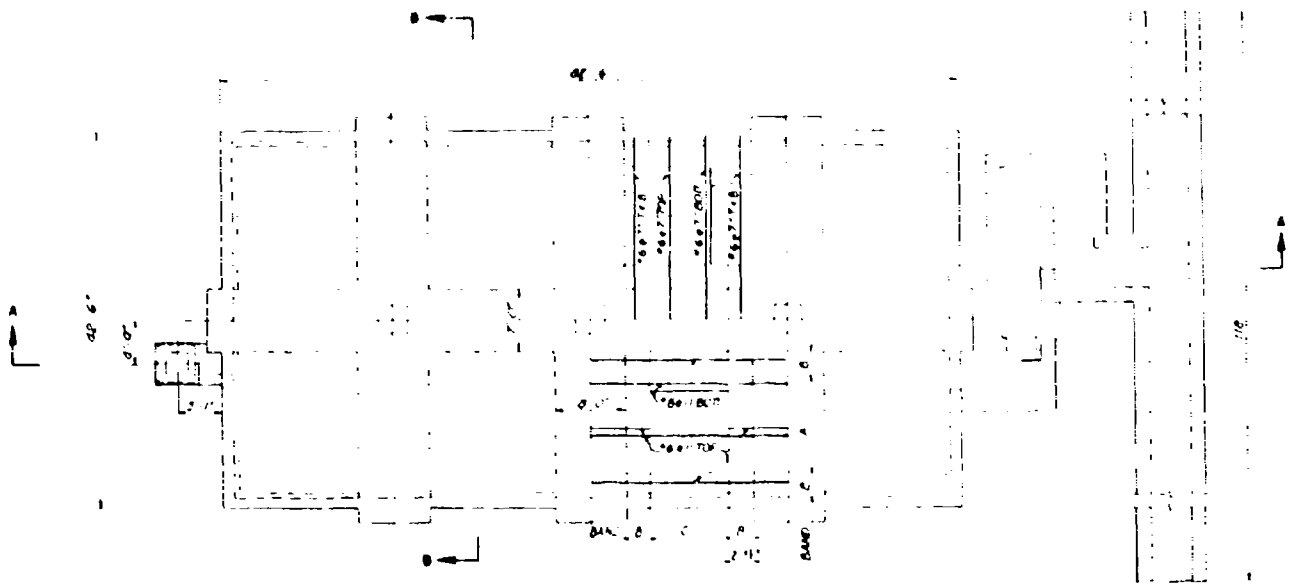
DETAIL D-D
SCALE 1/4" = 1'-0"



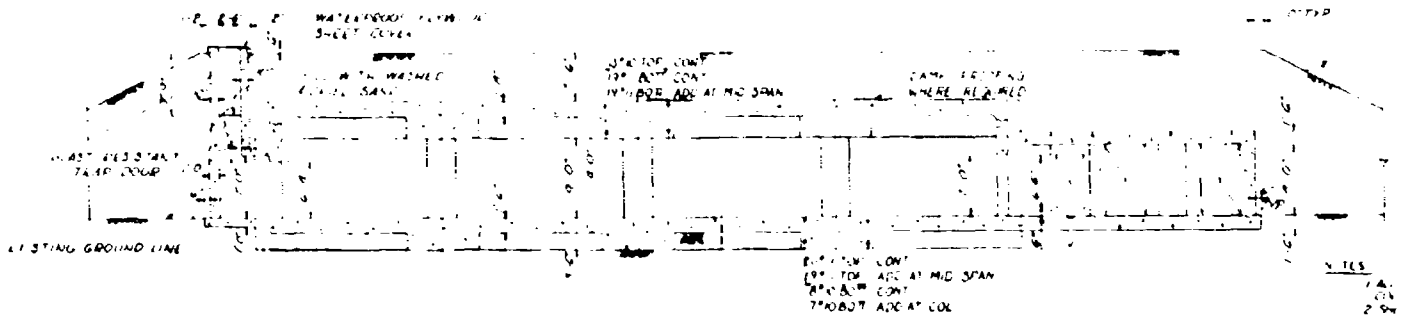
SECTION D-D
SCALE 1/4" = 1'-0"

2

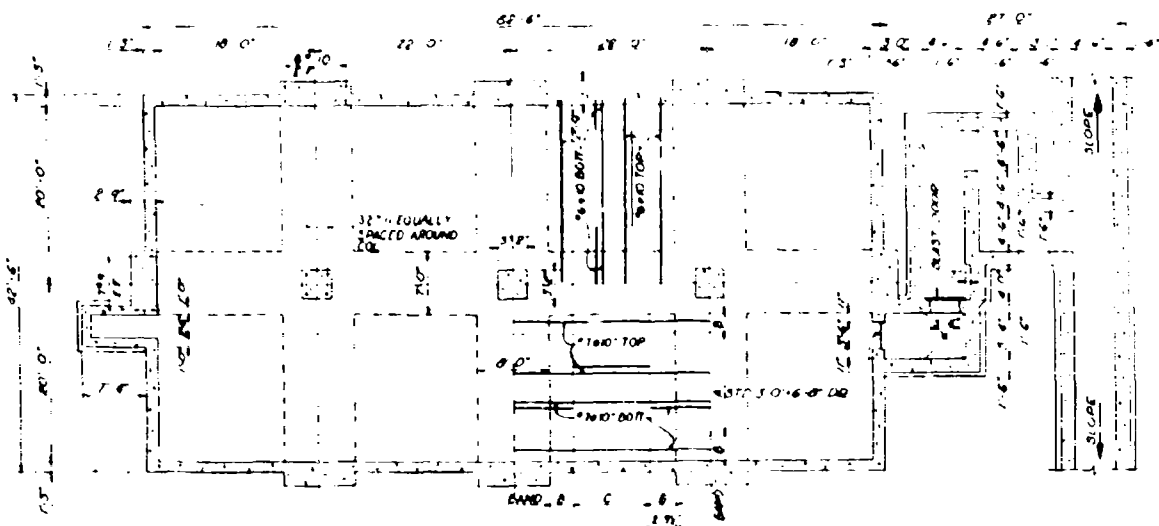
APPROVED	DATE	DESCRIPTION	BY
AMMANN & WHITNEY CONSULTING ENGINEERS 115 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 60-18-DI		SHEET 2 OF 2	



ROOF PLAN



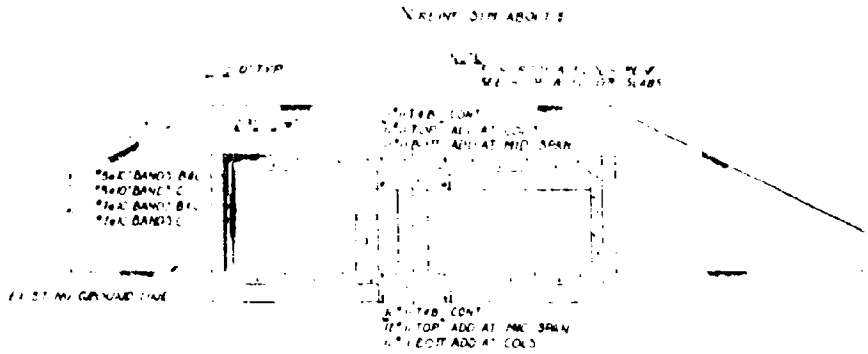
SECTION A-A



FLOOR PLAN

DESIGN

Design Procedure	1.0	1.0
Design Blast Wave	2.0	2.0
Blast Loading on Roof	3.0	3.0
Blast Loading on Walls	4.0	4.0
Nuclear Radiation Protection	5.0	5.0
Strength of Materials	6.0	6.0
Allowable Stresses and Deflection	7.0	7.0
General Notes	8.0	8.0

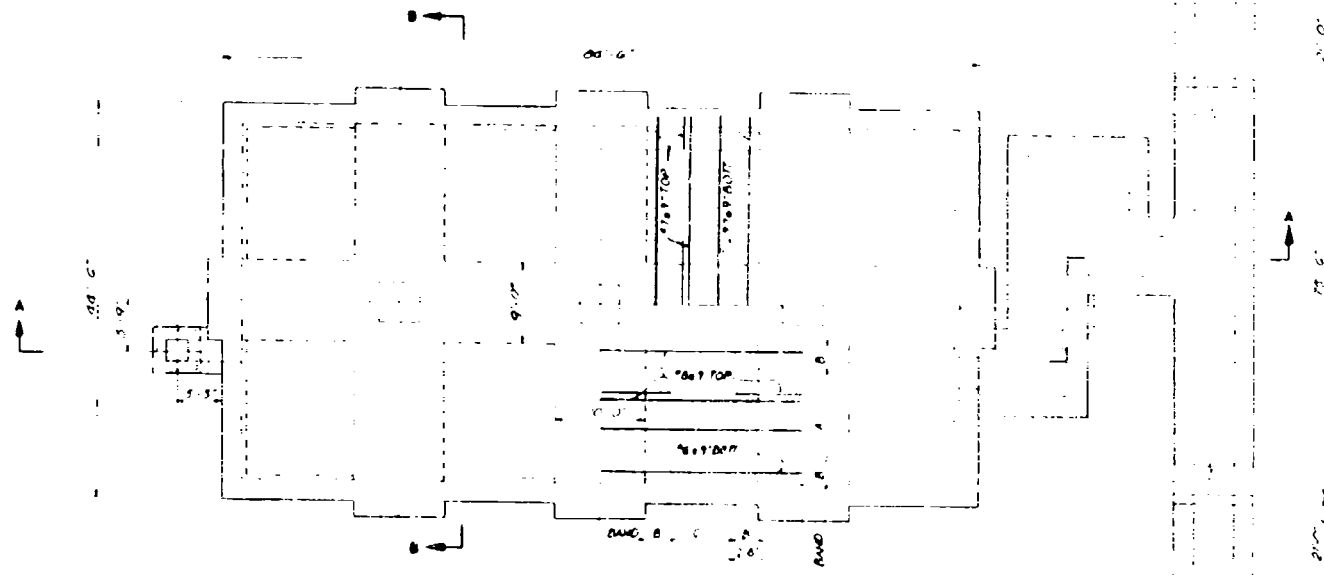


SECTION B-B

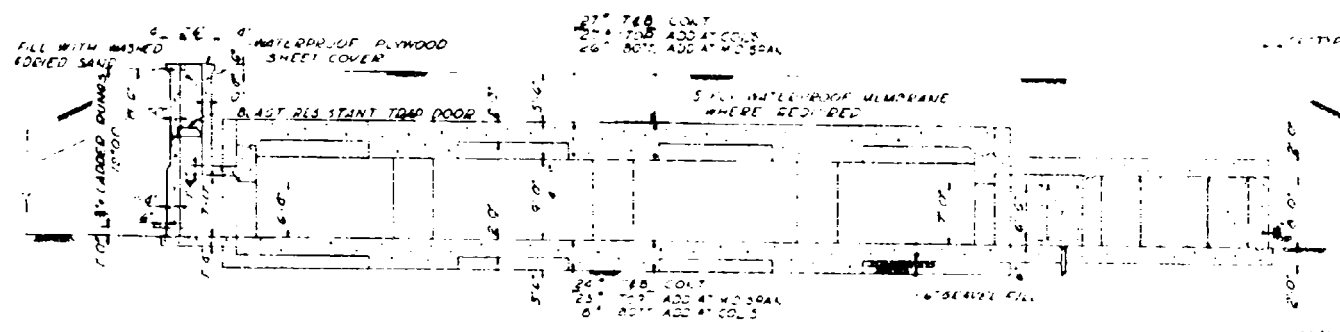
- NOTES**
1. ALL SLAB REINFORCING ABOUT CENTERLINE
 2. DETAILS REINFORCING NOT SHOWN

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		THE DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING CENTER FORT MONMOUTH, NEW JERSEY
PROJECT NO. 100-10 DRAWING NO. 60-10 SHEET 1 OF 1	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 100 PSI BLAST RESISTANT	CONSTRUCTION 60-10 SHEET 1 OF 1

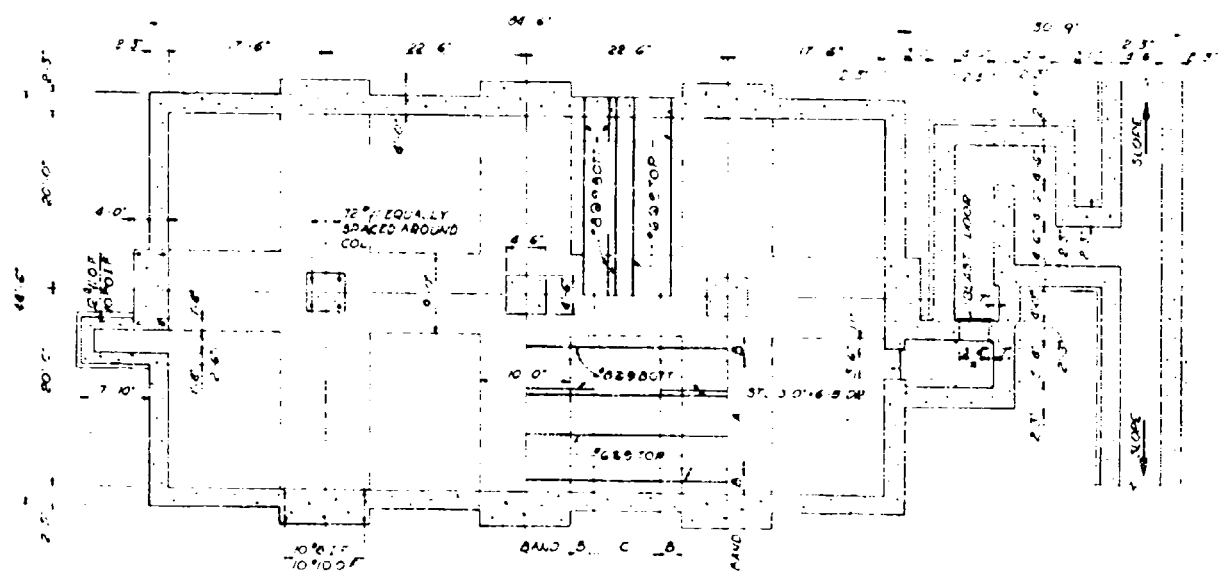
2



ROOF PLAN



SECTION A-A



FLOOR PLAN

DESIGN CONDITIONS

Design Procedure

Design Blast Wave

Blast Loading on Roof

Blast Loading on Walls

Nuclear Radiation Protection for Shelter Area

Strength of Materials

Statics

Blast Design

Allowable Stresses and Deflections

General Notes

- 1. The following features are not shown and shall be determined by the user's requirements.
- 2. The design shall be based on the following assumptions:
- 3. The design shall be based on the following assumptions:
- 4. The design shall be based on the following assumptions:
- 5. The design shall be based on the following assumptions:
- 6. The design shall be based on the following assumptions:

NOT TO SCALE
AS SHOWN

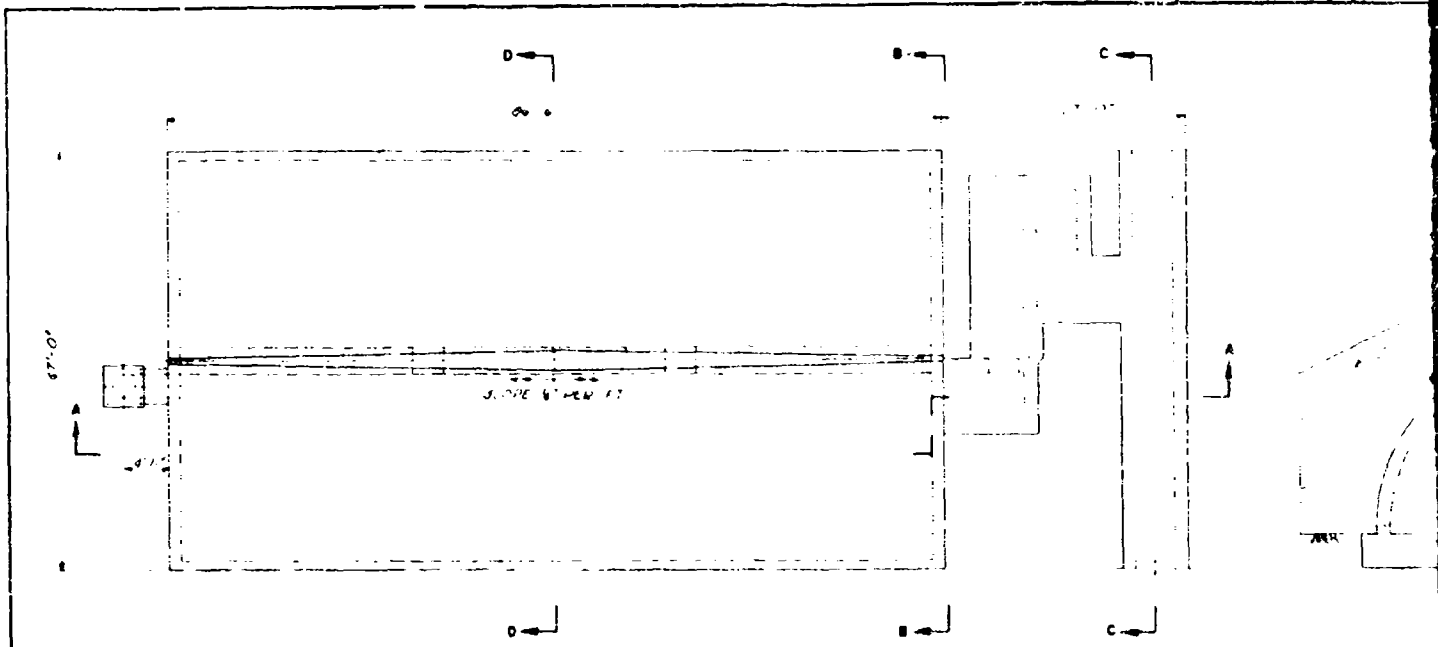
SEE DRAWING 60-18-01 FOR
GENERAL NOTES

SECTION 6.5
GENERAL PURPOSE STRUCTURE
EARTH COVERED, RECTANGULAR
200 PSF BLAST RESISTANT

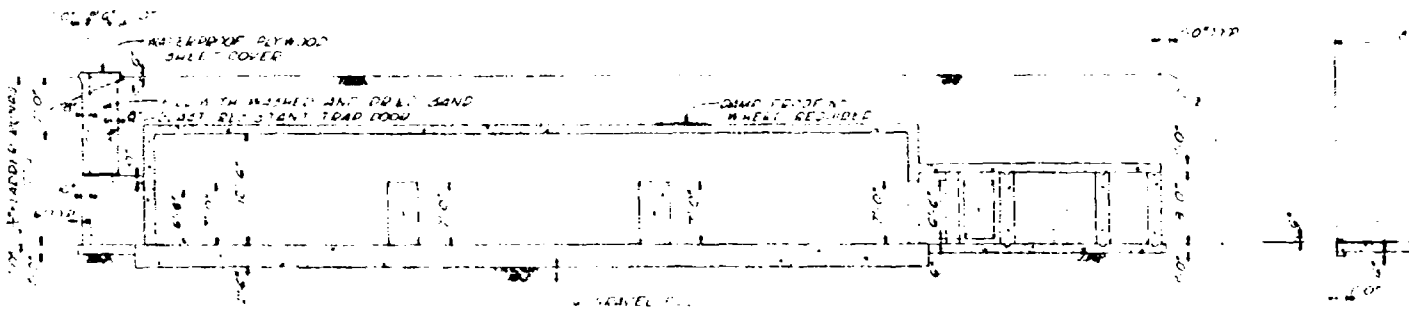
SECTION 6.5

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF RECORDS ARMY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY APPROVED BY DATE	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED, RECTANGULAR 200 PSF BLAST RESISTANT		
DRAWING NUMBER 60-18-01	SHEET 1	OF 1	DATE 60-18-01

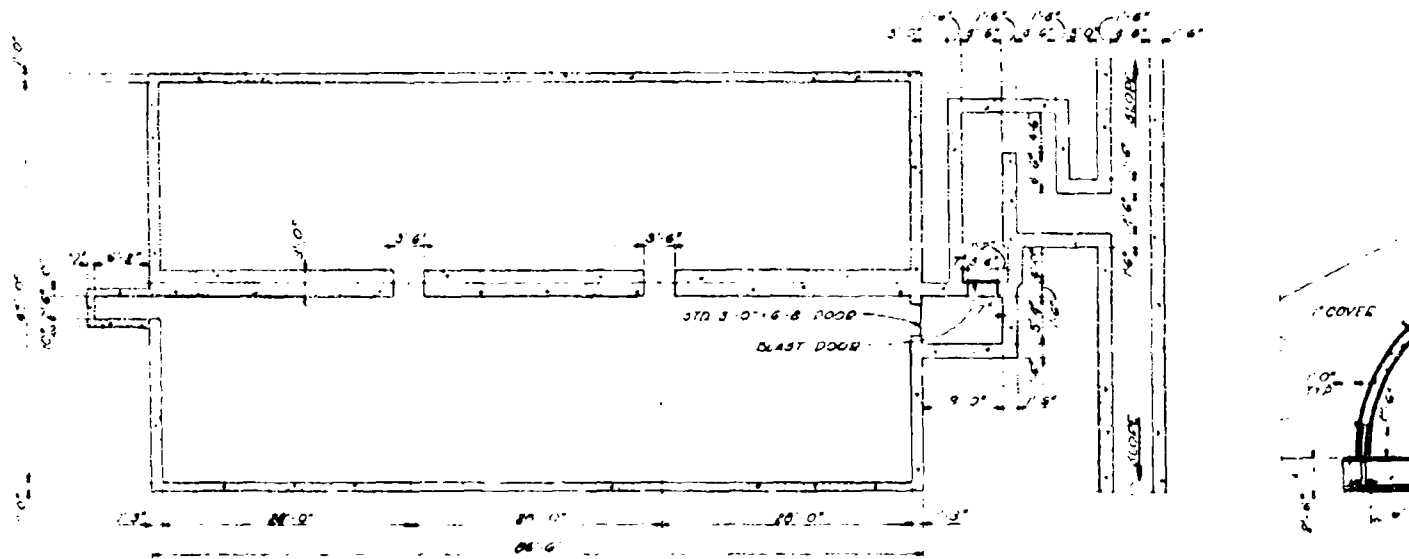
2



ROOF PLAN
SCALE: $\frac{1}{8}$ " = 1'-0"



SECTION A-A
SCALE: $\frac{1}{8}$ " = 1'-0"



FLOOR PLAN
SCALE: $\frac{1}{8}$ " = 1'-0"

DESIGN CONDITIONS

Design Procedure
 In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
 Peak incident pressure = 50 psi Duration = 0.83 sec

Blast Loading on Arch Surface
 Peak pressure = 40 psi

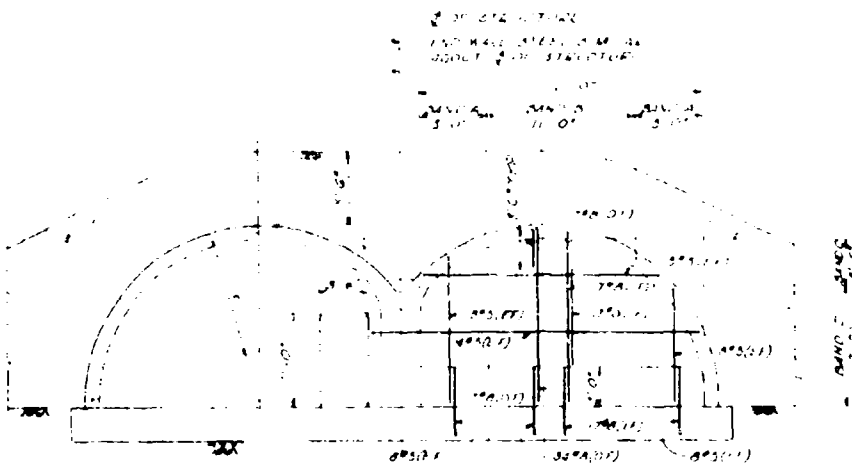
Nuclear Radiation Protection
 Total gamma and neutrons attenuated to 50r for a NRT weapon at any position which will produce a peak blast pressure equal to 50 psi

Strength of Materials	Static	Blast Design
Soil bearing capacity	8,000psi*	16,000psi
Concrete f_c	5,000psi	6,500psi
Rein. Steel, lower yield (1st Grade, ASTM A305 50T)	47,500psi	52,000psi
Structural steel, lower yield (ASTM A7-50)	36,000psi	41,600psi

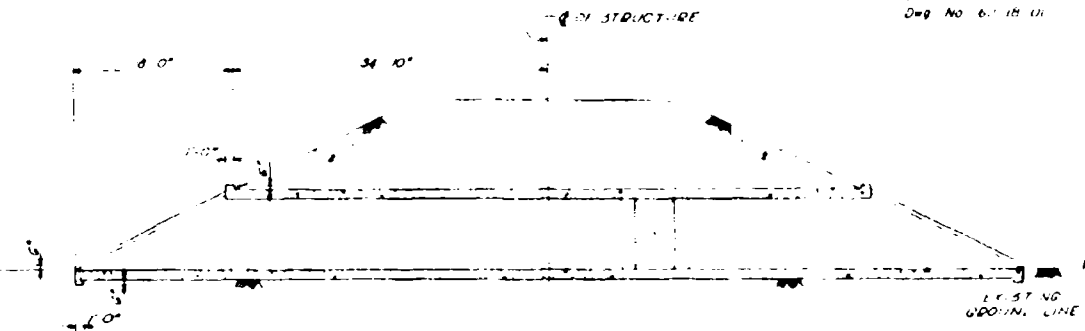
*Total capacity of soil

Allowable Stresses and Deflections
 The foundation, end walls and entrance way designed for elastic deformation under design blast load Arch designed for a maximum longitudinal deflection equal to $h/50$ where h is as indicated in Section B-B Blast door and escape hatch door designed for maximum elastic deformation under design blast load

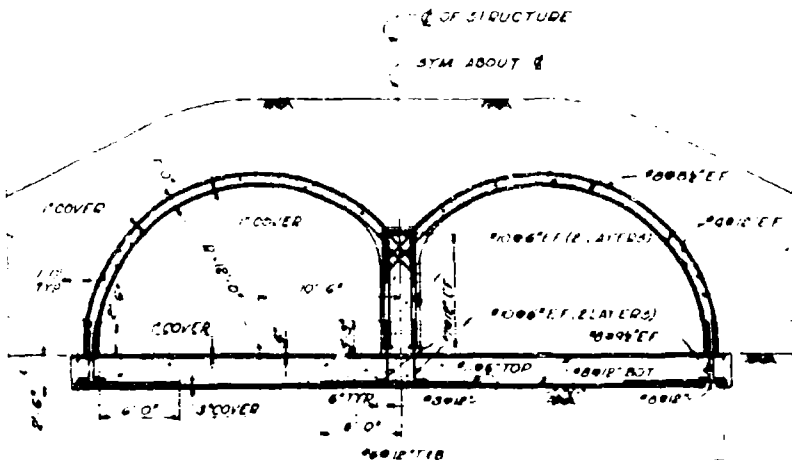
- General Notes**
- The following features are not shown and shall be determined to suit use requirements:
 interior partitions
 Mechanical and electrical equipment
 air locks and decontamination facilities
 - Access ramp may be provided if required for vehicles
 - Structure may be lowered to ground level and, if desired
 - For entrance way and escape hatch reinforcement and blast door details see Earth Covered Rectangular 5 psi Structure, Dwg No. 60-18-03



SECTION B-B
 SCALE: 1/4" = 1'-0"



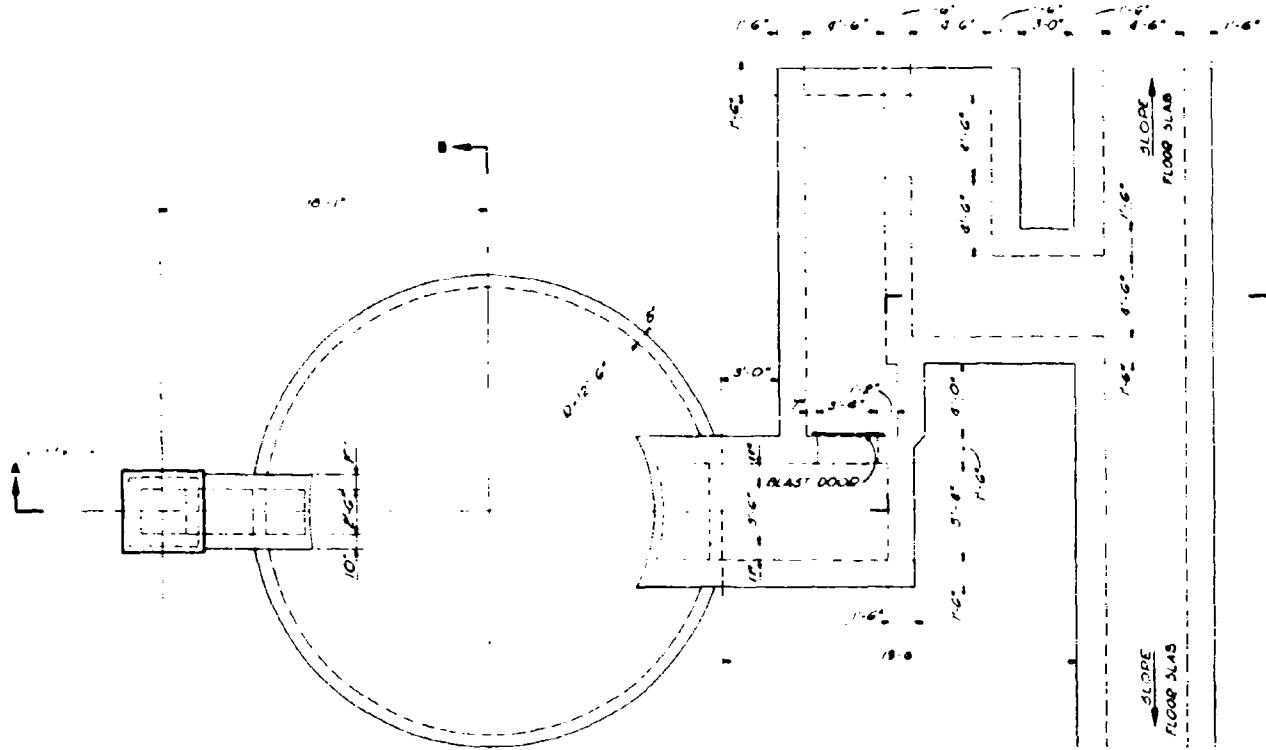
SECTION C-C
 SCALE: 1/4" = 1'-0"



SECTION D-D
 SCALE: 1/4" = 1'-0"

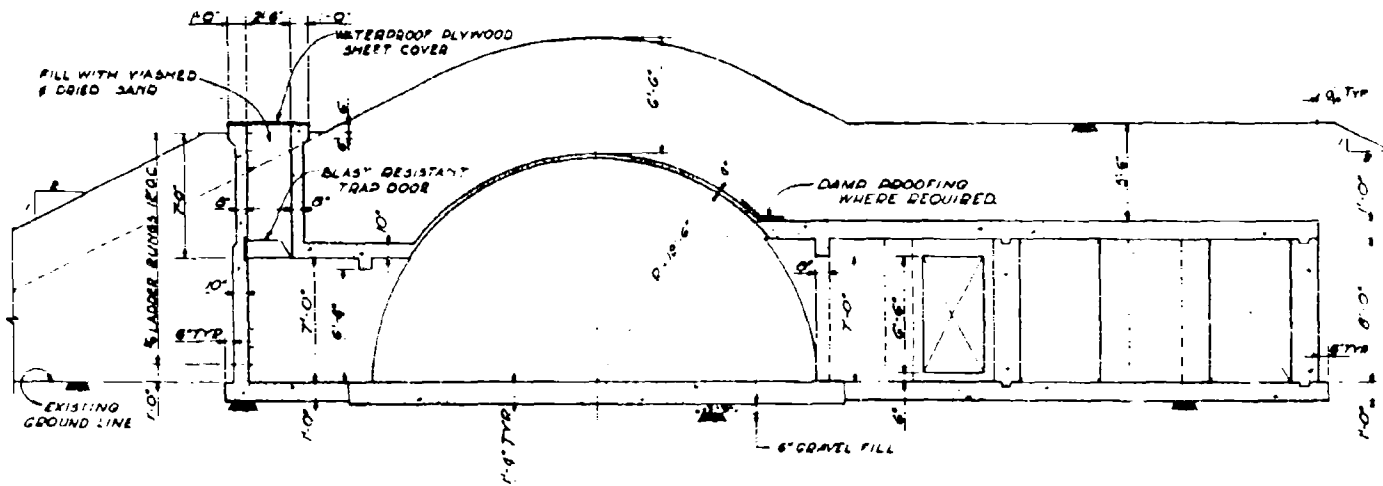
DESIGNED BY	DATE	DESCRIPTION	BY	APPROVED
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.		
PROJECT NO.	FJW	PROTECTIVE CONSTRUCTION GENERAL PURPOSE COVERED EARTH COVERED DOUBLE BARREL ARCH 50 PSI BLAST RESISTANT		
PROJECT NO.	40			
DATE OF PLOT	11/15/50	NO. OF SHEETS	1	OF
DRAWING NUMBER 60-18-02		AS NOTED		

2



ROOF PLAN

NOTE



SECTION A-A

DESIGN CONDITIONS

Design Procedure

In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave

Peak instant pressure = 50psi Duration = 0.85 sec

Blast Loading on Dome Surface

with pressure dips.

Nuclear Radiation Protection

Take gamma and neutrons attenuated to 50% for a HORT weapon of any yield which will produce a peak blast pressure equal to 50psi.

Strength of Materials

	Static	Blast Design
Soil bearing capacity (long term)	8,000psf*	16,000psf
Dome	3,500psi	3,900psi
Remainder of Structure	3,000psi	6,500psi
Rein. Steel (lower yield) (for Grade, ASTM A 705 50%)	47,500psi	57,000psi
Structural steel, lower yield (ASTM A7-50)	38,000psi	41,600psi

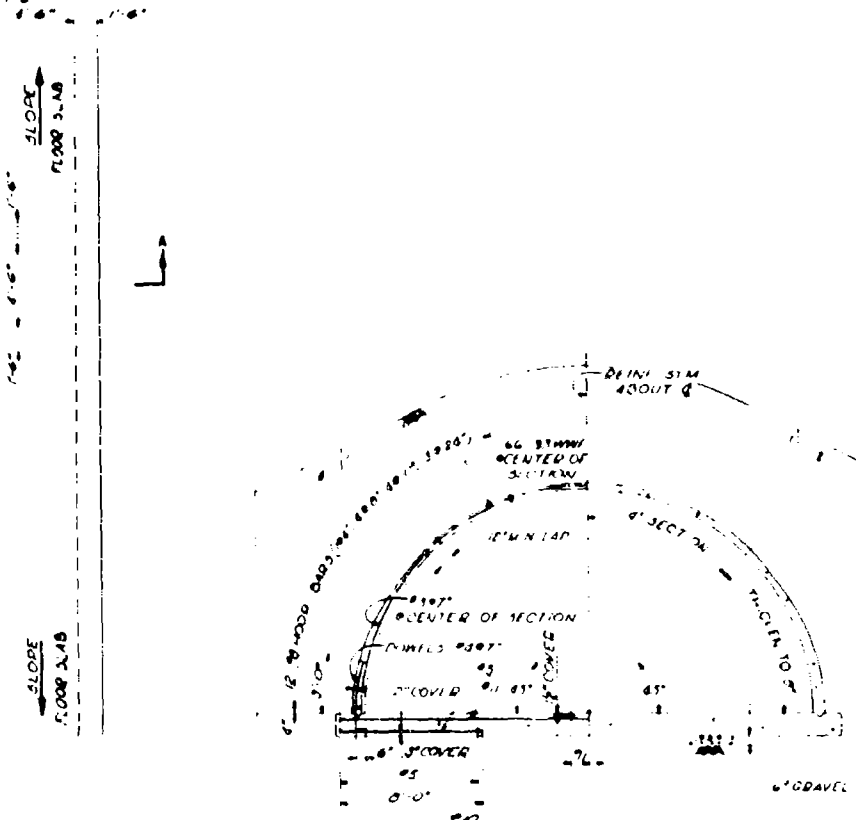
*rated capacity of soil

Allowable Stresses and Deflections

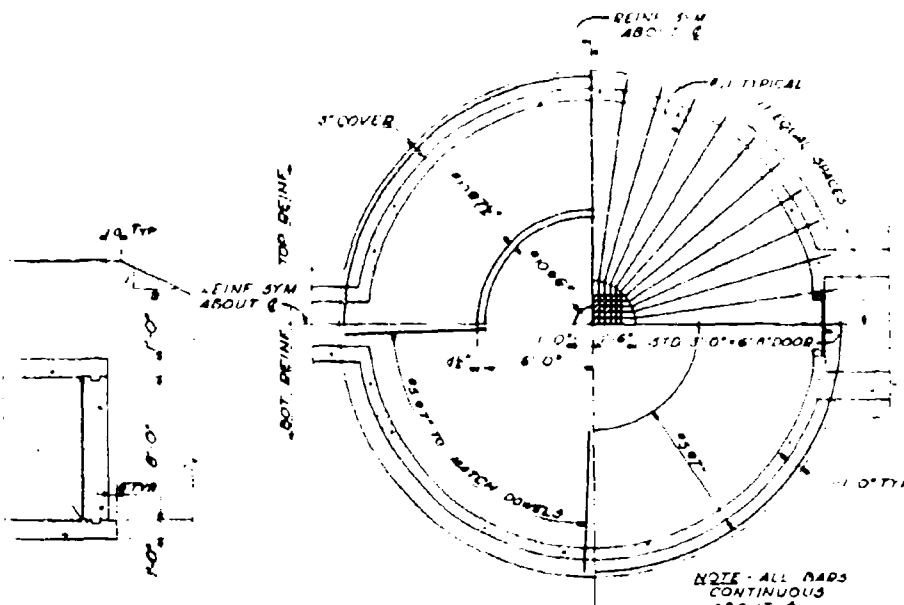
The foundation and entrance way designed for plastic deformation under design blast load. Dome, blast door and escape hatch door designed for maximum elastic deformation under design blast load.

General Notes

- The following features are not shown and shall be determined by suit use requirements:
 - Interior partitions
 - Mechanical and electrical equipment
 - Air locks and decontamination facilities
- Access ramp may be provided if required for vehicles
- Structure may be lowered to design soil and fill if desired
- See entrance way and escape hatch reinforcement, and blast door details see Part I, Cover on Rectangular Slips, Structure Eng. No. 60-18-D.



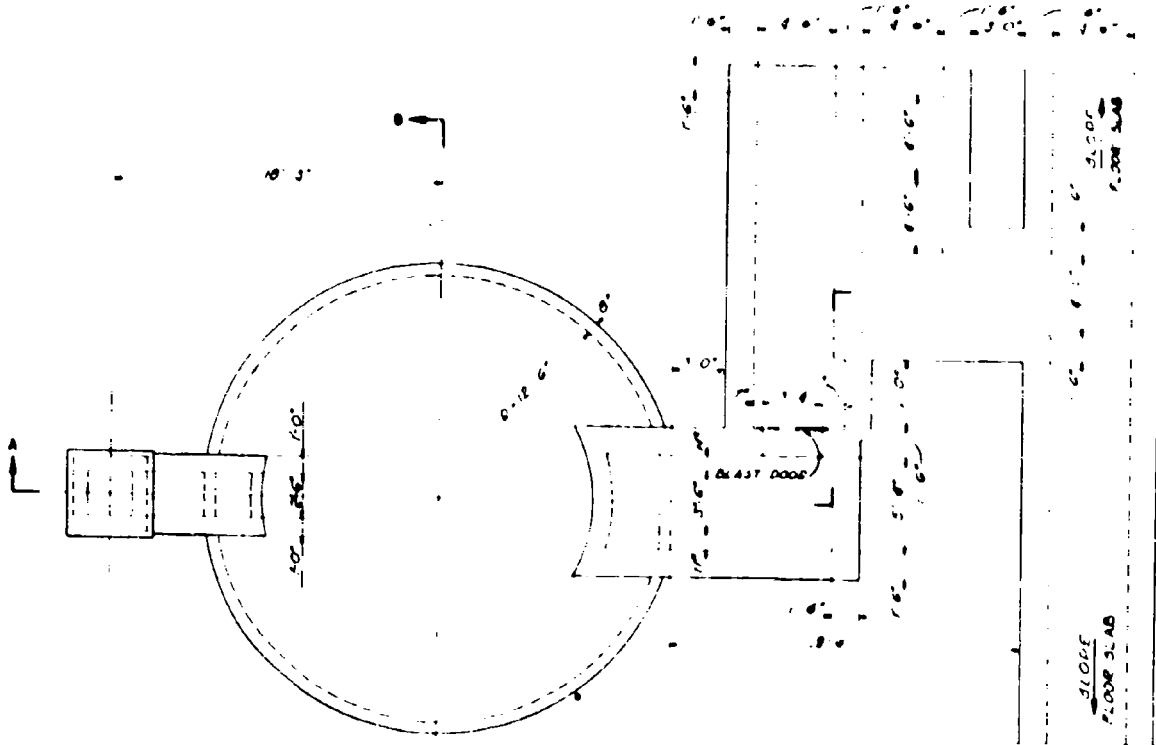
SECTION B-B



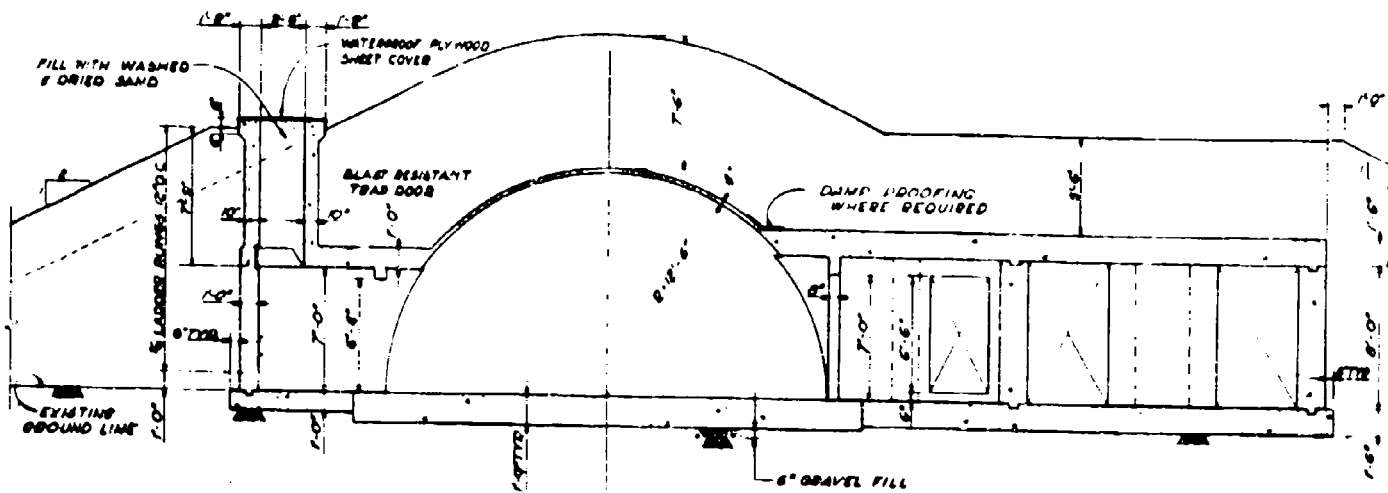
FLOOR SLAB AND FOUNDATION PLAN

REVISION	DATE	DESCRIPTION	BY	APPROVAL
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY		
CONSULTING ENGINEERS		OFFICE OF THE CHIEF OF ENGINEERS		
111-8TH AVENUE, NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION		
PROJECT NO. F.W.		PROTECTIVE CONSTRUCTION		
DESIGNED BY E.L.		GENERAL PURPOSE STRUCTURE		
CHECKED BY		EARTH COVERED DOME		
DATE		60 PSI BLAST RESISTANT		
SCALE		1/8" = 1'-0"		
SHEET NO.		60-18-02		
DATE		SHEET		

2



ROOF PLAN



SECTION A-A

DESIGN CONDITIONS

Design Procedure
 In accordance with OCE manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
 Peak incident pressure = 100psi Duration = 0.64sec

Blast Loading on Dome Surface
 Peak pressure = 135psi

Nuclear Radiation Protection
 Total gamma and neutron attenuated to 50r for a 200RT weapon at any position which will produce a peak blast pressure equal to 100psi

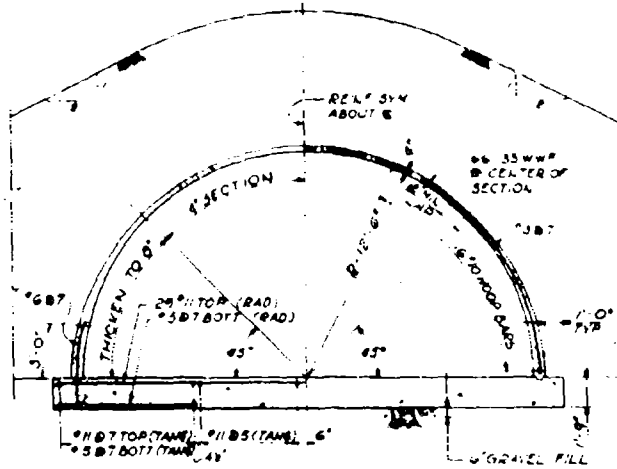
Strength of Materials	Stalls	Blast Design
So bearing capacity	8,000psi*	16,000psi*
Concrete f _c		
Dome	4,000psi	5,200psi
Remainder of Structure	5,000psi	6,500psi
Reinf. Steel, lower yield	47,500psi	57,000psi
Reinf. Grade ASTM A305-50T		
Structural steel, lower yield (ASTM A7-50)	38,000psi	47,000psi

* rated capacity of soil

Allowable Stresses and Deflections
 The foundation and entrance may designed for plastic deformation under design blast load. Dome, blast door and storage hatch door designed for maximum elastic deformation under design blast load

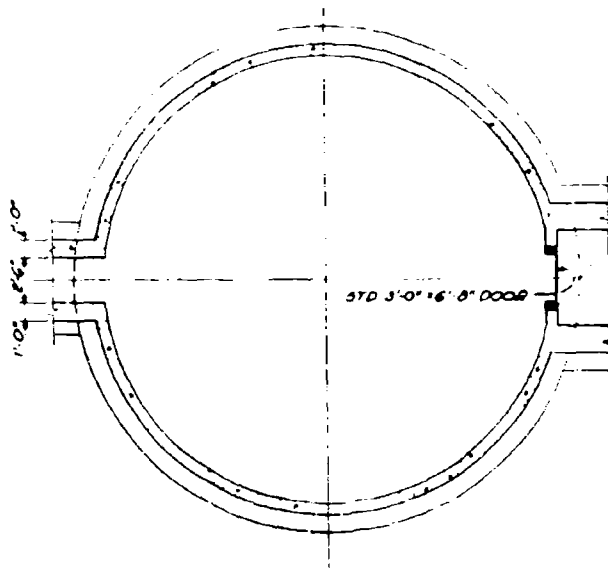
- General Notes**
- The following features are not shown and shall be determined to suit use requirements:
 Interior partitions
 Mechanical and electrical equipment
 Air locks and decontamination facilities
 - Access ramp may be provided if required for vehicles.
 - Thermal protection to be applied to all exterior doors
 - Structure may be lowered to balance cut and fill if desired

SLOPE FLOOR SLAB

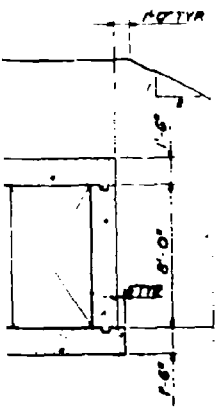


NOTE
 SHEAR REINF. STIRRUPS NOT SHOWN

SECTION 0-0

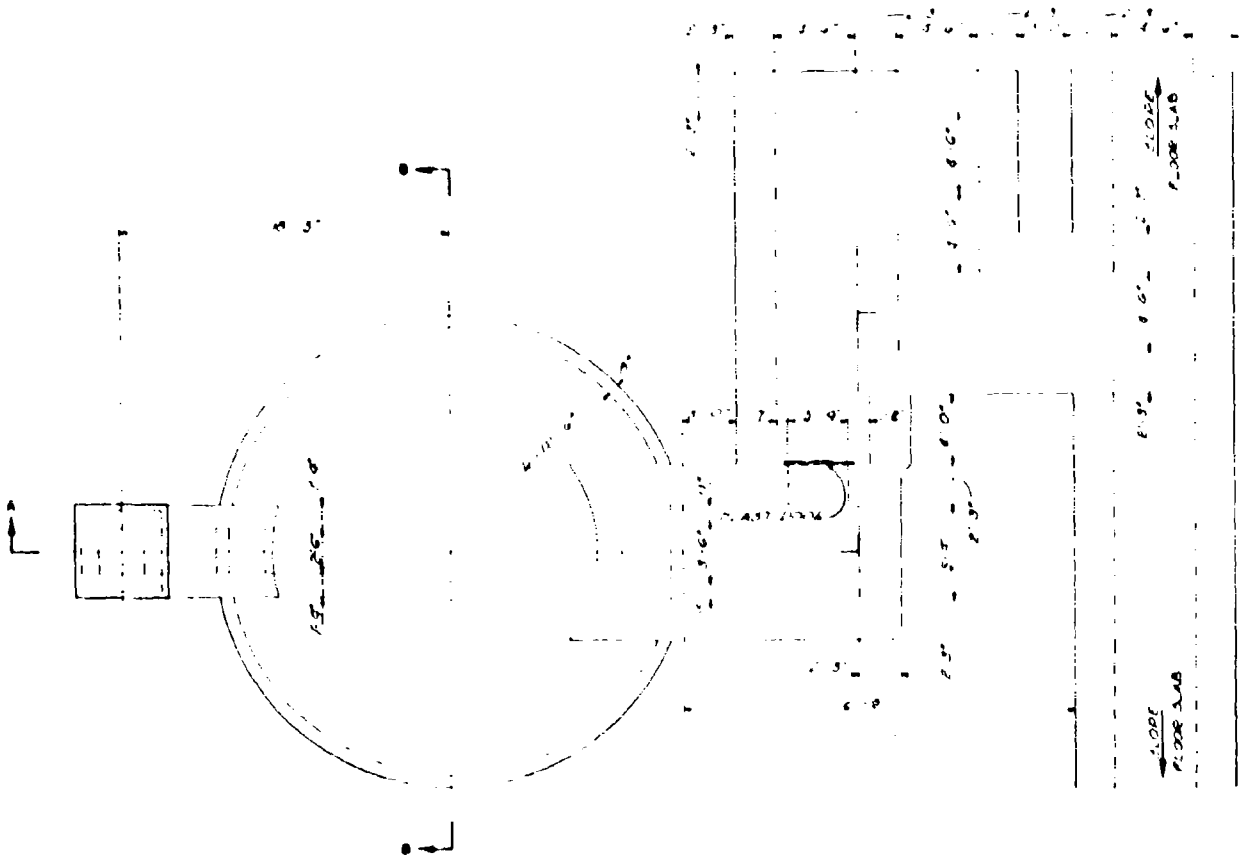


FLOOR SLAB AND FOUNDATION PLAN

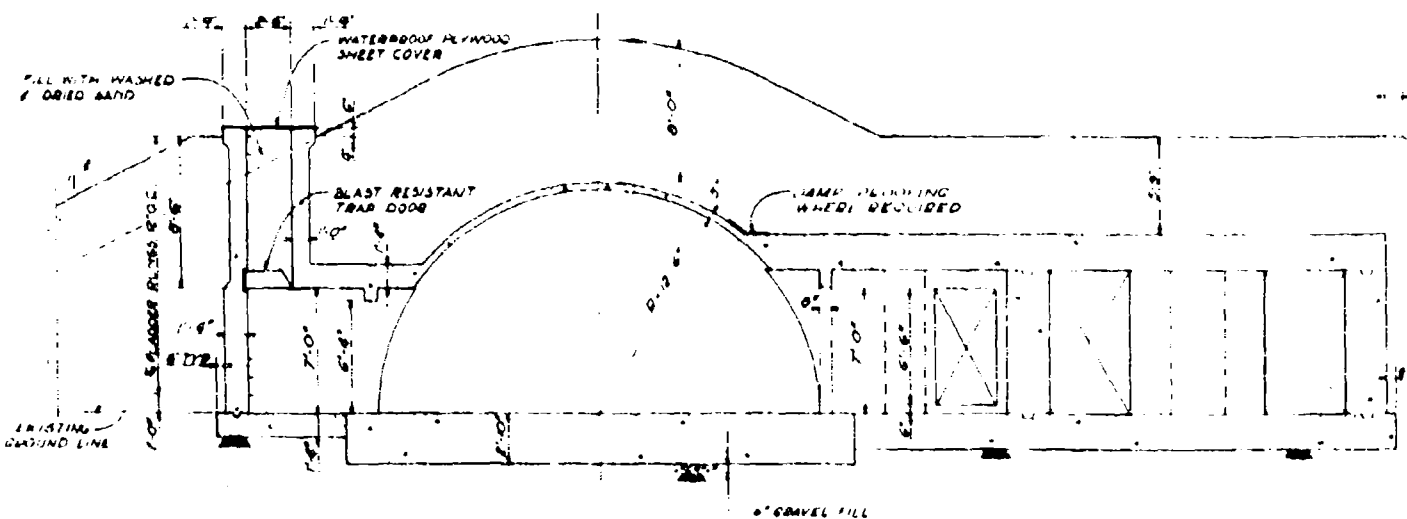


DATE	BY	APPROVED
AMMANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS BULFORD CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.
DESIGN BY P. J. W.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED DOME 100 PSI BLAST RESISTANT	
SCALE	SHEET NO.	
PROJECT NO.	DATE	
PROJECT TITLE	DRAWING NUMBER	
	60-18-08	

2



ROOF PLAN



SECTION A-A

DESIGN CONDITIONS

Design Procedure

In accordance with ACE manual "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave

Peak incident pressure 4000 psi duration 0.125 sec.

Blast Loading on Dome Surface

Peak pressure 4000 psi

Nuclear Radiation Protection

For gamma and neutrons attenuated to 0.01% of 5000 R/hr within 100 ft radius which will produce a peak dose rate equal to 0.01% of 5000 R/hr

Strength of Materials

	Static Allowable	Blast Design
Concrete	4000 PSI	6000 PSI
Reinforcing Steel	40000 PSI	50000 PSI
Structural Steel	30000 PSI	40000 PSI

*Plated capacity of soil

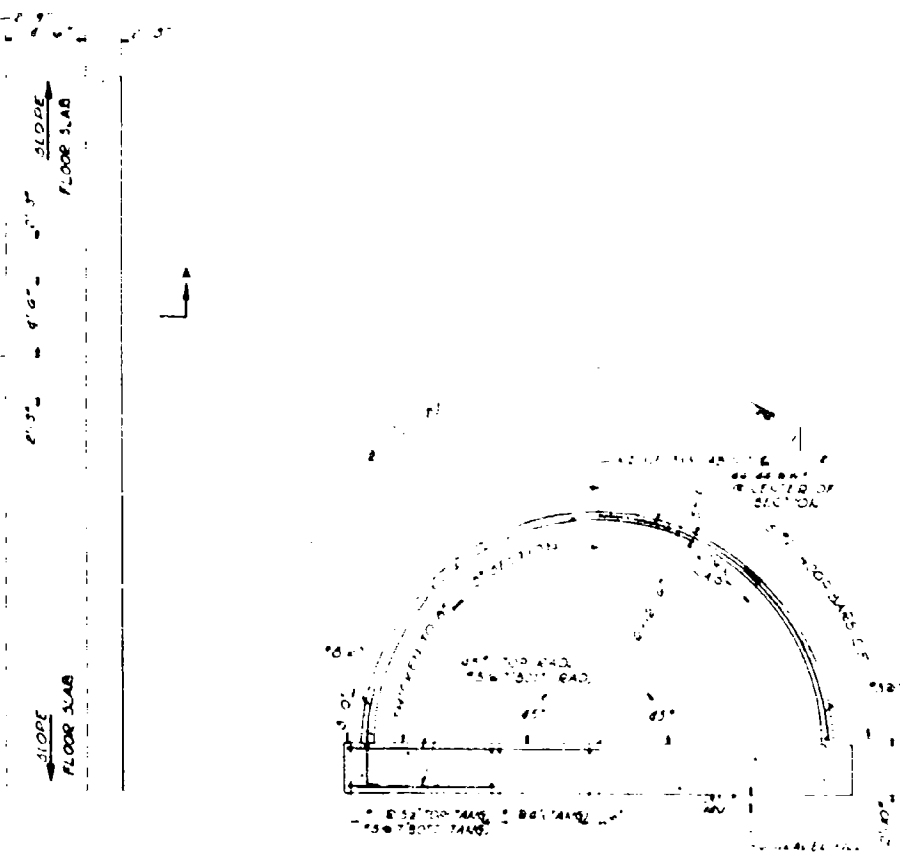
Allowable Stresses and Deflections

The foundation and entrance was designed for plastic deformation under design blast load. Blast door and escape hatch door designed for maximum elastic deformation under design blast load.

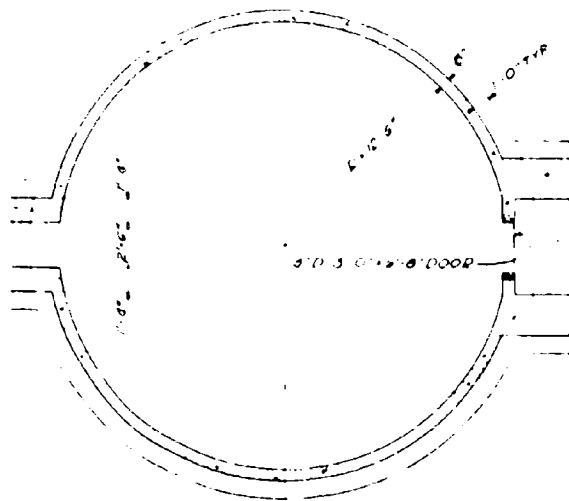
General Notes

The following features are not shown and shall be determined to suit use requirements:

- 1. Interior partitions
- 2. Mechanical and electrical equipment
- 3. Access and decontamination facilities
- 4. Access ramp may be provided if required for vehicles
- 5. Thermal protection to be applied to all exterior doors
- 6. Structure may be lowered to bracing cut and fill if desired



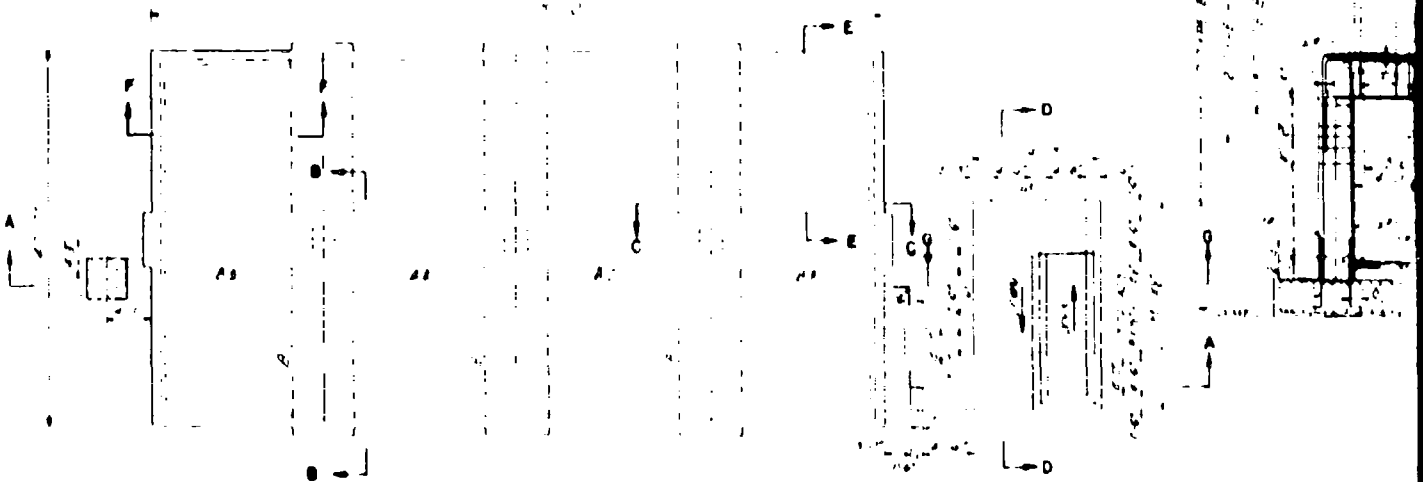
SECTION B-B



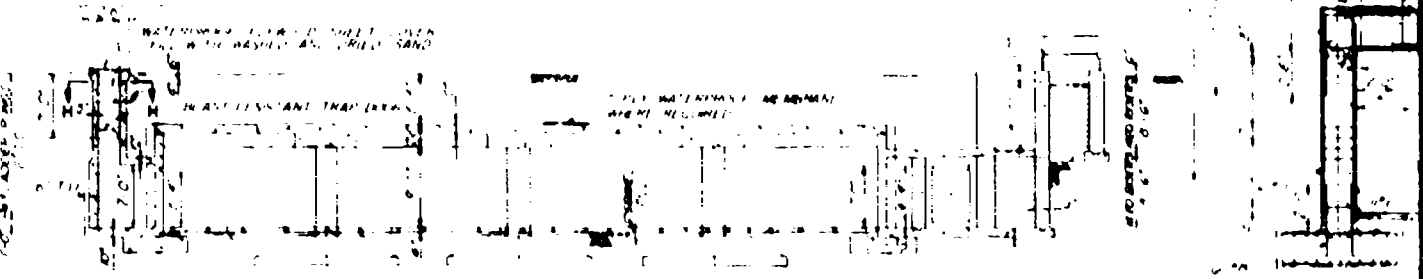
FLOOR SLAB AND FOUNDATION PLAN

DESIGNED BY	DATE	REVISIONS	BY
AMMANN & WHITNEY CONSULTING ENGINEERS 111.0TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE EARTH COVERED DOME 300 PSI BLAST RESISTANT			
PROJECT NO.	SCALE	SHEET NO.	
DATE	BY	DRAWING NUMBER	
BY	DATE	60-18-08	
DATE	BY	SHEET 1 OF 1	

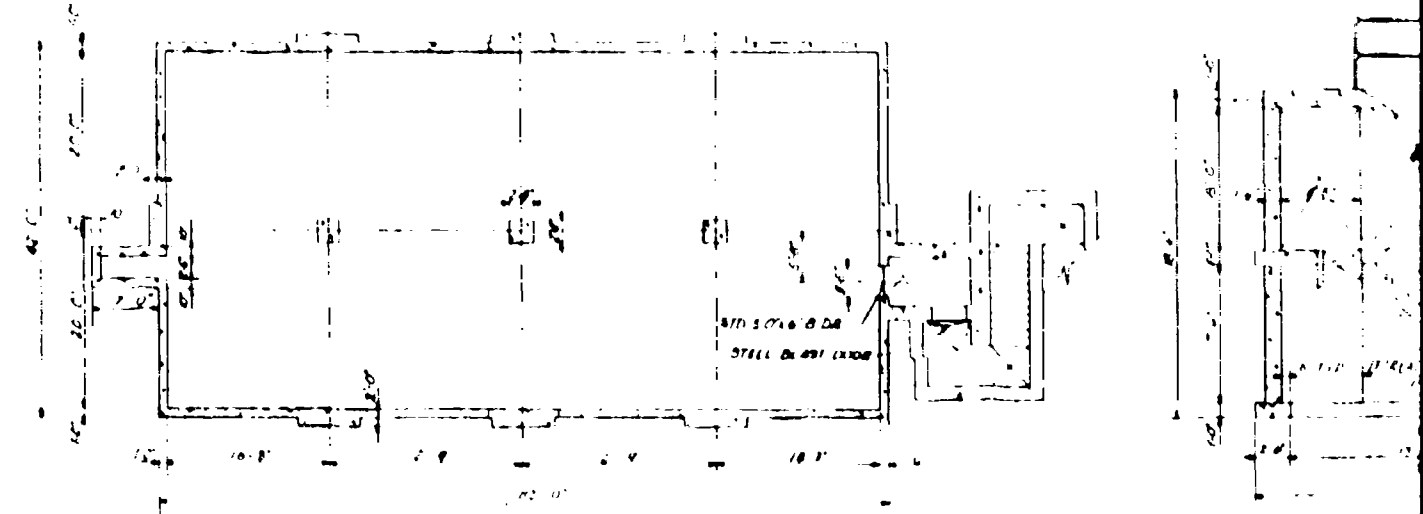
2



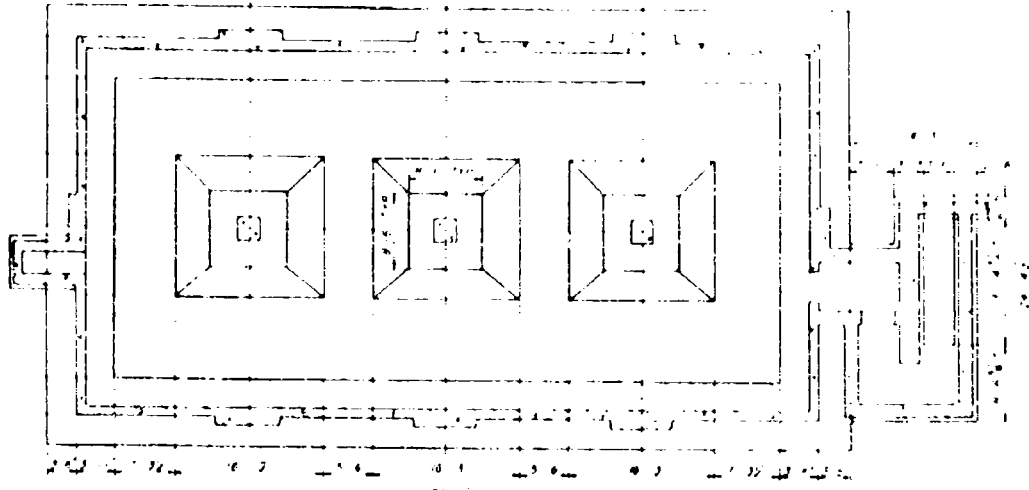
ROOF PLAN
SCALE 1/8" = 1'-0"



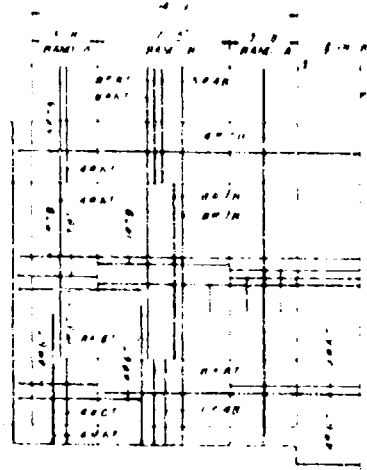
SECTION A-A
SCALE 1/8" = 1'-0"



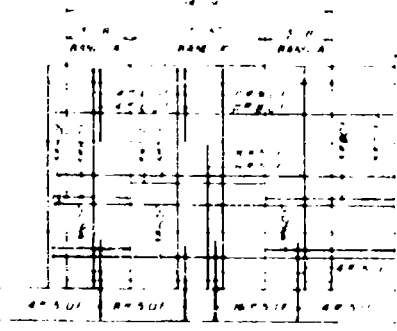
FLOOR PLAN
SCALE 1/8" = 1'-0"



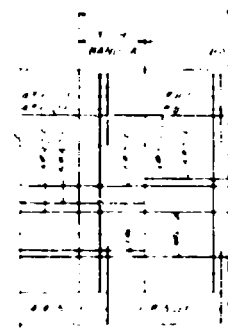
FOUNDATION PLAN
SCALE 1/4" = 1'-0"



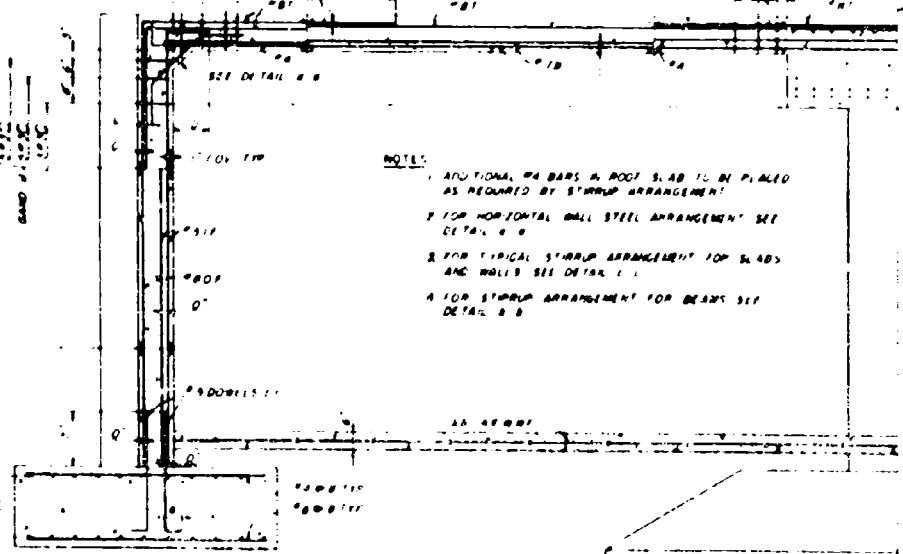
TYPICAL ROOF SLAB
SCALE 1/4" = 1'-0"



TYPICAL FRONT & REAR WALL
SCALE 1/4" = 1'-0"



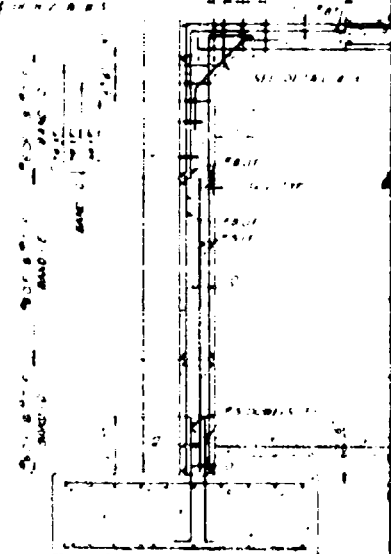
TYPICAL WALL
SCALE 1/4" = 1'-0"



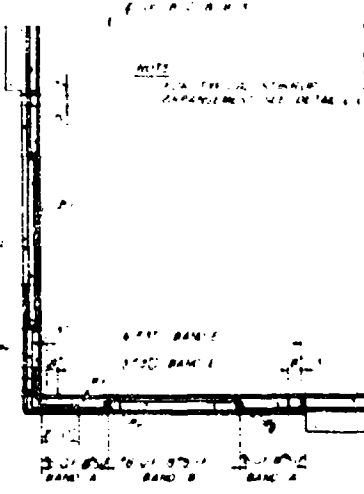
SECTION E-E
SCALE 1/4" = 1'-0"

NOTES:

1. ADDITIONAL #4 BARS A ROOF SLAB TO BE PLACED AS REQUIRED BY STIRRUP ARRANGEMENT
2. FOR HORIZONTAL WALL STEEL ARRANGEMENT SEE DETAIL E-H
3. FOR TYPICAL STIRRUP ARRANGEMENT FOR SLABS AND WALLS SEE DETAIL E-I
4. FOR STIRRUP ARRANGEMENT FOR BEAMS SEE DETAIL E-B



SECTION E-E
SCALE 1/4" = 1'-0"



DETAIL a-a
SCALE 1/4"=1'-0"



TYPE A



TYPE B



TYPE C



TYPE E

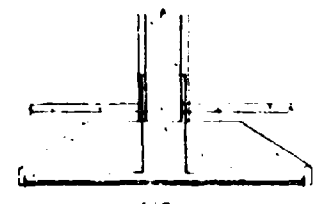


TYPE D

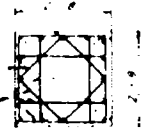


TYPE F

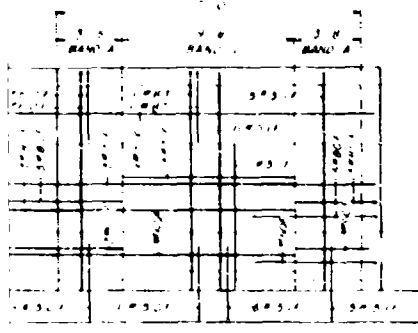
DETAIL b-b
SCALE 1/4"=1'-0"



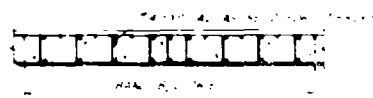
DETAIL OF COLUMN FOOTING
SCALE 1/4"=1'-0"



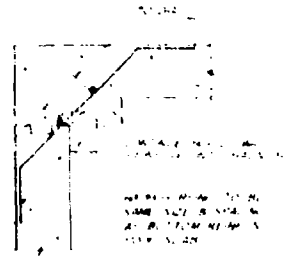
DETAIL OF COLUMN
SCALE 1/4"=1'-0"



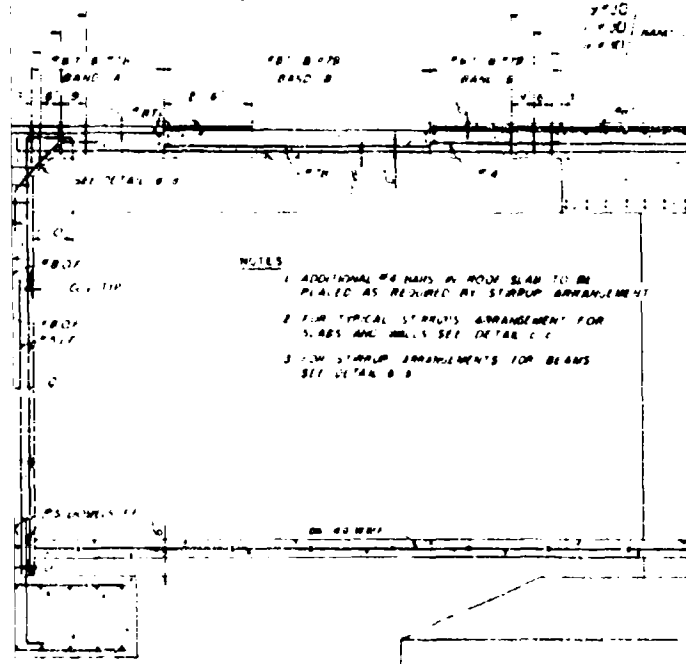
TYPICAL END WALL
SCALE 1/4"=1'-0"



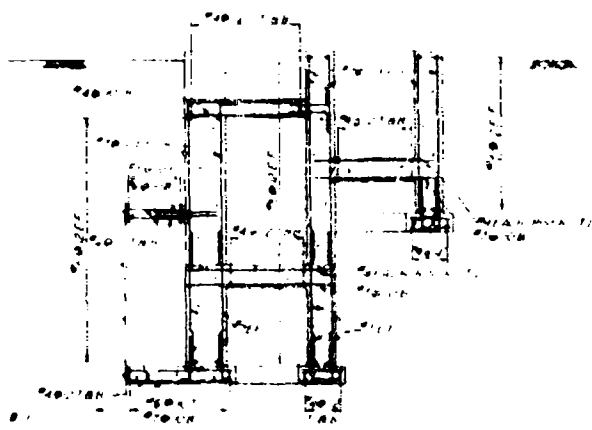
DETAIL c-c
SCALE 1/4"=1'-0"



DETAIL d-d
SCALE 1/4"=1'-0"



SECTION f-f
SCALE 1/4"=1'-0"

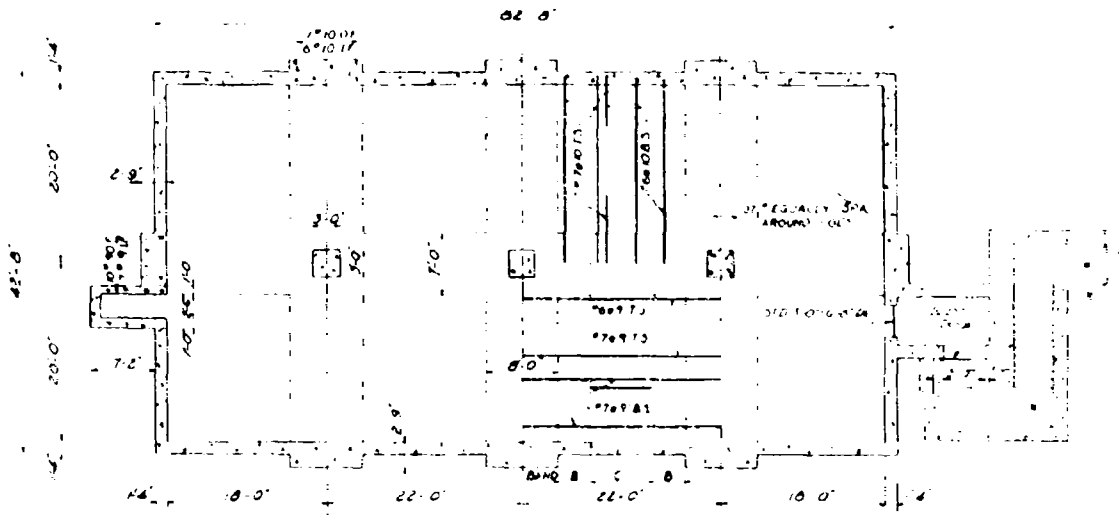


SECTION e-e
SCALE 1/4"=1'-0"

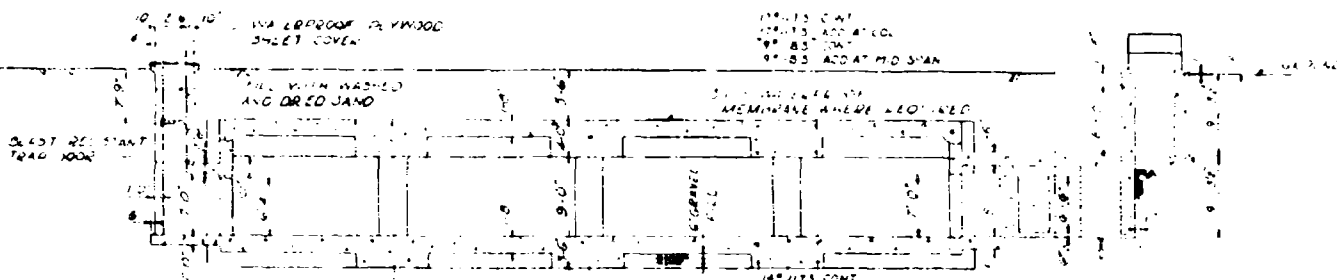
- NOTES
1. ADDITIONAL #4 BARS IN ROOF SLAB TO BE PLACED AS REQUIRED BY STARTUP ARRANGEMENT
 2. FOR TYPICAL STARTUP ARRANGEMENT FOR SLABS AND WALLS SEE DETAIL c-c
 3. FOR STARTUP ARRANGEMENTS FOR BEAMS SEE DETAIL a-a

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF QUARTERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY DATE		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED RECTANGULAR 80 PSI BLAST RESISTANT	
PROJECT NO. SHEET NO.		PER FEDERAL SPEC. DRAWING ENGINEERING BY AS NOTED DRAWING NUMBER 67-18-04 LAYER 2 OF 2	

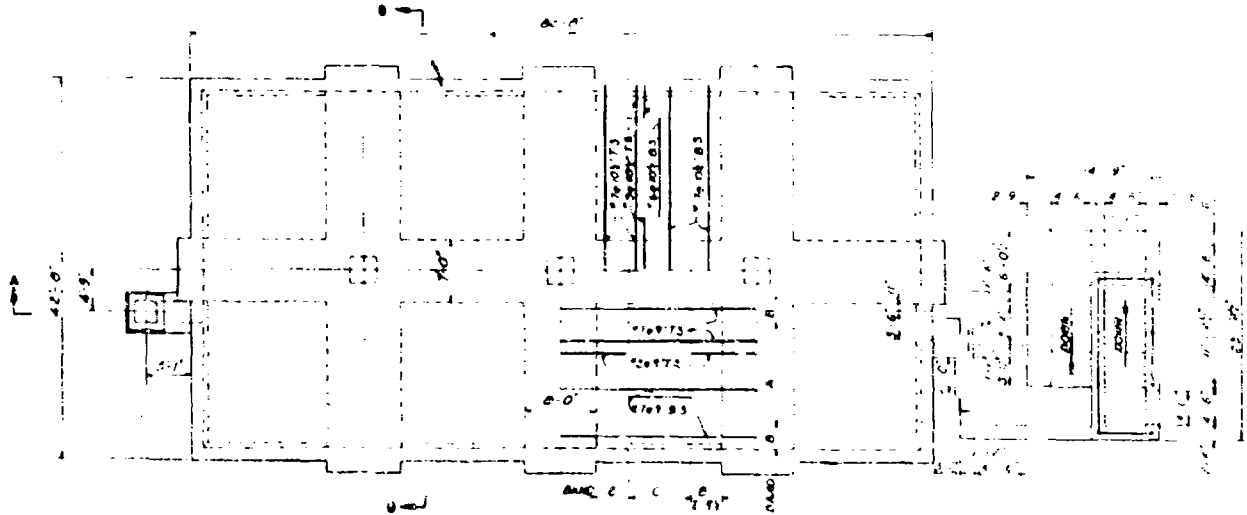
2



FLOOR PLAN
SCALE: 1/8"=1'-0"



SECTION A-A
SCALE: 1/8"=1'-0"



ROOF PLAN
SCALE: 1/8"=1'-0"

DESIGN CONDITIONS

Design Procedure
 In accordance with OCE manual, Design of Structures for Protection from the Effects of Atomic Weapons

Design Blast Wave
 Peak incident pressure = 100 psi Duration = 1.64 sec

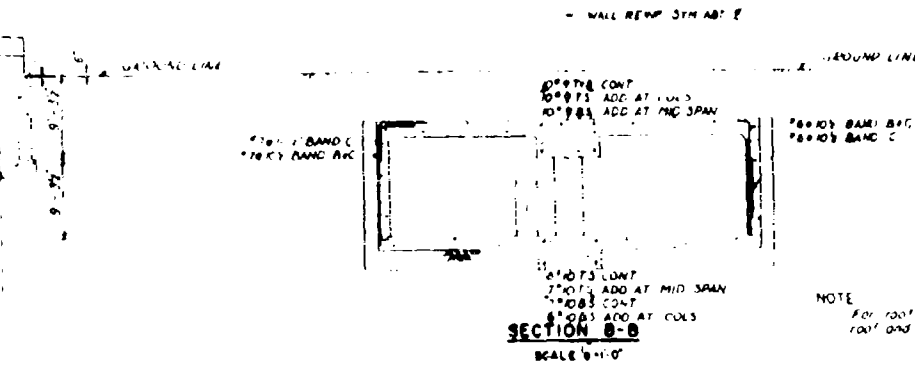
Blast Loading On Exterior Surfaces
 Peak pressure = 100psi Duration = 1.64 sec

Nuclear Radiation Protection
 Total gamma and neutron attenuated to 5% of a lethal weight of any material which will produce a peak blast pressure equal to 100psi

Strength of Materials	Static	Blast Design
Soil bearing capacity	6000 psi*	16,000 psi*
Concrete, f_c	5000 psi	6,500 psi
Rein steel, lower yield	47,500 psi	52,000 psi
(min Grade ASTM A305 30T)		
Structural steel, lower yield	38,000 psi	41,600 psi
(ASTM A7 50)		

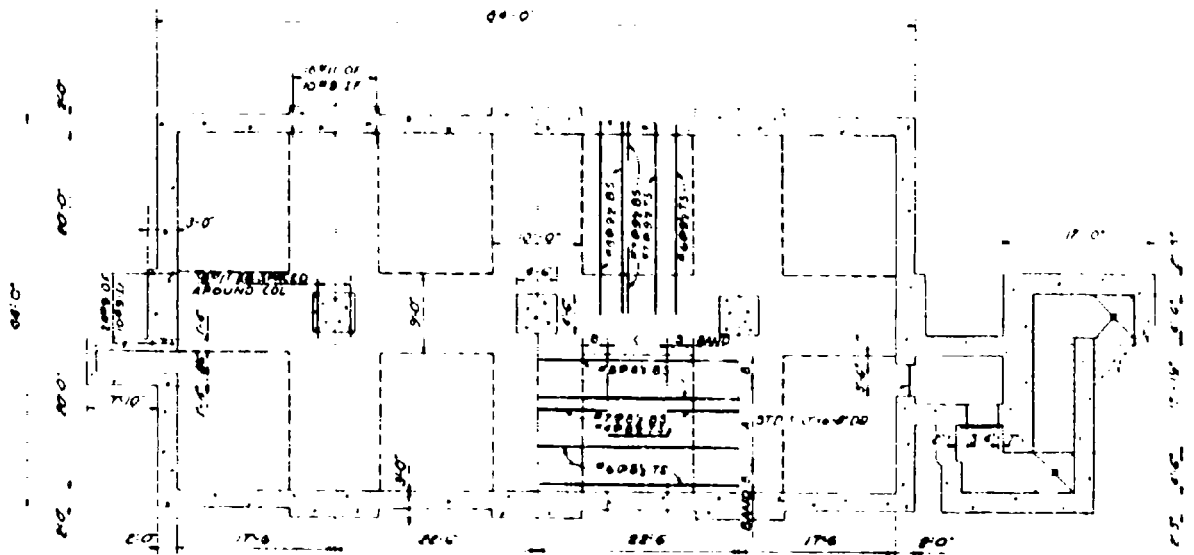
Allowable Stresses and Deflections
 Allowable stresses shall be as per the above table. Deflection shall be design blast wave blast wave and escape hatch and designed for maximum cable deflection. Under design blast wave

- General Notes**
- The following features are not shown and shall be determined to suit use requirements:
 Interior partitions
 Mechanical and electrical equipment
 Air locks and decontamination facilities
 - Access stairs may be varied as required
 - Access ramp may be provided if required for vehicles
 - The protection to be applied to all external doors

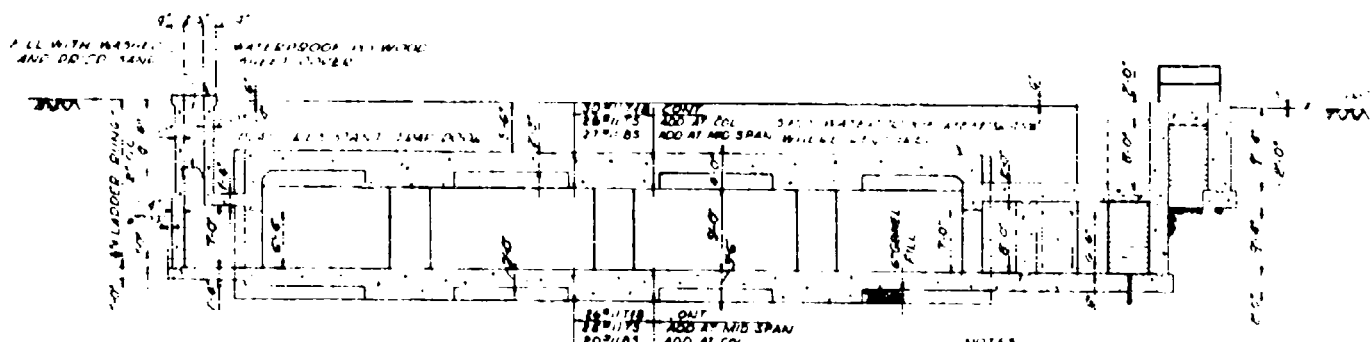


AMMANN & WHITNEY 111 5TH AVE., 21 NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. DRAWING NO.		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED RECTANGULAR 100 PSI BLAST RESISTANT	
DATE		DRAWING NUMBER 60-18-04	

2

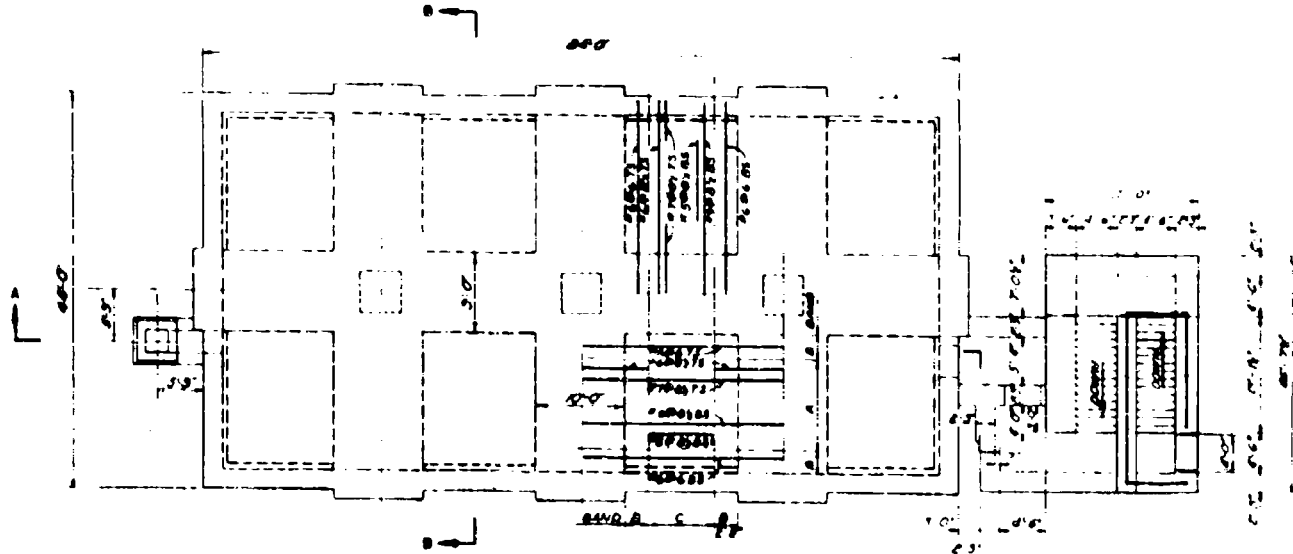


FLOOR PLAN



SECTION A-A

NOTES: ALL SLAB REINF. SH. ABOUT COLUMN CENTER LINES & SHEAR NAHS (STIRRUPS) NOT SHOWN



ROOF PLAN

DESIGN CONDITIONS

Design Procedure

In accordance with ACE manual, "Design of Structures for Protection from the Effects of Atomic Weapons."

Design Blast Wave

Peak incident pressure = 200psi Duration = 0.41sec

Blast Loading on Exterior Surface

Peak pressure = 200psi Duration = 0.41sec

Nuclear Radiation Protection

Total gamma and neutrons attenuated to 5% for a 50kT weapon at any position which will produce a peak blast pressure equal to 200psi

Strength of Materials

	Static	Blast Design
Soil bearing capacity	8,000 psf	16,000 psf
Concrete, f	5,000 psi	6,500 psi
Hot steel, tensile yield	47,000 psi	52,000 psi
Low alloy ASTM A305, yield		
Structural steel, lower yield (ASTM A7-57)	38,000 psi	41,600 psi

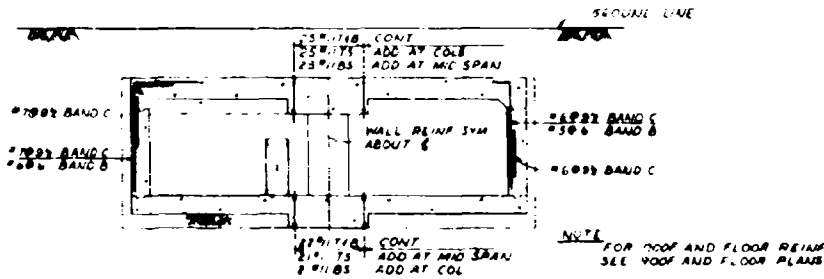
Water capacity of soil:

Allowable Stresses and Deflections

Roof, walls, floor and entrance way designed for plastic deformation and design blast load. Blast door and escape hatch door designed for maximum elastic deformation under design blast load.

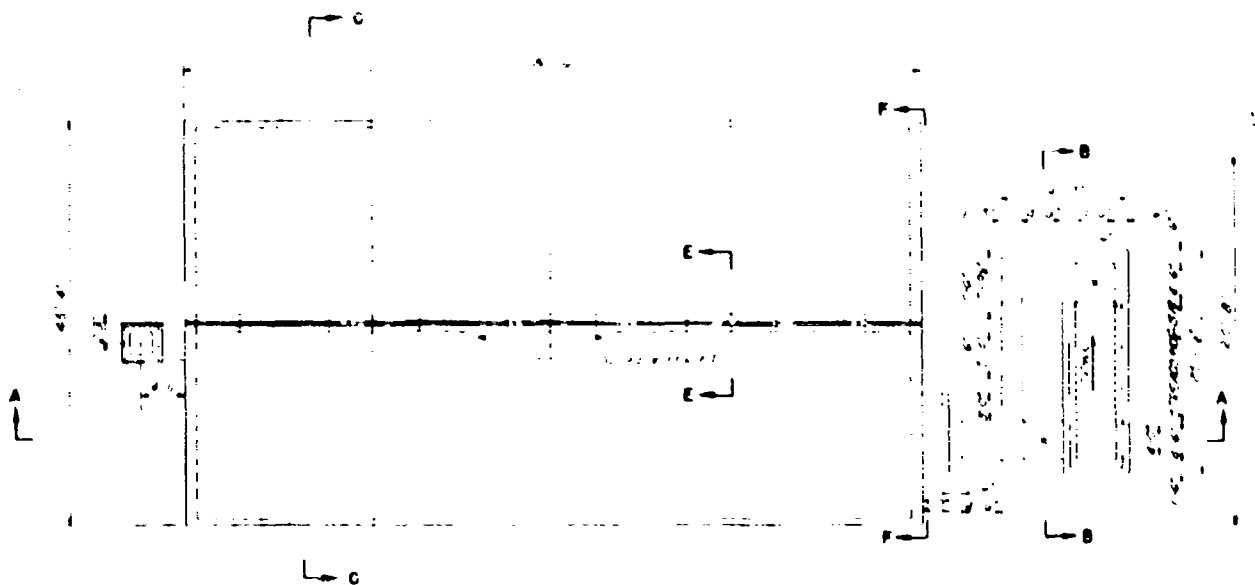
General Notes

- The following features are not shown and shall be determined to suit use requirements:
Interior partitions
Mechanical and electrical equipment
Air locks and decontamination facilities
- Access stairs may be added as required
- Access ramp may be provided as required for vehicles
- Thermal protection to be applied to all exterior doors

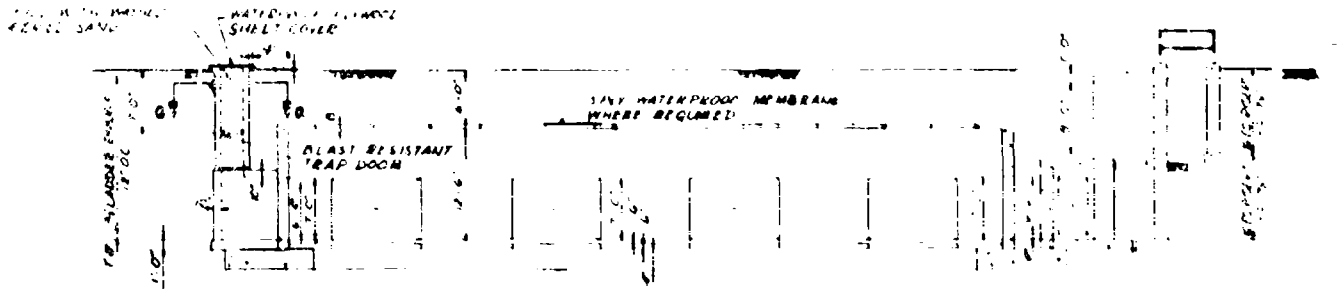


SECTION B-B

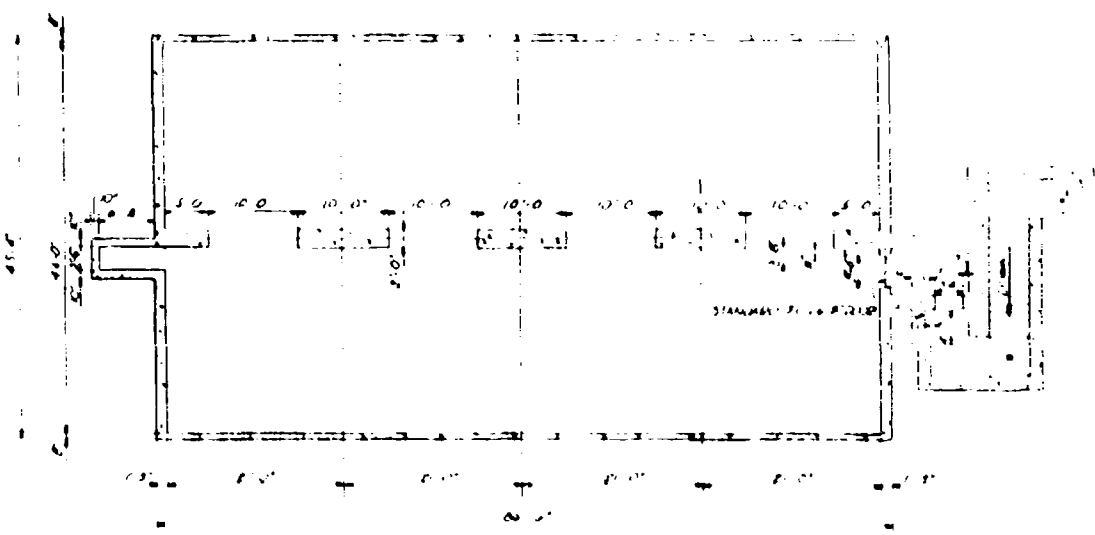
AMMANN & WHITNEY 111-87th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS HEAVY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DESIGNED BY D. G.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED RECTANGULAR 200 PSI BLAST RESISTANT		
CHECKED BY M. J.	DATE 1-1-54	SCALE 1/4" = 1'-0"	SHEET NO. 1 OF 1
DRAWING NUMBER 60-10-04		DATE 1-1-54	



ROOF PLAN
SCALE 1/4"=1'-0"



SECTION A-A
SCALE 1/4"=1'-0"



FLOOR PLAN
SCALE 1/4"=1'-0"

DESIGN CONDITIONS

Design Procedure
 In accordance with OCE Manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
 Peak incident pressure to be calculated (CPH) as

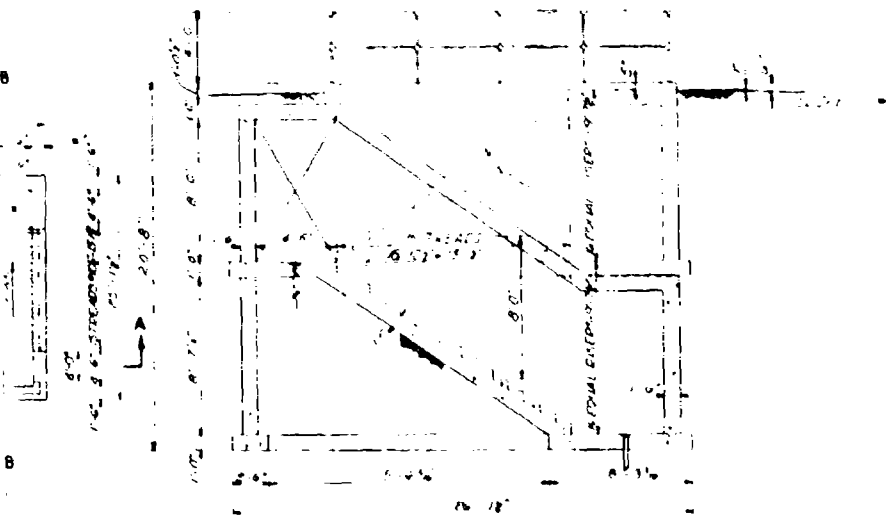
Blast Loading On Exterior Surface
 Peak pressure = 5.25 \times CPW (CPH) \times 1.25

Nuclear Radiation Protection
 The structure shall be designed to resist the radiation dose at the exterior wall to be 1000 rads (1000 \times 10⁻⁴ rads) at the exterior wall to be 1000 rads (1000 \times 10⁻⁴ rads) at the exterior wall to be 1000 rads (1000 \times 10⁻⁴ rads)

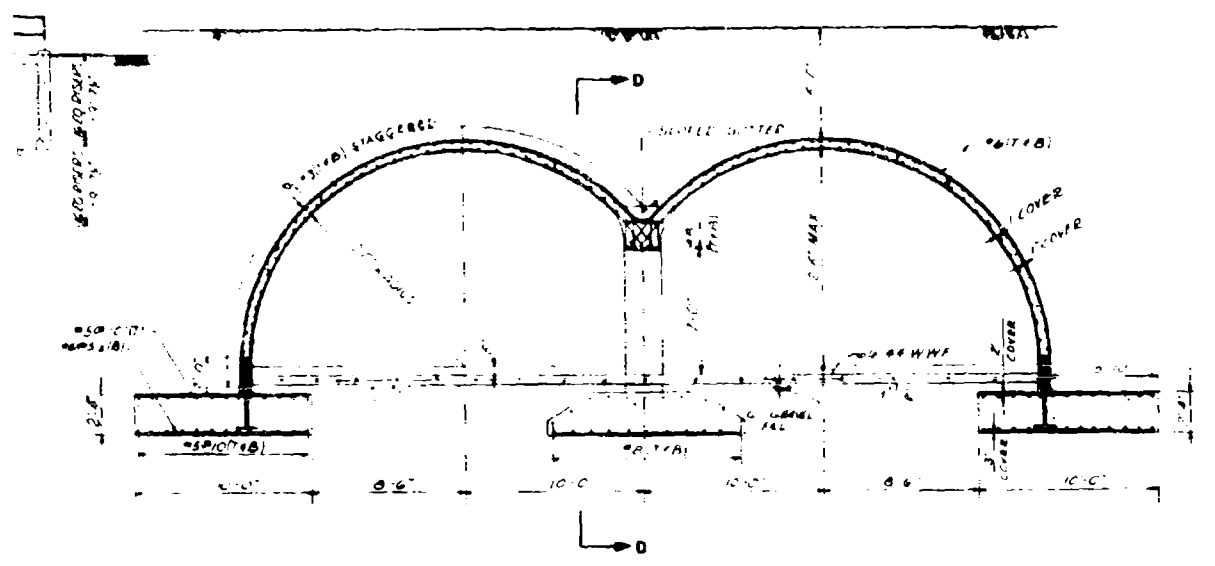
Strength of Materials	Static	Blast Design
Concrete	4000 PSI	4000 PSI
Steel	A36	A36
Reinforcing Steel	A615	A615
Welding	ASTM A572	ASTM A572
Structural Steel	A36	A36
ASTM A572		
Normal concrete of 4000		

Allowable Stresses and Deflections
 The structure shall be designed to resist deformation under design blast load. Arch, blast wall and ceiling shall also be designed for maximum elastic deformation under design blast load.

- General Notes**
- The following features are not shown and shall be determined to suit the requirements:
 - Interior finishes
 - Mechanical and electrical equipment
 - Arch and dome construction facilities
 - Access stairs may be provided as required
 - Access ramp may be provided if required for vehicles
 - For entrance way reinforcement and blast door details see Bureau Requisite Plans, Structure, Drawing No. 60-16-04



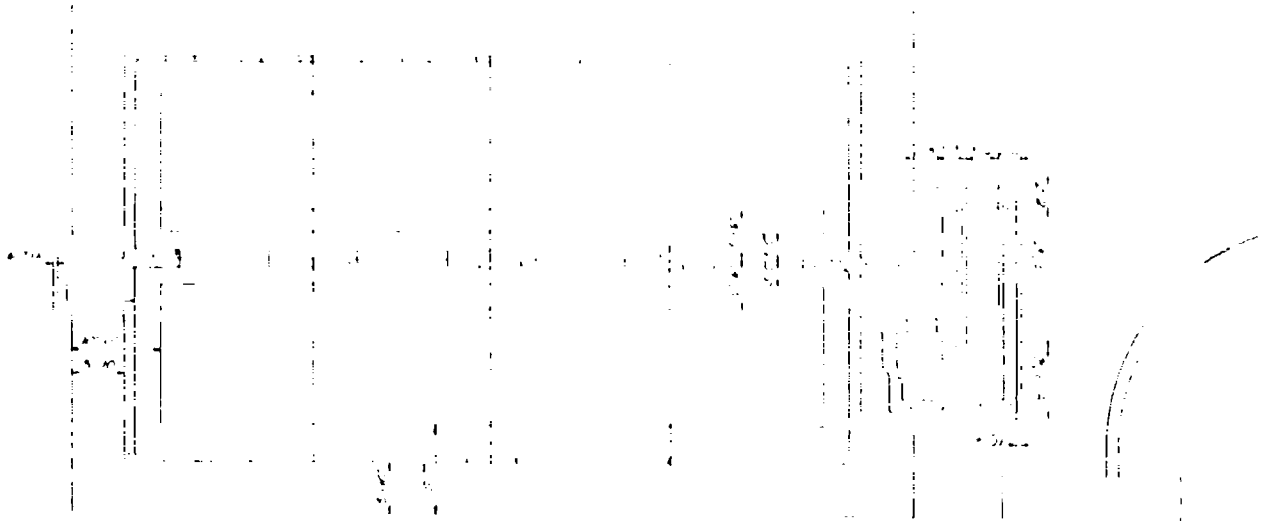
SECTION B-B
 SCALE NTB



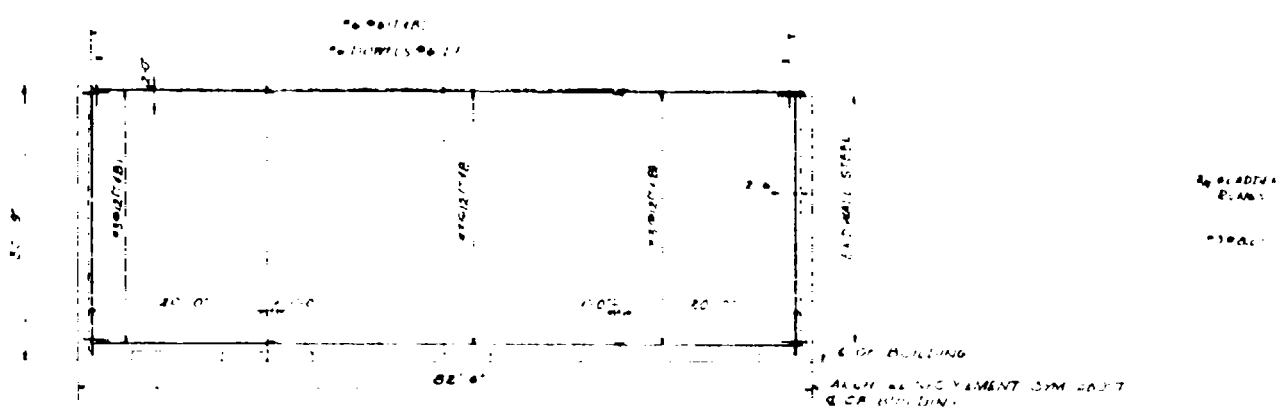
SECTION C-C
 SCALE 1/4"=1'-0"

2

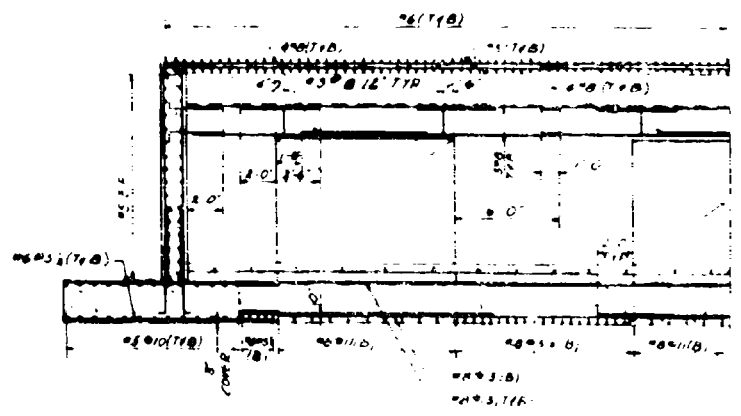
AMMANN & WHITNEY 111 - 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY Corps of Engineers Military Construction Center Washington, D. C.	
DRAWN BY J.S. CHECKED BY J.F.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED DOUBLE BARREL ARCH 50 PSI BLAST RESISTANT		
DATE 10/15/60	DRAWING NUMBER 60-16-02	SHEET 1 OF 2	SCALE AS NOTED



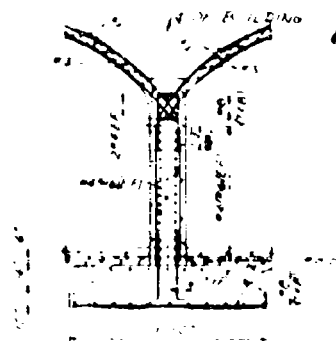
FOUNDATION PLAN
SCALE 1/4" = 1'-0"



DEVELOPED ROOF PLAN
SCALE 1/4" = 1'-0"



SECTION D-D
SCALE 1/4" = 1'-0"

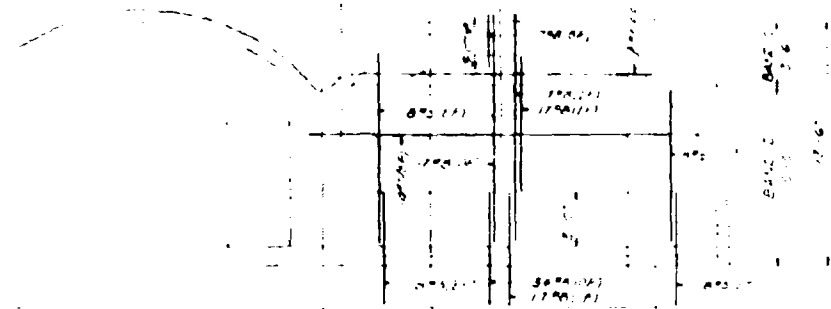


SECTION E-E
SCALE 1/4" = 1'-0"

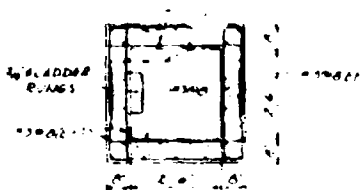
SEE BUILDING

2 1/2" WALL STEEL SIMILAR
ARCHES OF BUILDING

BASE 1 1/2" BASE 1 1/2" BASE 1 1/2"

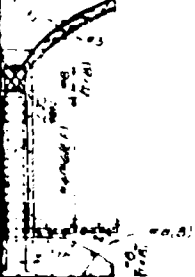


SECTION F-F
SCALE 1/4"=1'-0"



SECTION G-G
SCALE 1/4"=1'-0"

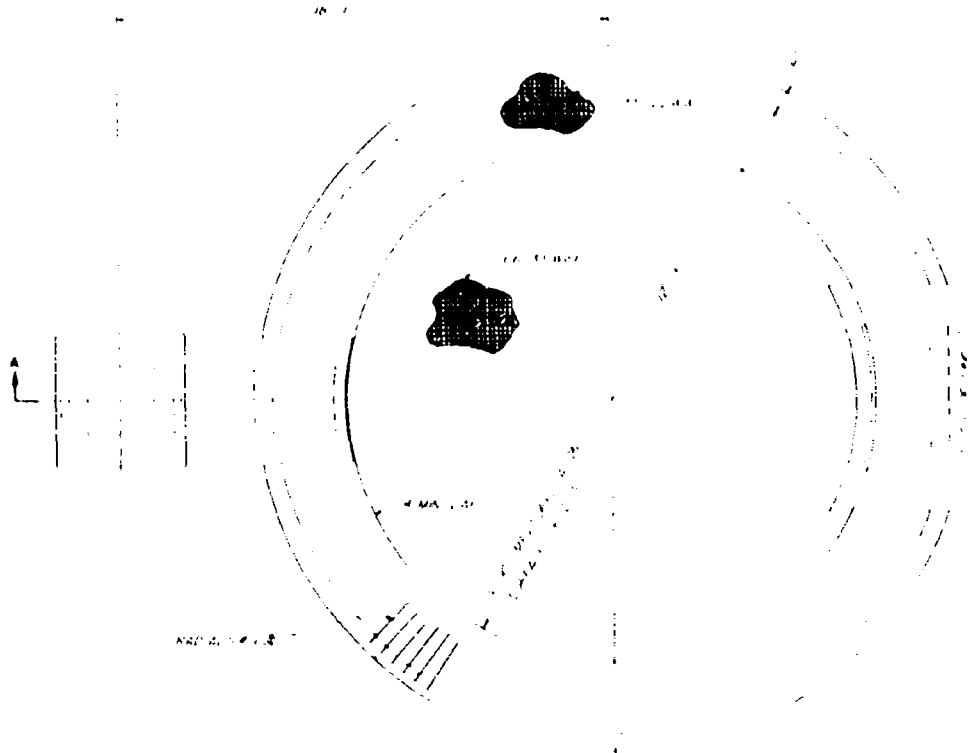
SEE BUILDING



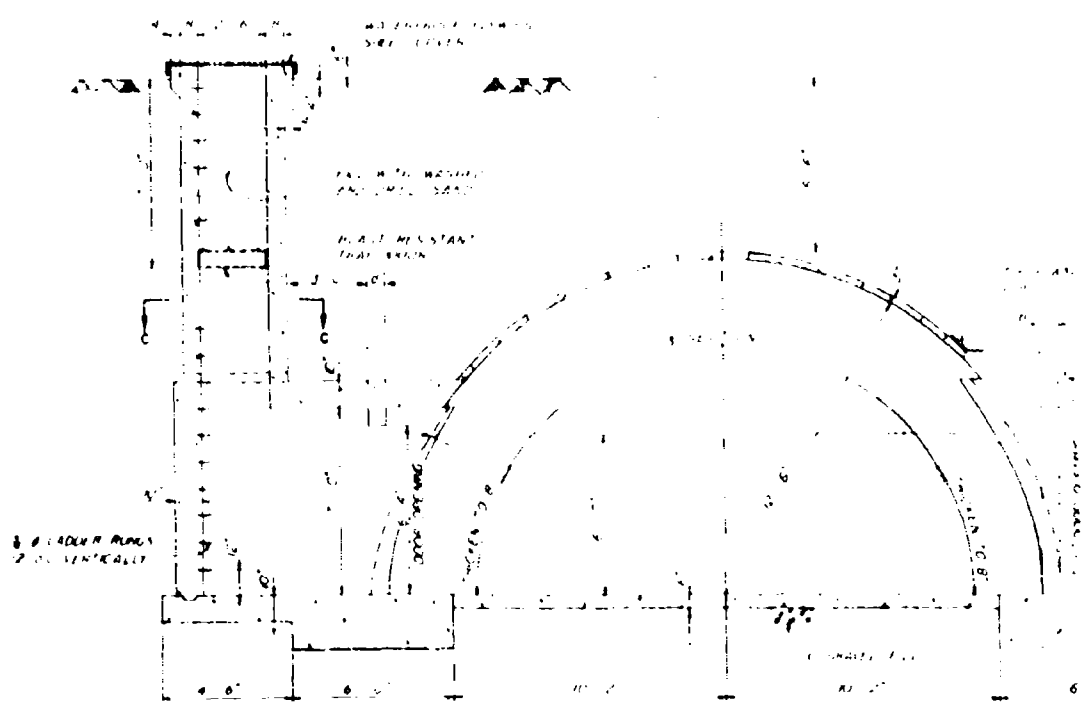
SECTION H-H
SCALE 1/4"=1'-0"

2

AMMANN & WHITNEY 111 5TH AVENUE NEW YORK, N. Y.	DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS ARMY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.
DRAWN BY J.S. CHECKED BY APPROVED BY DATE	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED DOUBLE BARREL ARCH 50 PSI BLAST RESISTANT
DATE SHEET 2 OF 2	DRAWING NUMBER 60-18-05



ROOF PLAN



SECTION A-A

DESIGN CONDITIONS

Design Procedure
 in accordance with U.S. Manual, "Design of Structures for Protection from the Effects of Atomic Weapons"

Design Blast Wave
 From adjacent structure collapse (Reference attached)

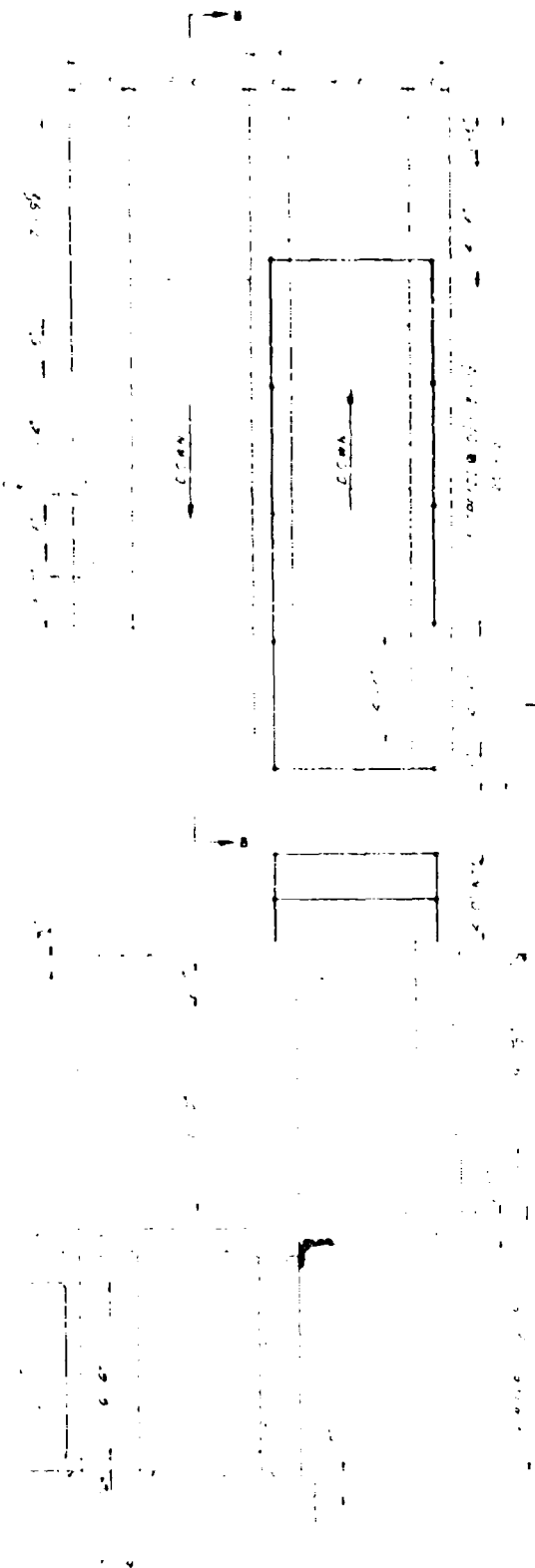
Blast Loading on Exterior Surfaces
 From adjacent structure collapse (Reference attached)

Nuclear Radiation Protection
 From gamma rays and neutrons, and fallout from nuclear explosion of 1000 kilotons which will produce a peak overpressure of 100 psi.

Strength of Materials	Status	Steel Design
Allowing capacity concrete, %	100%	100%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%
Allowing capacity steel, %	50%	50%

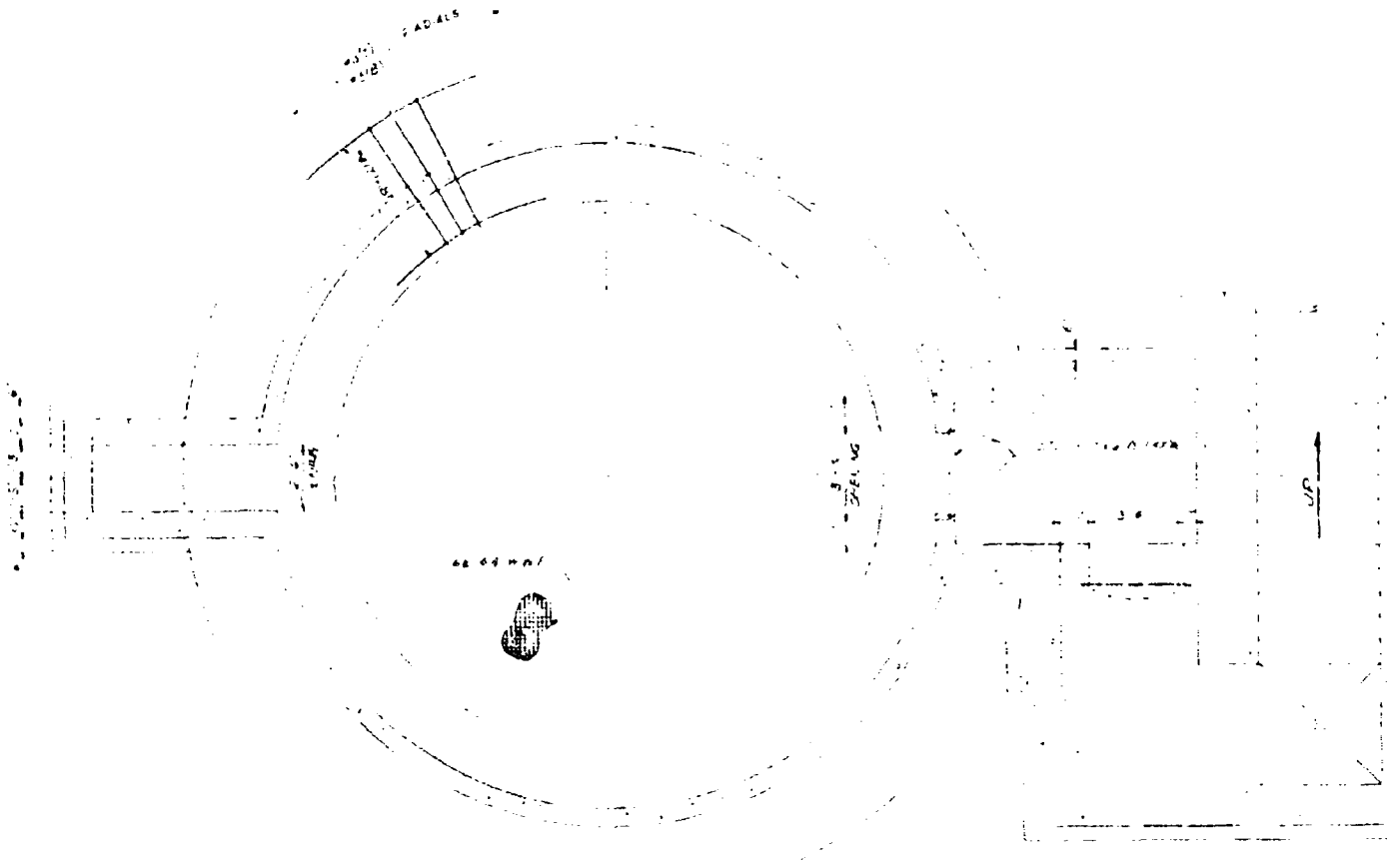
Allowable Structure and Deflections
 The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.

General Notes
 1. The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.
 2. The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.
 3. The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.
 4. The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.
 5. The structure shall be designed to resist the effects of blast loading without permanent deformation or excessive deflection.

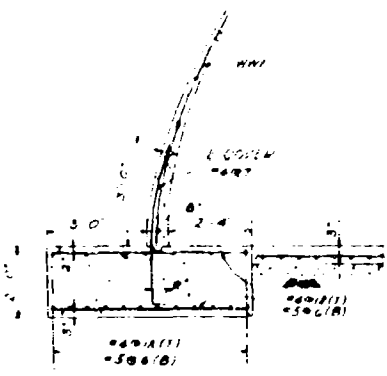


AMMANN & WHITNEY CORPORATE TRUSS ENGINEERING 111 8TH AVENUE, NEW YORK, N.Y.	DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEER PROJECT CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D.C.
PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED DOME 60 PSI BLAST RESISTANT	
DRAWING NUMBER 60-18-08	
DATE: 8/2/54	

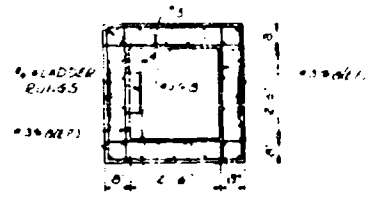
2



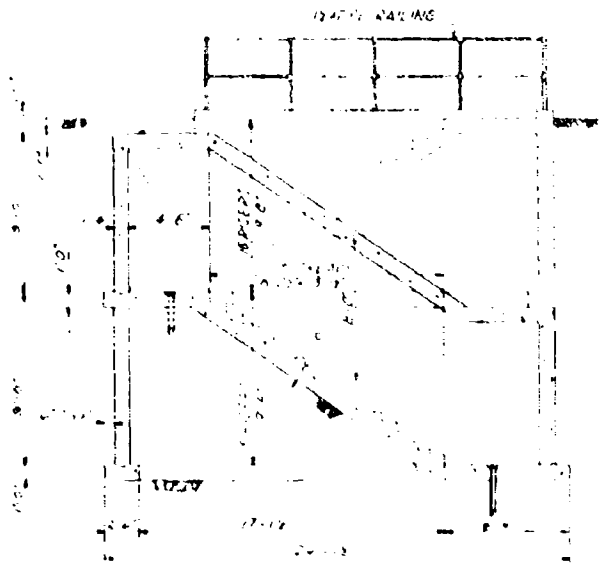
FLOOR SLAB AND FOUNDATION PLAN
SCALE 1/4"=1'-0"



DETAIL OF FOOTING
SCALE 1/4"=1'-0"



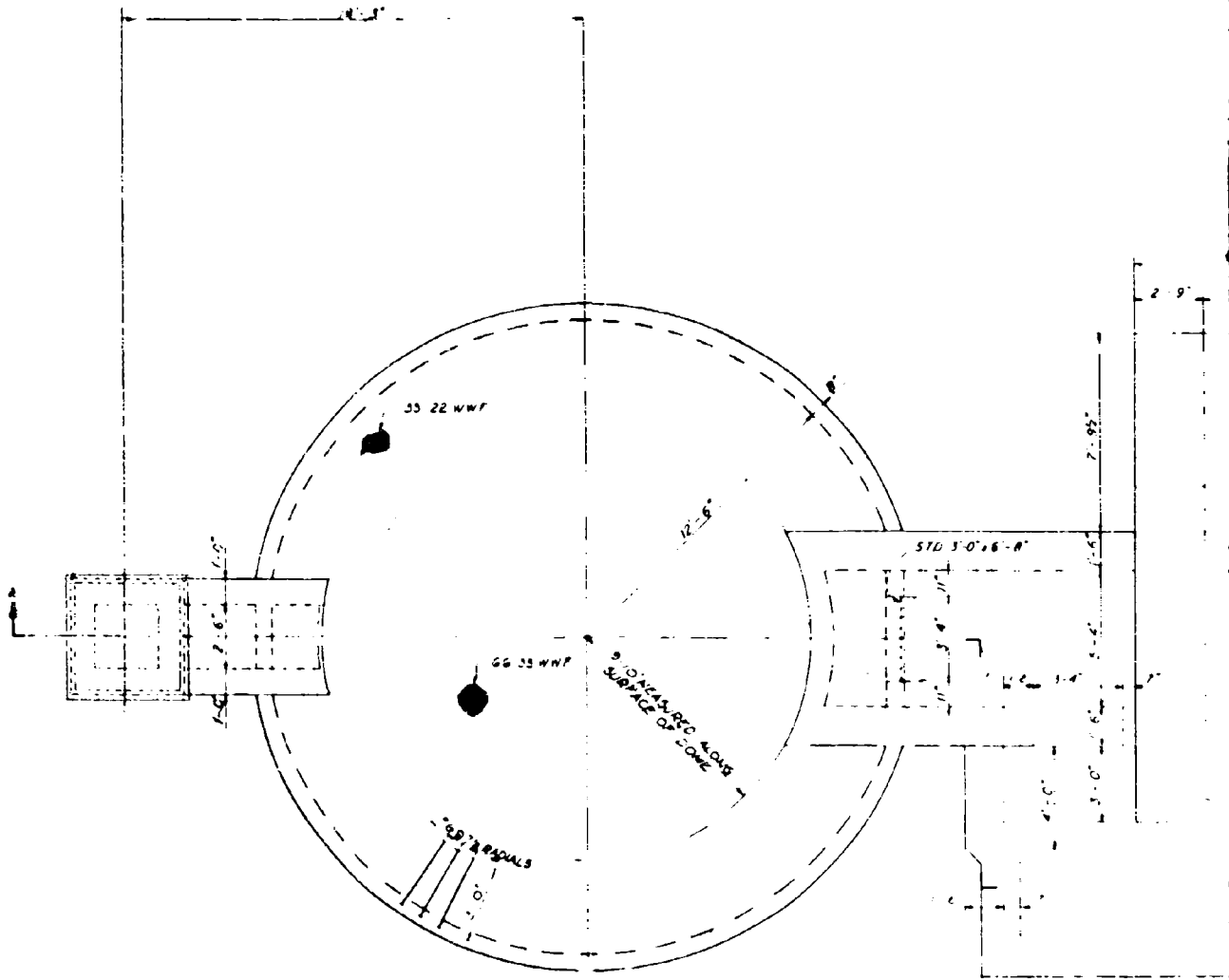
SECTION C-C
SCALE 1/4"=1'-0"



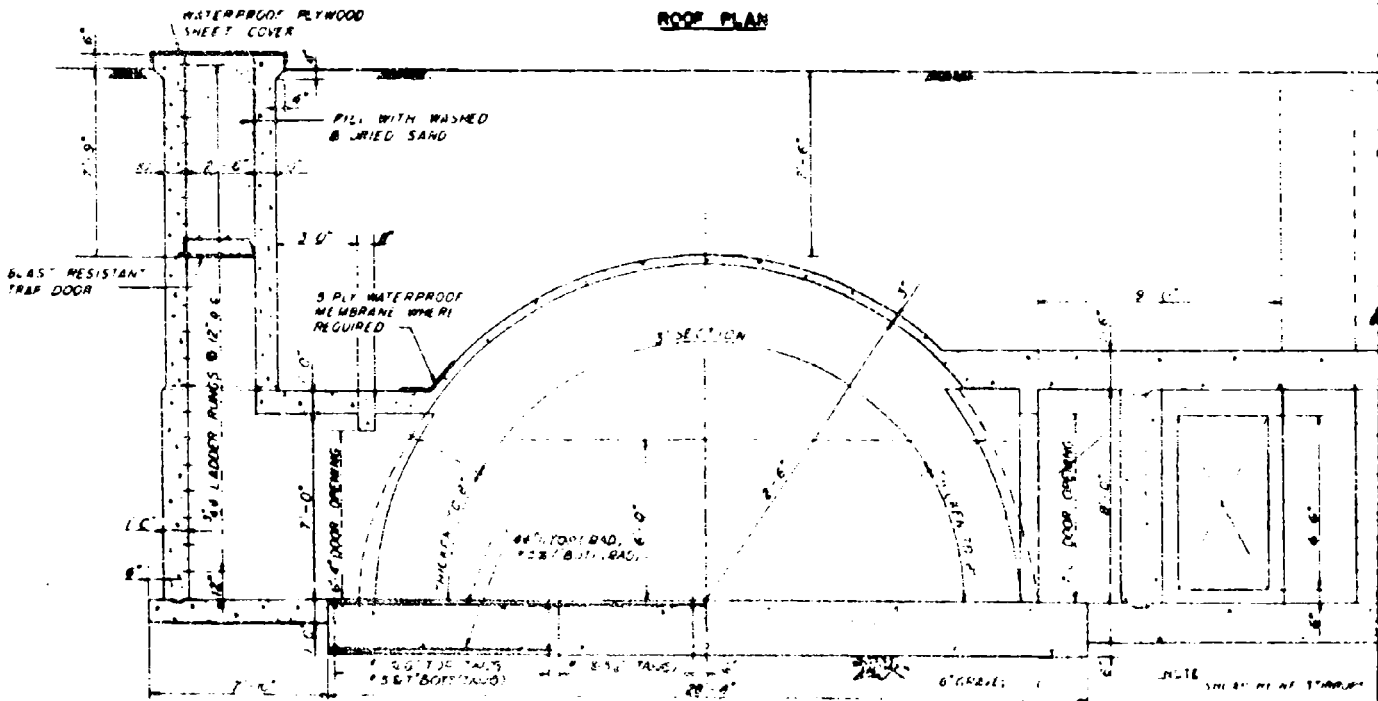
SECTION 9-B
NTS

2

ANDRANN & WHITNEY <small>ARCHITECTS AND ENGINEERS</small> 111 6TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY <small>ENGINEERING CENTER</small> 3705 WASHINGTON AVENUE WASHINGTON, D. C.	
PROJECT NO. 100-1000 DRAWING NO. 100-1000-100		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED DOME 50 PSI BLAST RESISTANT	
DATE: 10/15/50 BY: [Signature] CHECKED BY: [Signature]		SCALE: AS SHOWN NOTES: 50-16-06 1-51 2 of 2	

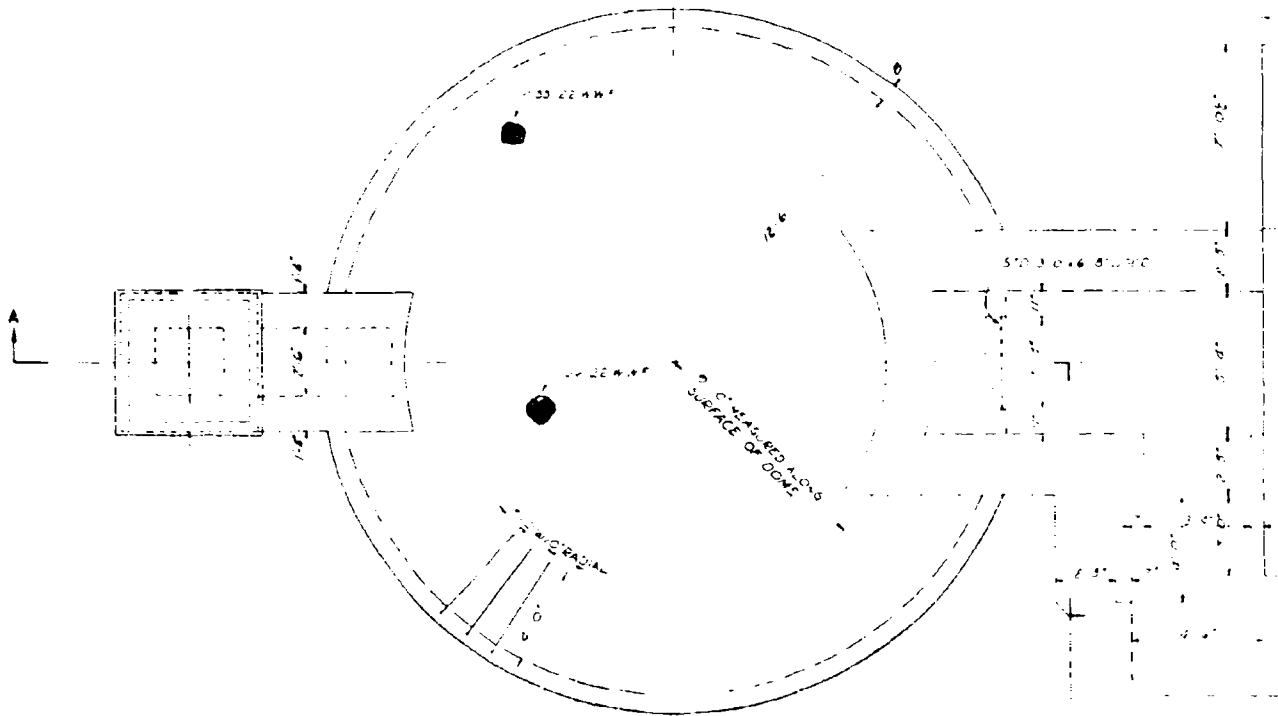


ROOF PLAN

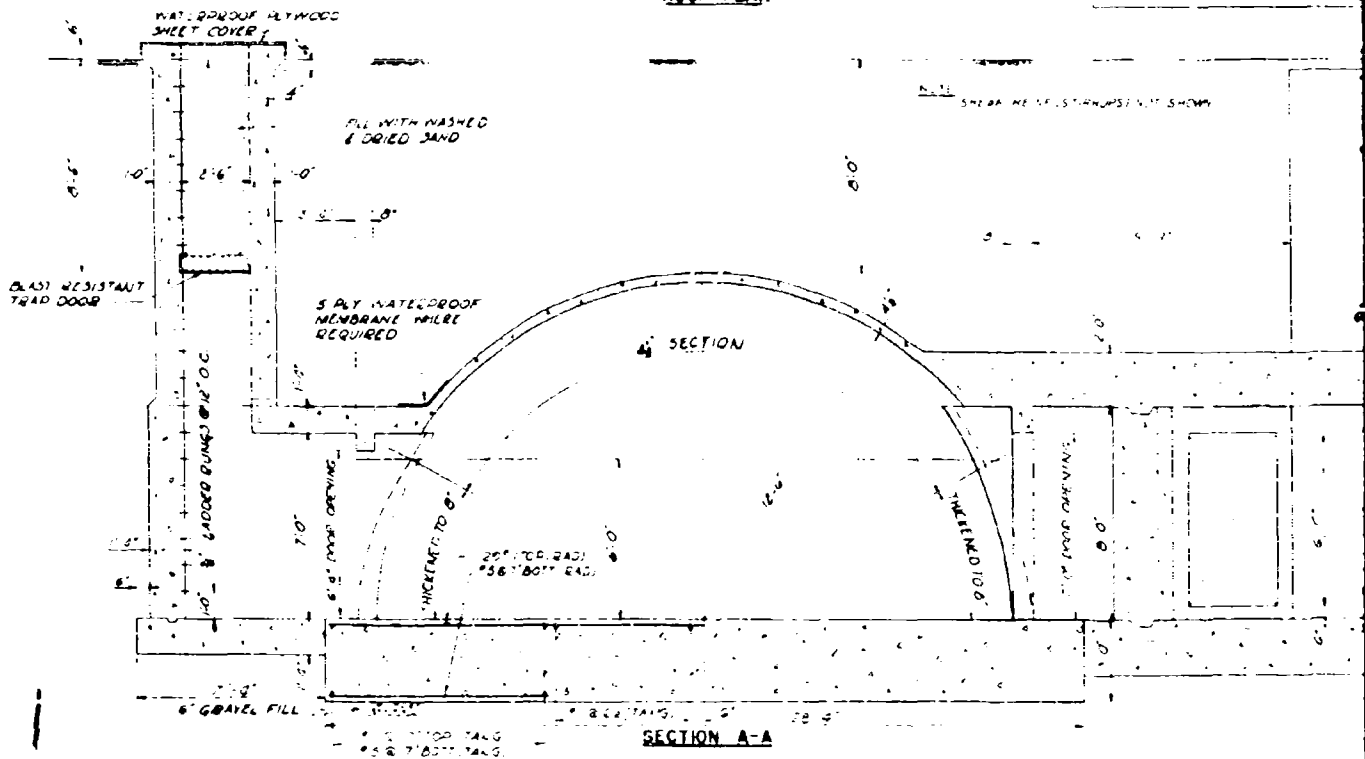


SECTION A-A

10-5'



ROOF PLAN



SECTION A-A

DESIGN CONDITIONS

Design Procedure
 In accordance with OCE manual, "Design of Structures for protection from the Effects of Atomic Weapons."

Design Blast Wave
 Peak incident pressure = 800 psi; Duration = 0.111 sec.

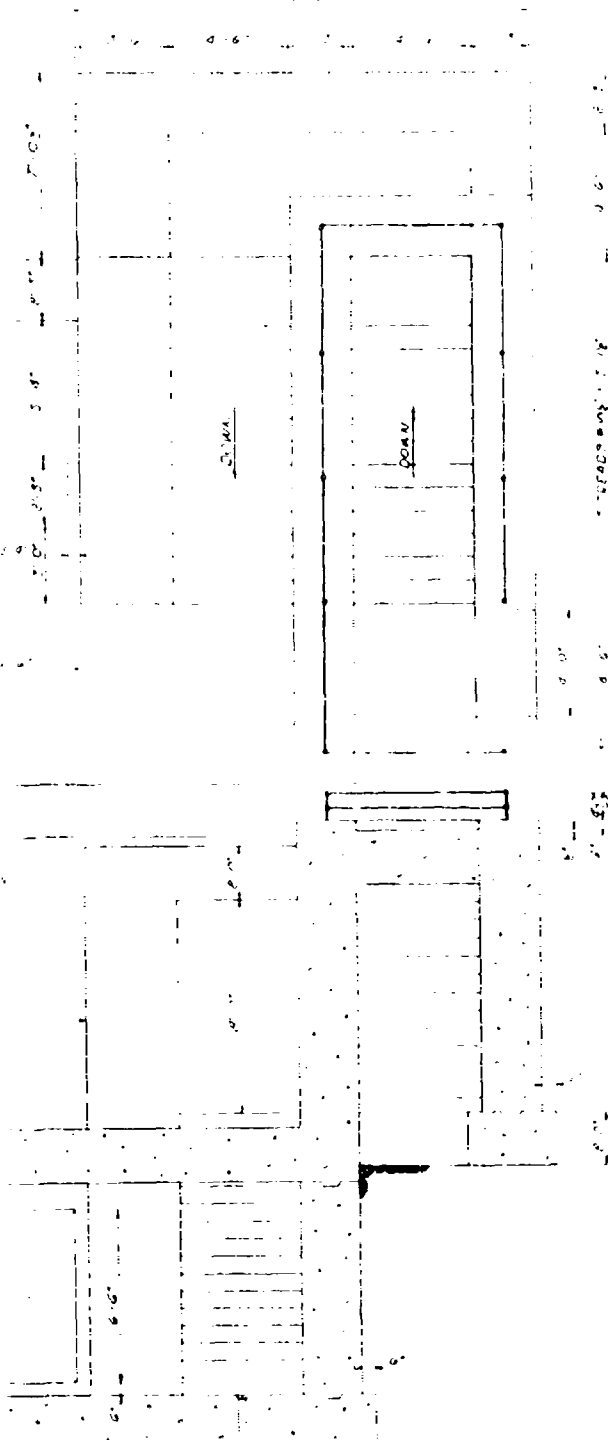
Blast Loading on Exterior Surface
 Peak pressure = 27.7 psi; Duration = 0.411 sec.

Nuclear Radiation Protection
 This structure and neurons are required to 30% of a 5000 R/hr dose rate at any point which will produce a peak dose rate of 1.5 R/hr.

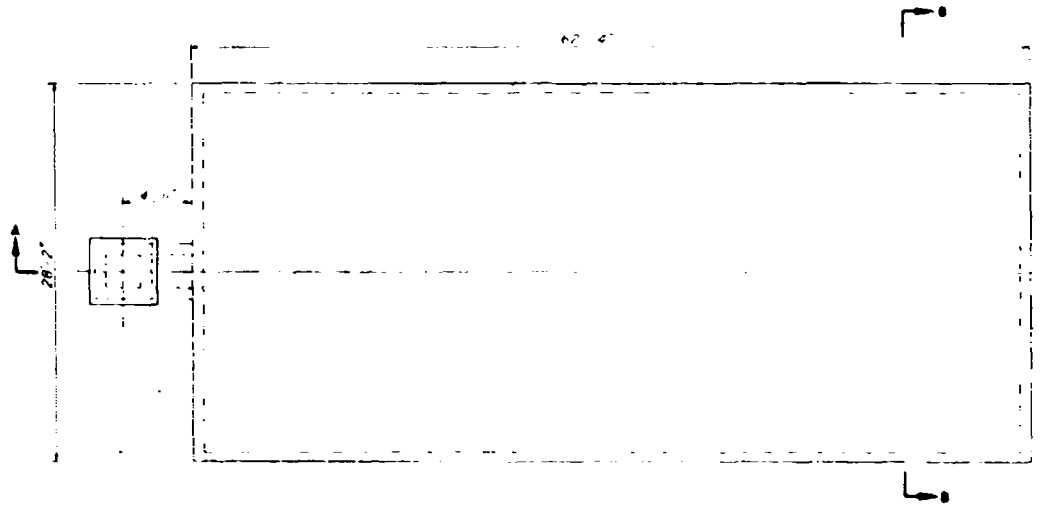
Strength of Materials	Static Allowable	Blast Design
Soil bearing capacity	8000 psi	15,000 psi
Concrete, f_c		
Dome	3000 psi	3900 psi
Reinforcing steel bars	5000 psi	6500 psi
Rein. steel lower yield	47,500 psi	52,000 psi
(Incl. Grade ASTM A 305 50T)		
Structural steel lower yield	38,000 psi	41,600 psi
(ASTM A7-30)		
* rated capacity of soil		

Allowable Stresses and Deformations
 The foundation and walls are designed for plastic deformation under design blast loads. Columns, slabs and beams are designed for maximum elastic deformation under design blast loads.

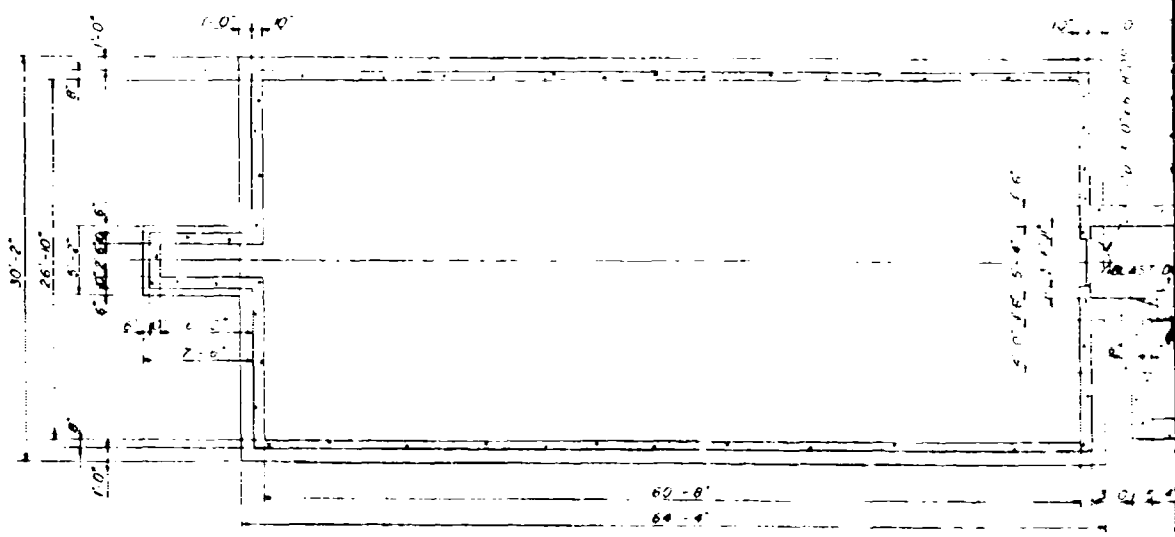
- General Notes**
- The following features are not shown and shall be determined to suit use requirements:
 interior partitions
 mechanical and electrical equipment
 air locks and decontamination facilities
 - Access stairs may be varied as required.
 - Access ramp may be provided if required for vehicles.
 - Thermal protection to be applied to all exterior doors.



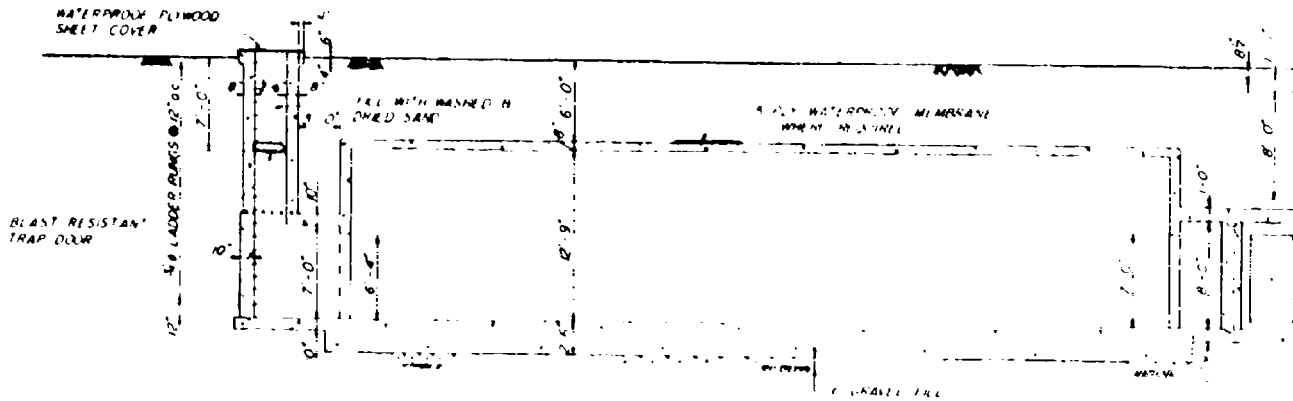
REVISION	DATE	DESCRIPTION	BY	APPROVAL
AMMANN & WHITNEY		DEPARTMENT OF THE ARMY		
CONSULTING ENGINEERS		OFFICE OF THE CHIEF OF ENGINEERS		
111 8TH AVENUE, NEW YORK, N. Y.		MILITARY CONSTRUCTION ENGINEERING DIVISION		
		WASHINGTON, D. C.		
MADE BY	J. F.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED DOME 200 PSI BLAST RESISTANT		
PLACED BY				
DESIGNED BY				
CHECKED BY				
DATE	APPROVED	DATE	BY	DATE
DRAWING NUMBER		60-18-06		
DATE		SHEET 1 OF 1		



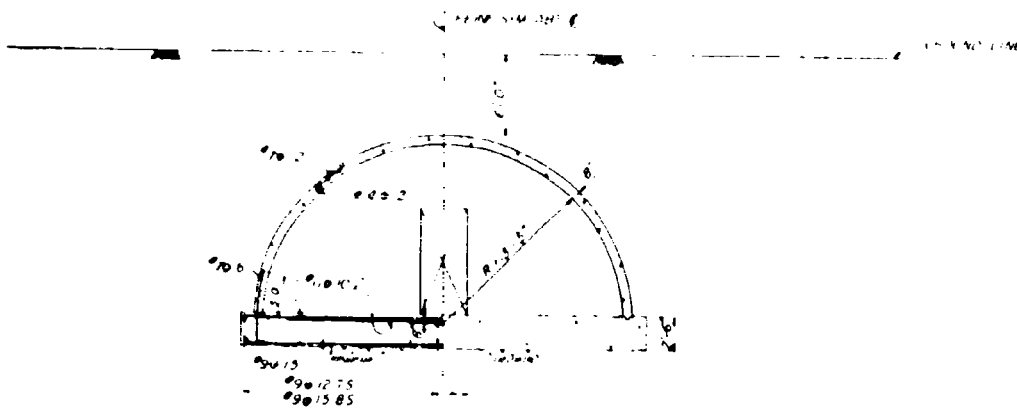
ROOF PLAN



FLOOR PLAN

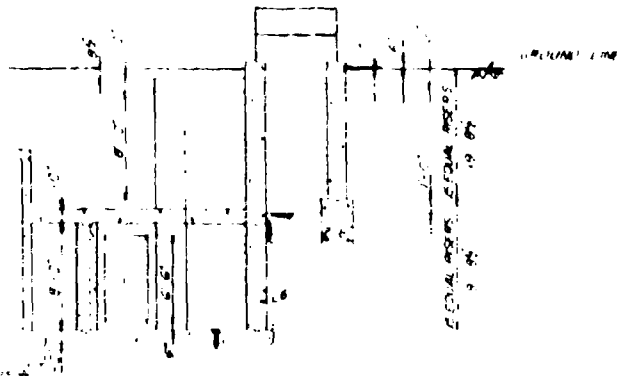


SECTION A-A



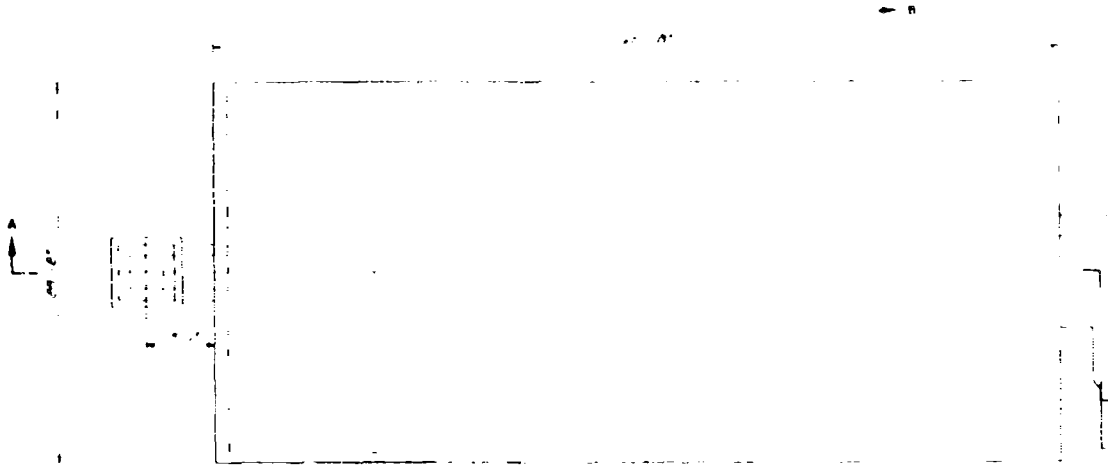
SECTION B-B

1

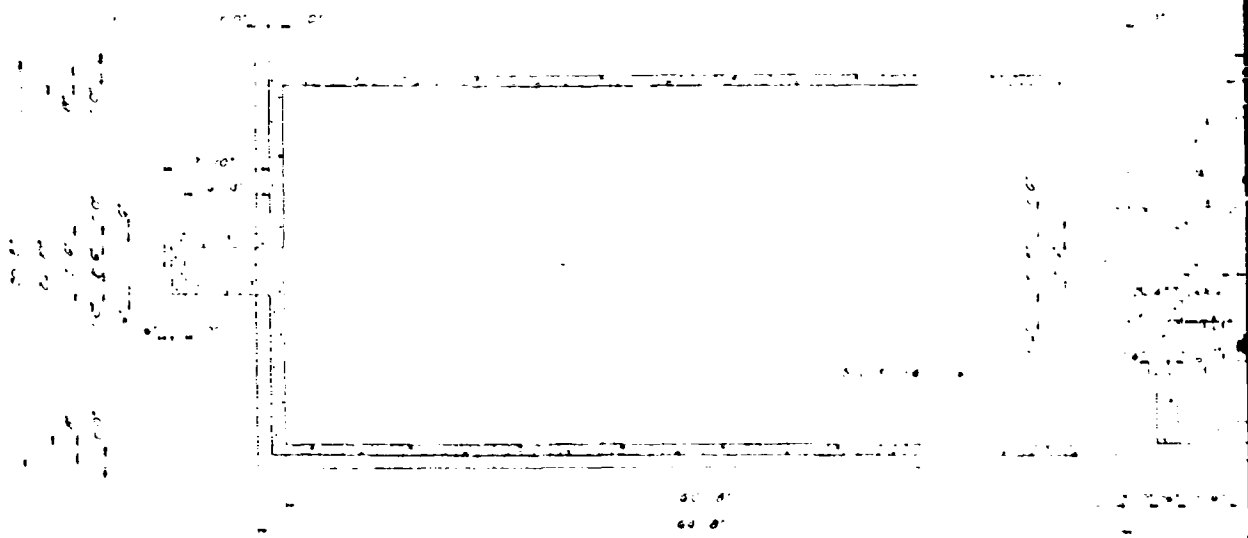


2

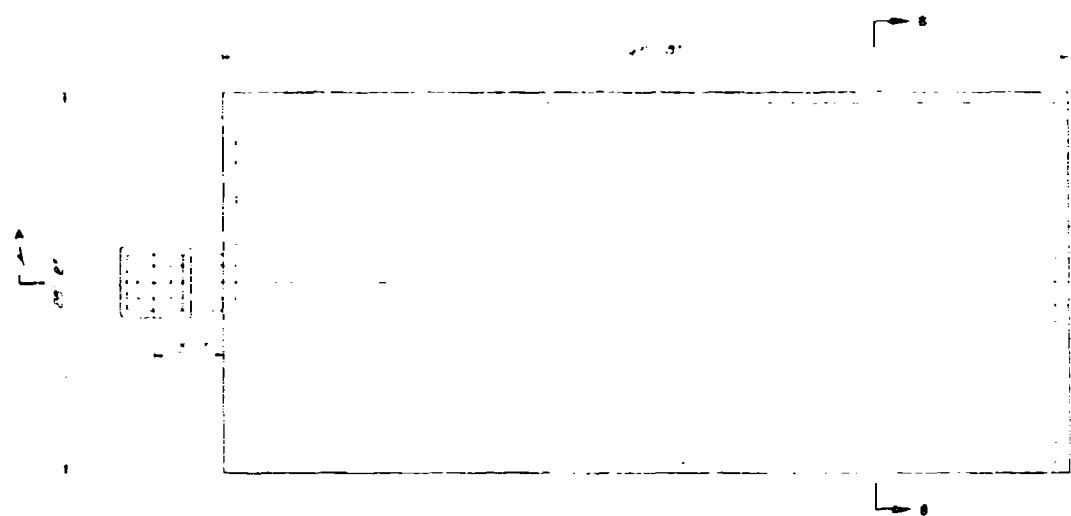
ARMANN & WHITNEY GENERAL ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. DRAWING NO.		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 1800 60 PSI BLAST RESISTANT	
DATE DRAWN BY		CHECKED BY DATE	
SCALE		SHEET NO. OF NO.	



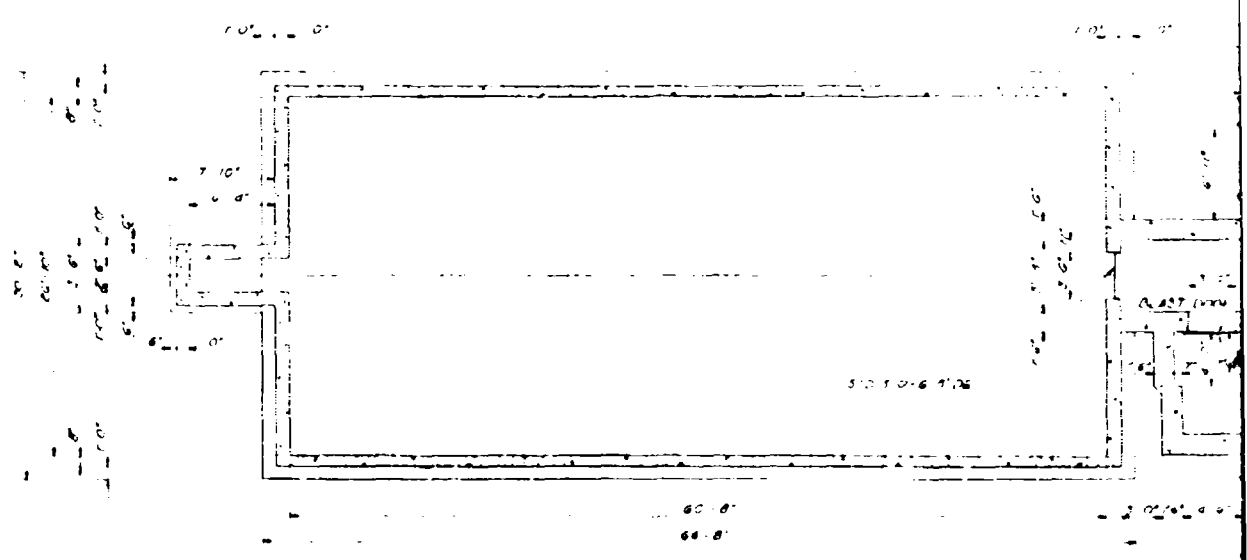
ROOF PLAN



FLOOR PLAN



ROOF PLAN



FLOOR PLAN

1

25.9M CONDITIONS

Design Procedure

The design procedure is based on the following assumptions:

Design Blast Wave

1. The design blast wave is assumed to be a hemispherical wave.

Blast Loading on Exterior Surface

1. The design blast loading is assumed to be uniform over the exterior surface.

Nuclear Radiation Protection

1. The design radiation protection is assumed to be based on the following assumptions:

Strength of Materials

Static

Blast Design

Material	Static	Blast Design
Concrete	4000 psi	4000 psi
Reinforcing Steel	60,000 psi	60,000 psi
Structural Steel	50,000 psi	50,000 psi
Welds	60,000 psi	60,000 psi
Fasteners	60,000 psi	60,000 psi

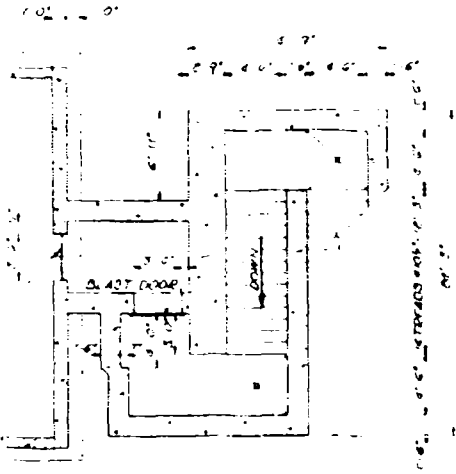
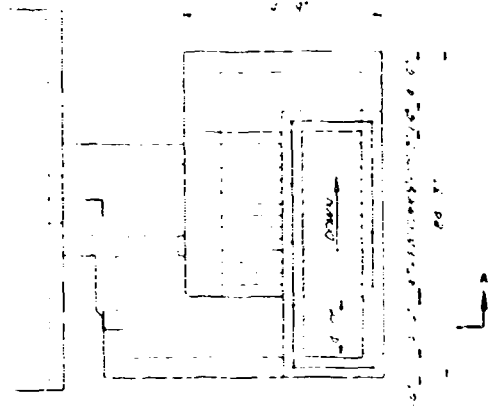
Allowable Stresses and Deflections

1. The design allowable stresses and deflections are based on the following assumptions:

General Notes

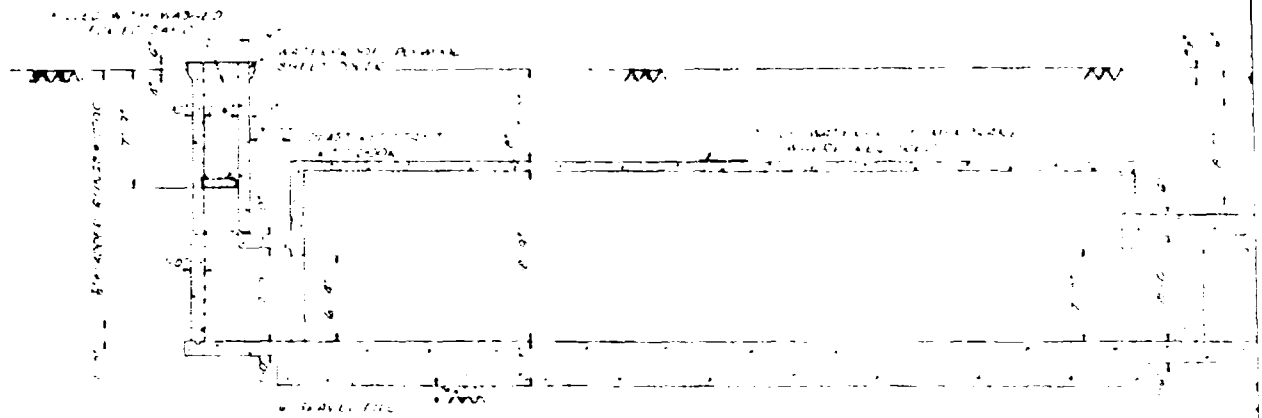
1. The design is based on the following assumptions:

- 1. The design is based on the following assumptions:
- 2. The design is based on the following assumptions:
- 3. The design is based on the following assumptions:
- 4. The design is based on the following assumptions:

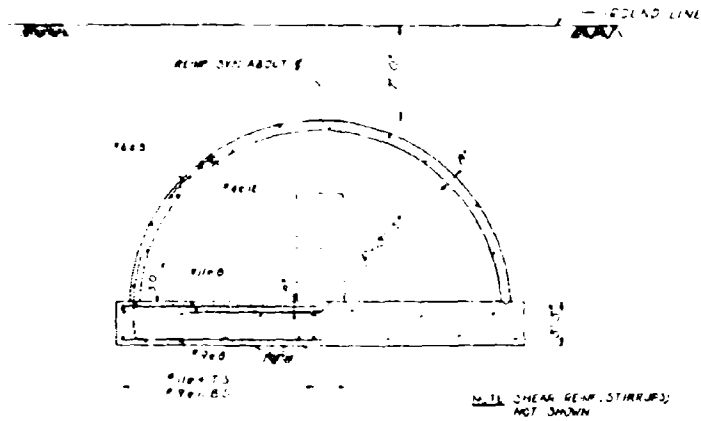


2

AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION BARRACKS 3 C	
DESIGNED BY L. W.	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE IGLOO 100 PSI BLAST RESISTANT		
CHECKED BY J. W.	DATE: 3/16/47		
DATE: 3/16/47	DRAWING NUMBER 60-18-07		SHEET 1 OF 2

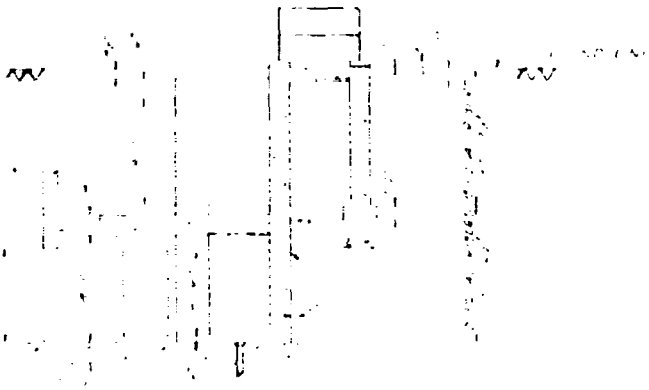


SECTION A-A



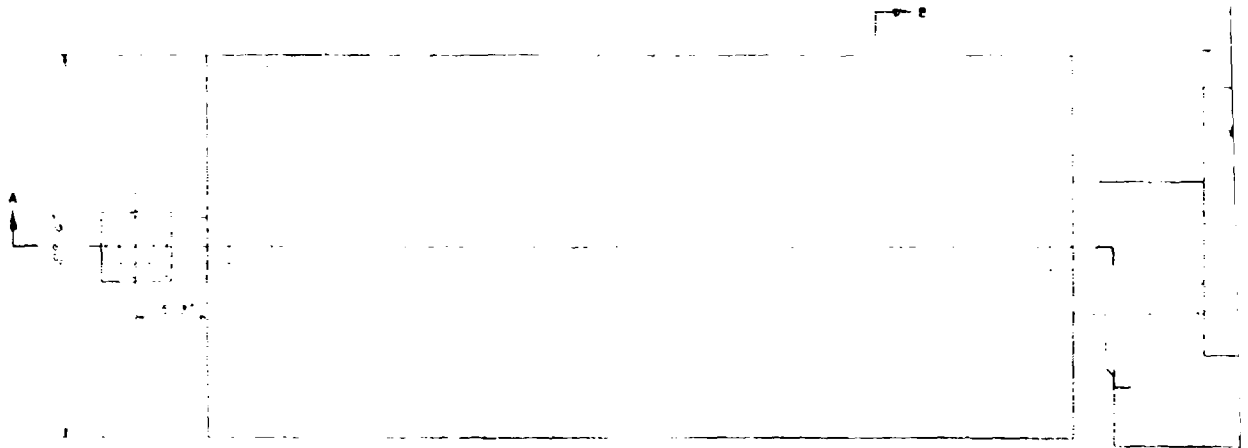
SECTION B-B

1

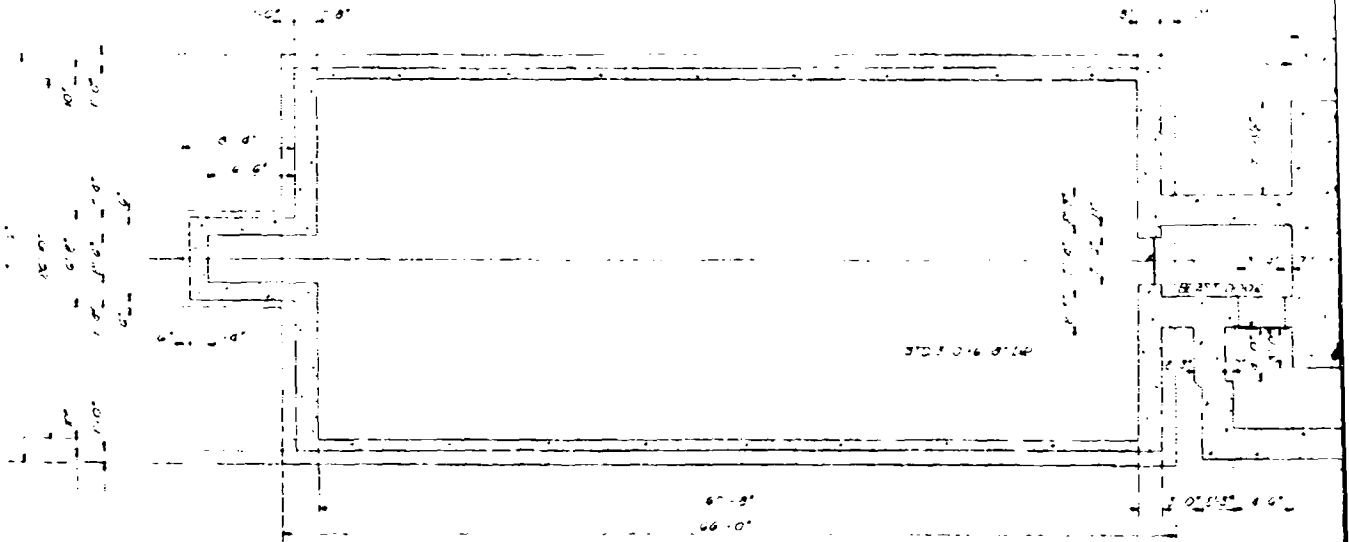


2

APPROVED	DATE	DESCRIPTION	BY	APPROVAL
AMMANN & WHITNEY CONSULTING ENGINEERS 111 FIFTH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.		
DESIGNED BY	DATE	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 18000 100 PSI BLAST RESISTANT		
ENGINEERED BY				
APPROVED BY				
DATE				
DATE FOR ISSUE	DATE	SCALE	SHEET NO. 2 OF 2 DRAWING NUMBER 60-18-07	
DATE	60-18-07	1/8" = 1'-0"	SHEET 2 OF 2	



ROOF PLAN



FLOOR PLAN

DESIGN PROCEDURE

1. The structure shall be designed to resist the effects of a nuclear explosion of the type specified in the program.

Design Assumptions

a. Blast pressure: 200 PSI (uniform)

Design of the Exterior Surface

1. The exterior surface shall be designed to resist the effects of a nuclear explosion of the type specified in the program.

Nuclear Radiation Protection

1. The structure shall be designed to resist the effects of a nuclear explosion of the type specified in the program which will produce a peak static pressure equal to the blast pressure.

Strength of Materials

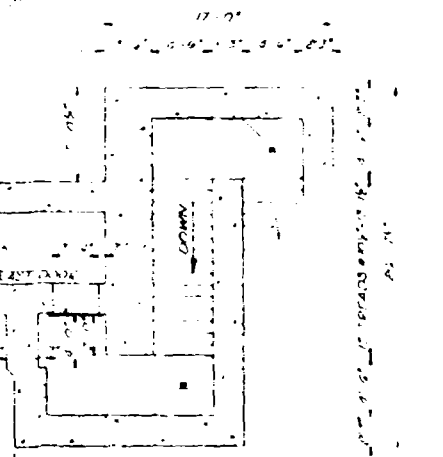
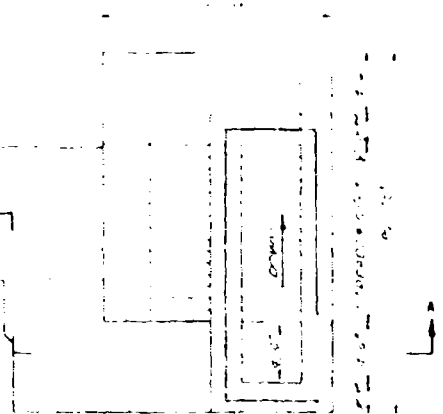
	Static	Blast Design
Concrete	4000 PSI	4000 PSI
Steel	40,000 PSI	40,000 PSI
Reinforcing Steel	40,000 PSI	40,000 PSI
Structural Steel	40,000 PSI	40,000 PSI
Aluminum	40,000 PSI	40,000 PSI

Allowable Stresses and Deflections

The structure shall be designed to resist the effects of a nuclear explosion of the type specified in the program which will produce a peak static pressure equal to the blast pressure.

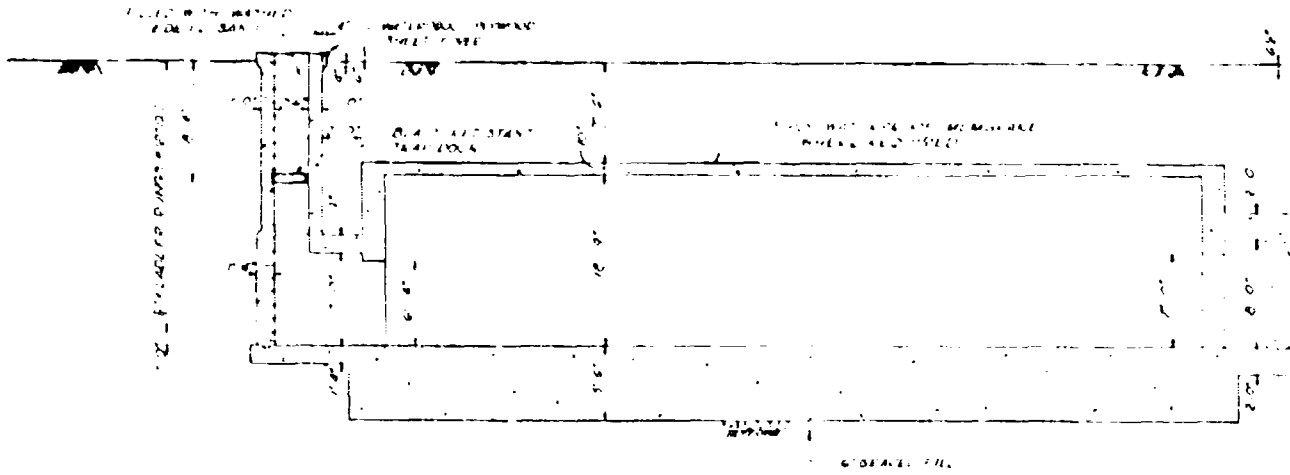
General Notes

- The following features are not shown and shall be determined to satisfy requirements:
 - Interior partitions
 - Mechanical and electrical equipment
 - Stairs and communication facilities
- Access stairs may be provided as required.
- Access ramp may be provided if required for vehicles.
- The no penetration to be observed at rate of doors.

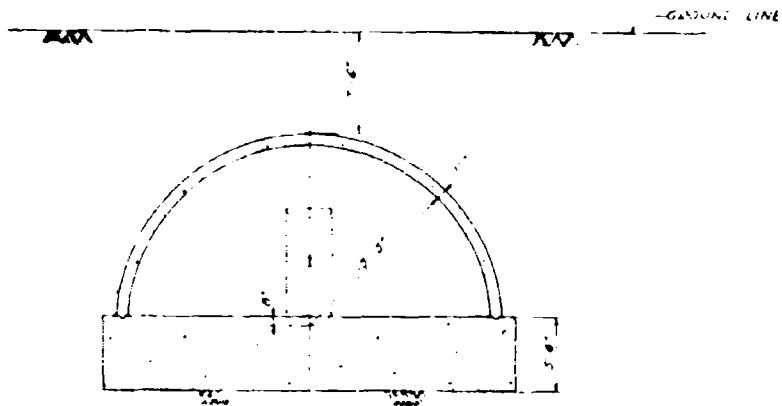


2

AMN ANN & WHITNEY CONSULTING ENGINEERS 111 5TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION SUBSTATION 8-C	
DESIGNED BY CHECKED BY APPROVED BY DATE	DATE APPROVED	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE IGLOO 200 PSI BLAST RESISTANT	
SHEET NO. 1 OF 2		DRAWING NUMBER 60-10-07	

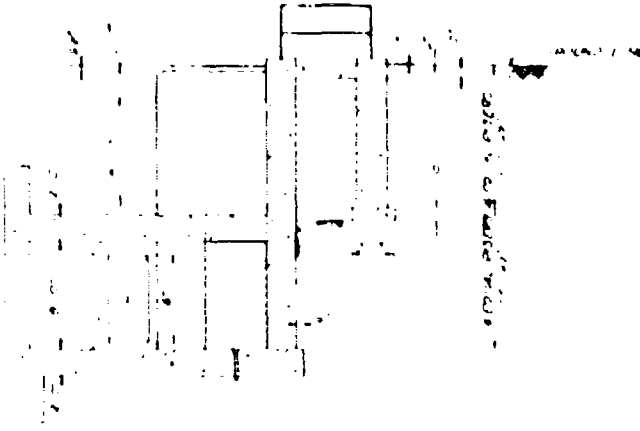


SECTION A-A



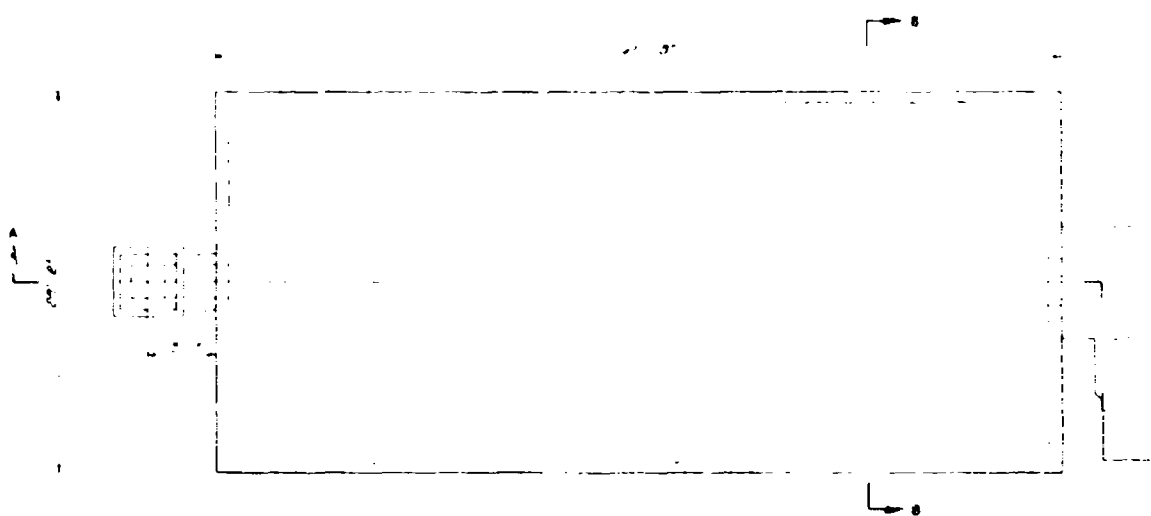
SECTION B-B

1

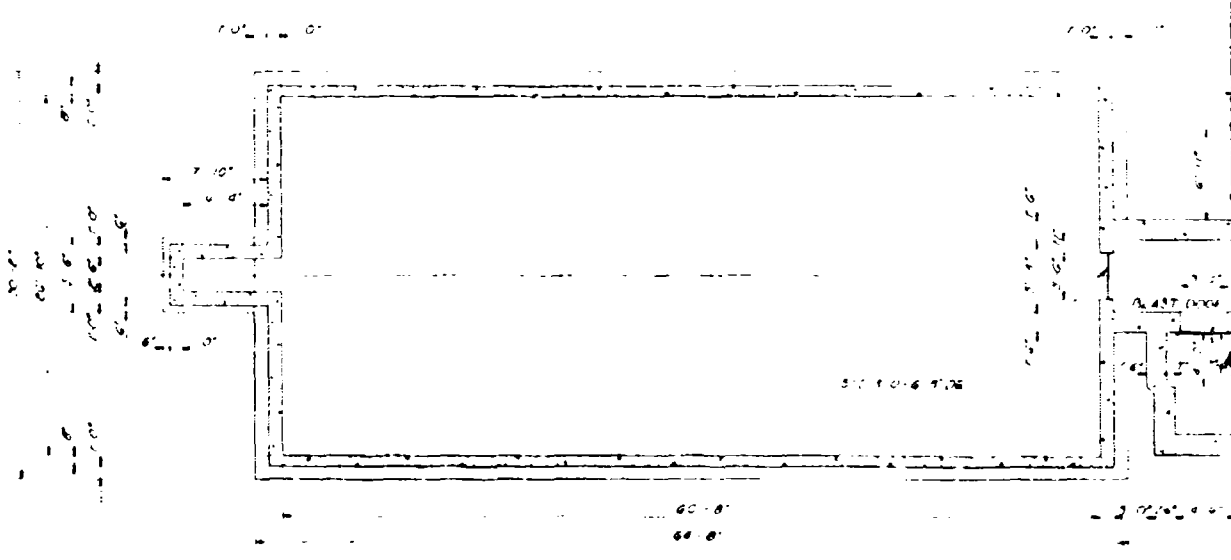


2

AMMANN & WHITNEY GENERAL ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. 60-15-07		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 1600 200 PSI BLAST RESISTANT	
DATE: 6-1-57		SCALE: 1/8" = 1'-0"	
SHEET 2 OF 2		60-15-07	



ROOF PLAN



FLOOR PLAN

DESIGN CONDITIONS

Design Procedure

The design procedure is in accordance with the provisions of the Army Corps of Engineers Manual of Design for Blast Resistant Structures.

Design Blast Wave

The design blast wave is 100 PSI overpressure.

Blast Loading on Exterior Surface

The exterior surface is subjected to the design blast wave.

Nuclear Radiation Protection

The structure is designed to provide protection against nuclear radiation in accordance with the provisions of the Army Corps of Engineers Manual of Design for Blast Resistant Structures.

Strength of Materials

	Static	Blast Design
Concrete	4000 PSI	4000 PSI
Reinforcing Steel	60,000 PSI	60,000 PSI
Structural Steel	50,000 PSI	50,000 PSI
Structural Steel (Welds)	50,000 PSI	50,000 PSI
Structural Steel (Bolts)	50,000 PSI	50,000 PSI
Structural Steel (Nuts)	50,000 PSI	50,000 PSI
Structural Steel (Welds)	50,000 PSI	50,000 PSI
Structural Steel (Bolts)	50,000 PSI	50,000 PSI
Structural Steel (Nuts)	50,000 PSI	50,000 PSI

Allowable Stresses and Deflections

The allowable stresses and deflections are in accordance with the provisions of the Army Corps of Engineers Manual of Design for Blast Resistant Structures.

General Notes

The structure is designed to provide protection against nuclear radiation in accordance with the provisions of the Army Corps of Engineers Manual of Design for Blast Resistant Structures.

Interior finishes

Equipment for the structure

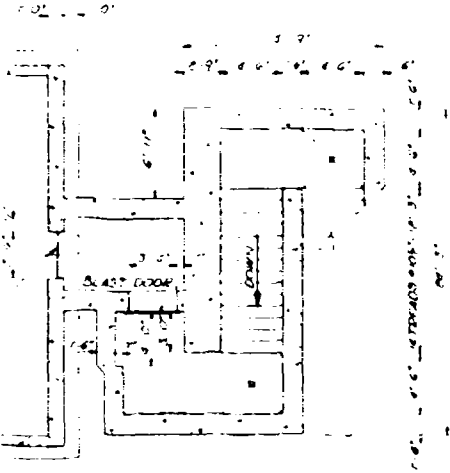
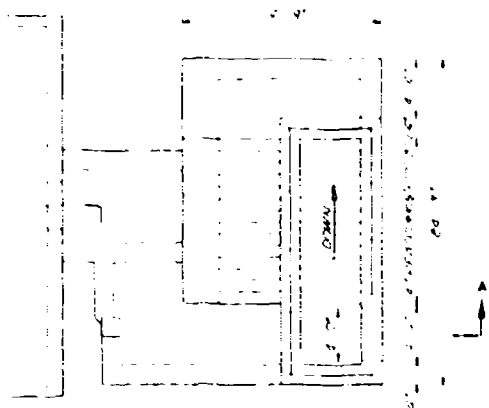
Access to the structure

1. Interior finishes to be as required.

2. Access to the structure to be as required.

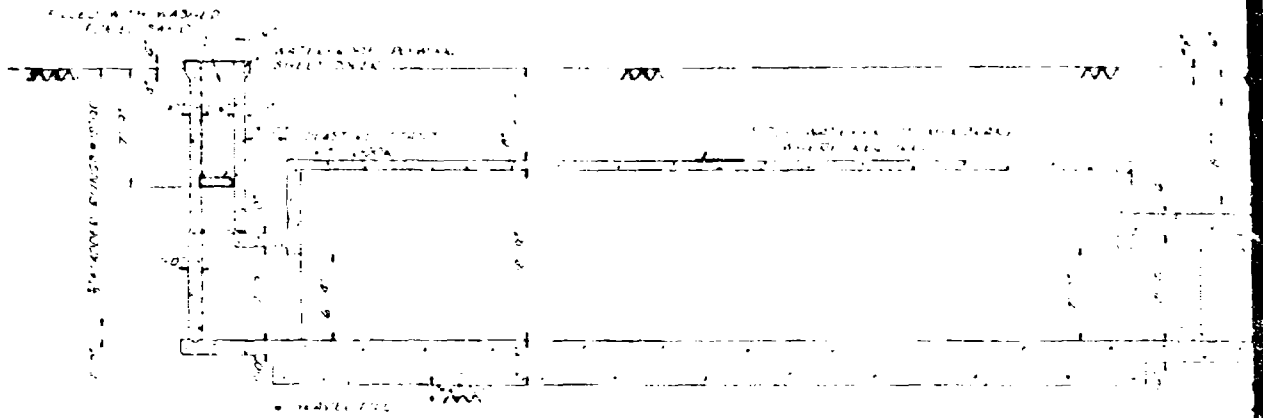
3. Access to the structure to be as required.

4. Details to be as required.

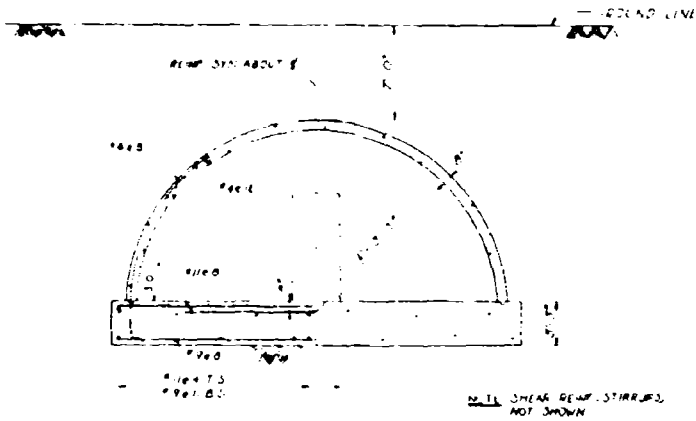


2

DESIGNED BY	DATE	APPROVED BY	DATE
AMMANN & WHITNEY CONSULTING ENGINEERS 111 8TH AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY APPROVED BY	PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE IGLOO 100 PSI BLAST RESISTANT		
AND FOR SCALE OF APPROVED	DATE	SCALE 3/16" = 1'-0"	SHEET NO. 60-18-07 DRAWING NUMBER 60-18-07 SHEET 1 OF 2

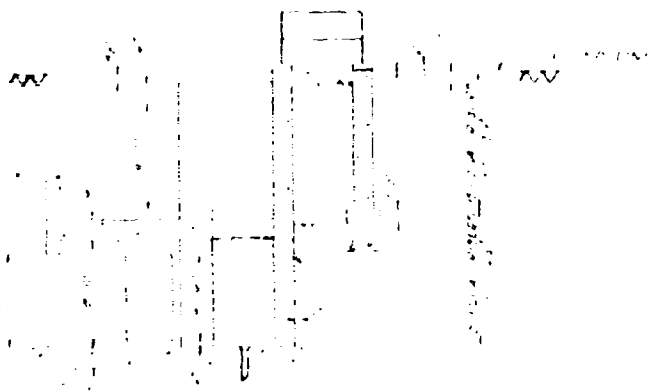


SECTION A-A



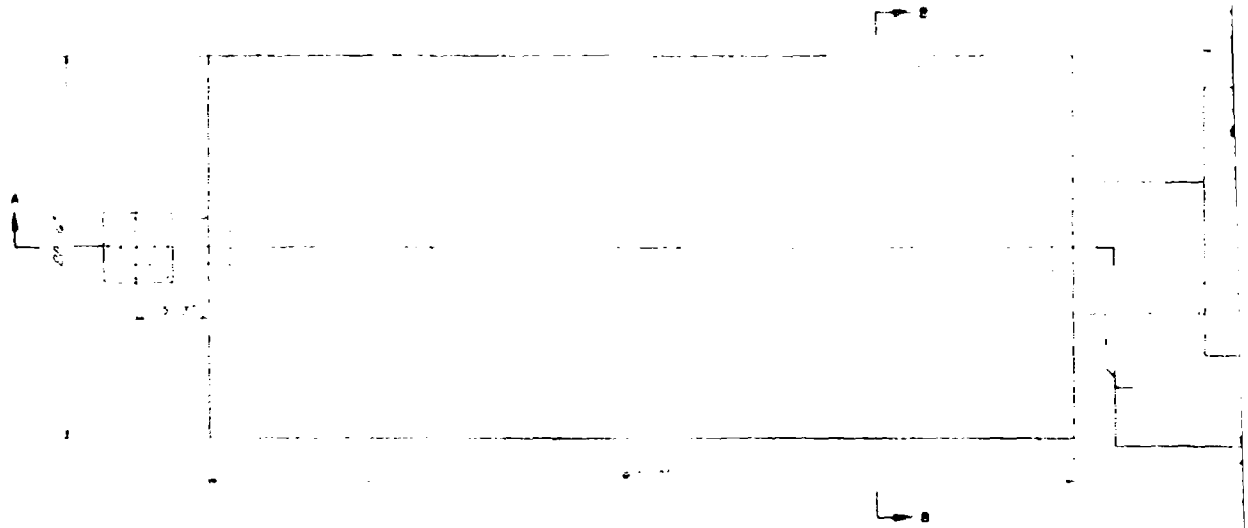
SECTION B-B

1

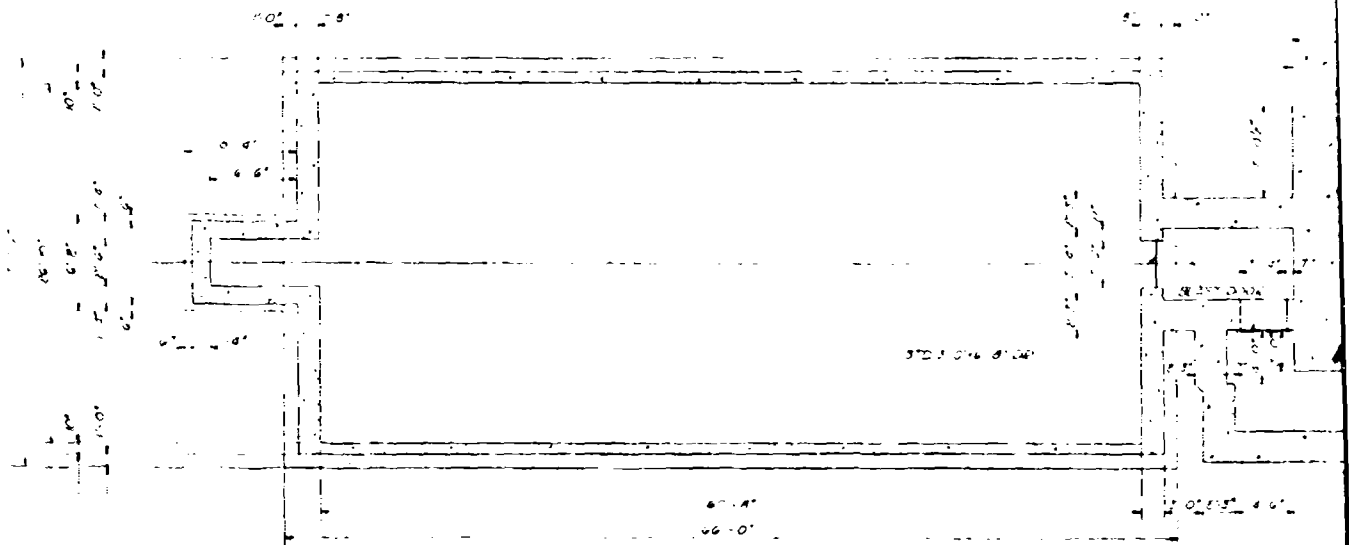


2

REVISION	DATE	DESCRIPTION	BY
AMMANN & WHITNEY CONSULTING ENGINEERS 111 7th AVENUE, NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
DRAWN BY CHECKED BY APPROVED BY DATE		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 10600 100 PSI BLAST RESISTANT DRAWING NUMBER 60-10-07 SHEET 2 OF 2	



ROOF PLAN



FLOOR PLAN

DESIGN NO. 1007

Design Procedure

The structure is designed to resist blast loading from the interior of the structure.

Design Blast Wave

The design blast wave is assumed to be

Blast Loading on Exterior Surface

The blast loading on the exterior surface is assumed to be

Nuclear Radiation Protection

The structure is designed to resist a nuclear radiation dose rate of 1000 R/hr which will produce a peak blast pressure of 100 psi.

Strength of Materials

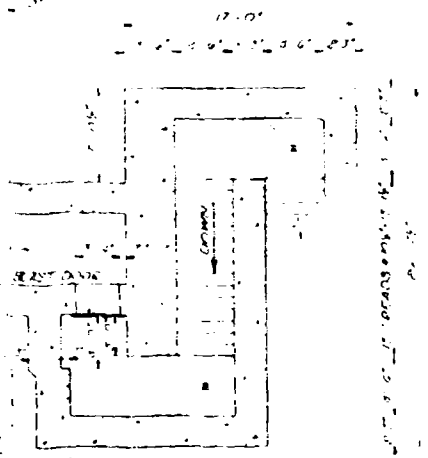
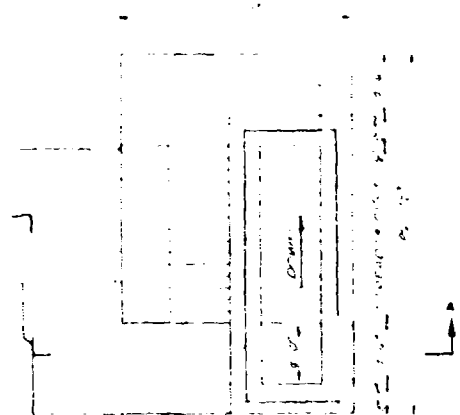
	Static	Blast Design
Concrete Strength	4000 PSI	4000 PSI
Reinforcing Steel	60,000 PSI	60,000 PSI
Allowable Stress	20,000 PSI	20,000 PSI
Allowable Deflection	1/400	1/400

Allowable Stresses and Deflections

The structure is designed to resist a blast loading of 100 psi. The structure is designed to resist a nuclear radiation dose rate of 1000 R/hr which will produce a peak blast pressure of 100 psi.

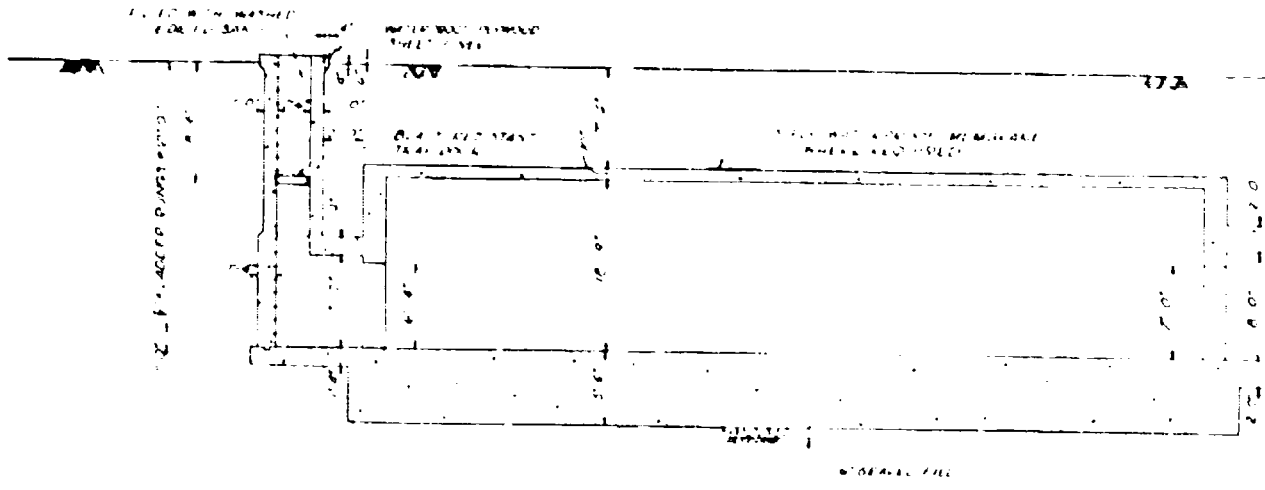
General Notes

- The following features are not shown and shall be determined to satisfy requirements:
 - Interior Partitions
 - Mechanical and electrical equipment
 - Fixtures and decontamination facilities
- Access stairs may be added as required.
- Access ramps may be provided as required for vehicles.
- The maximum load to be applied to the structure shall be determined.

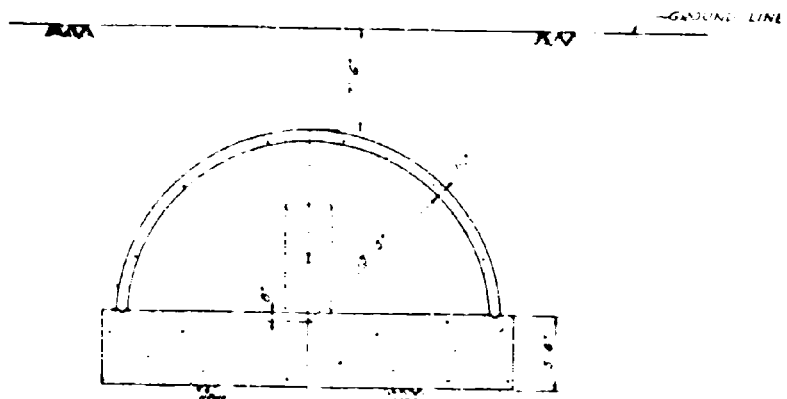


2

DESIGNED BY	DATE	DESCRIPTION	BY	APPROVAL
AMN ANN & WHITNEY		DEPARTMENT OF THE ARMY		
111 5TH AVENUE, NEW YORK, N. Y.		OFFICE OF THE CHIEF OF ENGINEERS		
		MILITARY CONSTRUCTION ENGINEERING DIVISION		
DESIGNED BY	DATE	PROTECTIVE CONSTRUCTION		
		GENERAL PURPOSE STRUCTURE		
		BURIED CONCRETE IGLOO		
		200 PSI BLAST RESISTANT		
CHECKED BY	DATE	SCALE	SHEET	
		1/4" = 1'-0"	1 OF 2	
APPROVED	DATE	DRAWING NUMBER	SHEET	
		60-18-07	1 OF 2	



SECTION A-A



SECTION B-B

1



2

AMMANN & WHITNEY GENERAL PURPOSE ENGINEERS 111 5TH AVENUE NEW YORK, N. Y.		DEPARTMENT OF THE ARMY OFFICE OF THE CHIEF OF ENGINEERS MILITARY CONSTRUCTION ENGINEERING DIVISION WASHINGTON, D. C.	
PROJECT NO. <i>FJW</i>		PROTECTIVE CONSTRUCTION GENERAL PURPOSE STRUCTURE BURIED CONCRETE 1600 200 PSI BLAST RESISTANT	
DRAWN BY <i>[Signature]</i>			
CHECKED BY <i>[Signature]</i>		DATE <i>1/21/07</i>	
SCALE		SHEET <i>2</i> OF <i>2</i>	