

UNCLASSIFIED

AD 267 595

*Reproduced
by the*

ARMED SERVICES TECHNICAL INFORMATION AGENCY
ARLINGTON HALL STATION
ARLINGTON 12, VIRGINIA



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

017486

TELETYPE COMPANY

SPENCER, JAMES PROJECT
b6 b7C 1953

ASTIA
NOV 6 1961
JIPOR

~~RESTRICTED - FROM THIS CLASSIFICATION~~
~~DO NOT DISSEMINATE - DOES NOT APPLY~~



SACRAMENTO DISTRICT
CORPS OF ENGINEERS
U. S. ARMY
SACRAMENTO, CALIFORNIA

SECURITY INFORMATION

CATALOGUED BY ASI/A
AS AD-A-267595

by authority of LT COL DISA DISAS(1) 3-312

1997-1998

SECURITY INFORMATION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

UNDERGROUND EXPLOSION TESTS

APPENDIX A

SUPPLEMENTARY

SKEW STRUCTURES

PROGRAM

Copy No. **13** of **25**

Department of the Army

Corps of Engineers

Sacramento District Office

1 March 1952

SECURITY INFORMATION

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
1	Introduction	1
2	Authorization	1
3	Objectives	1
4	Cooperating Agencies	2
5	Description of the Area	3
6	Laboratory Soil Tests	4
7	Target Fabrication	5
8	Charge	7
9	Target Preparation	7
10	Data	9
	<u>References</u>	11

REF ID: A66111
SECURITY INFORMATION

PLATES

<u>No.</u>	<u>Title</u>
I	Test Site Location
II	Charge Locations
III	Targets - Plans and Sections
IV	Round S-2 - Plans and Sections
V	Round S-2 - Target R-5 Crack Patterns and Wall Deformations
VI	Round S-2 - Target R-2 Crack Patterns and Wall Deformations
VII	Round S-2 - Target R-3 Crack Patterns and Wall Deformations
VIII	Round S-2 - Target R-1 Crack Patterns and Wall Deformations
IX	Round S-2 - Target T-3 Crack Patterns and Wall Deformations
X	Round S-2 - Target T-2 Crack Patterns and Wall Deformations
XI	Round S-2 - Target T-1 Crack Patterns and Wall Deformations
XII	Round S-3 - Plans and Sections
XIII	Round S-3 - Target R-4 Crack Patterns and Wall Deformations
XIV	Round S-3 - Target R-7 Crack Patterns and Wall Deformations
XV	Round S-3 - Target R-6 Crack Patterns and Wall Deformations

-b-

SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

PLATES

<u>No.</u>	<u>Title</u>
XVI	Round S-3 - Target T-7 Crack Patterns and Wall Deformations
XVII	Round S-3 - Target T-6 Crack Patterns and Wall Deformations
XVIII	Round S-3 - Target T-5 Crack Patterns and Wall Deformations
XIX	Replacement Point Layout

-o-

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

FIGURES

<u>No.</u>	<u>Title</u>
1	Triaxial Shear Tests
2	Concrete Compression Tests
3	Concrete Beam - Flexural Test
4	Concrete Beam - Flexural Test
5	Concrete Beam - Flexural Test
6	Summary of Tension Tests Steel Reinforcement Bars
7	Summary Survey Data Round S-2 - Target R-5
8	Summary Survey Data Round S-2 - Target R-3
9	Summary Survey Data Round S-2 - Target R-2
10	Summary Survey Data Round S-2 - Target R-1
11	Summary Survey Data Round S-2 - Target T-3
12	Summary Survey Data Round S-2 - Target T-2
13	Summary Survey Data Round S-2 - Target T-1
14	Summary Survey Data Round S-3 - Target R-4
15	Summary Survey Data Round S-3 - Target R-6
16	Summary Survey Data Round S-3 - Target R-7
17	Summary Survey Data Round S-3 - Target T-7
18	Summary Survey Data Round S-3 - Target T-6

CONFIDENTIAL
SECURITY INFORMATION

FIGURES

<u>No.</u>	<u>Title</u>
19	Summary Survey Data Round S-3 - Target T-5
20	Target Movements Relative to Center Line of Charge Round S-2
21	Target Movements Relative to Center Line of Charge Round S-3
22	Field Soil Tests

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

PHOTOGRAPHS

<u>NO.</u>	<u>SUBJECT</u>
1	- Round S-2 - Targets Prepared for Detonation - Crater
2	- Round S-3 - Detonation - Crater
3	- Round S-2 - Target R-1
4	- Round S-2 - Target R-2
5	- Round S-2 - Target R-3
6	- Round S-2 - Target R-5
7	- Round S-2 - Target T-1
8	- Round S-2 - Target T-2
9	- Round S-2 - Target T-3
10	- Round S-3 - Target R-4
11	- Round S-3 - Target R-6
12	- Round S-3 - Target R-7
13	- Round S-3 - Target T-5
14	- Round S-3 - Target T-6
15	- Round S-3 - Target T-7

-f-

CONFIDENTIAL
SECURITY INFORMATION

1. Introduction. ~~This report presents~~ data secured from two detonations at the Dry Clay site of the Underground Explosion Test Programs using 0.2 scale, buried, open-box and hollow cubical type reinforced concrete target structures. Concomitant data are also included. The shots were part of a large number of tests in clay and in other types of soil, and in rock, which are described in three booklets, "Underground Explosion Tests", issued by the Protective Construction Branch, Engineering Division, Office of the Chief of Engineers. The tests reported here are supplementary to those described in the booklet entitled, "Program A-Tests in Soils", and did not include the instrumentation or dust phases of the program mentioned therein.

2. Authorization. These tests were approved by the Chief of Engineers in a letter to the Division Engineer, South Pacific Division, dated 2 August 1951, subject, "Authorization - Supplementary Skew Structures Program - Underground Explosion Tests".

3. Objectives. The objective of the Underground Explosion Test Programs is to secure experimental data for "developing - protective construction criteria and for designing and constructing protective military structures and underground installations". The immediate purpose of this supplementary program is to verify empirical scale relationships previously established from larger, equal and smaller scale tests on targets set with no skew, and to determine the movements and the visual damage to targets with faces set at varying skew angles and distances from the center-line of the charge. Control targets set with no skew were used in each round.

CONFIDENTIAL
SECURITY INFORMATION

4. Cooperating Agencies. Office headquarters facilities at Dugway Proving Grounds were provided by the Chemical Corps, Department of the Army.

The Ordnance Department, Department of the Army, supplied explosives, and explosive storage facilities were made available at the Tooele Ordnance Depot.

The South Pacific Division Laboratory, Corps of Engineers, Department of the Army, performed the laboratory soil tests reported herein.

The Director, U. S. Coast and Geodetic Survey, Department of Commerce, furnished the services of a geodetic and precise level party to establish first order base lines and levels in the Dry Clay area, and to determine the vertical and horizontal position of fixed points on all target structures before and after the detonation of charges.

The Director, U. S. Geological Survey, Department of Interior, furnished the services of a geophysical survey party to extend preliminary seismic exploration of the area. The data have not been received for inclusion in this report.

Morrison-Knudsen Company, Inc., under contract to the Corps of Engineers, performed all construction work entailed by the program.

Pittsburgh Testing Laboratories, under contract to the Corps of Engineers, performed all concrete and steel testing required by the work.

Undisturbed soil samples have been forwarded to the Massachusetts Institute of Technology for eventual dynamically loaded triaxial shear tests.

CONFIDENTIAL
SECURITY INFORMATION

5. Description of the Area. Dry Clay test site is located in Sections 2, 3, 10 & 11, T9S, R9W, S.L.B.&M., about 85 miles by road southwest of Salt Lake City, Utah. It is about 10 miles (airline) southeast of the present headquarters of Dugway Proving Grounds. The location is shown on Plate I.

The area consists of an even-surfaced valley lying between buried mountains, supporting limited, desert-type vegetation. The valley floor was formed by the deposition of sediments in ancient Lake Bonneville. The depth of these sediments is in excess of 160 feet. These undeformed beds are jointed into rectangular blocks by a major set of joints which are vertical and strike north-south, and a less prominent set of joints, also vertical, and about normal to the major set, which strike east-west. Seismic explorations indicate that velocities range from a minimum of 1,000 feet per second at a depth of 3.7 feet, to a maximum velocity of 6,150 feet per second at a depth of 93 feet. A typical boring log of the area is shown on Plate XII.

Clay is the chief material at the site with minor amounts of interbedded fine sand, silt and diatomaceous marl. The overburden is an unstratified mixture of silt and clay containing a small amount of humus. No water table was encountered at any exploratory drill hole in the area. The joint systems allow the limited annual rainfall to penetrate deeply and the underlying material is slightly damp at all times. A detailed geologic study of the site is included in Reference 3.

CONFIDENTIAL
SECURITY INFORMATION

6. Laboratory Soil Tests. Two undisturbed soil samples were obtained at a preliminary test site at a depth of 4.5 to 5.4 feet below the ground surface. The location of the site is shown on Plate II. One sample could not be used for testing owing to its highly fractured condition, and only a limited number of specimens could be secured from the second sample, obtained prior to detonation.

The results of classification tests, using standard procedures, are given below:

Div. Serial No.	Laboratory Classification	Mechanical Analysis % Finer			Liquid Plasticity	
		No. 60	No. 270	5 Mic.	Limit	Index
278-SA	Silty Clay	100	99	42	43	14
279-SA	Silty Clay	100	99	33	45	16

The specific gravity of similar material from the area is 2.79.

Specimens from Sample No. 278-SA, with a diameter of 1.4 inches and a height of 3.25 inches, were tested to determine the shear strength at natural moisture content, using both triaxial and unconfined compression tests, and the effect of varying lateral pressures upon the shear strength, using triaxial tests. Density determinations were obtained from weights and physical dimensions of test specimens. The test results are shown in Figure 1.

The Division Laboratory states:

"The Modulus of Deformation may be defined as the average deviator stress per unit strain between the origin and a point on the stress-strain curve at one-third of the maximum deviator stress. The data indicate that the modulus of deformation increases with an increase in lateral pressure from overburden,

CONFIDENTIAL
SECURITY INFORMATION

which is approximately 0.2 Kg per cm^2 to 2 Kg per cm^2 but decreases when the lateral pressure is raised to 4 Kg per cm^2 . While this behavior is not consistent with average results obtained from other test sites in the area, these differences could be attributed in part to variations in the nature of the soil and the initial density of the specimens. The curved line forming the Mohr envelope is believed to represent, more nearly, the true values for this material. The straight dashed line represents an average shear strength for all four specimens.

"The difference in value for the modulus of deformation as obtained by unconfined compression tests compared to triaxial tests, may be explained by small variations within the specimens as well as by the different types of apparatus."

Additional test results on soil samples from the Dry Clay test area are given in References 1, 2, 3, 4 and 5.

7. Target Fabrication. The target structures were pre-cast in Salt Lake City. The concrete mix was designed for a strength of 4,000 p.s.i. at 28 days using Type I Portland Cement (Federal Specification No. SS-C-192). High early strength cement was substituted for the Type I in order to adhere to the program schedule. The concrete proportions by dry weight were: cement - 1; sand - 2.09; and aggregate - 2.13. The maximum size of coarse aggregate used in the mix was $1\frac{1}{2}$ inch. The designed cement factor was 6.2 sacks per cubic yard, the slump 5 inches, and the water-cement ratio, 0.915. The concrete was vibrated into place in the forms taking care not to disturb the designed steel spacing. Steel reinforcement "ears" were set in the corners of each target to facilitate handling. The targets were covered with heavy burlap maintained in a saturated condition and cured at the fabrication site for 3 days. The targets were then transported by truck to the test site and stored in the open until used. Plate III illustrates the target details.

- 5 -

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

Concrete was sampled in accordance with A.S.T.M. standards. Two test cylinders, 3 x 6 inches, were fabricated from concrete for each target. The cylinders were cured in the same manner as the targets, and stored in the open to duplicate the conditions of target storage. One cylinder from each target was broken as closely as practicable at 7 days of age, and the second cylinder as closely as practicable on the day the charge for the respective target was detonated. The results of the concrete compression tests are scheduled in Figure 2.

One reinforced concrete test beam, 6 x 13-1/2 x 57 inches, using steel reinforcement identical to that placed in the target structures, was fabricated with concrete sampled from Target T-6. The beam was cured and stored in a manner similar to that of the target, and tested as a simple beam under a third point loading condition as closely as practicable on the day Round S-3 was detonated. Details of the test beam and the location of points of cracking are shown in Figure 3. The test data is scheduled in Figure 4 and plotted in Figure 5.

Steel reinforcement for the targets consisted of new type, deformed bars specified to conform to the following requirements:

- a. Yield point not to exceed 65,000 p.s.i.
- b. Ultimate strength not to exceed 100,000 p.s.i.
- c. Variance from the average yield point of the samples tested not to exceed 10 - 12 percent.
- d. All samples to have similar stress-strain diagrams.

CONFIDENTIAL
SECURITY INFORMATION

A summary of tension tests on reinforcement bars sampled from the material used in the targets is scheduled in Figure 6. Stress-strain diagrams of steel reinforcement samples conforming to the same specifications and used in earlier targets of the program are contained in Reference 4.

8. Charge. Each charge consisted of 2,560 pounds of rectangular, precision-cast TNT blocks stacked to approximate a sphere. The center of gravity of each charge was set 7 feet below the ground surface. Some of the 100 pound blocks were cast with priming slots. M-1 demolition chain blocks containing primacord and telratol were used in the slots permitting thorough priming of the stack without disturbing the intimate contact of adjacent blocks. Two primacord leads were brought to the surface in steel conduits. The leads were detonated with electrical caps and a hand-operated blasting apparatus. A detail of the charges is shown on Plate IV.

9. Target Preparation. No construction work had occurred in the immediate area prior to the preparations for Rounds S-2 and S-3. Two preliminary detonations, about 400 feet west of the immediate test area, one at 0.1 scale and one at 0.2 scale, which resulted in no damage to the targets used, were made to establish the test distances from charge to targets for Round S-2. Test distances for Round S-3 were determined from the results of Round S-2. Target layouts for Rounds S-2 and S-3 are shown on Plates IV and XII.

CONFIDENTIAL
SECURITY INFORMATION

General information on the test rounds is tabulated below:

<u>Target</u>	<u>Type</u>	<u>Radius Feet</u>	<u>Radius Scale λ</u>	<u>Skew Angle Degrees</u>
<u>Round S-2</u>				
R-5	Open box	33	2.42	45
R-3	" "	29	2.12	45
R-2	" "	25	1.83	45
R-1	" "	29	2.12	Zero
T-3	Hollow Cube	20	1.46	45
T-2	" "	20	1.46	30
T-1	" "	20	1.46	Zero
<u>Round S-3</u>				
R-4	Open box	23.96	1.75	Zero
R-7	" "	24.08	1.76	30
R-6	" "	25.00	1.83	Zero
T-7	Hollow Cube	17.46	1.28	45
T-6	" "	17.58	1.29	30
T-5	" "	18.50	1.35	Zero

Note: Radius = Distance from center-line of charge to closest point on the target

$$\text{Radius Scale: } \lambda = \text{Radius} \times (\text{Weight of Charge})^{-\frac{1}{2}}$$

The targets were lowered by a crane and jacked into place. Alignment, distance and grade of each target were carefully checked. Referenced medium movement stakes were buried adjacent to the targets close to the top of the ground.

- 8 -

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

The targets were backfilled in 6 to 8 inch layers, with moistened material obtained from the required excavation, and tamped with pneumatic hand tampers. Care was exercised in applying water and in tamping the material in order to place the backfill, as closely as practicable, to the same density as that of the undisturbed medium. Soil tests of field samples, however, indicate that some variation in density and moisture content did occur, and that the properties of the original medium, due to its unique structural characteristics, were altered by the excavation and back-filling operations. A summary of tests on samples taken to determine moisture content and density, as determined by the sand-displacement method, is scheduled in Figure 22.

10. Data. The true and apparent craters caused by the detonations are shown on Plates IV and XII. The true craters were determined by probing with a steel rod, since a previous comparison of the results obtained using a hollow-tube type sampler and a steel probe not only indicated excellent correlation but resulted in a considerable savings in the cost of the field work for this operation.

The motions of the medium movement stakes placed adjacent to the targets prior to the detonation are shown on Plates IV and XII.

The results of visual examination of the targets are shown on Plates V to XI and XIII to XVIII. The locations of cracks and offsets on cracks are plotted to scale and the crack sizes are specified. While the crack locations are shown accurately, in only a few instances were the cracks in the targets as straight as those shown on the drawings. The drawings should be interpreted as showing the location of the probable center-line of a crack between points of major changes of direction. The

CONFIDENTIAL
SECURITY INFORMATION

sizes of the cracks were measured accurately to the limits specified on the drawings. Primary emphasis was given to determining the relative size of the cracks in a crack system or a face rather than in determining crack sizes to a more detailed degree than that specified.

Tension cracks, generally, were open and well defined. Compression cracks were closed, but by comparison with tension cracks had distinctly different characteristics. A faint hair-line crack could be determined only by tracing the course of the crack by means of selective absorption. A compression "zone" consists of a comparatively wide area that had been subjected to stress, the outer fibers of which had been crushed. A shear "zone" consists of a series of parallel cracks of different sizes, usually associated with numerous small spalls.

Offsets on a crack were measured as accurately as possible by means of a straight-edge and scale.

The profiles of target faces were determined by measuring offsets to the target at the designated point from a template with a constant gage distance. In all instances the measurements were made after the detonations and the profiles must be interpreted as reflecting both initial (minor) wall deflections from an ideal plane due to construction, and those due to deformation as a result of the detonation.

Movements of fixed points on the targets, determined by the U. S. Coast and Geodetic Survey, are shown in Figures 7 to 19. The component movements of the points relative to the center-line of the charge are scheduled in Figure 20 for Round S-2 and Figure 21 for Round S-3.

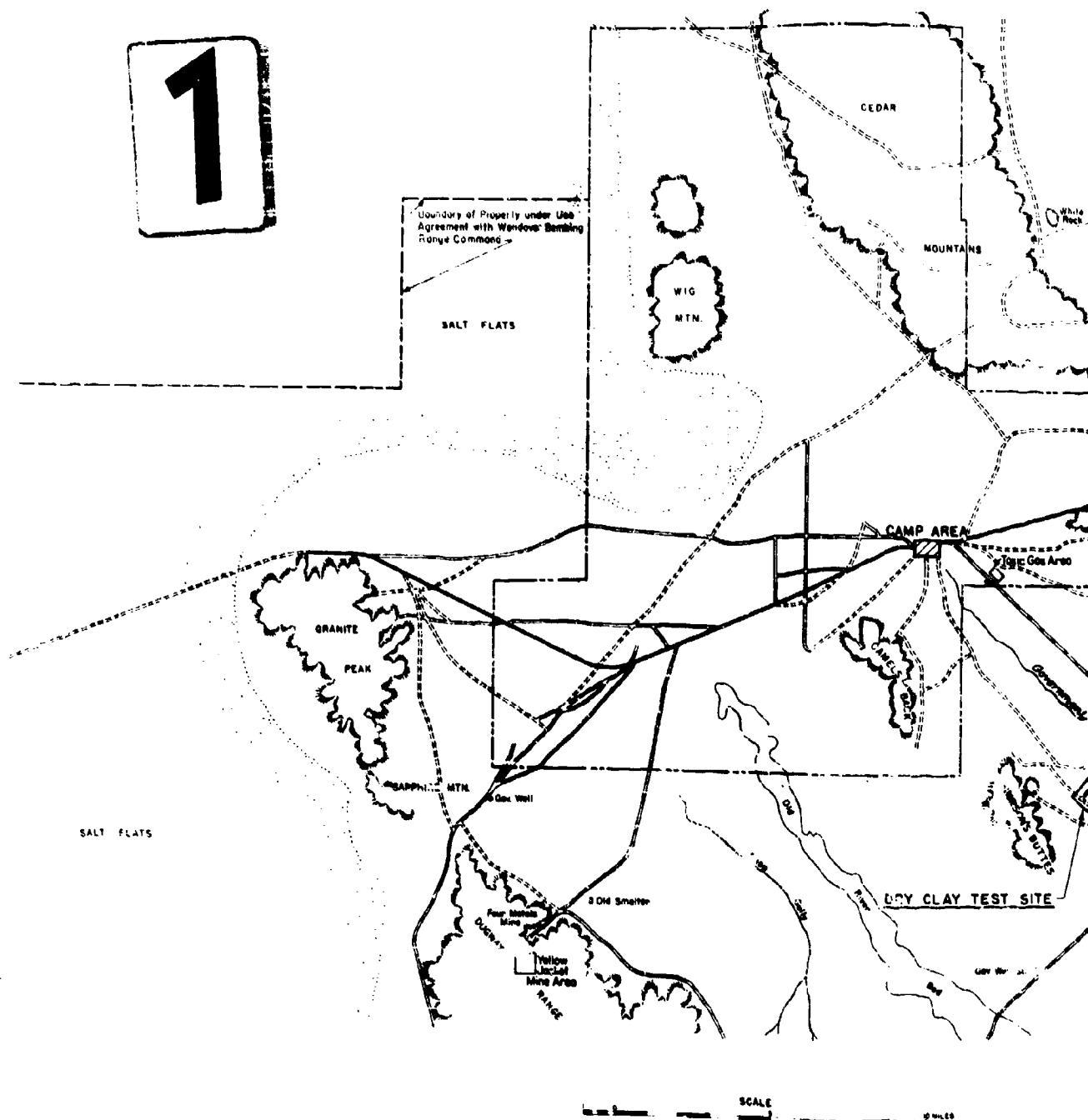
Photographs 3 to 15 show the faces of the targets damaged by the detonations.

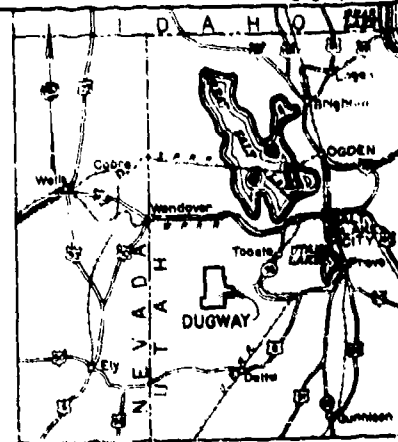
CONFIDENTIAL
SECURITY INFORMATION

REFERENCES

- 1 - Preliminary Soils Exploration
Underground Explosion Test Program
Dugway Proving Grounds, Utah
Sacramento District, Corps of Engineers
April 1948
- 2 - Report of Soil Tests
Underground Explosion Tests, Dry Clay
South Pacific Division Testing Laboratory
Corps of Engineers
17 September 1948
- 3 - Underground Explosion Tests
Volume III - Dry Clay
Appendix A - Geology
Corps of Engineers, U. S. Army
Office, District Engineer, Sacramento, California
May 1949
- 4 - Underground Explosion Tests
Volume III - Dry Clay
Appendix B - Construction
Corps of Engineers, U. S. Army
Office, District Engineer, Sacramento, California
June 1949
- 5 - Report of Soil Tests
Underground Explosion Tests Program
Dry Clay Site
South Pacific Division Laboratory, Sausalito, Calif.
October 1951

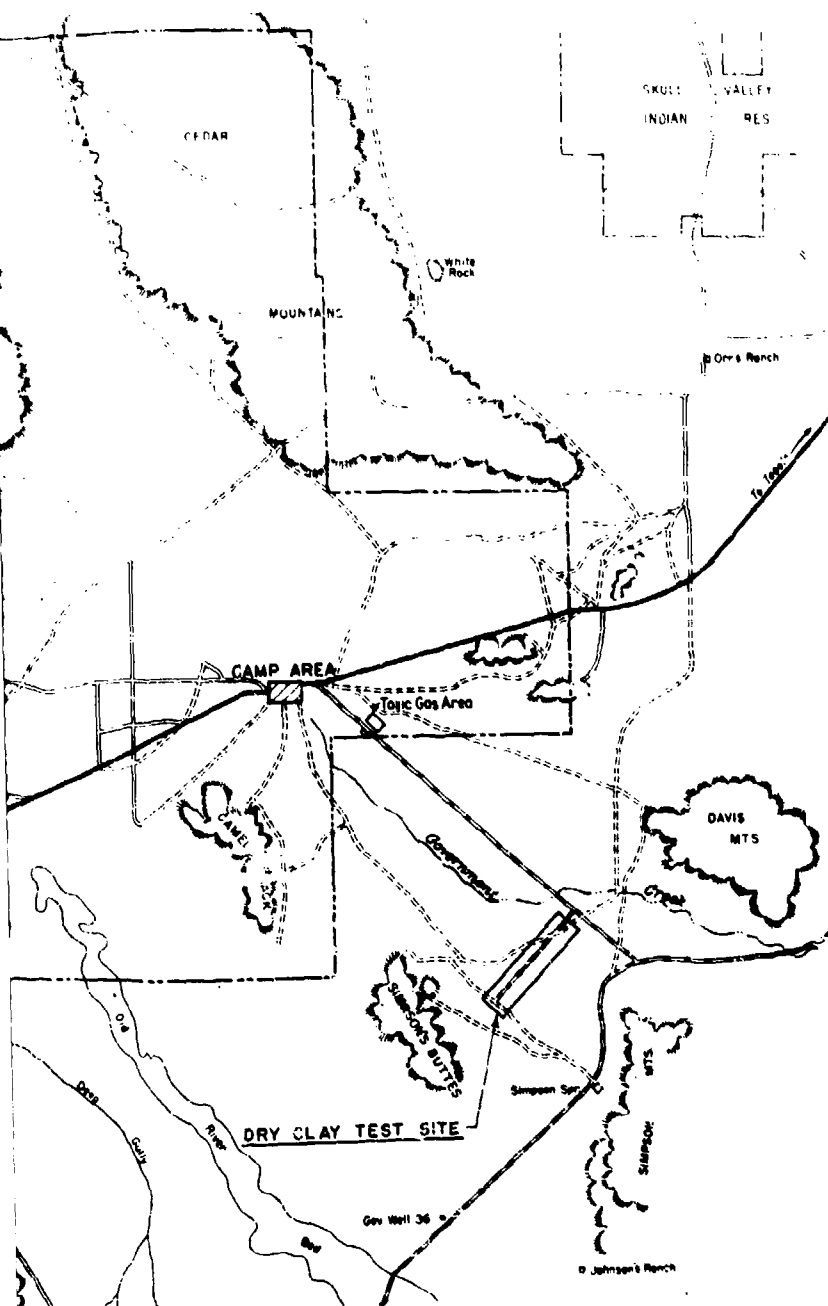
1





CINITY MAP

2



SCALE 0 1 2 MILES

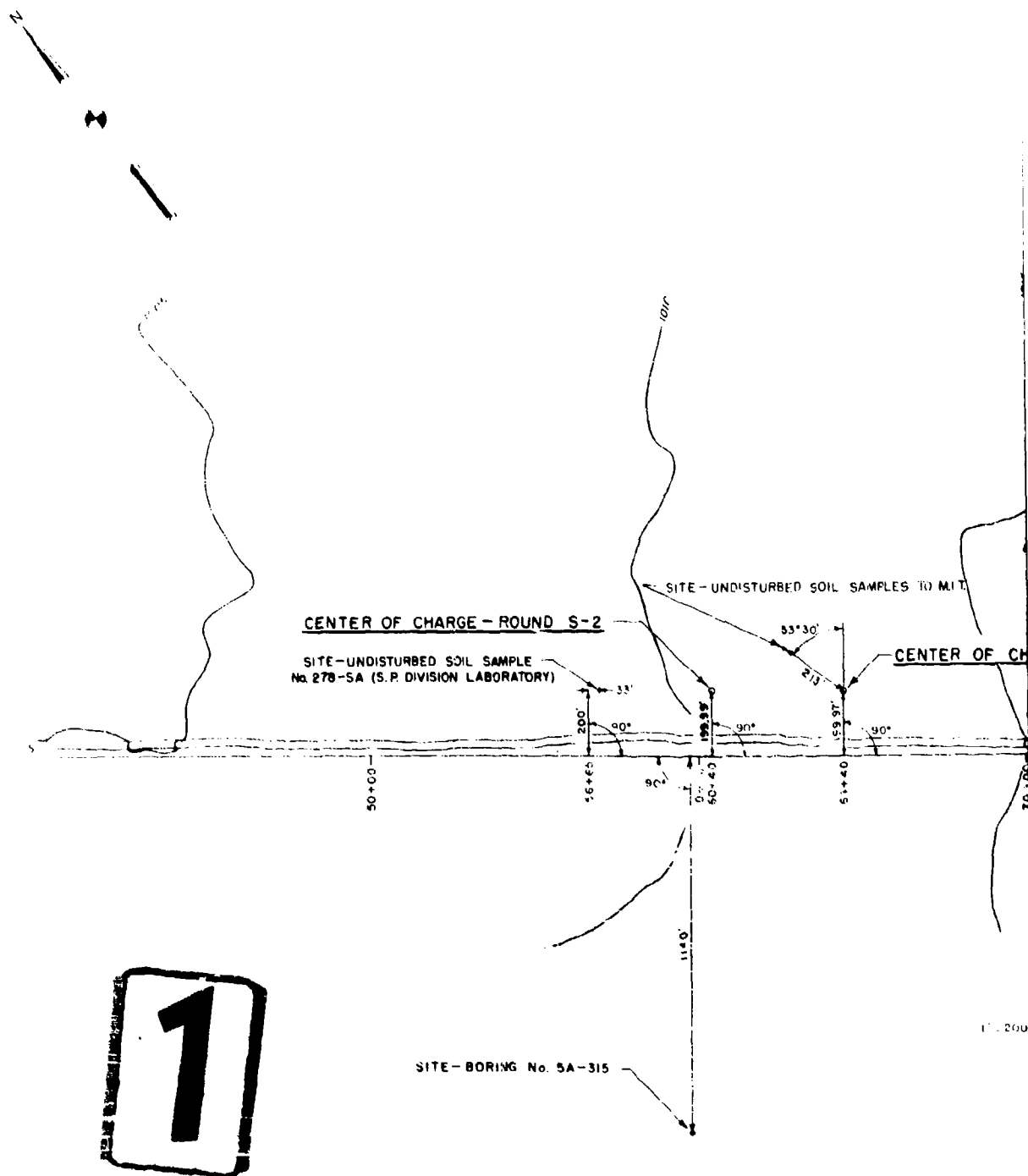
EXPLANATION

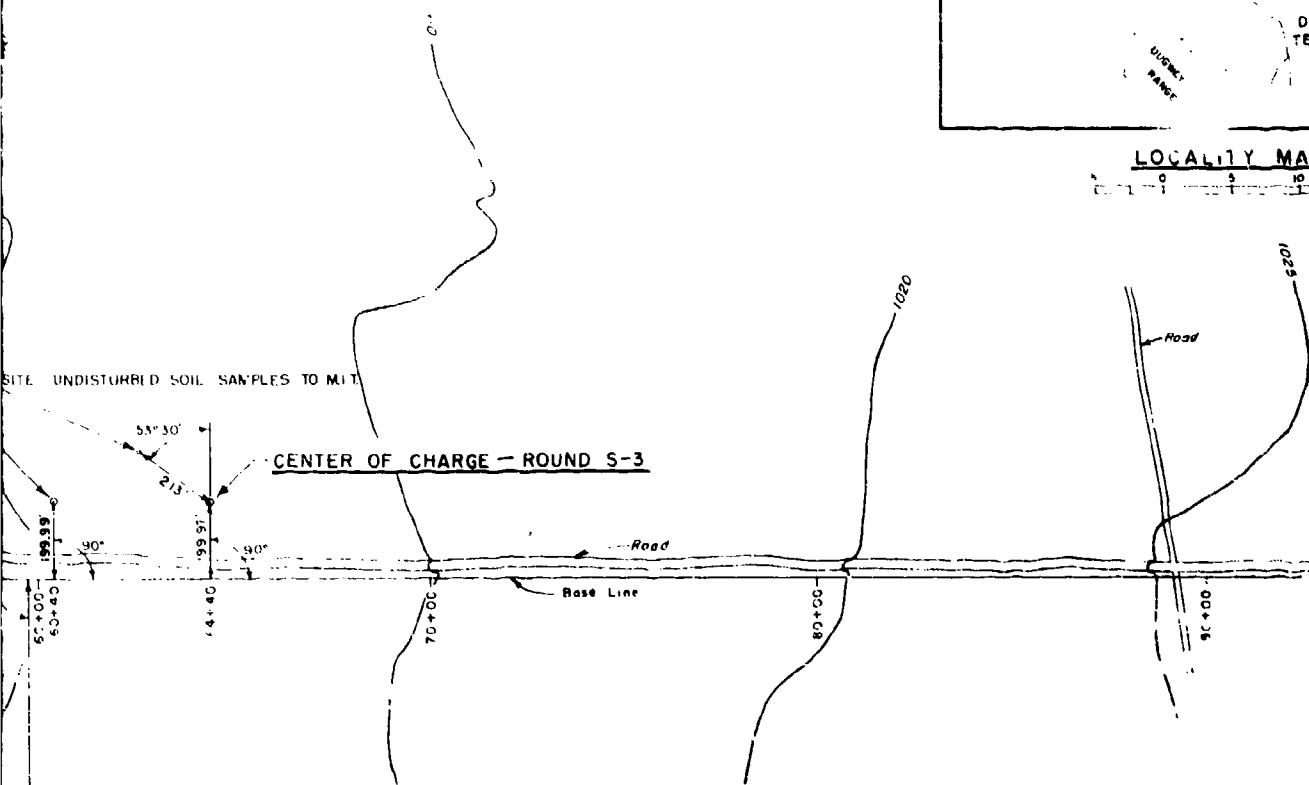
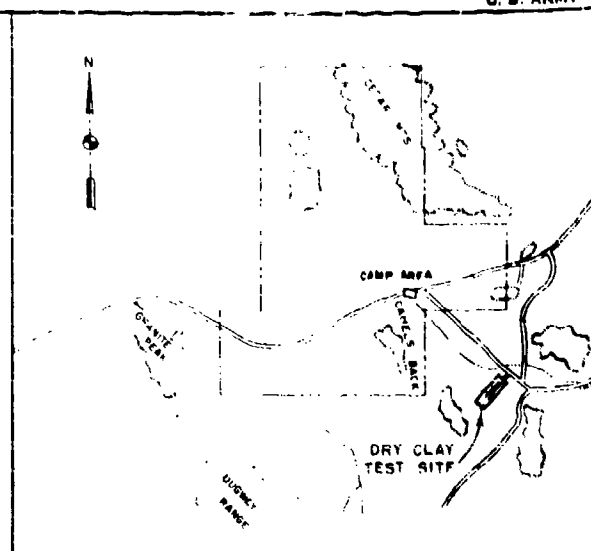
- Dugway Proving Grounds Boundary Line
- Surface Roads
- Gravelled Roads
- Unimproved Road
- Wagon Trails

REVISIONS	DATE	DESCRIPTION	BY	APPROVED
COMPS OF ENGINEERS, U.S. ARMY OFFICE OF THE DISTRICT ENGINEER SOUTHWEST DISTRICT SACRAMENTO, CALIFORNIA				
UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKEW STRUCTURES PROGRAM				
TEST SITE LOCATION				
DESIGNED BY: D.L.		DATE: 24 FEB 1952		
CHECKED BY: [Signature]		SCALE: 1" = 1 MILE		
APPROVED BY: [Signature]		FILE NO: 84-01-162		

CONFIDENTIAL - SECURITY INFORMATION

PLATE 1



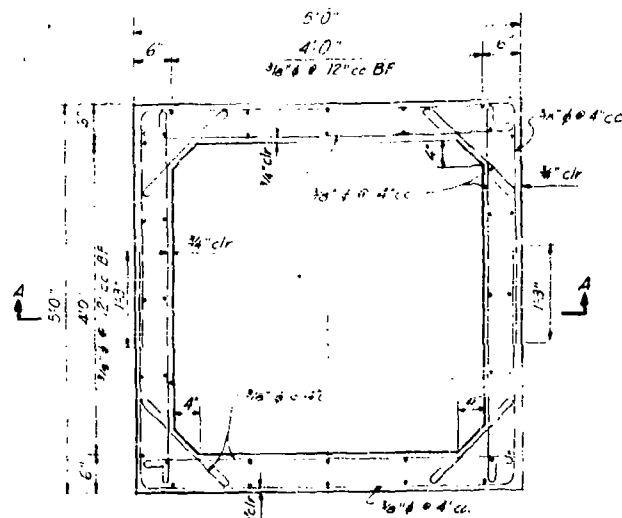


GRAPHIC SCALE

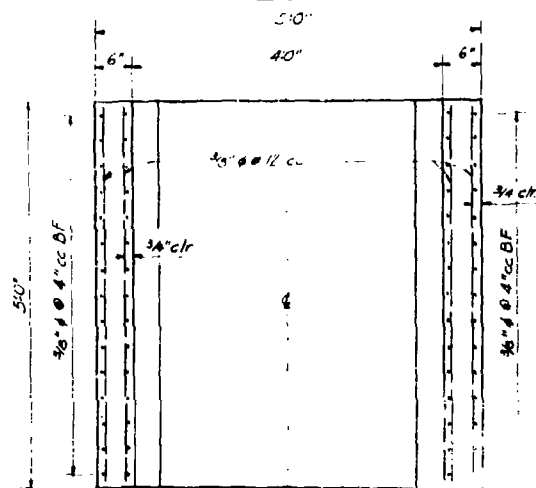
0 100' 200' 400' 600' 800' 1000'

REVISION		DATE	BY	WT
CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DISTRICT ENGINEER SACRAMENTO DISTRICT SACRAMENTO, CALIFORNIA				
DESIGNED		H.E.K.		
DRAWN		A.L.		
CHECKED		H.E.K.		
SUBMITTED BY		J. H. K. R. R. R.		
APPROVED		J. H. K. R. R. R.		
DATE		21 FEB 1952		
PROJECT		AS SHOWN		
SHEET		2		
FILE		34-01-162		

CONFIDENTIAL - SECURITY INFORMATION PLATE II



PLAN



SECTION AA

TARGET TYPE "R"

SCALE: 1"=1'-0"



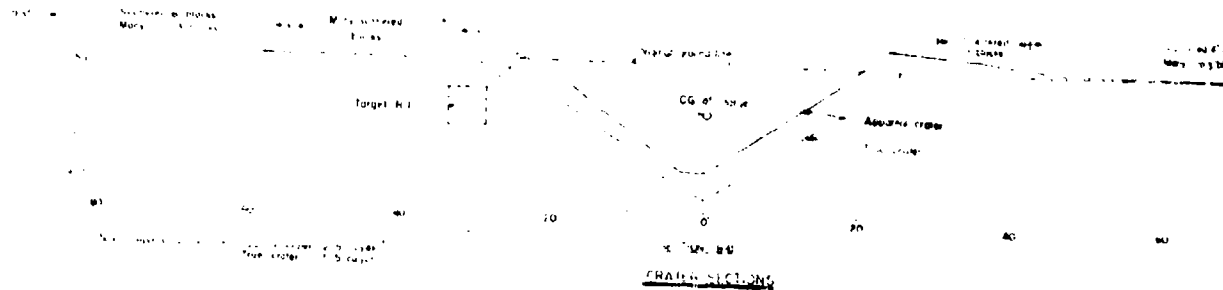
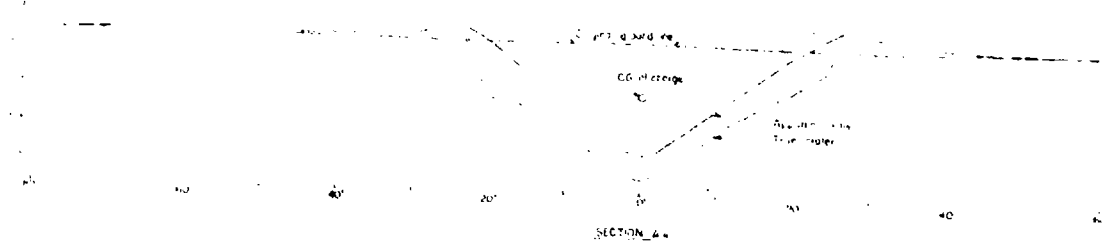
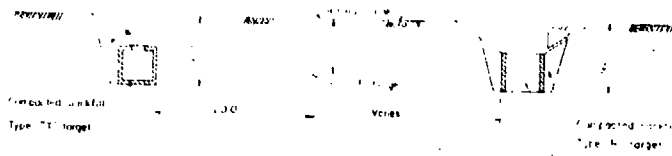
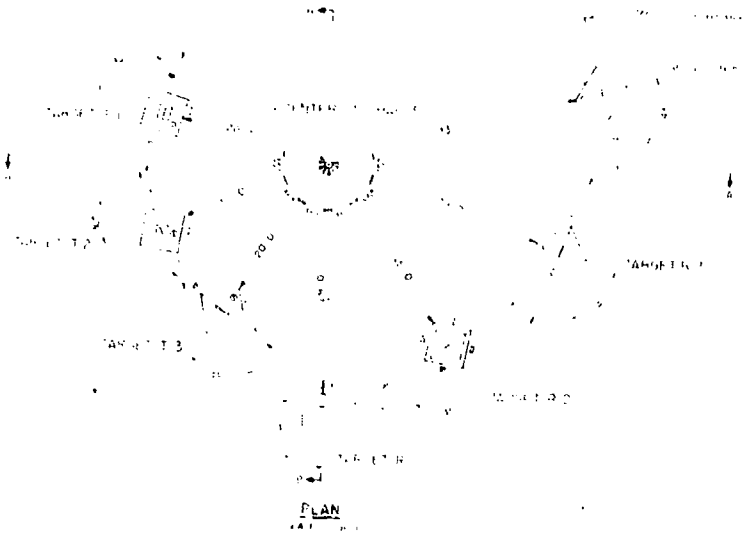
Hand-drawn structural diagram of a rectangular frame. The overall dimensions are 5'-0" (50") in height and 1'-6" (18") in width. The diagram shows a rectangular frame with a central opening. The frame is composed of two main vertical sections and two main horizontal sections. The reinforcement details are as follows:

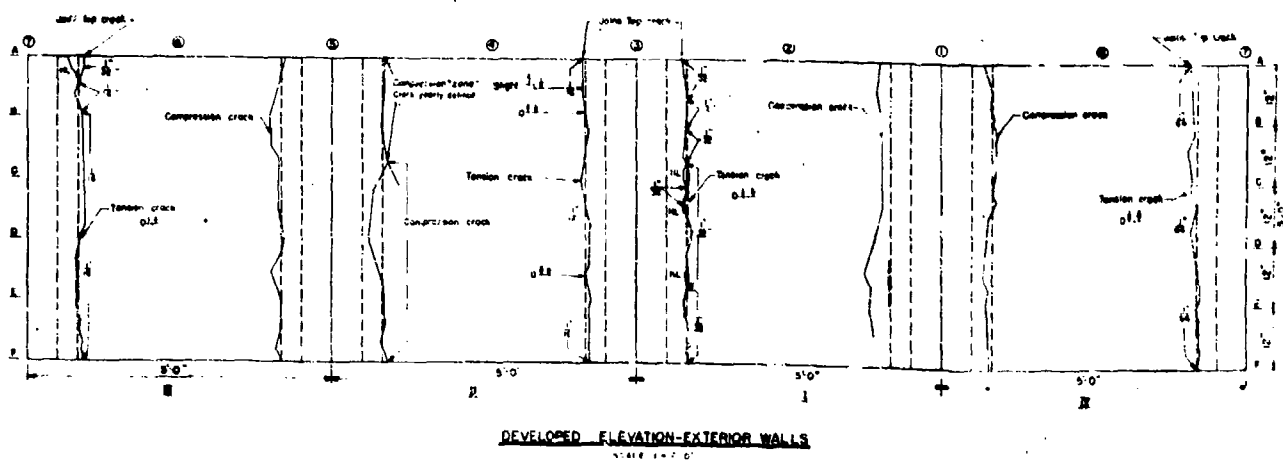
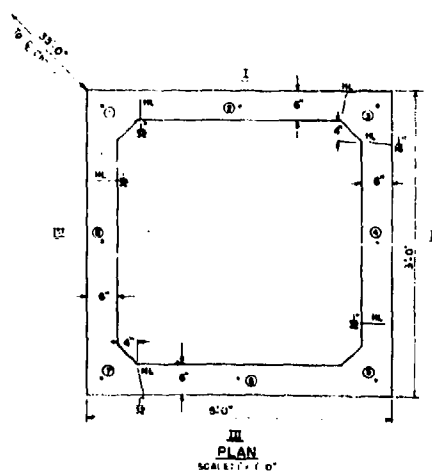
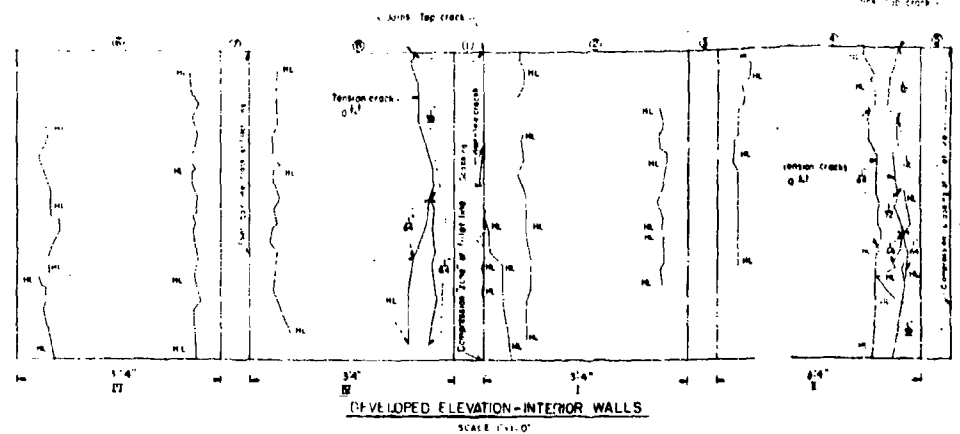
- Top Section:** 3/8" ϕ 5 @ 12" cc (center-to-center) spacing.
- Bottom Section:** 3/8" ϕ 5 @ 12" cc spacing.
- Left Section:** 3/8" ϕ 5 @ 12" cc spacing.
- Right Section:** 3/8" ϕ 5 @ 12" cc spacing.
- Central Opening:** 1'-0" (12") wide and 1'-0" (12") high.
- Reinforcement Details:**
 - Top and bottom horizontal sections: 3/8" ϕ 5 @ 12" cc.
 - Left and right vertical sections: 3/8" ϕ 5 @ 12" cc.
 - Reinforcement is shown as small circles with dots in the center, indicating the placement of bars.

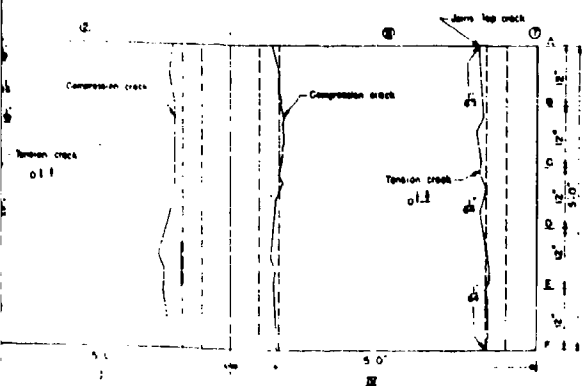
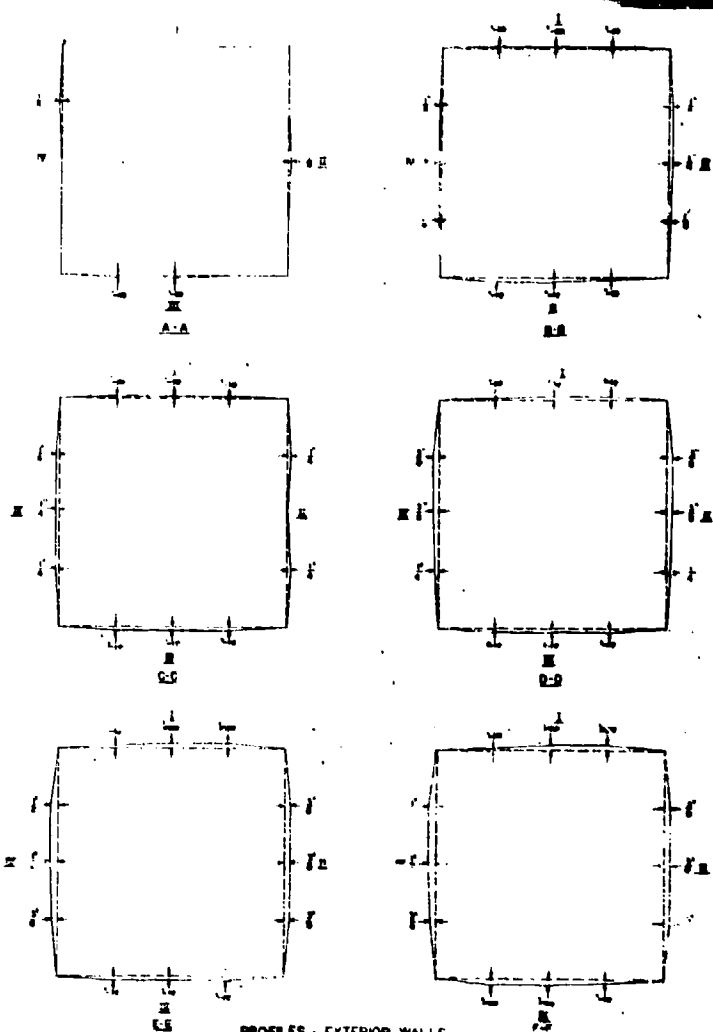
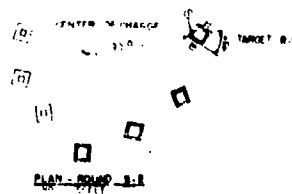


EXPEDIENT		DATE		SERIAL		PAGE	
				NOV 1964		1	
CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DISTRICT ENGINEER SACRAMENTO DISTRICT SACRAMENTO, CALIFORNIA							
PROJECT		UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKELW STRUCTURES PROGRAM					
DESIGN		TARGETS PLANS AND SECTIONS					
DRAWING							
H.E.R.							
REVISION		1. <i>W. B. [Signature]</i> 2. <i>H. E. [Signature]</i>					
APPROVED		1. <i>H. E. [Signature]</i> 2. <i>[Signature]</i>					
DATE		SERIAL		PAGE		FILE NO.	
FEB 1965		1		1		84-01-162	

PLATE 10







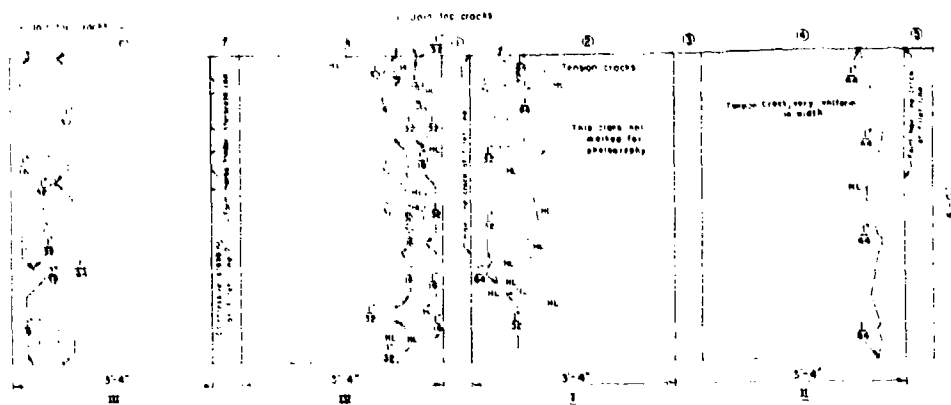
$\Gamma = 1.0^\circ$

 $\Gamma = 1.0^\circ$

 $\Gamma = 0.1^\circ$

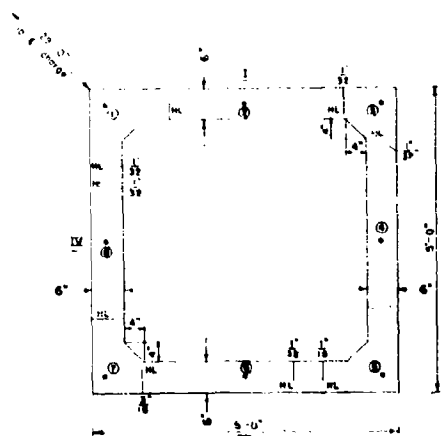
1. Finger faces are designated I, II, III, or off clockwise
2. Rings are numbered clockwise and designated ①
3. Grooves and offsets of grooves are located to scale
4. Hex hole grooves (- 6) are specified "H"
5. Clock holes 120° uniformly between the diameters specified when
any Holes are not indicated
6. Groove offset symbols are shown in section

1. REPORT NO. 2. PROJECT NO. 3. DATE 4. BY 5. FOR 6. REMARKS 7. REVISIONS 8. APPROVED 9. DATE 10. BY 11. FOR 12. REMARKS 13. REVISIONS 14. APPROVED 15. DATE 16. BY 17. FOR 18. REMARKS 19. REVISIONS 20. APPROVED 21. DATE 22. BY 23. FOR 24. REMARKS 25. REVISIONS 26. APPROVED 27. DATE 28. BY 29. FOR 30. REMARKS 31. REVISIONS 32. APPROVED 33. DATE 34. BY 35. FOR 36. REMARKS 37. REVISIONS 38. APPROVED 39. DATE 40. BY 41. FOR 42. REMARKS 43. REVISIONS 44. APPROVED 45. DATE 46. BY 47. FOR 48. REMARKS 49. REVISIONS 50. APPROVED 51. DATE 52. BY 53. FOR 54. REMARKS 55. REVISIONS 56. APPROVED 57. DATE 58. BY 59. FOR 60. REMARKS 61. REVISIONS 62. APPROVED 63. DATE 64. BY 65. FOR 66. REMARKS 67. REVISIONS 68. APPROVED 69. DATE 70. BY 71. FOR 72. REMARKS 73. REVISIONS 74. APPROVED 75. DATE 76. BY 77. FOR 78. REMARKS 79. REVISIONS 80. APPROVED 81. DATE 82. BY 83. FOR 84. REMARKS 85. REVISIONS 86. APPROVED 87. DATE 88. BY 89. FOR 90. REMARKS 91. REVISIONS 92. APPROVED 93. DATE 94. BY 95. FOR 96. REMARKS 97. REVISIONS 98. APPROVED 99. DATE 100. BY 101. FOR 102. REMARKS 103. REVISIONS 104. APPROVED 105. DATE 106. BY 107. FOR 108. REMARKS 109. REVISIONS 110. APPROVED 111. DATE 112. BY 113. FOR 114. REMARKS 115. REVISIONS 116. APPROVED 117. DATE 118. BY 119. FOR 120. REMARKS 121. REVISIONS 122. APPROVED 123. DATE 124. BY 125. FOR 126. REMARKS 127. REVISIONS 128. APPROVED 129. DATE 130. BY 131. FOR 132. REMARKS 133. REVISIONS 134. APPROVED 135. DATE 136. BY 137. FOR 138. REMARKS 139. REVISIONS 140. APPROVED 141. DATE 142. BY 143. FOR 144. REMARKS 145. REVISIONS 146. APPROVED 147. DATE 148. BY 149. FOR 150. REMARKS 151. REVISIONS 152. APPROVED 153. DATE 154. BY 155. FOR 156. REMARKS 157. REVISIONS 158. APPROVED 159. DATE 160. BY 161. FOR 162. REMARKS 163. REVISIONS 164. APPROVED 165. DATE 166. BY 167. FOR 168. REMARKS 169. REVISIONS 170. APPROVED 171. DATE 172. BY 173. FOR 174. REMARKS 175. REVISIONS 176. APPROVED 177. DATE 178. BY 179. FOR 180. REMARKS 181. REVISIONS 182. APPROVED 183. DATE 184. BY 185. FOR 186. REMARKS 187. REVISIONS 188. APPROVED 189. DATE 190. BY 191. FOR 192. REMARKS 193. REVISIONS 194. APPROVED 195. DATE 196. BY 197. FOR 198. REMARKS 199. REVISIONS 200. APPROVED 201. DATE 202. BY 203. FOR 204. REMARKS 205. REVISIONS 206. APPROVED 207. DATE 208. BY 209. FOR 210. REMARKS 211. REVISIONS 212. APPROVED 213. DATE 214. BY 215. FOR 216. REMARKS 217. REVISIONS 218. APPROVED 219. DATE 220. BY 221. FOR 222. REMARKS 223. REVISIONS 224. APPROVED 225. DATE 226. BY 227. FOR 228. REMARKS 229. REVISIONS 230. APPROVED 231. DATE 232. BY 233. FOR 234. REMARKS 235. REVISIONS 236. APPROVED 237. DATE 238. BY 239. FOR 240. REMARKS 241. REVISIONS 242. APPROVED 243. DATE 244. BY 245. FOR 246. REMARKS 247. 	
---	--

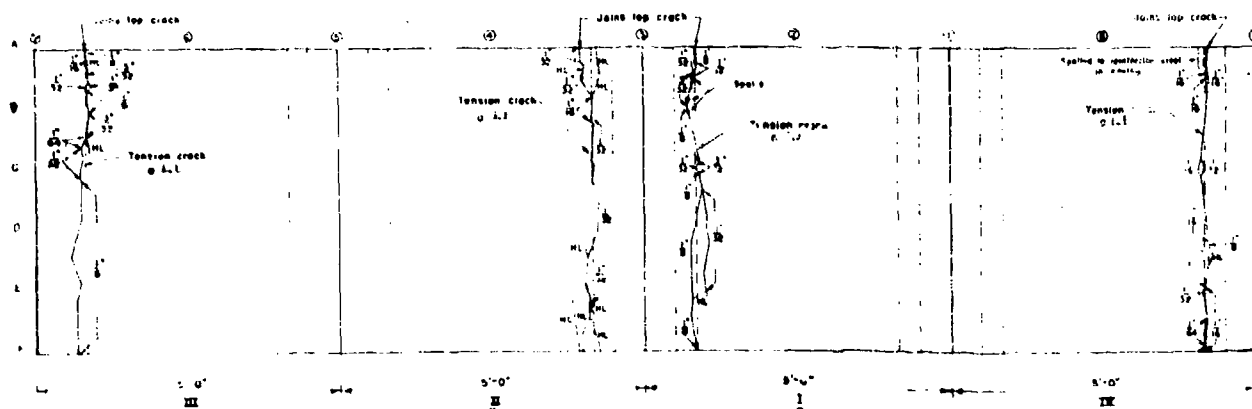


DEVELOPED ELEVATION - INTERIOR WALLS
SCALE: 1" = 1'-0"

1



PLAN
SCALE: 1" = 1'-0"

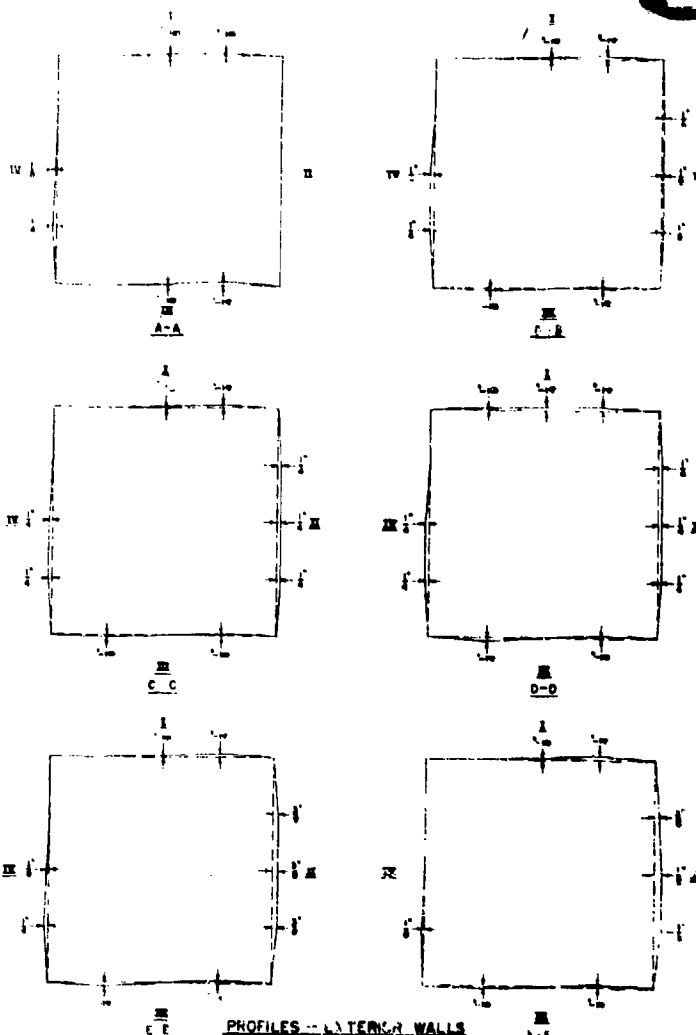


DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE: 1" = 1'-0"

2

CENTER OF
CHARGE

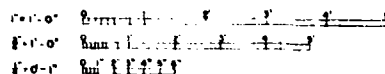
TARGET R-3

PLAN - ROUND S-2
NO SCALE

PROFILES - LATERAL WALLS

SCALE: PLAN 1/4"=1'-0"
DEFORMATION 1/8"=1'-0"

GRAPHIC SCALES



GENERAL NOTES

1. Light holes are designated I, II, III, or IV depending on location.
2. Results are numbered according to designations I, II, III, or IV.
3. Cracks and offsets of cracks are located by scale.
4. Non-linear cracks (A) are specified "NL".
5. Crack sizes were uniform between the dimensions specified when size limits are not indicated.
6. Crack offset symbols are shown in section.
7. No specific compression cracks or voids were observed.

U. S. ARMY CORPS OF ENGINEERS OFFICE OF THE CHIEF OF ENGINEERS WASHINGTON, D. C.	
UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKEW STRUCTURES PROGRAM ROUND S-2 TARGET R-3 CRACK PATTERNS & WALL DEFORMATION	
DESIGNED BY H. H. H.	CHECKED BY H. H. H.
DRAWN BY H. H. H.	APPROVED BY H. H. H.
DATE 21 JUL 1962	
P4-01-162	

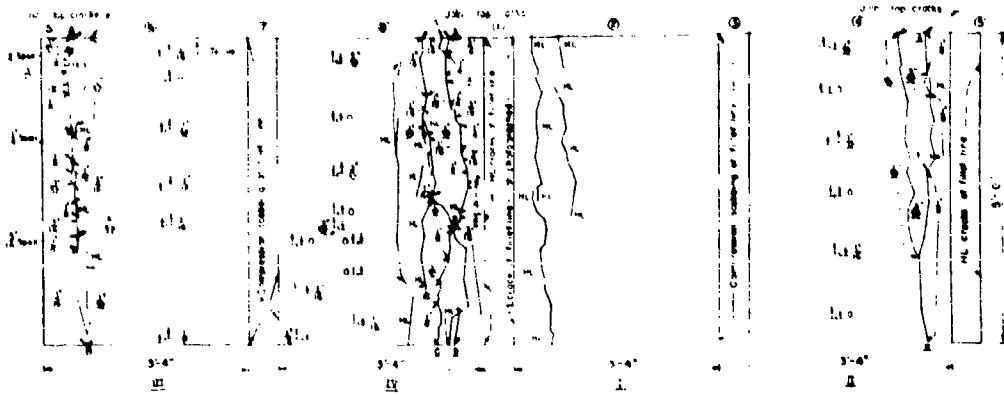
CONFIDENTIAL - SECURITY INFORMATION

PLATE 2

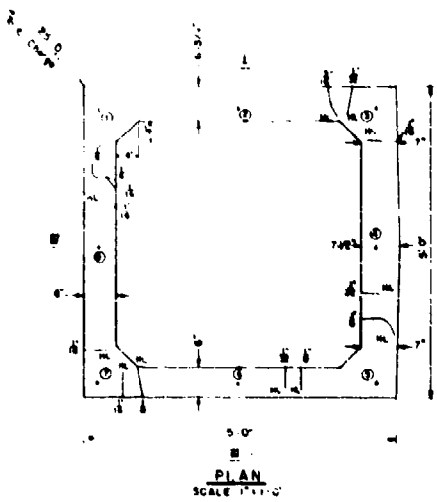
Note: Tension cracks
Open in direction A-B

Note: Tension cracks
Open in direction A-B-C-D

Note: Tension cracks
Open in direction A-B

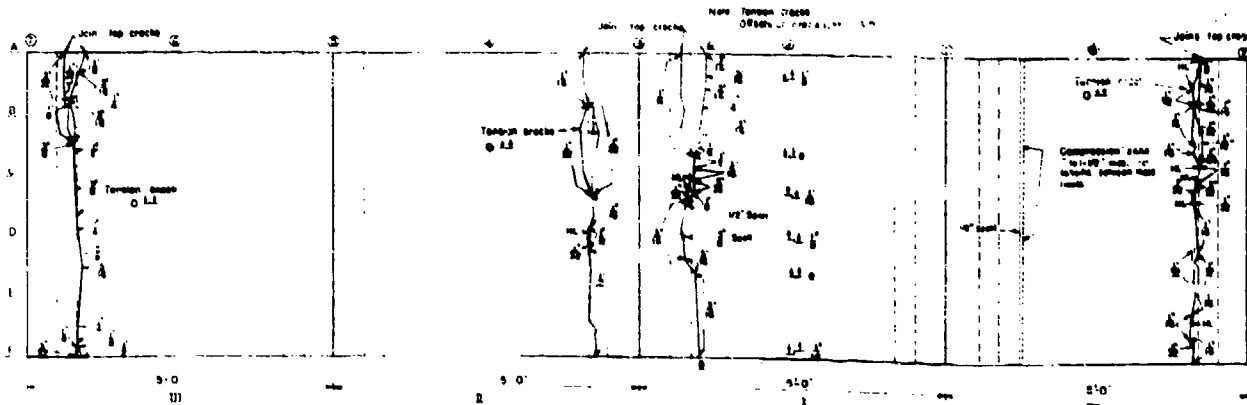


DEVELOPED ELEVATION - INTERIOR WALLS
SCALE 1"=1'-0"



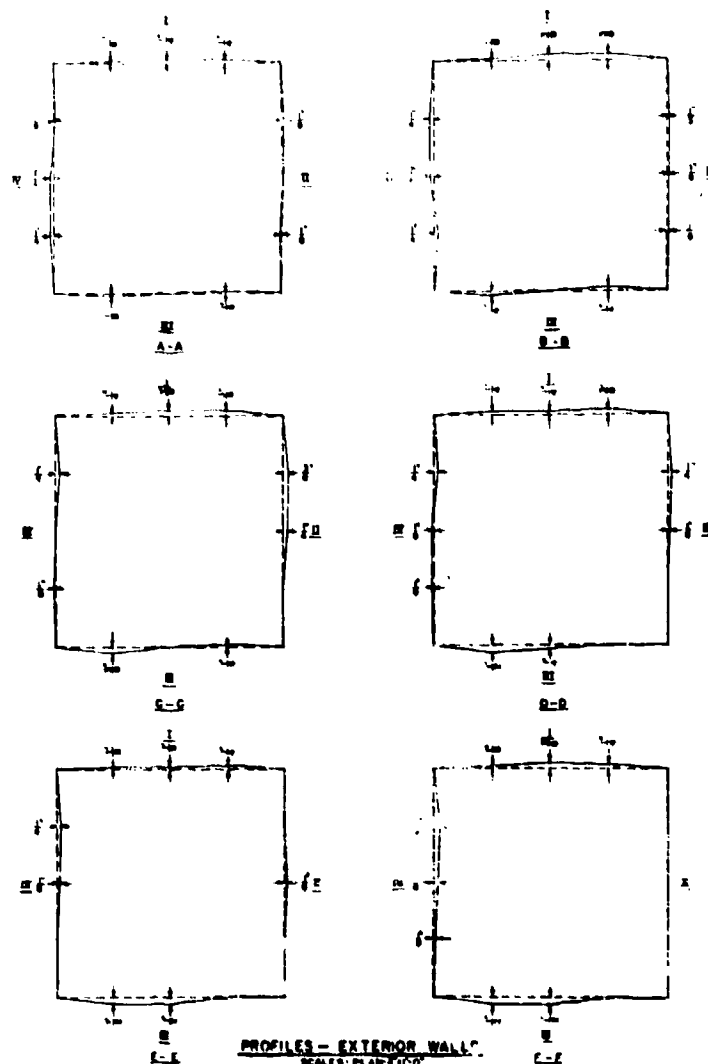
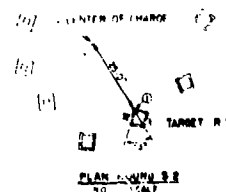
Note: Wall I varies uniformly
to grade the bottom.
Wall II varies uniformly
to grade the top.

PLAN
SCALE 1"=1'-0"



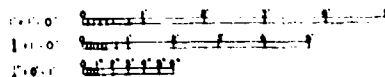
DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE 1"=1'-0"

Scale: 1" = 10' 0"



PROFILES - EXTERIOR WALL
SCALE: PLATE 10
DEFORMATION 1/10"

CRACK SCALES



GENERAL NOTES

1. Target faces are designated I, II, III, or IV depending on the direction of the explosion.
2. Levels and numbers of cracks are designated (1).
3. Cracks and offsets of cracks are located to scale.
4. Non-linear cracks (N-L) are specified "N-L".
5. Crack lines vary uniformly between the dimensions specified when the lines are not indicated.
6. Crack offset symbols are shown in the top right corner.

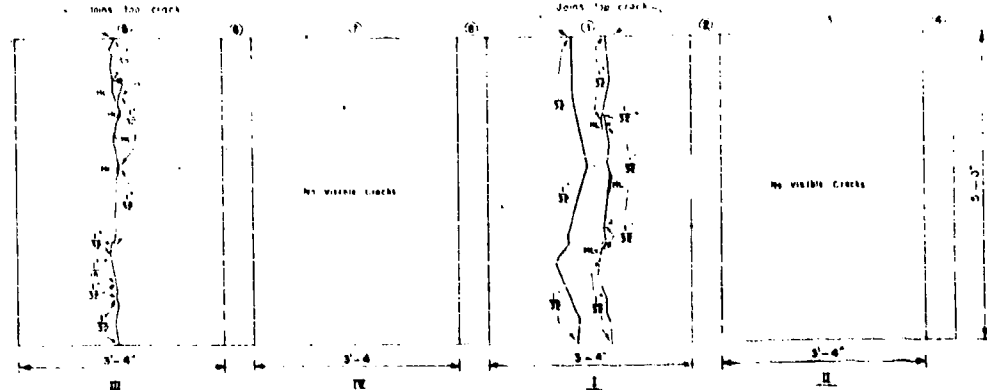
U. S. ARMY CORPS OF ENGINEERS HEADQUARTERS FORT MONMOUTH, NEW JERSEY	
UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKW STRUCTURES PROGRAM	
ROUND S-2 TARGET R-2	
CRACK PATTERNS & WALL DEFORMATION	
DATE: 11/1/62	BY: [Signature]
SCALE: 1/10"	PLATE 10
NO. 11/1/62	PLATE 10

CONFIDENTIAL SECURITY INFORMATION

PLATE 10

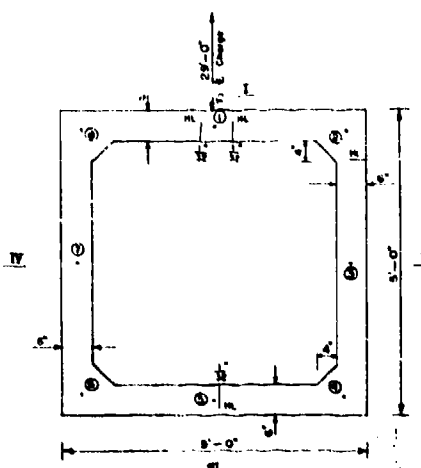
Note: Tension Cracks 1/8"

Note: Tension Cracks 1/8"



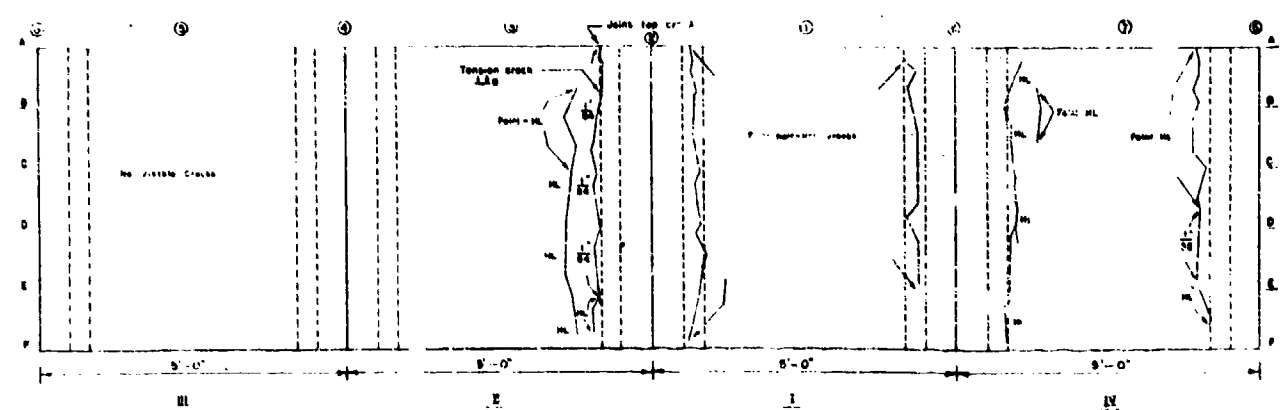
DEVELOPED ELEVATION - INTERIOR WALLS

SCALE: 1" = 1'-0"



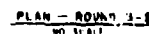
PLAN

SCALE: 1" = 1'-0"

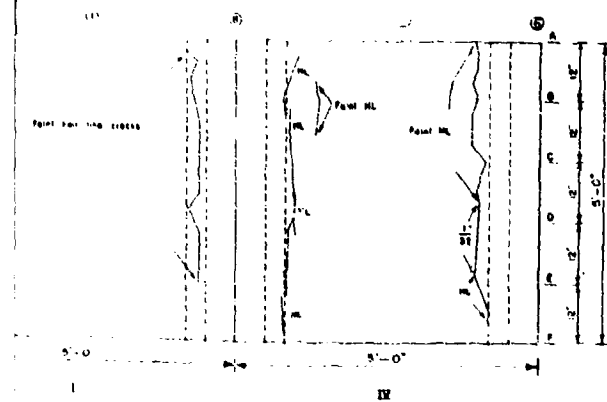
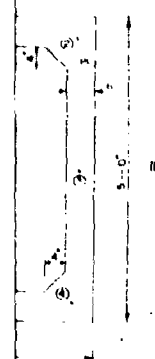


DEVELOPED ELEVATION - EXTERIOR WALLS

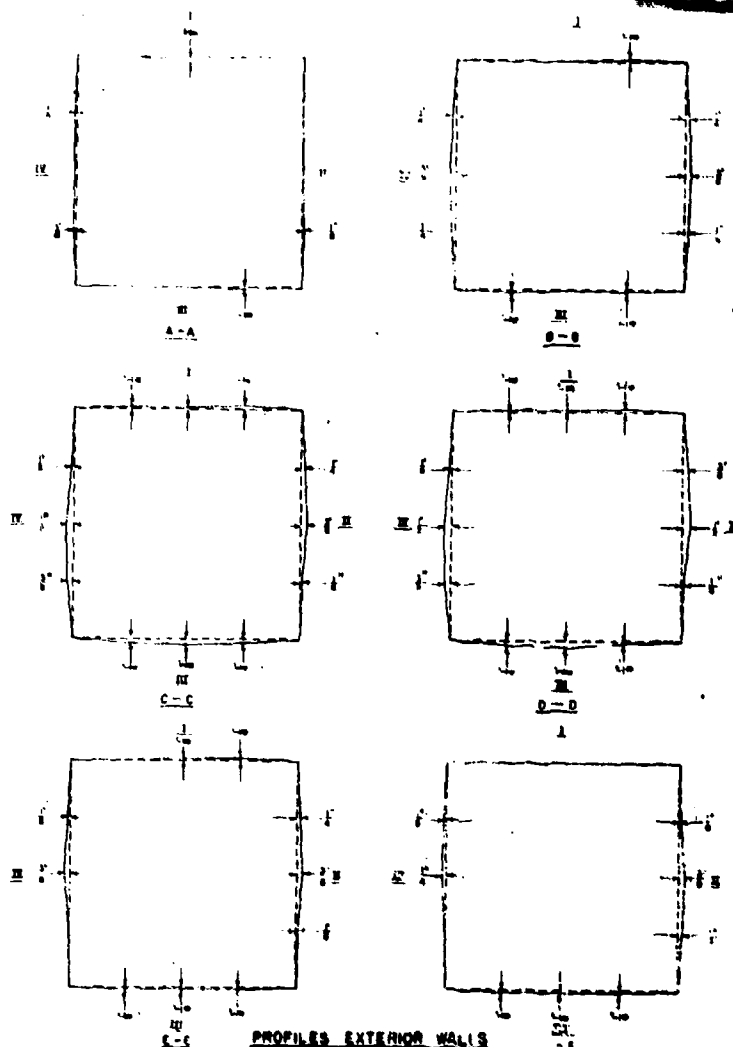
SCALE: 1" = 1'-0"



PRIOR WALLS



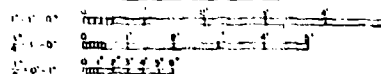
INTERIOR WALLS



PROFILES EXTERIOR WALLS

SCALE: - PLAN 1/8" = 1' - (1/8")
ELEVATION 1/4" = 1' - (1/4")

GRAPHING SCALES



GENERAL NOTES

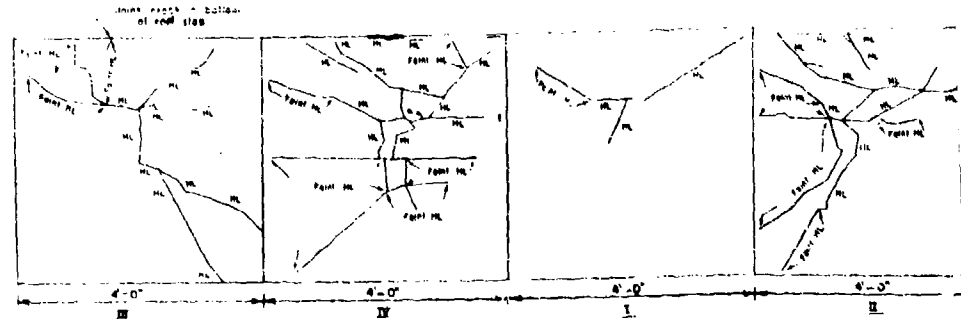
- 1- Target faces are designated I, II, III, or IIII clockwise
- 2- Arrows are numbered clockwise and designated (1)
- 3- Clocks and offsets of clocks are labeled by degree.
- 4- How-long clocks: (1) are latitude "ML"
- 5- Clocks with very uncertainty between the diameters specified when both limits do not indicated.
- 6- Clock offset symbols are shown in section
- 7- How-long diameters (clock or diam) was indicated

[illegible]

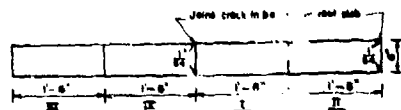
CONFIDENTIAL - SECURITY INFORMATION

PLATE VI

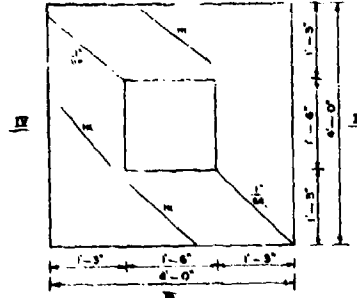
1



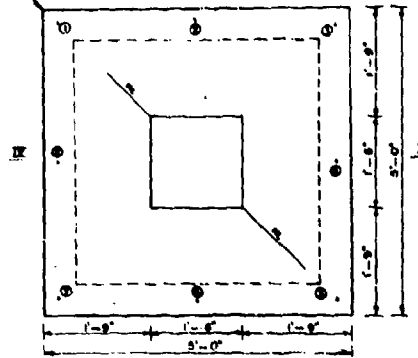
DEVELOPED ELEVATION - TOP WALLS
SCALE: 1" = 1'-0"



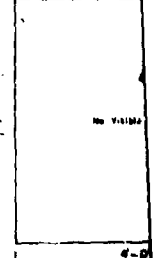
DEVELOPED ELEVATION - PORT
SCALE: 1" = 1'-0"



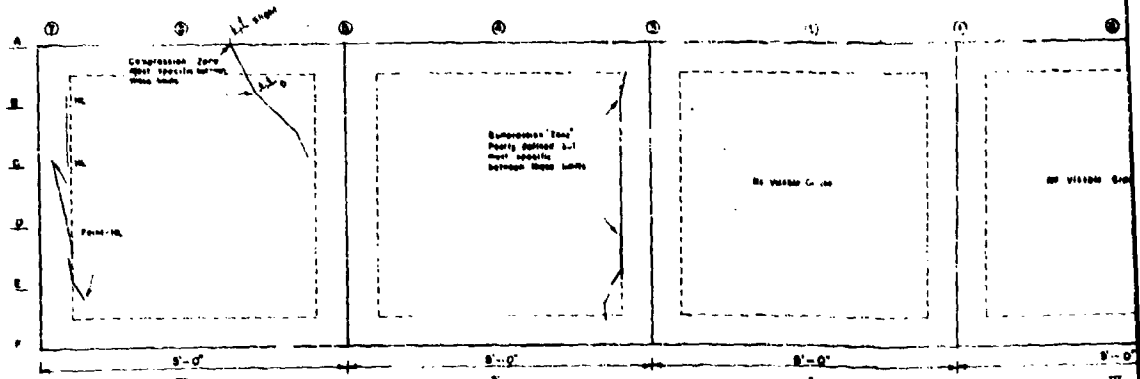
PLAN - ROOF SLAB - BOTTOM - (MIRROR VIEW)
SCALE: 1" = 1'-0"



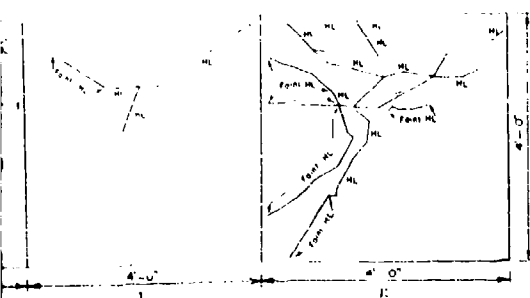
PLAN
SCALE: 1" = 1'-0"



PLAN - BASE SLAB
SCALE: 1" = 1'-0"

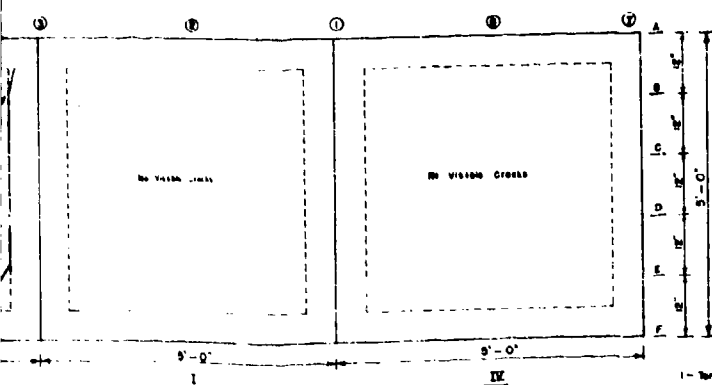
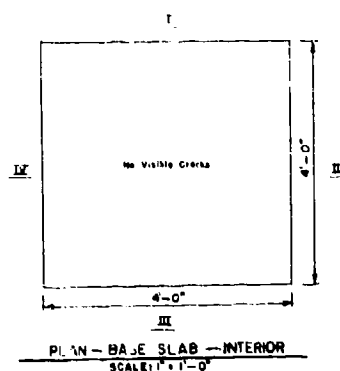
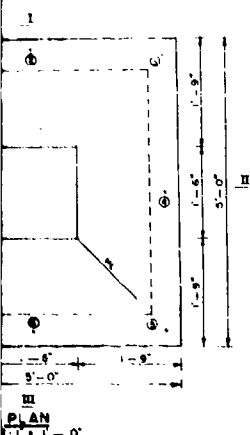


DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE: 1" = 1'-0"

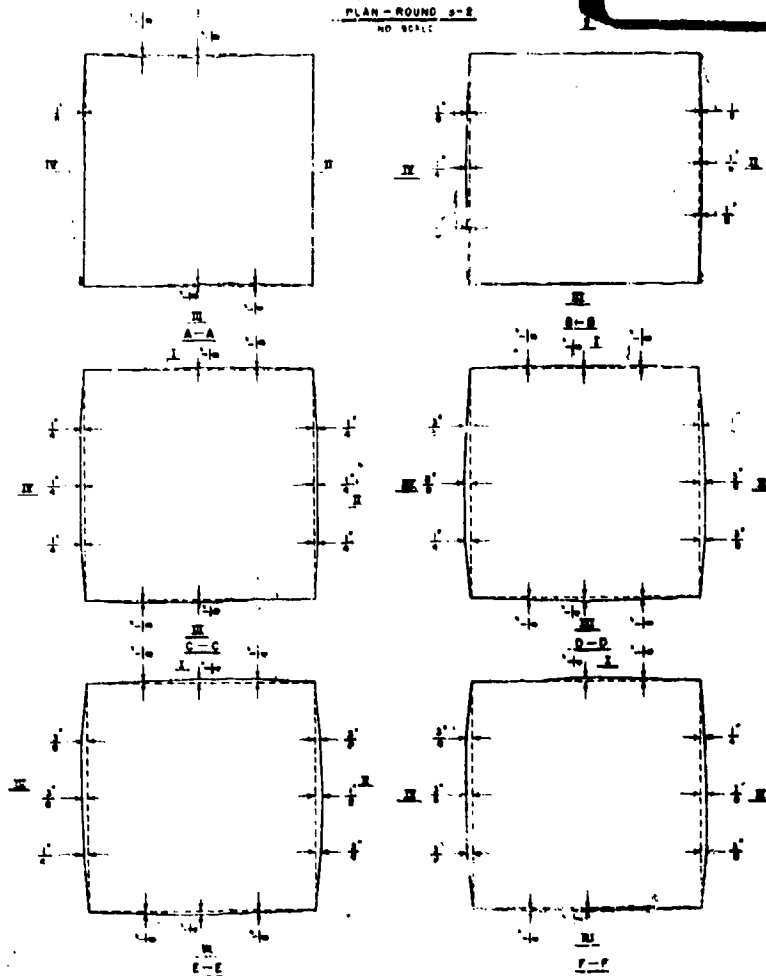
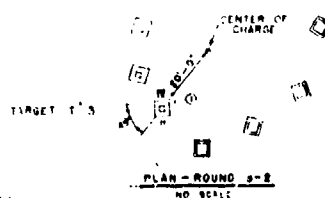


ELEVATION - PORT
SCALE: 1" = 1'-0"

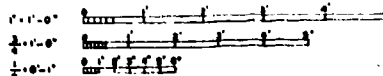
ELEVATION - PORT
SCALE: 1" = 1'-0"



ELEVATION - EXTERIOR WALLS
SCALE: 1" = 1'-0"



GRAPHIC SCALES



GENERAL NOTES

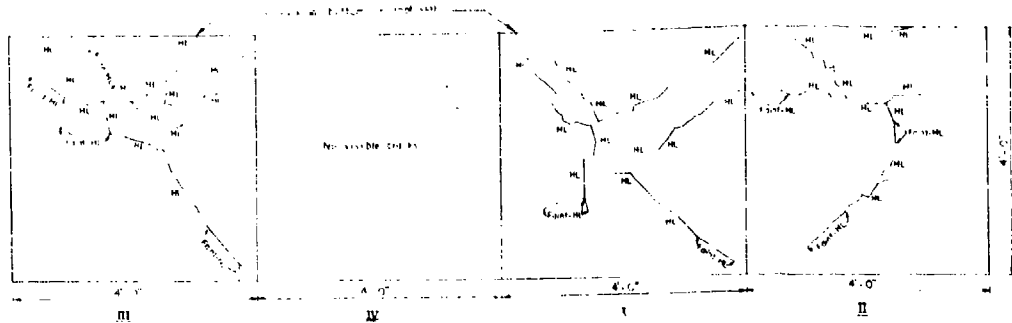
- 1- Target locations are designated I, II, III, or IV as indicated.
- 2- Rivets are numbered consecutively and designated O.
- 3- Cracks and offsets at cracks are located by scale.
- 4- Crack size (width) is indicated by "X".
- 5- Crack sizes vary uniformly between the dimensions indicated and size limits are not indicated.
- 6- Crack offset symbols are shown in section.

U. S. ARMY ENGINEERING CENTER Ft. Belvoir, Chicago, Ill.	
UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY BREW STRUCTURES PROGRAM	
ROUND S-2 TARGET #3	
CRACK PATTERNS & WALL DEFORMATION	
DESIGNED BY H.E.R.	CHECKED BY H.E.R.
APPROVED BY H.E.R.	DATE 11 FEB 1952
84-01-162	

CONFIDENTIAL - SECURITY INFORMATION

PLATE IX

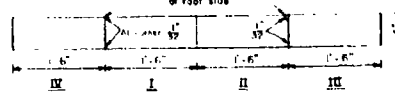
1



DEVELOPED ELEVATION - INTERIOR WALLS

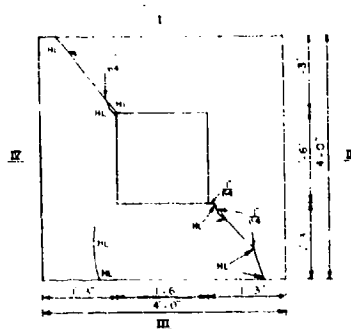
SCALE: 1/4" = 1'-0"

Joint crack 1/4" high



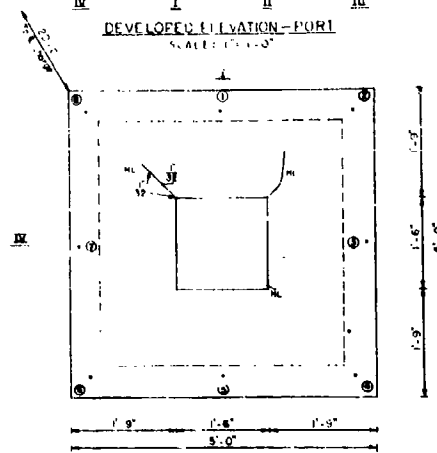
DEVELOPED ELEVATION - PORT

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



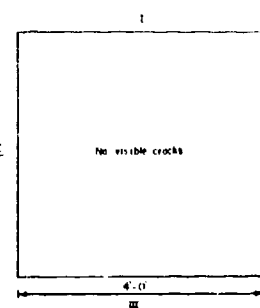
PLAN - ROOF SLAB - BOTTOM (MIRROR VIEW)

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



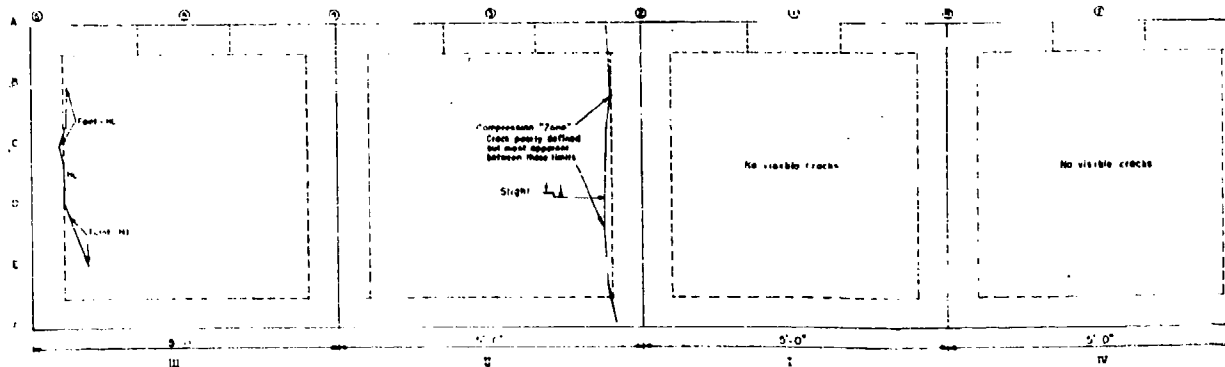
PLAN

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



PLAN - BASE SLAB - INTERIOR

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



DEVELOPED ELEVATION - EXTERIOR WALLS

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



ON THE RECORD was 1

b6
b7C
b7D

[illegible]

Figure 1 consists of two schematic diagrams, (a) and (b), illustrating the experimental setup. Diagram (a) shows a vertical tube with a piston at the bottom, a gas column of height h , and a pressure sensor at the top. Diagram (b) shows a similar setup with a gas column of height h and a pressure sensor at the top, with a piston at the bottom.

AN
1-2

1

Technical drawing of a rectangular area divided into two sections, labeled (A) and (B). The drawing includes dimensions and labels for each section.

Section (A) (Left):

- Label: (A)
- Text: No visible cracks
- Width: 12' 0"

Section (B) (Right):

- Label: (B)
- Text: No visible cracks
- Width: 5' 0"

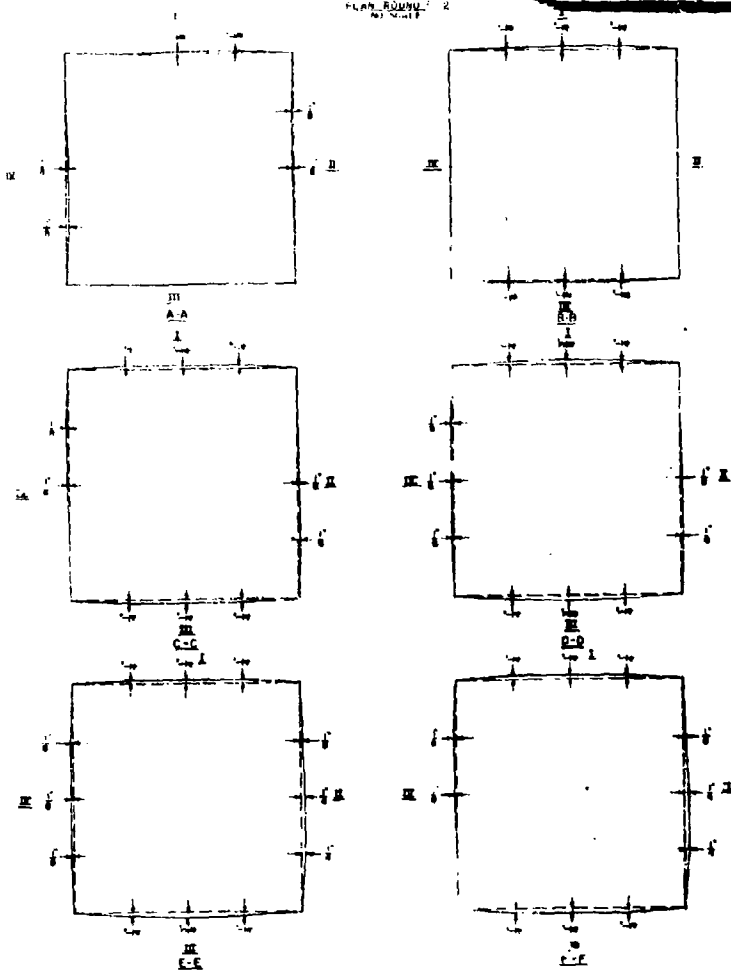
Overall dimensions:

- Total width: 17' 0"
- Height: 12' 0"

The drawing shows a rectangular area with dashed lines indicating internal divisions. A vertical line separates the two sections. A scale bar at the bottom indicates 12' 0" and 5' 0".

EXTERIOR WALLS

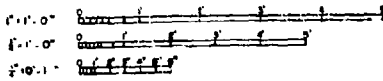
FLAN RUMU 2
No. 1018



PROFILES - EXTERIOR WALLS
SCALES - PLAN - 1" = 1'-0"

SCALES - PLAN - $\frac{1}{8} = 1'-0"$
DEFORMATION - $\frac{1}{8} = 0'-1"$

GRAPHIC SCALES

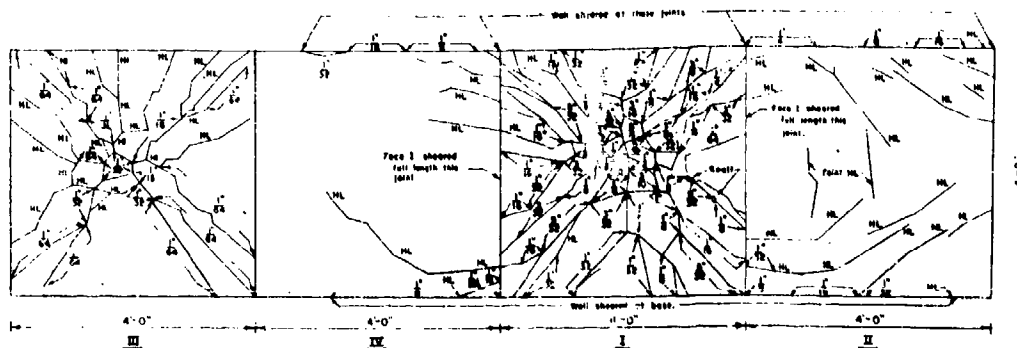


GENERAL NOTES

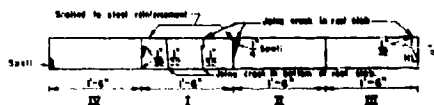
1. Target lines are designated I, II, III, or SR clockwise.
2. Cracks are numbered clockwise and designated (1).
3. Cracks and fissures of cracks are located to scale.
4. Hair line cracks (1-1/8") are specified "SL".
5. Crack sizes vary uniformly between the dimensions specified when size limits are not indicated.
6. Crack length symbols are shown in section.

OFFICE OF THE DIRECTOR		DATE	
SUBJECT		FILE NO.	
OFFICE OF THE DIRECTOR, U. S. ARMY WASHINGTON, D. C. 20315 (100-442600)			
REPORT NO. H. R.		UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKEW STRUCTURES PROGRAM ROUND 5-2 TARGET 7-2 CRACK PATTERNS & WALL DEFORMATION	
NAME H. R.		NAME H. R.	
ADDRESS H. R.		ADDRESS H. R.	
CITY H. R.		CITY H. R.	
STATE H. R.		STATE H. R.	
ZIP H. R.		ZIP H. R.	
PHONE H. R.		PHONE H. R.	
FAX H. R.		FAX H. R.	
E-MAIL H. R.		E-MAIL H. R.	
TELETYPE H. R.		TELETYPE H. R.	
TELEFAX H. R.		TELEFAX H. R.	
TELEVISION H. R.		TELEVISION H. R.	
RADIO H. R.		RADIO H. R.	
OTHER H. R.		OTHER H. R.	
DATE 2 FEB 1992		DATE 84 01 16Z	

Note: All crack sizes not specified are 1/8" or less.

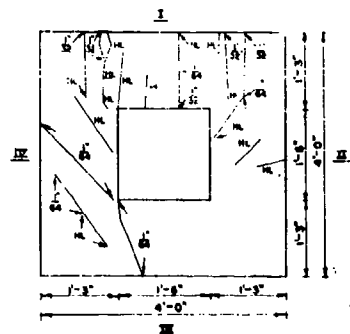


DEVELOPED ELEVATION - INTERIOR WALLS
SCALE: 1" = 1'-0"

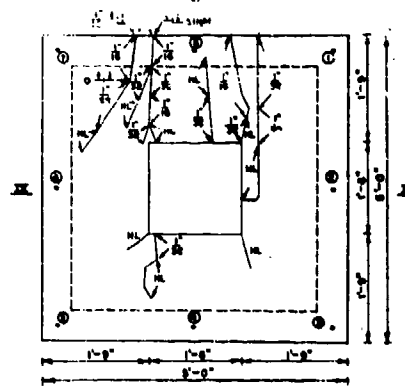


DEVELOPED ELEVATION - PORT
SCALE: 1" = 1'-0"

Note: Change 20'-0" perpendicular to C. of exterior of Face I.

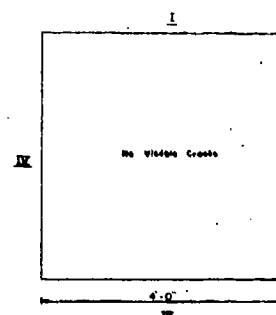


PLAN - ROOF SLAB - BOTTOM - (MIRROR VIEW)
SCALE: 1" = 1'-0"

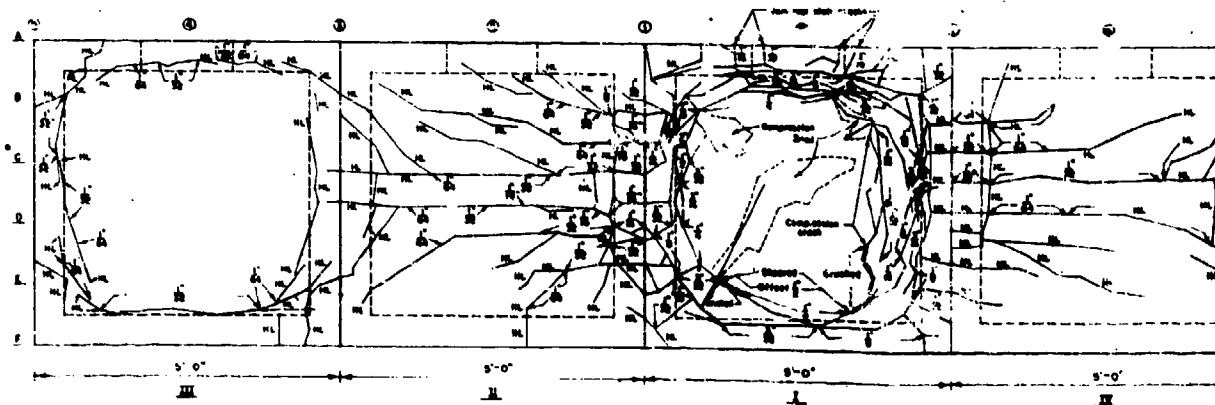


PLAN
SCALE: 1" = 1'-0"

Note: Only the primary crack system is shown. All crack sizes not specified are 1/8" or less.



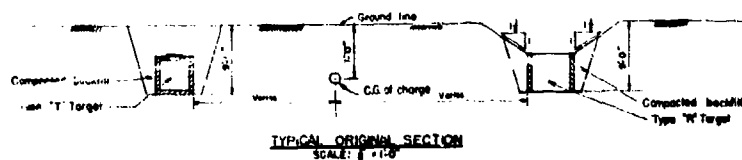
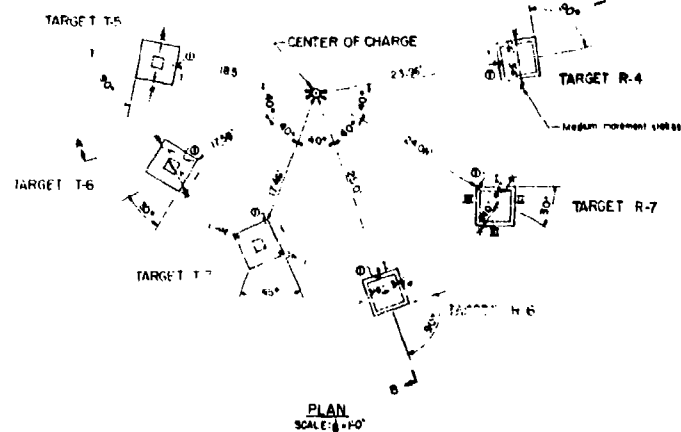
PLAN - BASE SLAB - INTERIOR
SCALE: 1" = 1'-0"



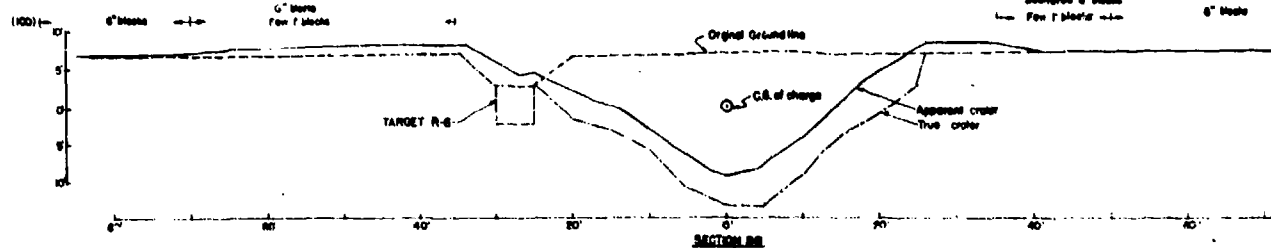
DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE: 1" = 1'-0"



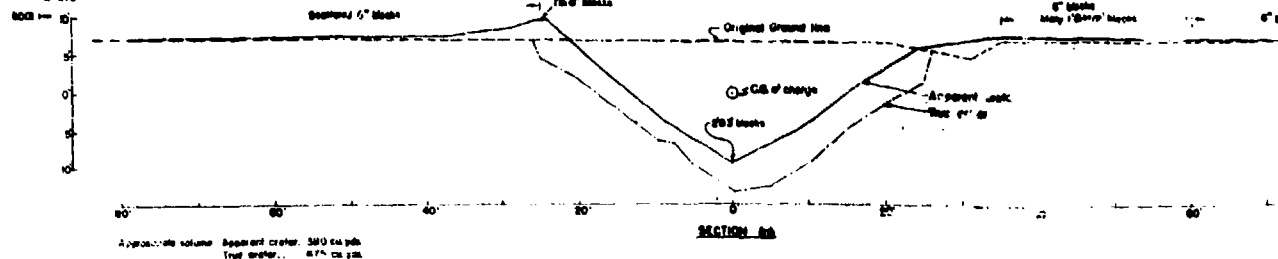
1



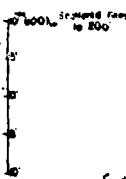
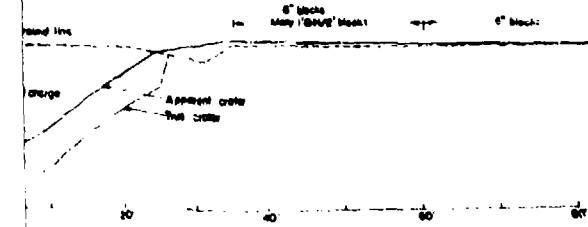
100' to 50' - Scattered line for 6" blocks
to 325' - Flies



Scattered line
to 175'



CRATER SECTIONS



TYPICAL BORING LOG--DRY CLAY AREA
Note: Log of core No. 25 located about
400' SW of Boring 25 but at
about the same elevation.

$\xi = 1.0$
 $\rho = 1.00$

1. Target faces are designated 1, 2, 3 clockwise
2. Rivets are numbered clockwise and designated a

[illegible]

Note: Tension cracks

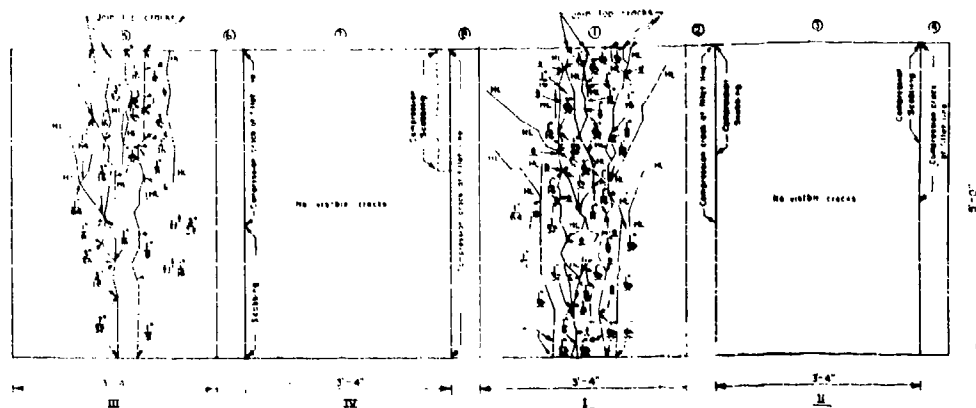
At a-b Sight At b-c Sight At c-d Sight

At d-e Sight

Note: Tension cracks

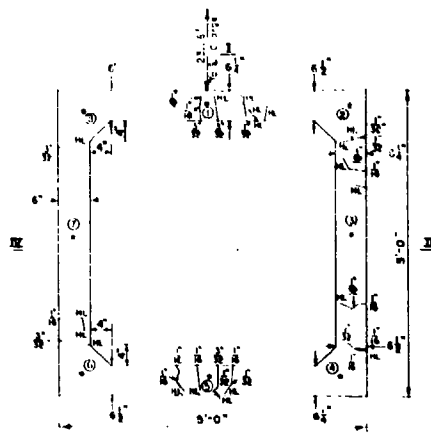
At a-b Sight At b-c Sight At c-d Sight

At d-e Sight



DEVELOPED ELEVATION - INTERIOR WALLS

SCALE: 1"=1'-0"



PLAN

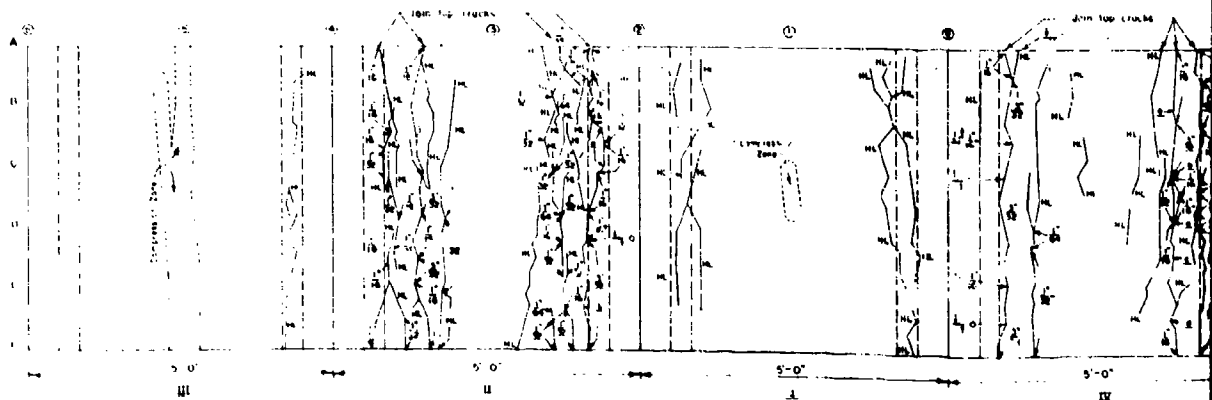
SCALE: 1"=1'-0"

Note: Tension cracks

At a-b Sight At b-c Sight

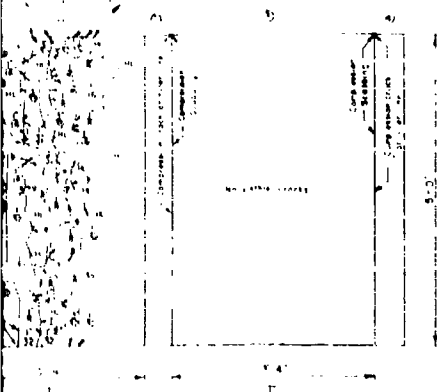
Note: Tension cracks

At a-b Sight At b-c Sight At c-d Sight At d-e Sight



DEVELOPED ELEVATION - EXTERIOR WALLS

SCALE: 1"=1'-0"



SCALES: PLAN: 1" = 10'-0"
ELEVATION: 1" = 0'-1"

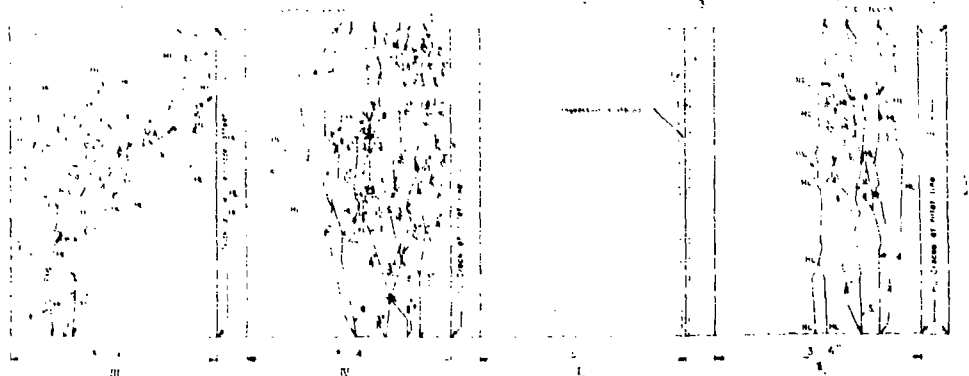
$1' = 1' - 0''$
 $2' = 1' - 0''$
 $3' = 0' - 1''$

1. Target faces are designated I, II, III, or IV (checkboxes)
2. Rivets are numbered clockwise and designated (C)
3. Cracks and effects of cracks are located to scale
4. Part line (dash) is specified "HL"
5. Crack sizes vary uniformly between the dimensions specified when size limits are not indicated
6. Crack offset symbols are shown in section

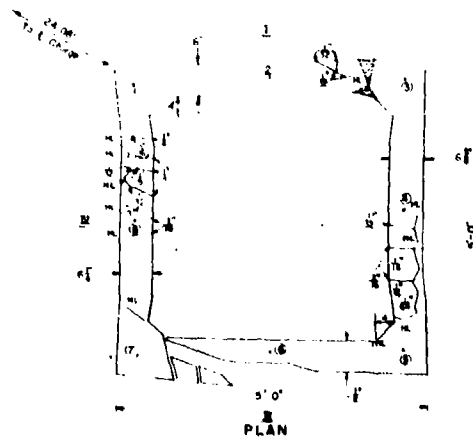
[illegible]

Notes: 1. This drawing is a reproduction of the original drawing. 2. The original drawing is a photograph of the original drawing. 3. The original drawing is a photograph of the original drawing.

Notes: 1. This drawing is a reproduction of the original drawing. 2. The original drawing is a photograph of the original drawing. 3. The original drawing is a photograph of the original drawing.



DEVELOPED ELEVATION INTERIOR WALLS
SCALE 1/4" = 1'-0"

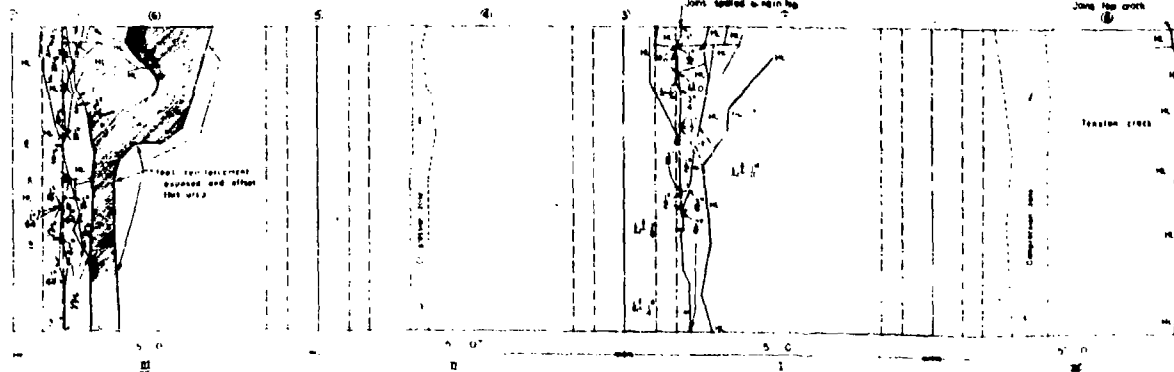


PLAN
SCALE 1/4" = 1'-0"

Note: This face body shopped and refert

At 1/4" = 1'-0" At 1/4" = 1'-0" At 1/4" = 1'-0"
At 1/4" = 1'-0" At 1/4" = 1'-0" At 1/4" = 1'-0"

Note: Tension cracks



DEVELOPED ELEVATION EXTERIOR WALLS
SCALE 1/4" = 1'-0"

GRAVEL AREA

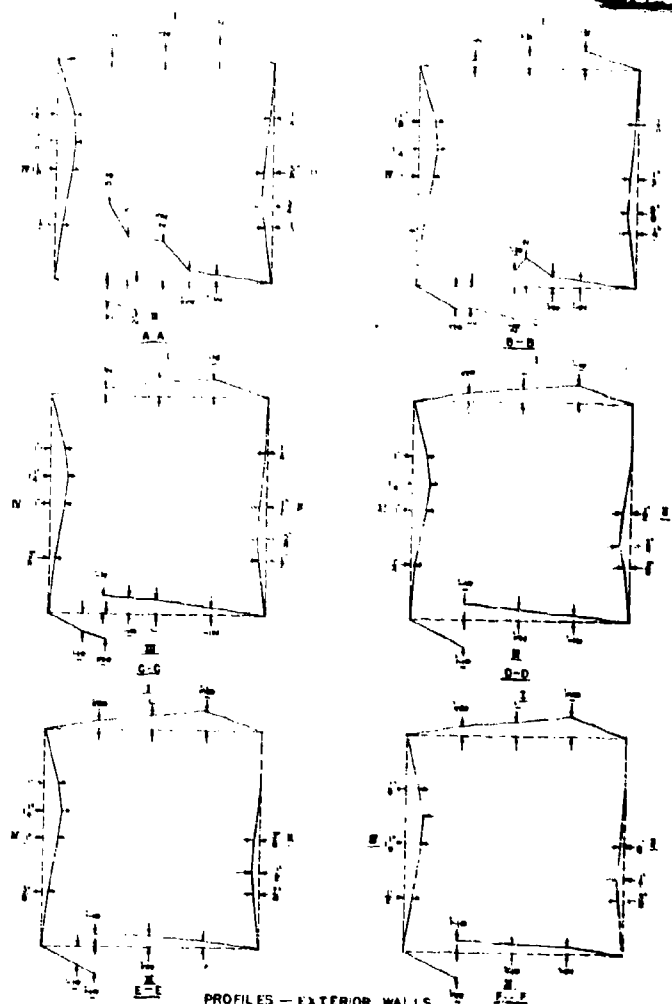
1/4" = 1'-0"
1/4" = 1'-0"
1/4" = 1'-0"

2

OFFICE IN CHARGE

TARGET R 7

PLAN - ROUND S 3



PROFILES - EXTERIOR WALLS

SCALER PLAN 1-1-0
DEFORMATION 1-0-0

GENERAL NOTES

1. Target faces are numbered 1, 2, 3, 4, 5, 6 clockwise.
2. Walls are numbered clockwise and designated by letters A, B, C, D, E, F.
3. Cracks and offsets of cracks are located by scale.
4. Hairline cracks (0.01) are specified "H".
5. Cracks vary uniformly between the dimensions specified when the limits are not indicated.
6. Cracks of 0.01 inch or less are shown in section.
7. Areas covered to a depth of 1/2 inch of steel reinforcement are shown in this view.

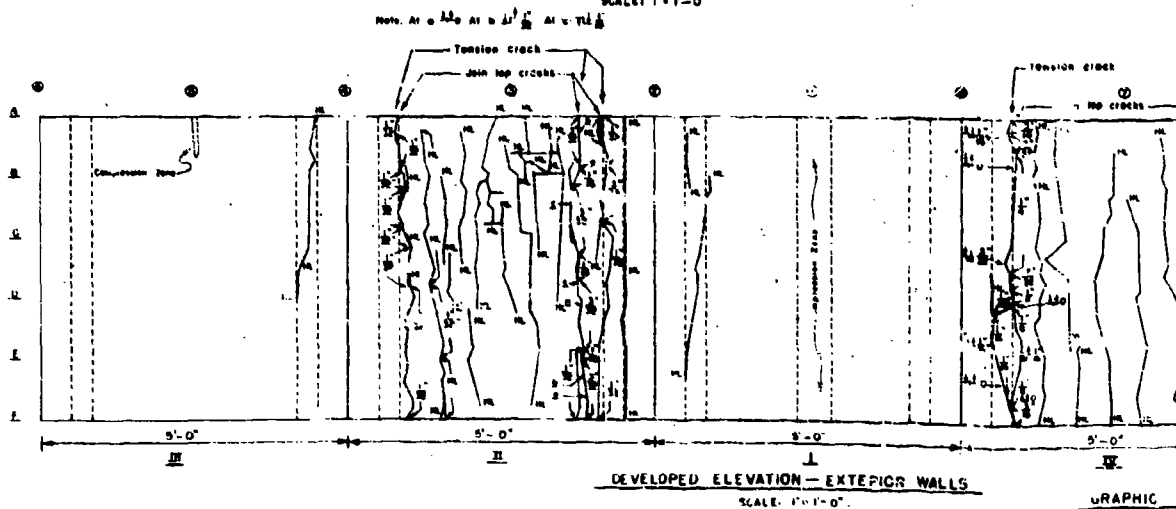
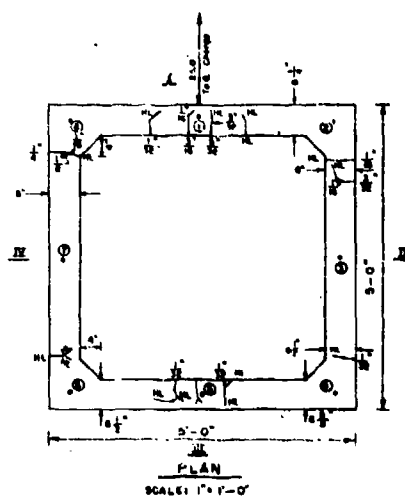
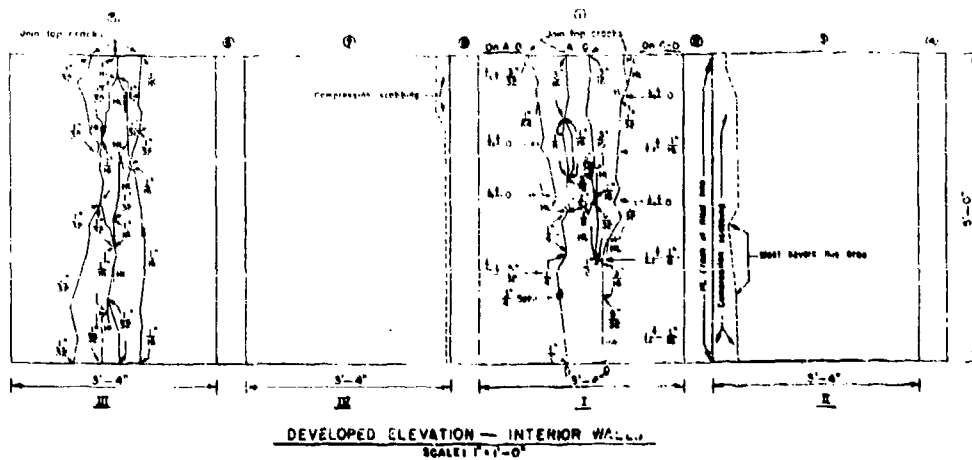
GRAPHIC SCALES

1/4" = 1'	1/8" = 1'	1/16" = 1'	1/32" = 1'
1/4" = 1'	1/8" = 1'	1/16" = 1'	1/32" = 1'
1/4" = 1'	1/8" = 1'	1/16" = 1'	1/32" = 1'

OFFICE OF THE CHIEF OF ENGINEERS U. S. ARMY FORT MONMOUTH, N. J.	
UNDERGROUND EXPLOSION TESTS SUPPLEMENTARY SKEW STRUCTURES PROGRAM ROUND S 3 TARGET R 7 CRACK PATTERNS & WALL DEFORMATION	
DESIGNED BY H. E. R.	CHECKED BY H. E. R.
DRAWN BY H. E. R.	APPROVED BY H. E. R.
DATE 21 JAN 1952	
84-01-162	

CONFIDENTIAL - SECURITY INFORMATION

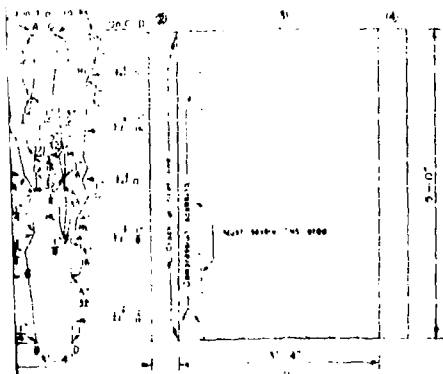
PLATE XIV



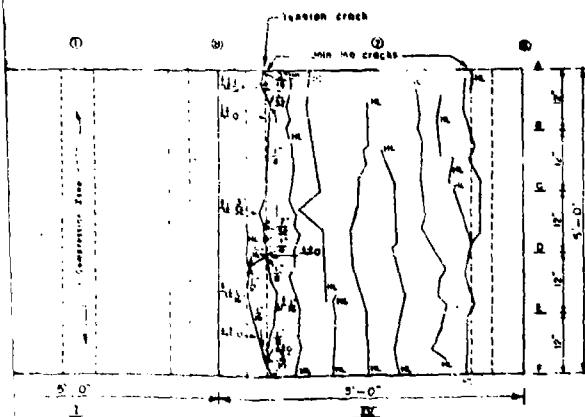
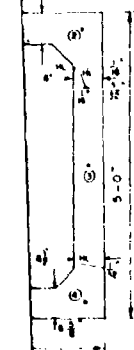
GRAPHIC

$1:1:0$ $1:1:0$
 $2:1:0$ $2:1:0$
 $3:1:0$ $3:1:0$

2



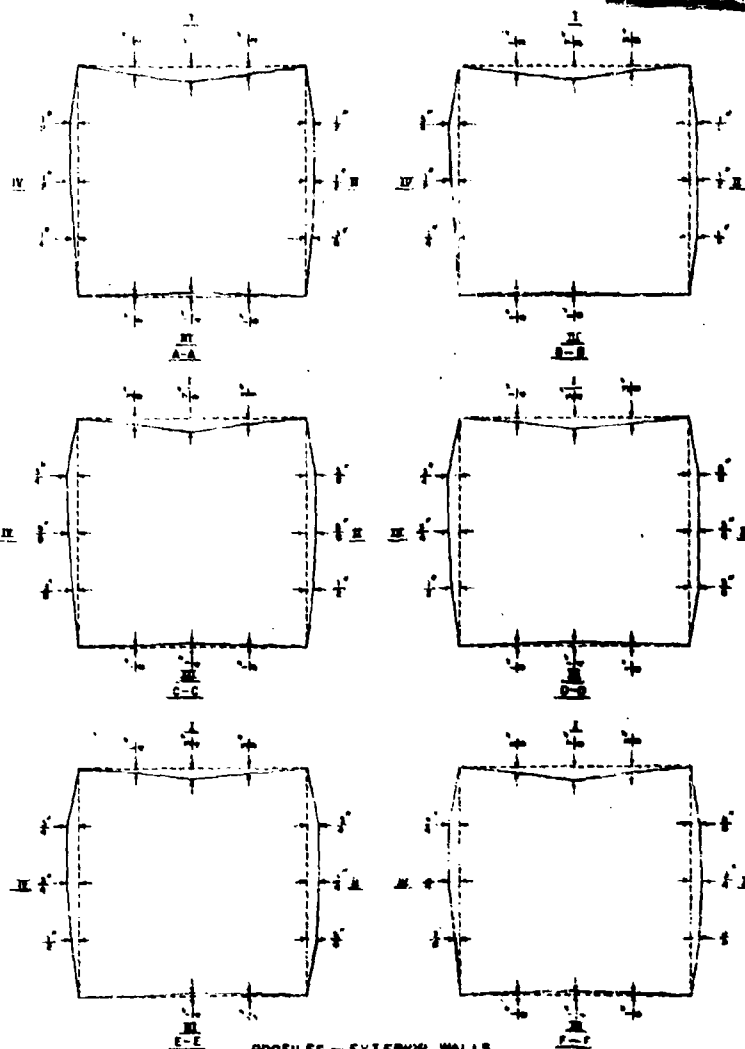
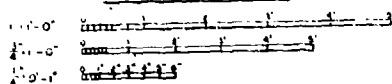
HIGH WALLS



FOUNDATION - EXTERIOR WALLS

1990

GRAPHIC SCALES



PROFILES - EXTERIOR WALLS

SCALE: PLAN 1" = 0'
DEFORMATION 1" = 0'

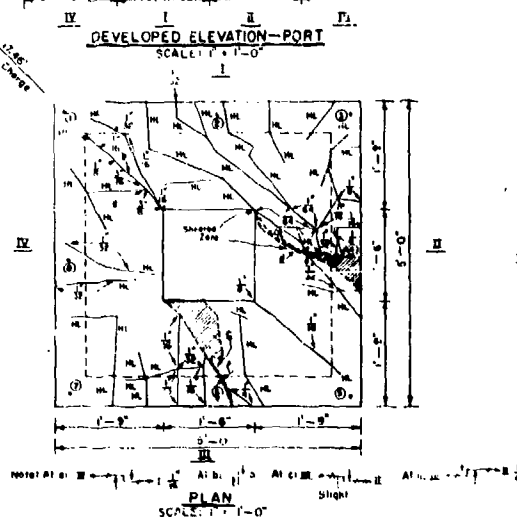
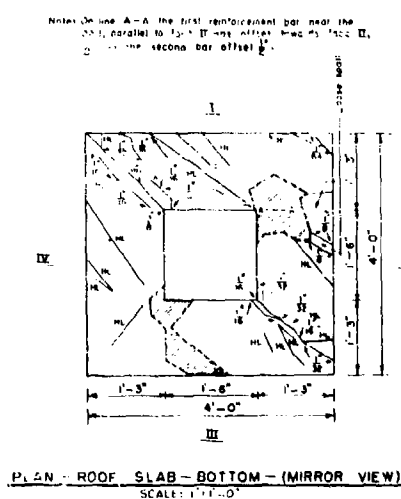
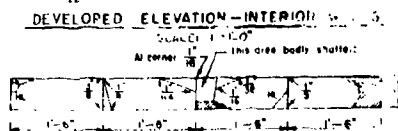
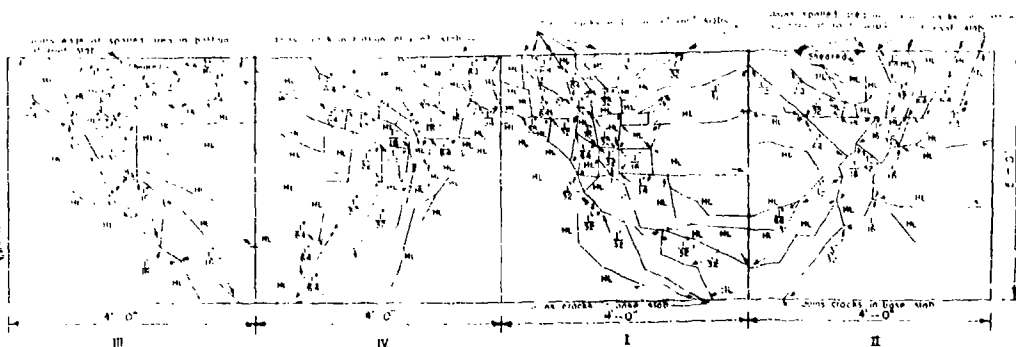
GENERAL NOTES

- 1 Target Areas are down - $\rightarrow$ 1 H, 2, or 3 clockwise.
- 2 Events are numbered clockwise and designated $\odot$.
- 3 Cracks and offsets of cracks are labeled by S.W.
- 4 Near-line cracks - $\rightarrow$ are labeled "N".
- 5 Crack sizes vary uniformly between the dimensions specified when size limits are not indicated.
- 6 Crack - Water symbols are shown in section  

UNDERGROUND EXPLOSION TESTS
SUPPLEMENTARY SKEW STRUCTURES PROGRAM
ROUND 5-7
TARGET P-6
CRACK PATTERNS & WALL DEFORMATION

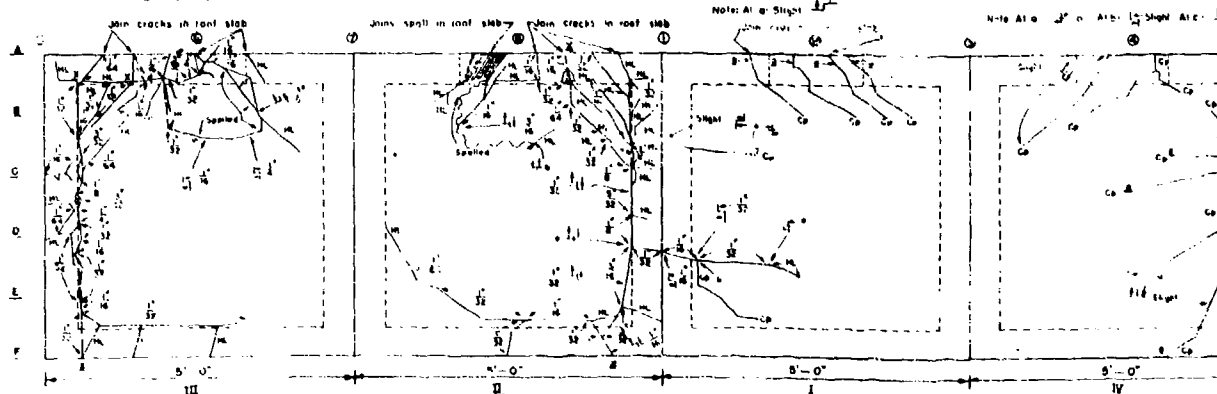
(CONFIDENTIAL - SECURITY INFORMATION PLATE 07)

1



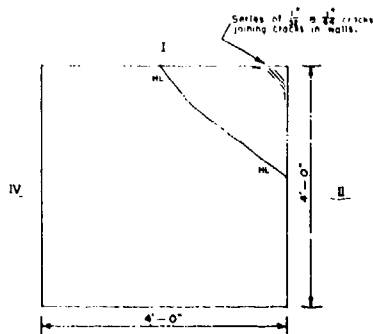
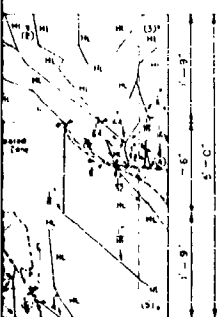
Note: Tension cracks indicated by X-X. Hair line cracks of spalled area are not shown.

Note: Tension cracks indicated by X-X. At 1-10.

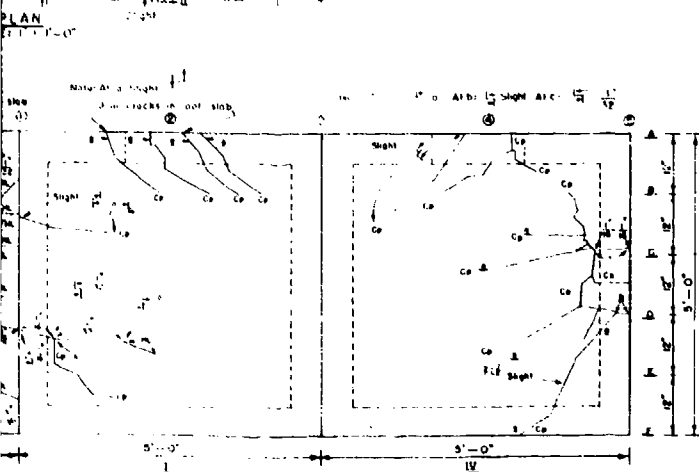
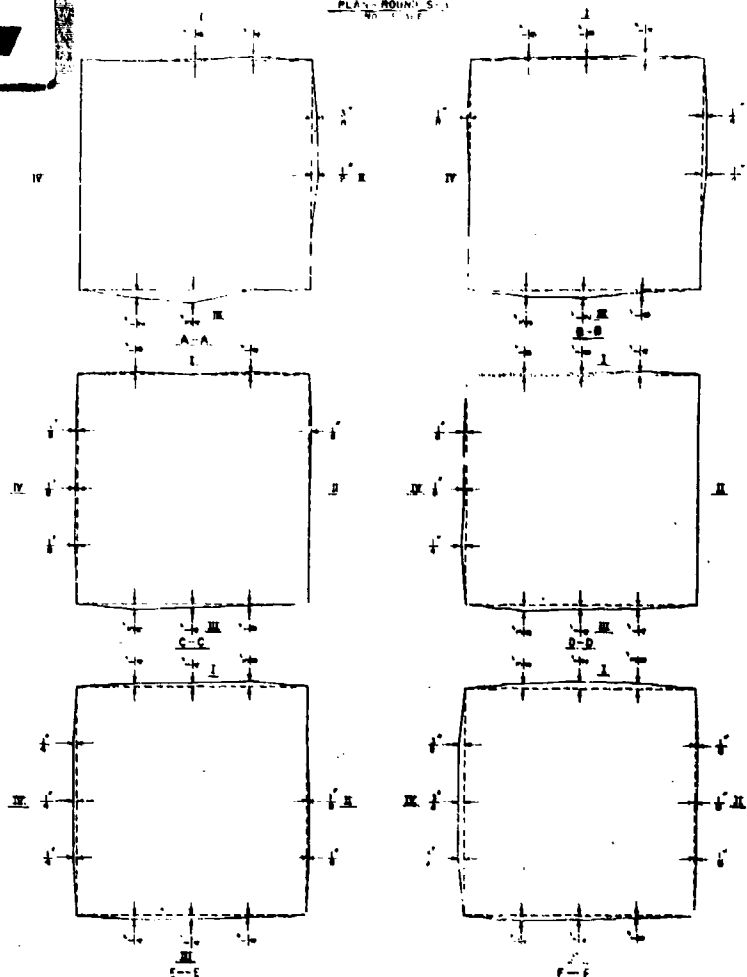




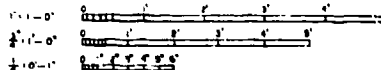
ELEVATION--PORT



PLAN - BASE SLAB - INTERIOR
SCALE: 1" = 1'-0"

ELEVATION EXTERIOR WALLS

PROFILES -- EXTERIOR WALLS



GENERAL NOTES

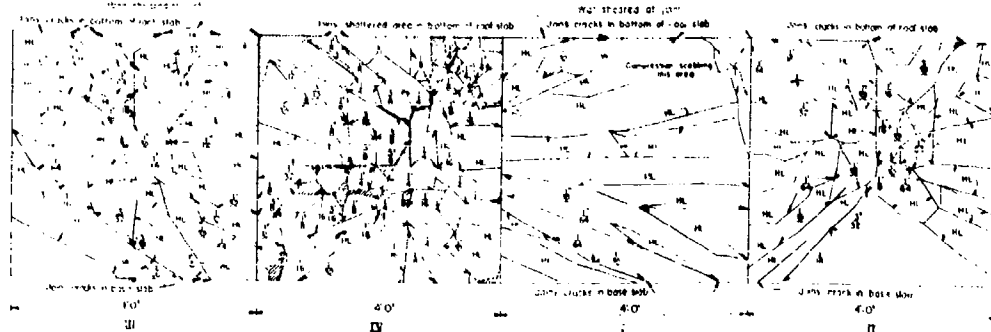
- 1 - Target faces are designated I, II, III, or IV clockwise.
- 2 - Levels are numbered clockwise and denoted by circles.
- 3 - Cracks and offsets of cracks are labeled to scale.
- 4 - Hair-line cracks $\frac{1}{16}$ " are specified "MC".
- 5 - Crack size very uniformly between the dimensions specified when size limits are not indicated.
- 6 - Cracks specified "CA" are compression cracks, apparent, but poorly defined.
- 7 - Areas specified to be beyond depth of steel reinforcement are shown thus: 
- 8 - Crack offset symbols are shown in section:

Moor.	Verl.
Crack	Crack

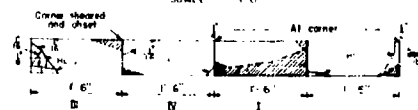
[illegible]

Cracks in severely distressed
members and crack systems are shown
Cracks are not indicated on all walls
Wall is shown full length of all joints

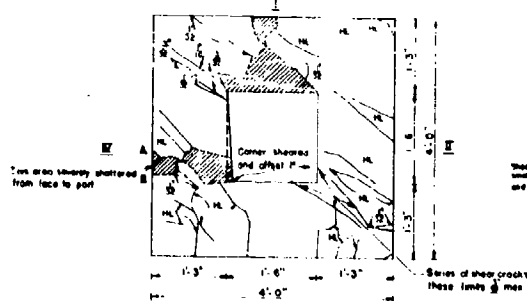
1



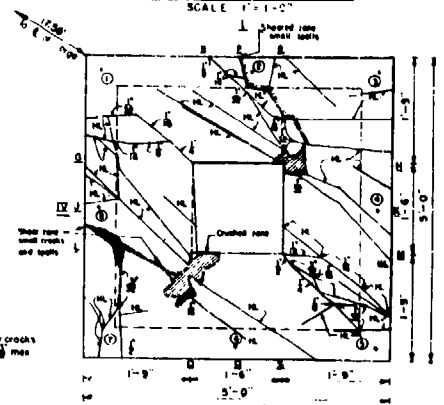
DEVELOPED ELEVATION - INTERIOR WALLS
SCALE: 1" = 1'-0"



DEVELOPED ELEVATION - PORT
SCALE: 1" = 1'-0"



PLAN - ROOF SLAB BOTTOM - (MIRROR VIEW)
SCALE: 1" = 1'-0"



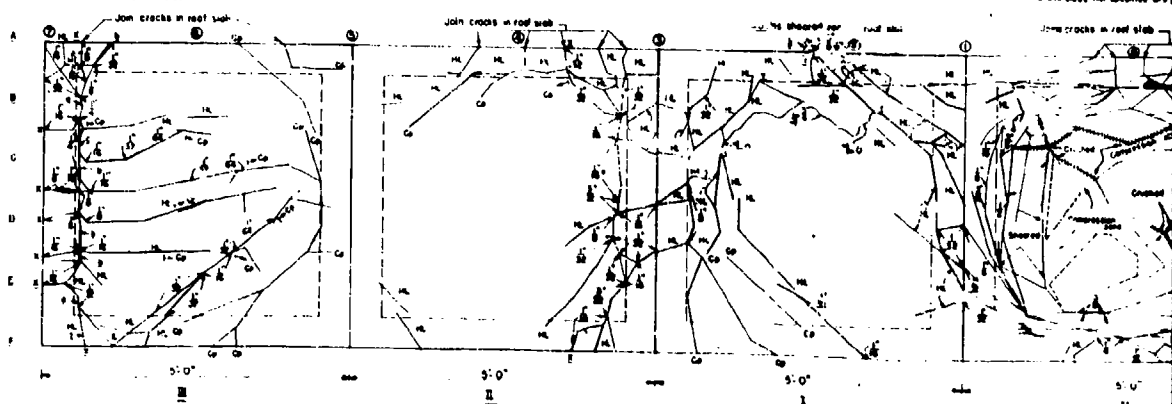
PLAN - BASE SLAB - IN
SCALE: 1" = 1'-0"

Note Tension crack indicated by Δ
Cp indicates the General type B applies
fig. 10 the point specified to the end
of the crack

Note Tension crack indicated by Δ

Note Two areas heavily shattered
8' x 10' and 10' x 10' on base

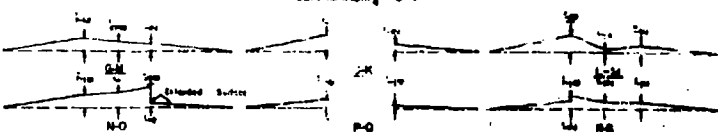
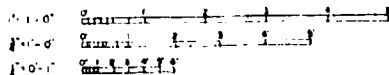
Note Two areas severely shattered
Only primary crack systems are
indicated not specified only



DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE: 1" = 1'-0"

GRAPHIC SCALES

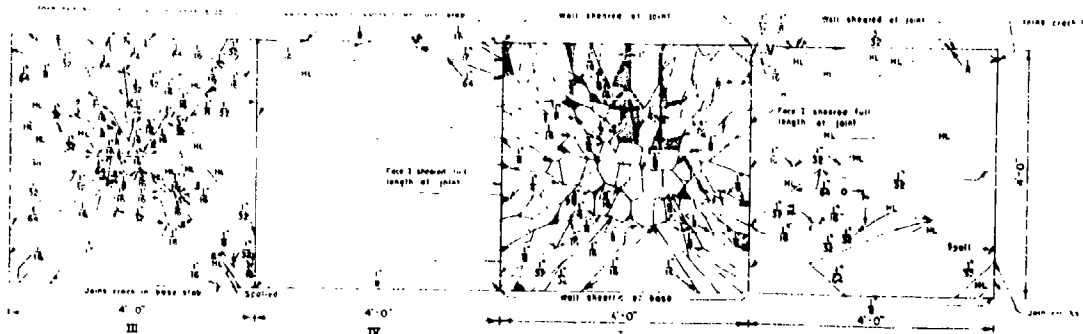
0' 0" 1' 0" 2' 0" 3' 0" 4' 0" 5' 0" 6' 0" 7' 0" 8' 0" 9' 0" 10' 0"



- 2 Target faces designated I, II, III, or IV increase.
- 3 Arcs are numbered clockwise and designated A-O.
- 4 Circles and offsets of circles are labeled to scale.
- 5 Non-line cracks (—) are specified "NLT".
- 6 Crack sizes vary uniformly between the dimensions specified when the "to" limit is not indicated.
- 7 Cracks specified "Ep" are reinforcement cracks wherever not poorly defined.
- 8 Areas spelled to or beyond depth of steel reinforcement are shown thus: **REINFORCED**
- 9 Crack offset symbols are shown in section.



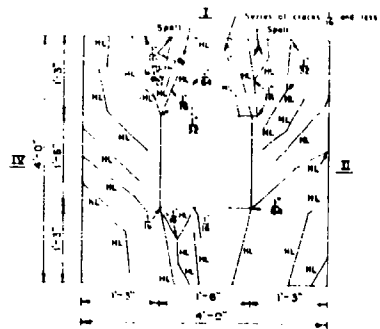
1



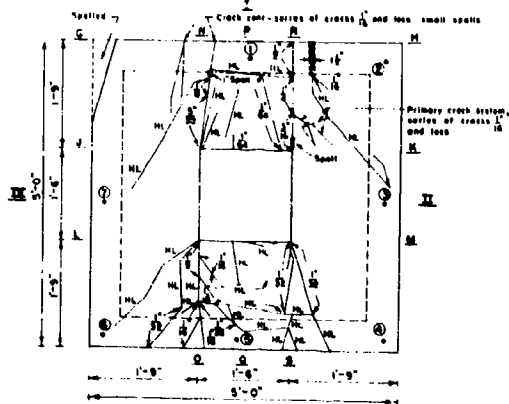
DEVELOPED ELEVATION - INTERIOR WALL
SCALE: 1" = 1'-0"



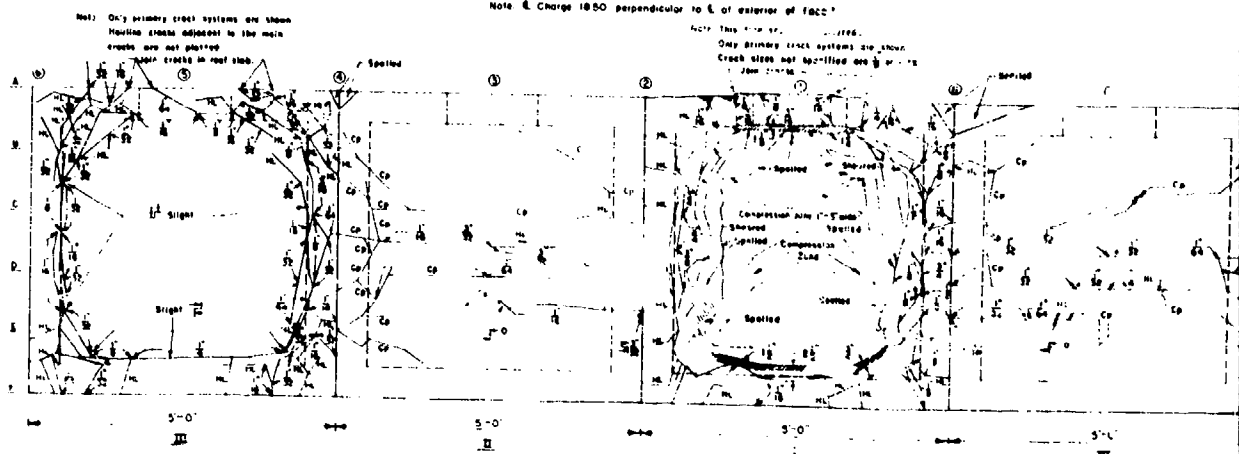
DEVELOPED ELEVATION - PORT
SCALE: 1" = 1'-0"



PLAN - ROOF SLAB - BOTTOM - (MIRROR VIEW)
SCALE 1" = 1'-0"

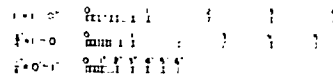


PLAN-BASE SLAB-INTERIOR
SCALE 1"=1'-0"



DEVELOPED ELEVATION - EXTERIOR WALLS
SCALE: 1"=1'-0"

GRAPHIC SCALES

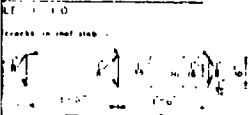


TARGET T-5

CONTINUED OF CHARGE

PLAN - ROUND S-3
NO SCALE

SECTION - INTERIOR WALLS



ELEVATION - PORT



PORT AREA - SEE DETAIL CRACKS AND LOSS - SMALL SPACES

PRIMARY CRACK SYSTEM - SERIES OF CRACKS IN AND THROUGH

CRACK SIZE NOT SPECIFIED

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

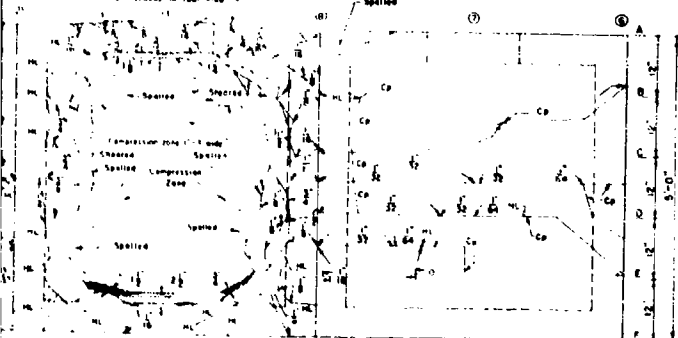
CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

PLAN - BASE SLAB - INTERIOR

SCALE 1" = 1'-0"



SECTION - EXTERIOR WALLS

SCALE 1" = 1'-0"



CRACKS IN PORT AREA

CRACKS IN PORT AREA

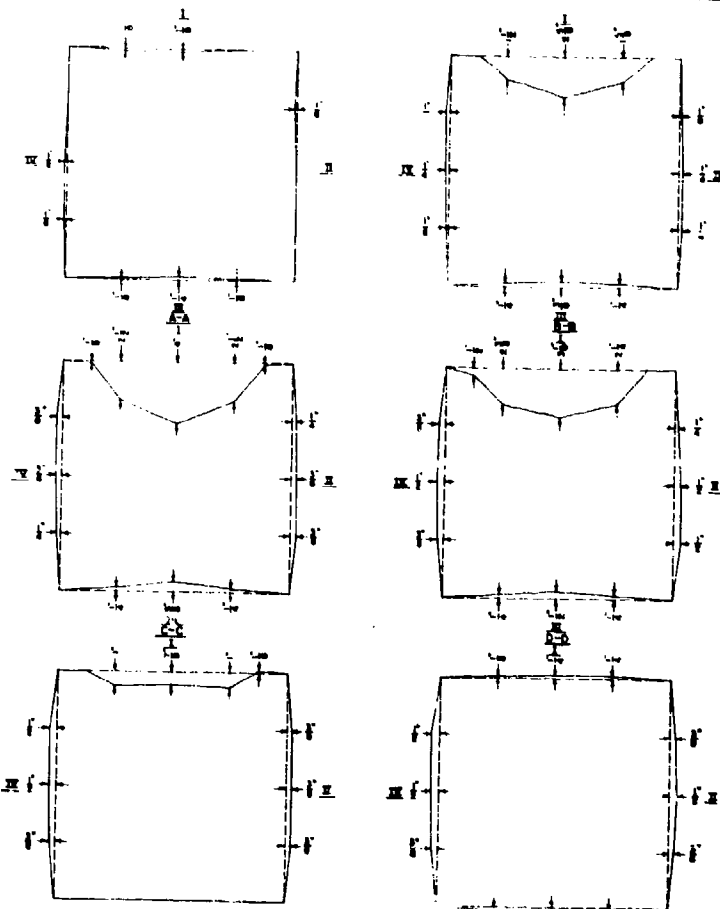
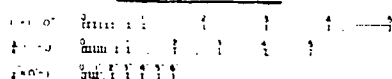
CRACKS IN PORT AREA

CRACKS IN PORT AREA

CRACKS IN PORT AREA

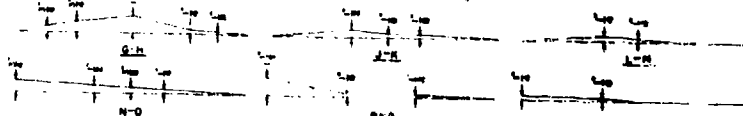
CRACKS IN PORT AREA

GRAPHIC SCALES



PROFILES - ROOF SLAB

SCALE: PLAN 1/4" = 1'-0" DEFORMATION 1" = 0.1"



PROFILES - ROOF SLAB

SCALE: PLAN 1/4" = 1'-0" DEFORMATION 1" = 0.1"

GENERAL NOTES

1. Target holes are marked with "T" and labeled I, II, III, or IV clockwise.
2. Rivets are numbered clockwise and designated (R).
3. Cracks and offsets of cracks are located by scale.
4. Hair-line cracks (1/16") are specified "HL".
5. Crack sizes vary uniformly between the dimensions specified when size limits are not indicated.
6. Cracks specified "Cp" are compression cracks, apparent, but poorly defined.
7. Areas spalled in or beyond depth of steel reinforcement are shown thus [diagonal lines].
8. Crack offset symbols are shown in section.



U. S. ARMY	
CRACK PATTERNS & WALL DEFORMATION	
ROUND S-3	
TARGET T-5	
CRACK PATTERNS & WALL DEFORMATION	
21 SEP 1967	
84-01-167	

CONFIDENTIAL - SECURITY INFORMATION PLATE XXIII

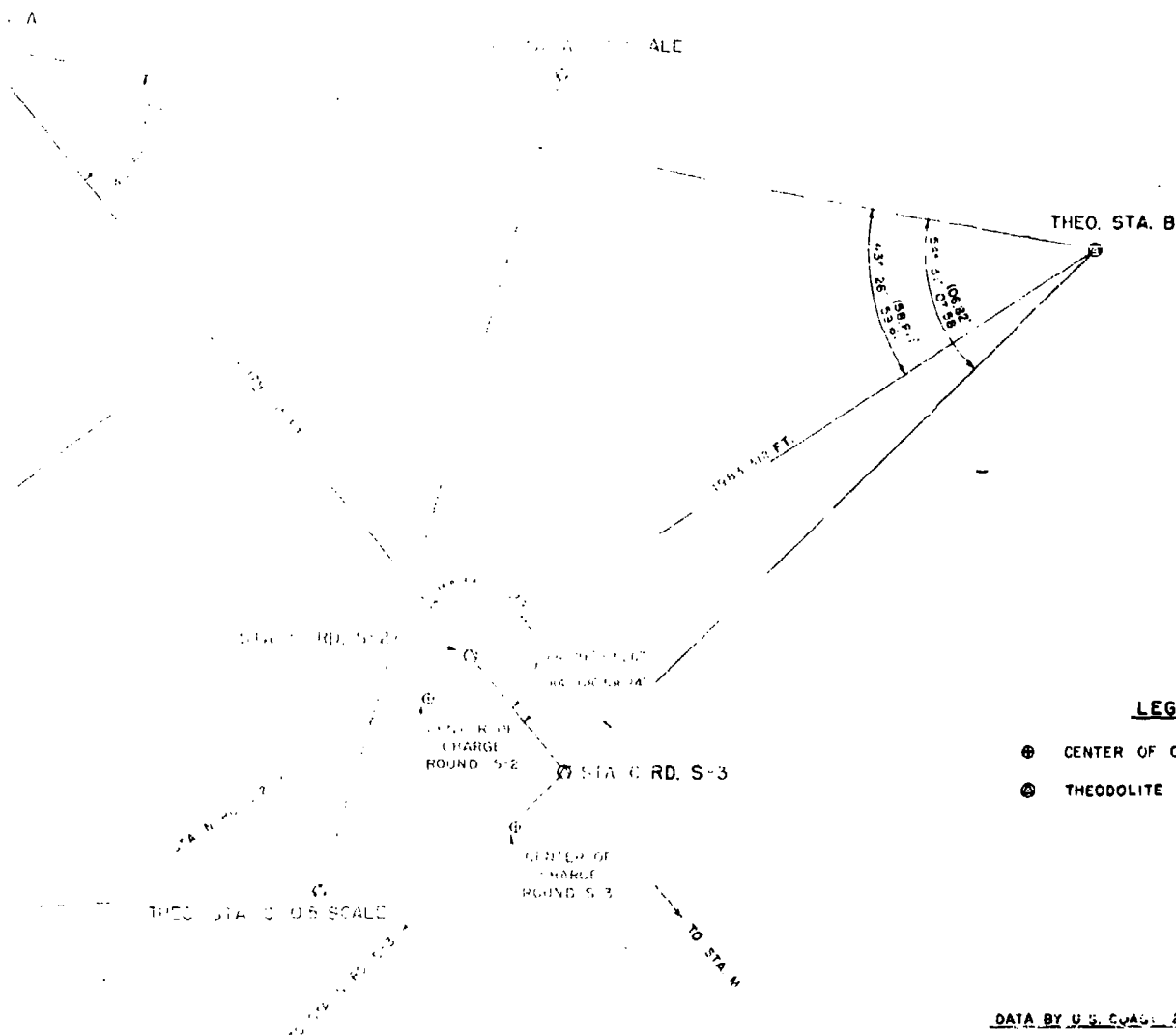
THEO. STA. A

40° 59' 59" E

THEO. STA. B 0.5 SCALE

THE

1

**LEGEND**

- ⊙ CENTER OF CHARGES.
- ⊙ THEODOLITE STATIONS A,B,C.

DATA BY U.S. COAST & GEODETIC SURVEY

GRAPHIC SCALE

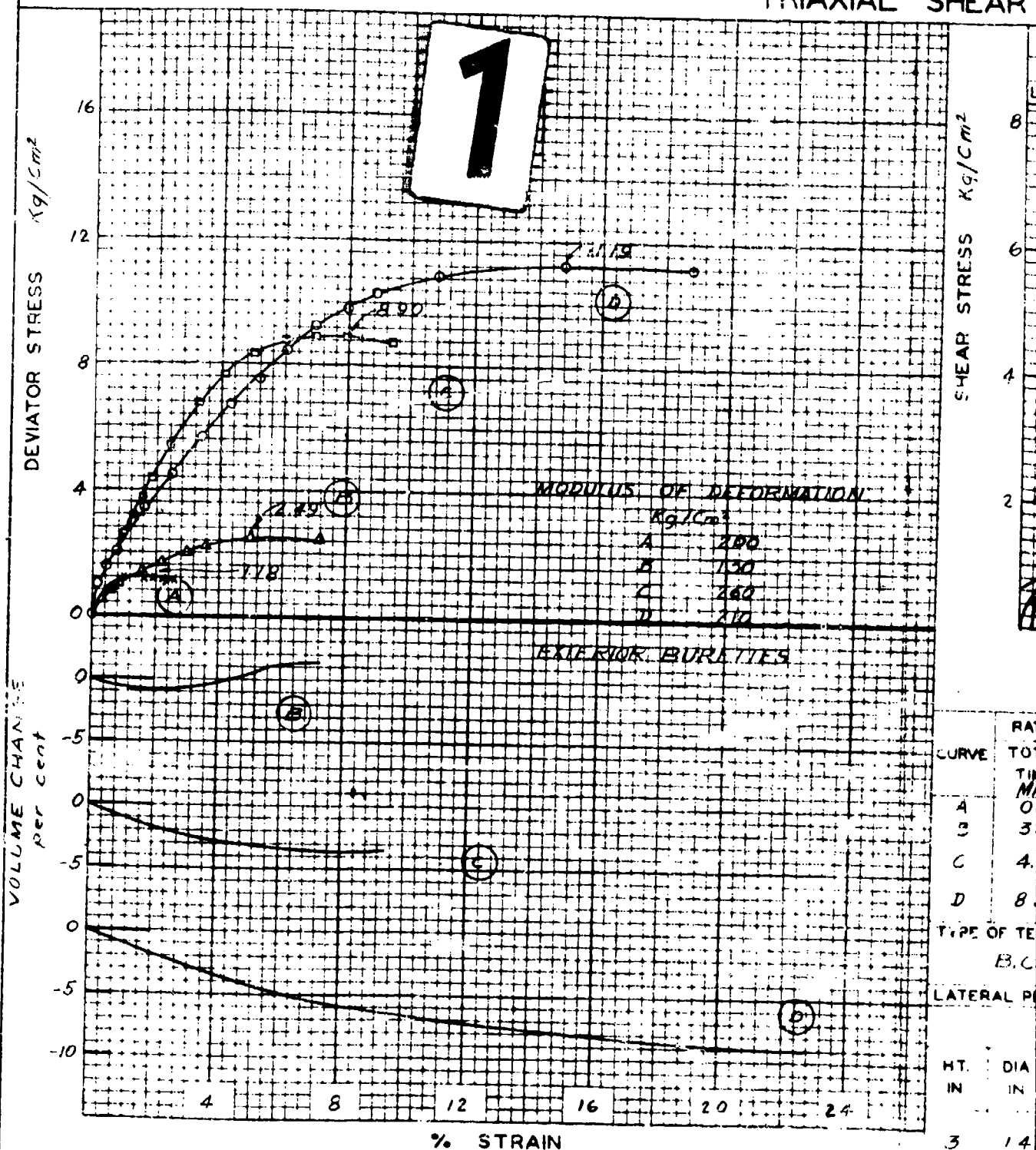
0 200 400 600 800 1000

DESIGN		DATE		REVISION		BY		CD	
CORPS OF ENGINEERS, U. S. ARMY OFFICE OF THE DISTRICT ENGINEER SACRAMENTO DISTRICT SACRAMENTO, CALIFORNIA									
PROJECTS					UNDERGROUND EXPLOSION TESTS				
DRAWN DL					SUPPLEMENTARY SKEW STRUCTURES PROGRAM				
CHECKED H.E.R.					REPLACEMENT POINT LAYOUT				
APPROVED BY [Signature]					APPROVED BY [Signature]				
DATE 21 FEB 1962					SCALE: AS SHOWN SHEET 18 FILE NO. 84-01-162				

CONFIDENTIAL - SECURITY INFORMATION

PLATE 2

TRIAxIAL SHEAR



2

CONFIDENTIAL
SECURITY INFORMATION

FIELD DATA - CONCRETE

MECHANICAL STRENGTH TESTS

Test Cylinders - 3 X 6 Inches

<u>Ident</u>	<u>Date Cured</u>	<u>Date Crushed</u>	<u>No. of Cyls.</u>	<u>Age-Days</u>	<u>Unit Load Lbs/Sq. In.</u>
<u>GROUP 2 (Detonated 9-29-51)</u>					
P-1	8-22	8-28	1	6	5177
	8-22	10-1	1	40	5494
P-2	8-22	8-28	1	6	3670
	8-22	10-1	1	38	6107
P-3	8-22	8-28	1	7	2941
	8-22	10-1	1	33	4648
P-4	8-22	8-28	1	5	3652
	8-22	9-11	1	12	4039
T-1	8-22	8-28	1	8	4484
	8-22	10-1	1	35	7428
T-2	8-29	9-4	1	6	4807
	8-29	10-1	1	33	4575
T-3	8-30	9-4	1	5	3205
	8-30	10-1	1	31	5780
<u>GROUP 3 (Detonated 10-11-51)</u>					
P-4	8-29	9-4	1	6	2826
	8-29	10-16	1	47	4617
P-6	8-31	9-5	1	5	1803
	8-31	10-16	1	46	5743
P-7	9-1	9-7	1	6	3687
	9-1	10-16	1	45	3841
T-5	9-1	9-7	1	6	3431
	9-1	10-16	1	44	4543
T-6	9-4	9-10	1	6	4157
	9-4	10-16	1	41	5640
T-7	9-4	9-10	1	6	3843
	9-4	10-16	1	42	5234

Notes: Data by Pittsburgh Testing Laboratories

CONFIDENTIAL
SECURITY INFORMATION

Figure 2

CONFIDENTIAL
SECURITY INFORMATION

SUPPLEMENTARY TEST PROCEDURES PROGRAM

CONCRETE BEAM

Flexural Test - Third Point Loading

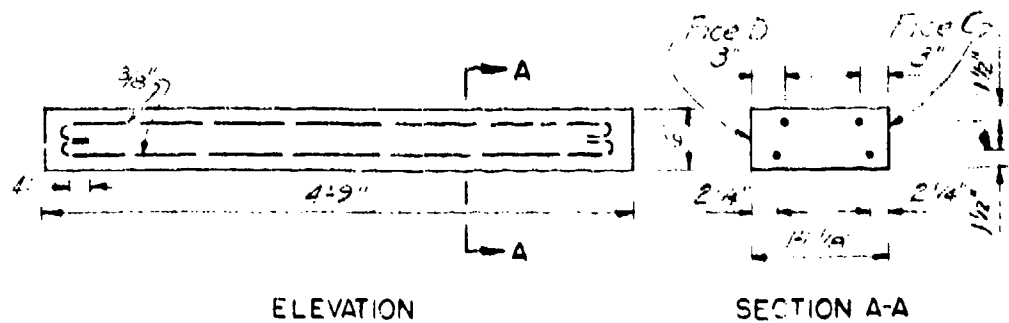
<u>Load - Pounds</u>	<u>Deflection Inches</u>	<u>Deflection Inches</u>	<u>Average Deflection Inches</u>
0	0.000	0.000	0.0000
1,000	0.004	0.011	0.0075
2,000	0.008	0.017	0.0125
3,000	0.011	0.024	0.0175
4,000	0.016	0.032	0.0240
5,000	0.026	0.048	0.0370
6,000	0.047	0.073	0.0600
7,000	0.066	0.097	0.0815
8,000	0.097	0.135	0.1160
9,000	0.168	0.210	0.1890
9,750	Tension failure of concrete		
9,500	0.236	0.234	0.235
10,000	0.248	0.306	0.277
10,500	0.304	0.371	0.338
11,000	0.373	0.441	0.407
11,500	0.437	0.505	0.471
11,600	Steel broke		

NOTE: Data by Pittsburgh Testing Laboratories

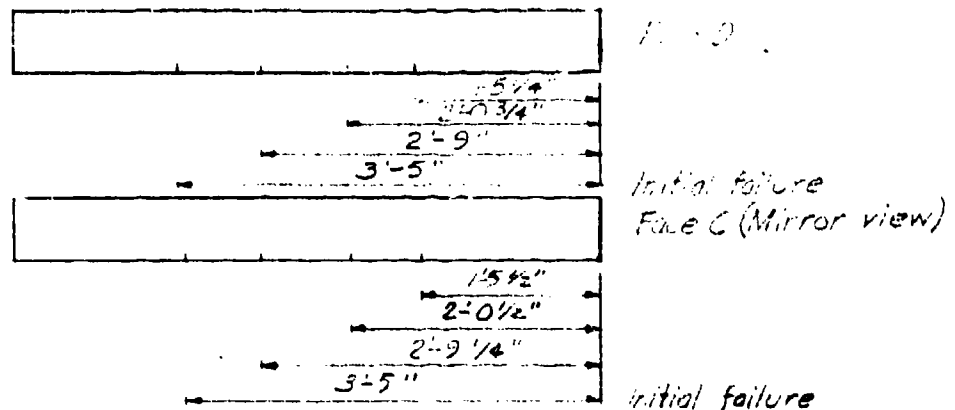
CONFIDENTIAL
SECURITY INFORMATION

Figure 3

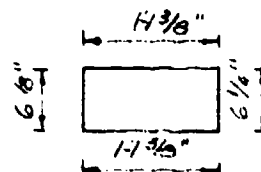
R



TEST BEAM



CRACK LOCATIONS AT ULTIMATE LOAD



SECTION AT FAILURE

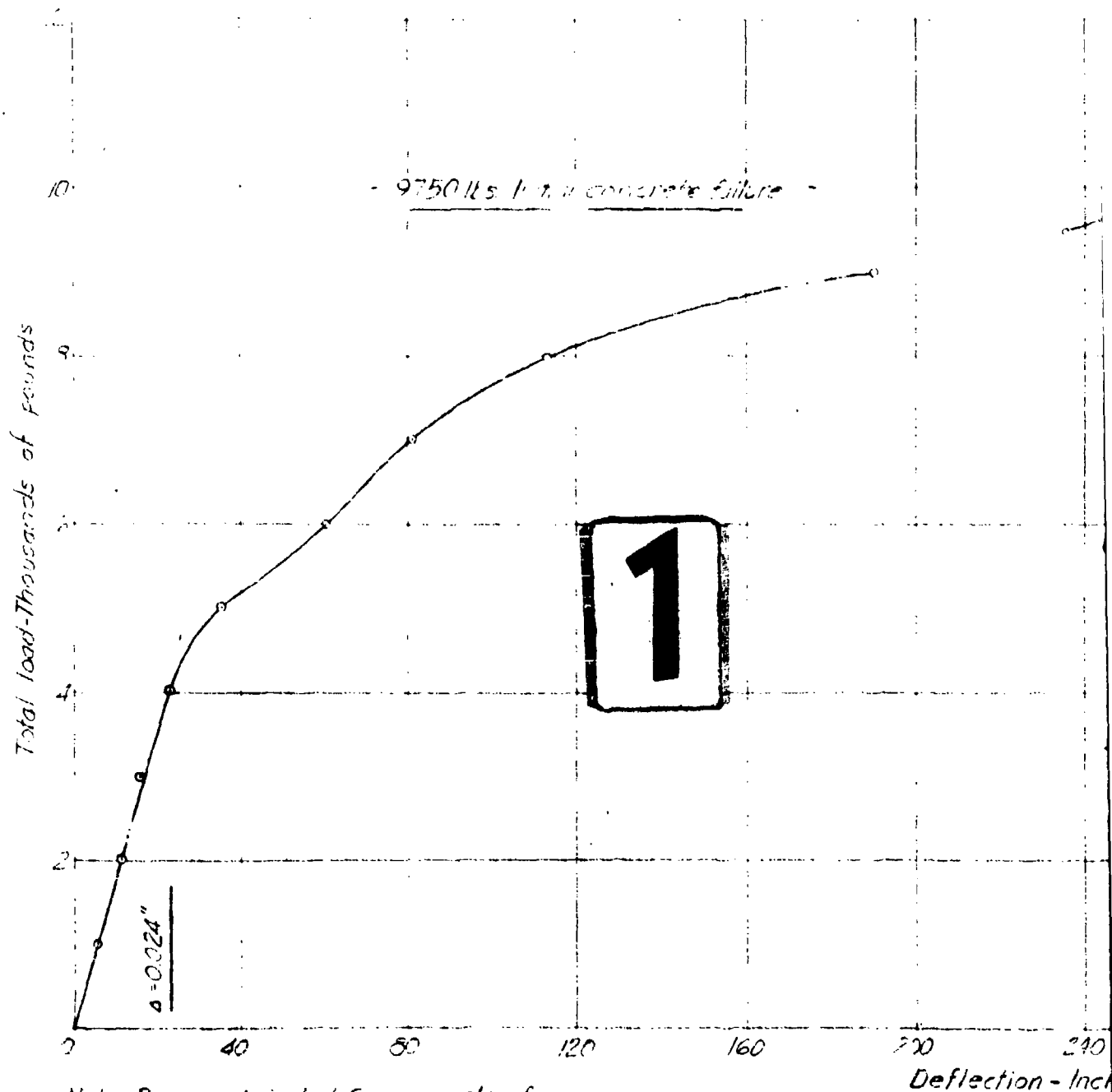
$$I = \frac{L^3}{12} = \frac{(3.375 \text{ ft})^3}{12} = 26.4 \text{ in.}^3$$

$$E = \frac{F}{\Delta L} = \frac{13,241 \text{ lb}}{0.0001667 \text{ in.}} = 79,400,000 \text{ lbs/in.}^2$$

$$L = 50 \text{ in.}$$

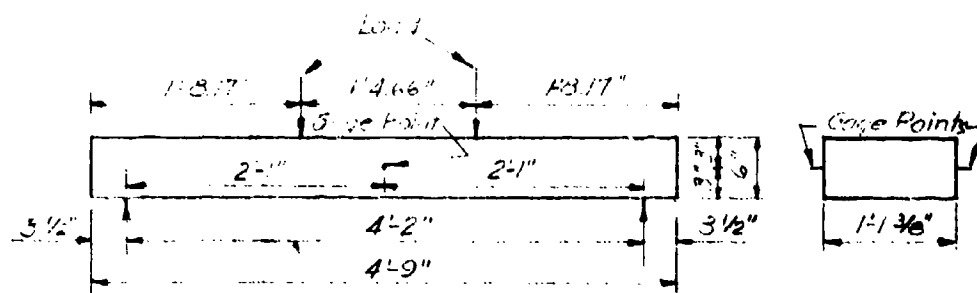
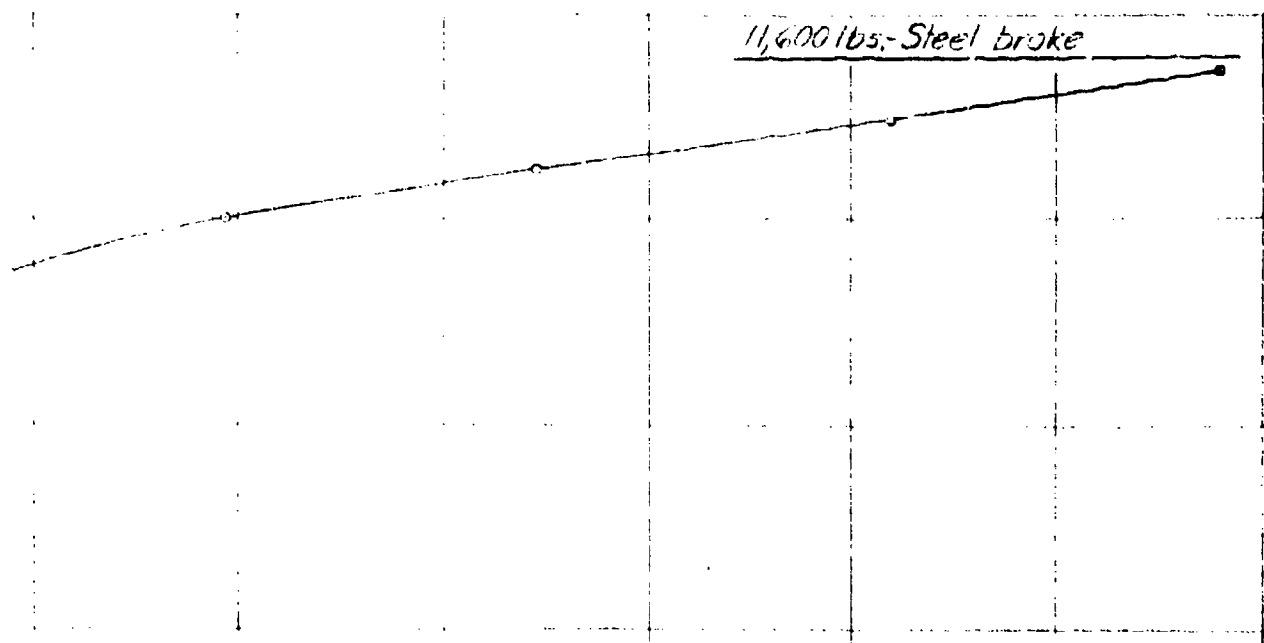
$$F = \frac{WL}{\delta} = \frac{16,000 (50)}{13.33 (6.197)} = 1,130 \text{ lbs/in.}^2$$

SUPPLEMENTARY SKEW STRUCTURES PROGRAM CONCRETE BEAM - FLEXURAL TEST



Note Beam fabricated from sample of concrete for Target, T-6, Round S-3, and is considered representative of concrete in the skew targets, Age 49 days

SUPPLEMENTARY SKEW S
CONCRETE BEAM - F



LOAD, SUPPORT, AND GAGE POINTS

2

200 240 280 320 360 400 440 480
Deflection - inches $\times 10^{-3}$

SUPPLEMENTARY SKIN STRUCTURES PROGRAM

SUMMARY OF TENSION TESTS - STEEL REINFORCEMENT BARS

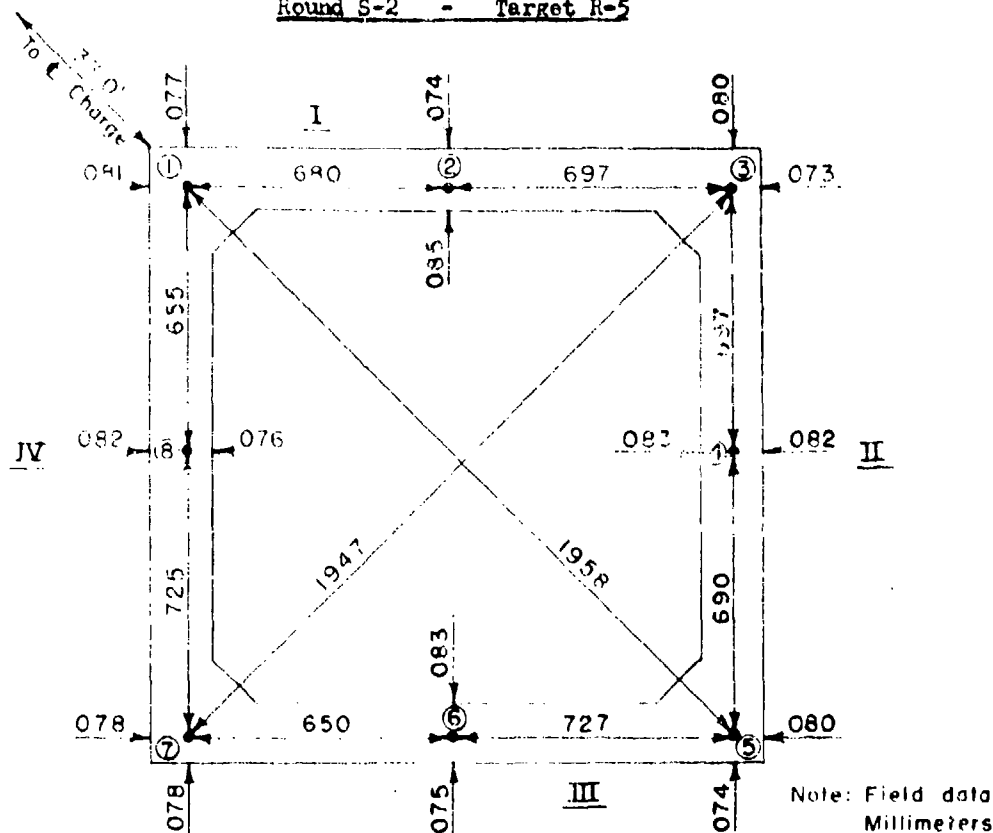
<u>Spec. No.</u>	<u>Size</u>	<u>Yield Point P.S.I.</u>	<u>Ultimate Strength P.S.I.</u>	<u>Elongation - % 8" Gage Length</u>
A	3/8" Rl.	49,500	60,900	19
B	3/8" Rl.	49,500	62,200	17
C	3/8" Rl.	<u>50,500</u>	<u>58,800</u>	<u>21</u>
	Average	49,800	60,300	19

NOTE: All bars are type deformed steel reinforcement, Intermediate Grade
Yield Point determined by Drop Beam Method (ASTM Designation A 150-3a)
Data by Pittsburgh Testing Laboratories

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SKEW STRUCTURE PROGRAM

Round S-2 - Target R-5



SUMMARY SURVEY DATA

Station "C" - X=500 & Y=500
Azimuth "A" - 0° - 00' - 00"
= Y Ordinate

Data supplied by U. S.
Coast & Geodetic Survey

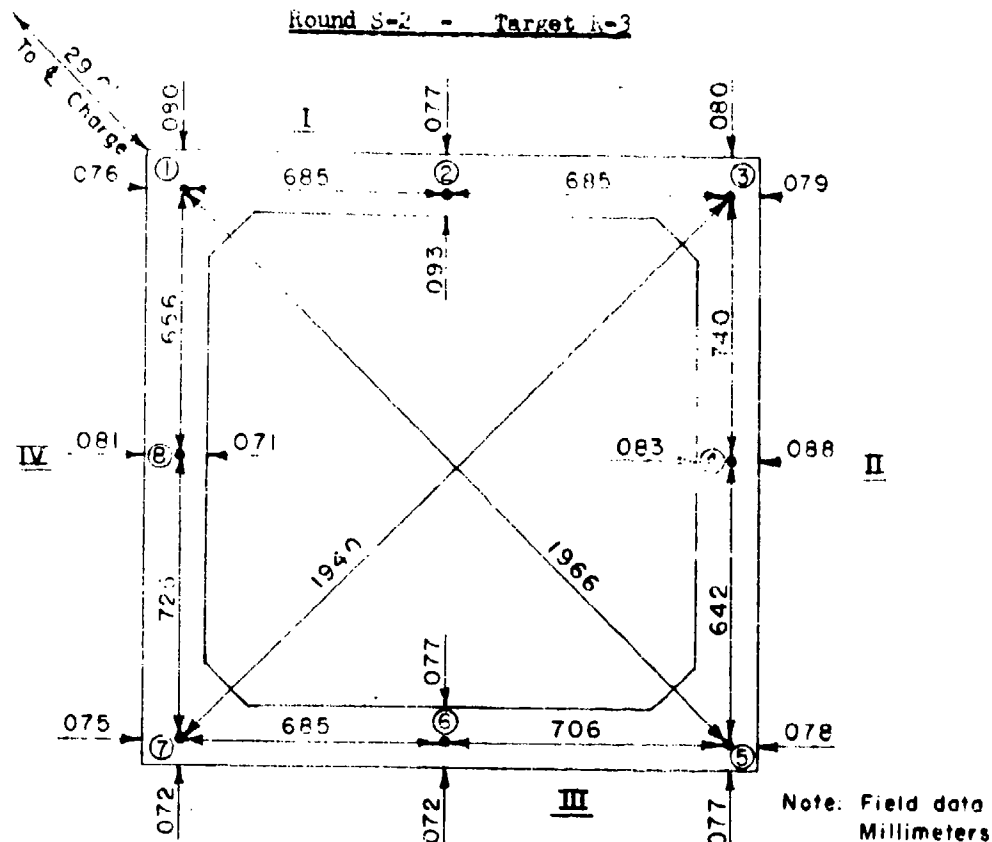
Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	473.4100	507.4604	97.0898	473.4003	507.5033	97.0869	-0.0097	+0.0429	-0.0029
2	472.7817	507.8263	97.0876	472.7699	507.8620	97.0841	-0.0118	+0.0386	-0.0035
3	472.2263	508.1628	97.0884	472.2074	508.1958	97.0841	-0.0189	+0.0330	-0.0043
4	472.5923	508.7909	97.0903	472.5773	508.8235	97.0849	-0.0150	+0.0326	-0.0059
5	472.9195	509.3560	97.0897	472.9068	509.3892	97.0820	-0.0127	+0.0332	-0.0077
6	473.5117	509.0158	97.0905	473.5021	509.0539	97.0912	-0.0096	+0.0381	-0.0073
7	474.1076	508.6582	97.0955	474.0991	508.7012	97.0892	-0.0085	+0.0430	-0.0063
8	473.7604	508.0548	97.0905	473.7494	508.0979	97.0862	-0.0110	+0.0431	-0.0043

Center of Charge X = 475.0809 Y = 497.6579

CONFIDENTIAL
SECURITY INFORMATION

FIGURE 7

CONFIDENTIAL SECURITY INFORMATION
SUPPLEMENTAL SKEN STRUCTURE PROGRAM



Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

SUMMARY SURVEY DATA

Data supplied by U. S.
 Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	479.1262	506.0791	97.1000	479.1429	506.1279	97.1020	+0.0167	+0.0488	+0.0020
2	478.8340	506.6989	97.0966	478.8460	506.7451	97.0992	+0.0120	+0.0472	+0.0026
3	478.5524	507.3214	97.0955	478.5579	507.3686	97.0990	+0.0055	+0.0472	+0.0035
4	479.2262	507.6354	97.0931	479.2348	507.6743	97.0950	+0.0086	+0.0389	+0.0019
5	479.7962	507.9284	97.0964	479.8086	507.9633	97.0971	+0.0124	+0.0349	+0.0007
6	480.0932	507.2860	97.0971	480.1092	507.3220	97.0976	+0.0160	+0.0360	+0.0005
7	480.3706	506.6629	97.1040	480.3993	506.6996	97.1044	+0.0287	+0.0367	+0.0004
8	479.7207	506.3570	97.1021	479.7402	506.4016	97.1033	+0.0195	+0.0446	+0.0012

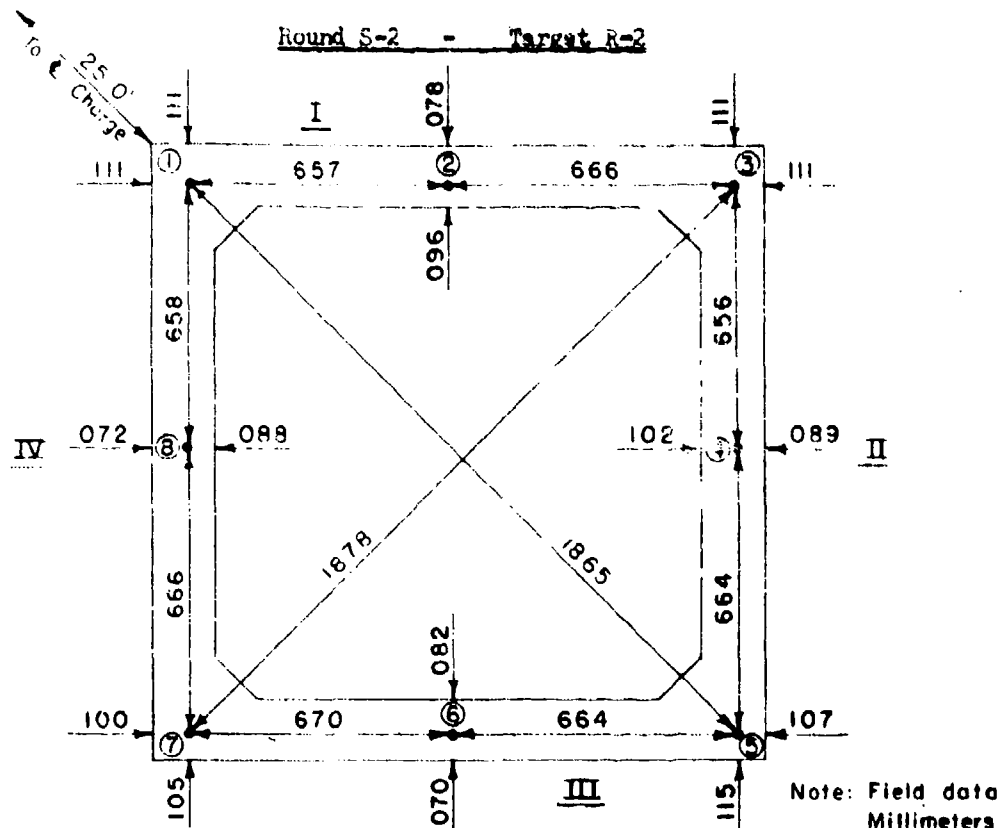
Center of Charge X = 478.0809 Y = 497.6579

CONFIDENTIAL
 SECURITY INFORMATION

LINE 10

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SKEW STRUCTURE PROGRAM



SUMMARY SURVEY DATA

Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

Data supplied by U. S.
 Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	Coord. Meters	Coord. Meters	Elev. Meters	Coord. Meters	Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	482.4277	502.1252	97.0837	482.4579	502.1172	97.0878	+0.0302	-0.0080	+0.0041
2	482.5061	502.7786	97.0942	482.5126	502.7726	97.108	+0.0065	-0.0060	+0.0066
3	482.6591	503.4268	97.1049	482.6499	503.4266	97.1144	-0.0092	-0.0002	+0.0095
4	483.3114	503.3462	97.1054	483.3026	503.3361	97.1144	-0.0088	-0.0101	+0.0090
5	483.9567	503.1945	97.1026	483.9464	503.1737	97.1134	-0.0103	-0.0208	+0.0109
6	483.8853	502.5333	97.0807	483.8962	502.5157	97.0944	+0.0109	-0.0176	+0.0077
7	483.7258	501.8806	97.0827	483.7578	501.8566	97.0848	+0.0320	-0.0240	+0.0021
8	483.0651	501.9606	97.0791	483.0987	501.9501	97.0822	+0.0336	-0.0105	+0.0031

Center of Charge X = 476.0809 Y = 497.6579

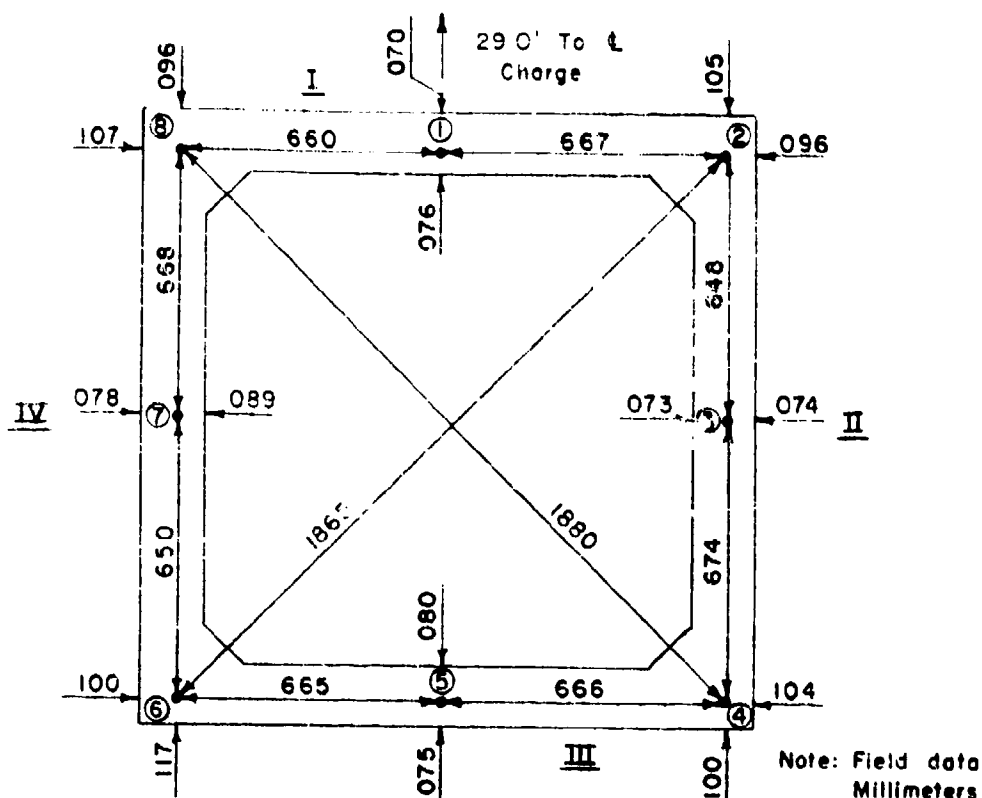
CONFIDENTIAL
 SECURITY INFORMATION

FIGURE 9

CONFIDENTIAL SECURITY INFORMATION

DIFFERENTIAL SURVEILLANCE PROGRAM

Round 3-2 - Target A-1



SUMMARY SURVEY DATA

Station "A" - X=500 & Y=500
Azimuth "A" - 0° - 00' - 00"
= Y Ordinate

Data supplied by U. S.
Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	485.0020	497.6768	97.0908	485.0606	497.6655	97.0883	+0.0586	-0.0113	-0.0025
2	485.0219	497.6438	97.0883	485.0805	498.3330	97.0842	+0.0586	-0.0108	+0.0004
3	485.0204	497.3753	97.0837	485.7281	498.3659	97.0818	+0.0417	-0.0094	+0.0011
4	485.0901	497.3555	97.0805	485.4076	498.3467	97.0812	+0.0522	-0.0088	+0.0008
5	485.0900	497.2901	97.0891	486.1311	497.6807	97.0867	+0.0511	-0.0097	-0.0024
6	485.0900	497.6216	97.0901	486.4021	497.6151	97.0852	+0.0556	-0.0092	-0.0014
7	485.0900	497.6910	97.0913	485.7537	497.6816	97.0857	+0.0565	-0.0121	-0.0056
8	485.0900	497.6166	97.0910	485.9837	497.0045	97.0883	+0.0560	-0.0121	-0.0057

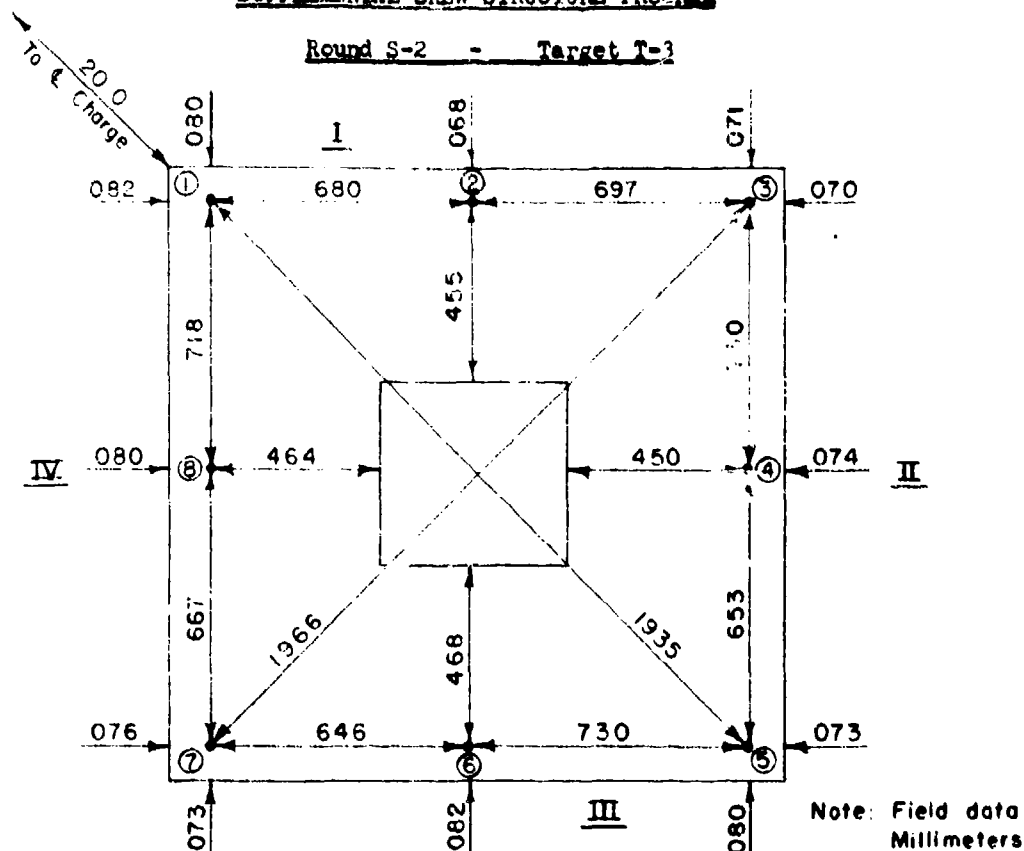
Center of Charge X = 485.0809 Y = 497.6579

CONFIDENTIAL
SECURITY INFORMATION

FIGURE 10

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SKEW STRUCTURE PROGRAM



SUMMARY SURVEY DATA

Station "C" - X=500 & Y=500
Azimuth "A" - 0° - 00' - 00"
= Y Ordinate

Data supplied by U. S.
Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	481.1724	494.1224	97.0832	481.2903	494.5427	97.2457	+0.1179	-0.0807	+0.1725
2	481.8396	494.2528	97.0860	481.9560	494.1757	97.2048	+0.1164	-0.0771	+0.1188
3	482.5246	494.3733	97.0830	482.6404	494.3003	97.1453	+0.1158	-0.0730	+0.0623
4	482.6434	493.6544	97.0908	482.7597	493.5811	97.1074	+0.1143	-0.0733	+0.0166
5	482.7571	493.0101	97.0942	482.8701	492.9385	97.0694	+0.1130	-0.0716	-0.0248
6	482.0357	492.8832	97.0912	482.1531	492.8079	97.1248	+0.1174	-0.0753	+0.0326
7	481.4039	492.7581	97.0860	481.5210	492.6796	97.1705	+0.1171	-0.0785	+0.0845
8	481.2915	493.4151	97.0838	481.4111	493.3368	97.2110	+0.1196	-0.0783	+0.1272

Center of Charge X = 476.0809 Y = 497.6579

CONFIDENTIAL
SECURITY INFORMATION

FIGURE 11

SUPPLEMENTAL SKEW STRUCTURE PROGRAM

SUPPLEMENTAL SKEW STRUCTURE PROGRAM

Round S-2 - Target T-2

The diagram shows a square structure with a central square and four quadrants labeled I, II, III, and IV. The central square has a diagonal cross. Dimensions are given in feet (ft) and inches (in). Weights are given in pounds (lb).

Dimensions and Weights:

- Top-left corner: 075 (ft) vertical, 080 (ft) horizontal, 080 (ft) diagonal, 200 (ft) diagonal arrow labeled "To Charge".
- Top-right corner: 080 (ft) vertical, 082 (ft) horizontal, 074 (ft) diagonal.
- Bottom-right corner: 076 (ft) vertical, 077 (ft) horizontal, 074 (ft) diagonal.
- Bottom-left corner: 069 (ft) vertical, 075 (ft) horizontal, 069 (ft) diagonal.
- Central square: 480 (ft) vertical, 440 (ft) horizontal, 490 (ft) diagonal.
- Quadrant I (top-left): 687 (ft) vertical, 683 (ft) horizontal, 1946 (ft) diagonal.
- Quadrant II (top-right): 683 (ft) vertical, 687 (ft) horizontal, 1943 (ft) diagonal.
- Quadrant III (bottom-right): 693 (ft) vertical, 693 (ft) horizontal, 1946 (ft) diagonal.
- Quadrant IV (bottom-left): 685 (ft) vertical, 689 (ft) horizontal, 1943 (ft) diagonal.

Note: Fi
M

Station "C" - X=500 & Y=500
Azimuth "A" - 0° - 00' - 00"
= Y Ordinate

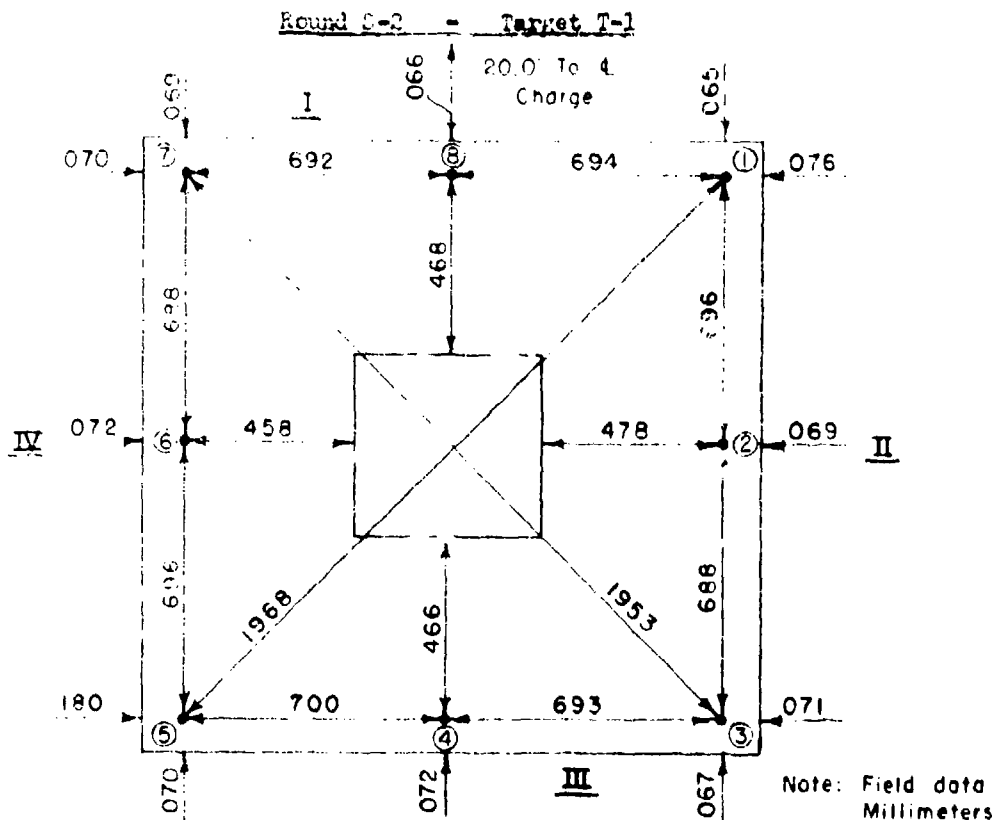
Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	478.9187	491.7362	97.0984	479.0069	491.6340	97.2413	+0.0882	-0.1022	+0.1429
2	479.5907	491.6204	97.1094	479.6765	491.5054	97.2013	+0.0858	-0.1150	+0.0959
3	479.4830	490.9357	97.0998	479.5499	490.8263	97.1362	+0.0669	-0.1094	+0.0364
4	479.3706	490.2702	97.0939	479.4202	490.1661	97.0727	+0.0496	-0.1041	-0.0212
5	478.6862	490.3778	97.0922	478.7393	490.2876	97.1172	+0.0531	-0.0902	+0.0250
6	478.0038	490.4943	97.0876	478.0590	490.4155	97.1597	+0.0552	-0.0788	+0.0721
7	478.1156	491.1707	97.0865	478.1890	491.0862	97.2174	+0.0724	-0.0045	+0.1309
8	478.2385	491.8489	97.0883	478.3305	491.7610	97.2776	+0.0920	-0.0879	+0.1893

CONFIDENTIAL
SECURITY INFORMATION

FIGURE 12

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SKEW STRUCTURE PROGRAM



SUMMARY SURVEY DATA

Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

Data supplied by U. S.
 Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	475.1655	491.5091	97.0963	475.2182	491.3657	97.2314	+0.0527	-0.1434	+0.1351
2	474.9880	490.8362	97.0986	475.0201	490.7019	97.1656	+0.0321	-0.1343	+0.0670
3	474.8078	490.1732	97.0957	474.8180	490.0467	97.0972	+0.0102	-0.1265	+0.0015
4	474.1370	490.3449	97.0977	474.1525	490.2382	97.1136	+0.0155	-0.1067	+0.0159
5	473.4619	490.5284	97.0954	473.4830	490.4399	97.1271	+0.0211	-0.0885	+0.0317
6	473.6460	491.1994	97.0989	473.6847	491.1028	97.1958	+0.0387	-0.0966	+0.0968
7	473.8280	491.8631	97.0995	473.8843	491.7585	97.2616	+0.0563	-0.1046	+0.1621
8	474.4979	491.6882	97.0991	474.5513	491.5630	97.2560	+0.0634	-0.1252	+0.1569

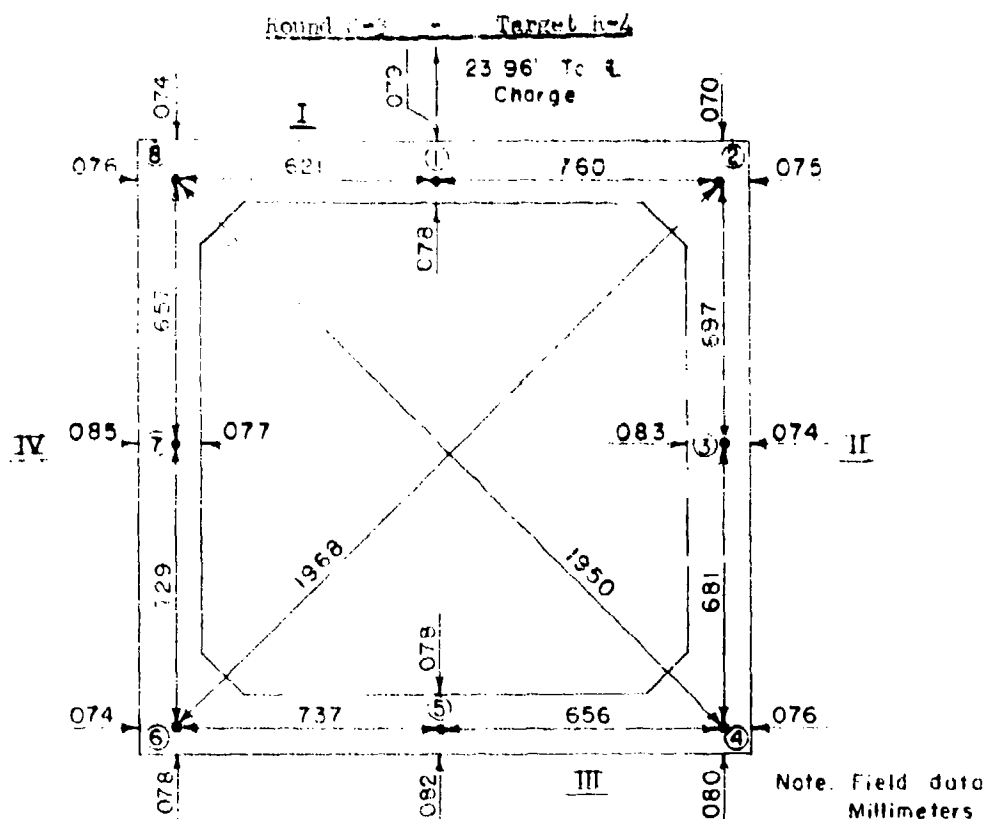
Center of Charge X = 476.0809 Y = 497.6579

CONFIDENTIAL
 SECURITY INFORMATION

FIGURE 17

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SLOW STRUCTURE PROGRAM



SUMMARY SURVEY DATA

Station "C" - A-500 & Y-500
Azimuth "A" - 0° - 00' - 00"
- Y Ordinate

Data supplied by U. S.
Coast & Geodetic Survey

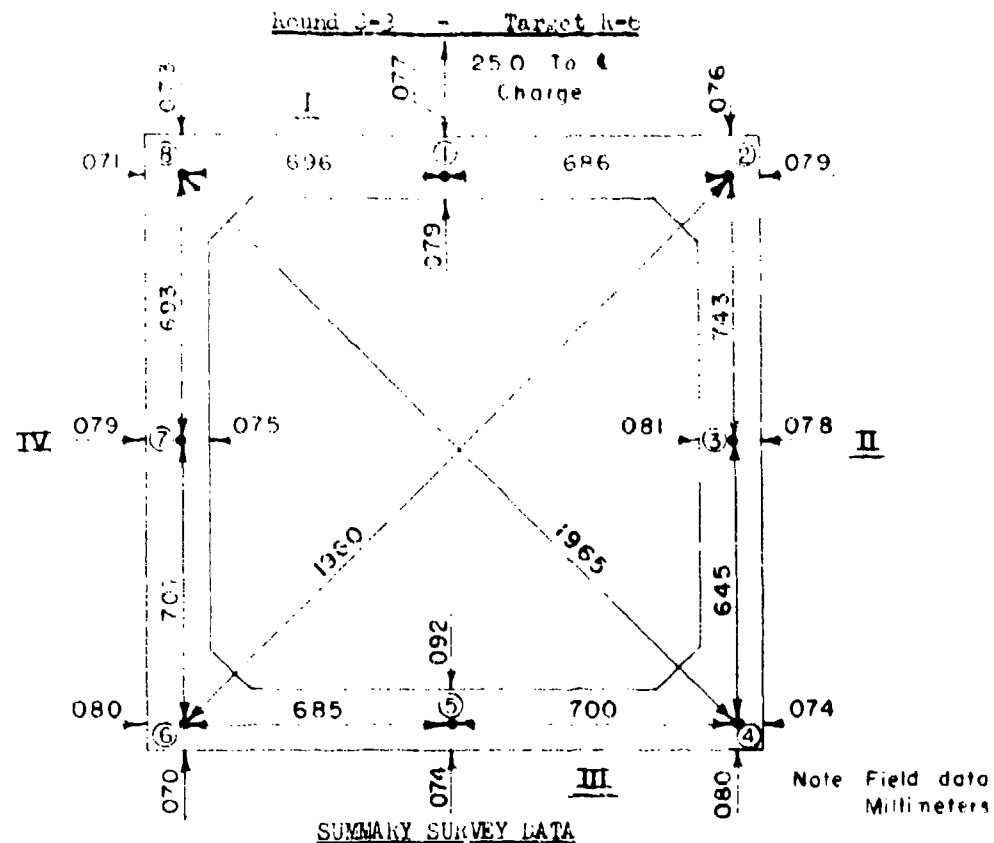
Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	477.7766	503.5277	97.6241	477.8082	503.7532	97.6523	+0.0316	+0.2261	+0.0282
2	477.0276	503.6495	97.6241	477.0503	503.5593	97.6196	+0.0227	+0.2103	+0.0255
3	477.1439	504.3368	97.6261	477.1581	504.5492	97.6506	+0.0142	+0.2124	+0.0245
4	477.2620	505.0104	97.6354	477.2814	505.2220	97.6586	+0.0194	+0.2116	+0.0232
5	477.9074	504.9015	97.6331	477.9270	505.0979	97.6596	+0.0196	+0.1964	+0.0265
6	478.6369	504.7638	97.6354	478.6607	505.0001	97.6636	+0.0238	+0.2163	+0.0282
7	478.4976	504.0669	97.6311	478.5306	504.2812	97.6609	+0.0330	+0.2143	+0.0298
8	478.2913	503.4189	97.6238	478.4124	503.6311	97.6548	+0.0271	+0.2122	+0.0310

Center of Charge X = 475.3817 Y = 495.9499

CONFIDENTIAL
SECURITY INFORMATION

U. S. G. S.

CONFIDENTIAL SECURITY INFORMATION
SUPPLEMENTAL ORIGIN TARGETING PROGRAM



Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

Data supplied by U. S.
 Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. meters
1	484.0712	495.9713	97.6144	484.1987	495.9902	97.6496	+0.1275	+0.0189	+0.0352
2	484.0653	496.6564	97.6091	484.1716	496.6784	97.6439	+0.1063	+0.0220	+0.0348
3	484.8061	496.6659	97.6134	484.9152	496.6938	97.6386	+0.1091	+0.0279	+0.0252
4	485.4531	496.6748	97.6188	485.5619	496.6975	97.6349	+0.1088	+0.0227	+0.0161
5	485.4669	495.9743	97.6218	485.5646	495.9955	97.6396	+0.0977	+0.0212	+0.0176
6	485.4684	495.2899	97.6351	485.5743	495.3099	97.6346	+0.1059	+0.0200	+0.0195
7	484.7668	495.2827	97.6298	484.8732	495.2953	97.6566	+0.1064	+0.0126	+0.0268
8	484.0736	495.2738	97.6251	484.1768	495.2922	97.6629	+0.1032	+0.0184	+0.0378

Center of Charge X = 470.3817 Y = 495.9499

CONFIDENTIAL
 SECURITY INFORMATION

FIGURE 15

SUPPLEMENTAL OPEN STRUCTURE PROGRAM

Round C-1 - Target N-7

To & Charge

I
676
696
690
076
075
079
070
091

II
090
075
643
071

III
642
752
071
070

IV
076
080
705
074
074

1365
1970

Note. Field data
Millimeters

SUMMARY SURVEY DATA

Data supplied by U. S.
Coast & Geodetic Survey

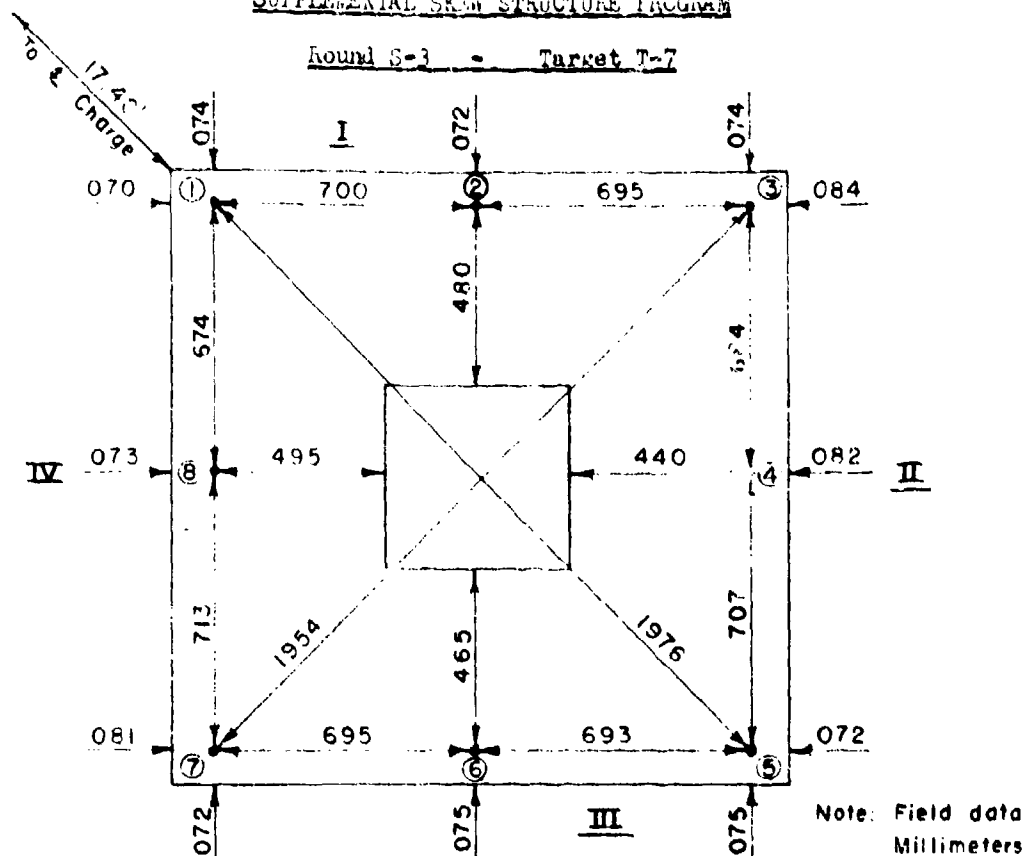
Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	482.0792	500.7538	97.6221	482.2323	500.8669	97.6706	+0.1531	+0.1131	+0.0485
2	482.3152	501.3875	97.6128	482.4196	501.5175	97.6536	+0.1044	+0.1300	+0.0408
3	482.5500	502.0420	97.6081	482.6324	502.1878	97.6409	+0.0824	+0.1458	+0.0328
4	483.2674	501.7899	97.6174	483.3293	501.8856	97.6446	+0.0619	+0.0957	+0.0272
5	483.8720	501.5684	97.6204	483.9344	501.6555	97.6416	+0.0624	+0.0871	+0.0212
6	483.6152	500.8632	97.6231	Destroyed by Explosion					
7	483.3856	500.2640	97.6334	483.5256	500.3466	97.6706	+0.1500	+0.0826	+0.0372
8	482.7243	500.5087	97.6254	482.8819	500.6344	97.6676	+0.1656	+0.1257	+0.0422

Center of Charge X = 476.3817 Y = 495.9499

CONFIDENTIAL
SECURITY INFORMATION

1732 16

CONFIDENTIAL SECURITY INFORMATION
SUPPLEMENTAL SKM STRUCTURE PROGRAM



SUMMARY SURVEY DATA

Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

Data supplied by U. S.
 Coast & Geodetic Survey

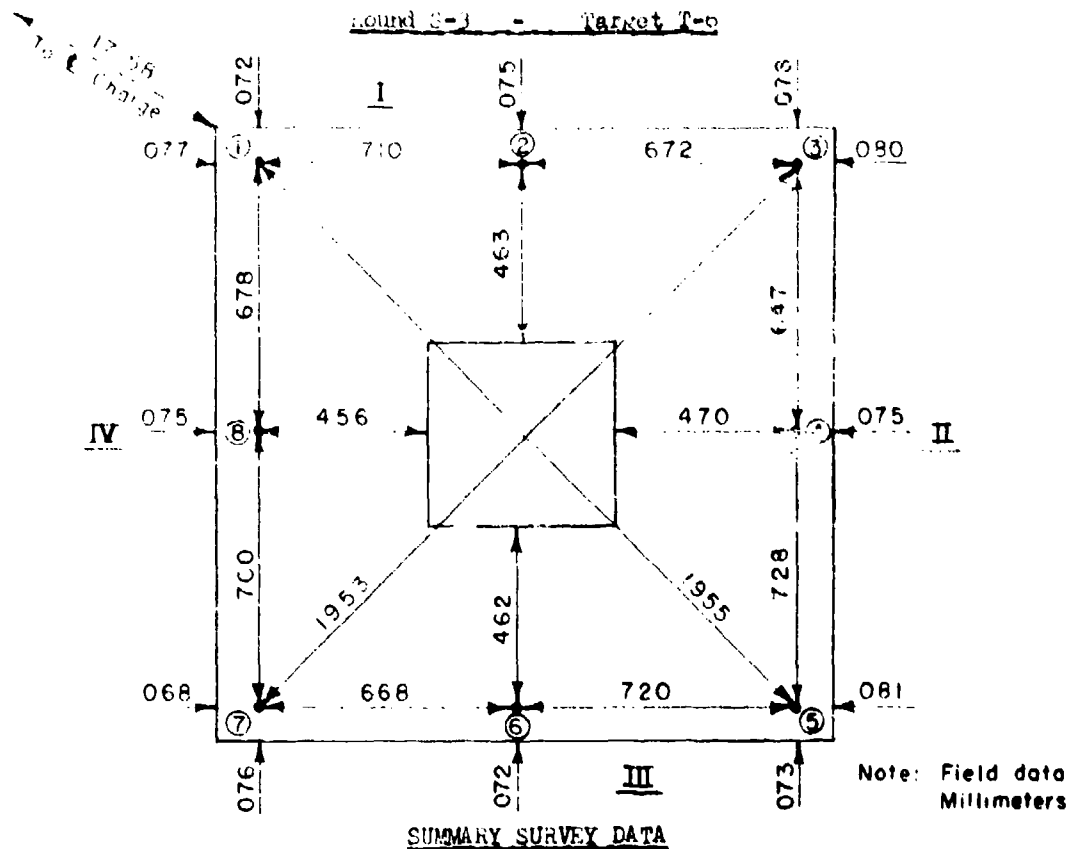
Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	480.5261	492.4586	97.6364	480.7784	492.2393	97.7203	+0.2523	-0.1693	+0.1439
2	481.2215	492.5258	97.6371	481.4737	492.3650	97.7483	+0.2522	-0.1608	+0.1112
3	481.9139	492.5814	97.6388	482.1664	492.4280	97.7158	+0.2525	-0.1534	+0.0770
4	481.9796	491.9005	97.6388	482.2367	491.7445	97.6996	+0.2571	-0.1560	+0.0608
5	482.0473	491.1968	97.6371	482.2841	491.0398	97.6816	+0.2368	-0.1570	+0.0445
6	481.3592	491.1326	97.6331	Destroyed by explosion					
7	480.6648	491.0792	97.6328	480.9037	490.9076	97.7329	+0.2389	-0.1716	+0.1001
8	480.5904	491.7876	97.6318	480.8364	491.6176	97.7549	+0.2460	-0.1700	+0.1231

Center of Charge X = 476.3817 Y = 495.9499

CONFIDENTIAL
 SECURITY INFORMATION

FIGURE 17

CONFIDENTIAL SECURITY INFORMATION
SUPPLEMENTAL CHARGE STRUCTURE PROGRAM



Station "C" - X=500 & Y=500
Azimuth "A" - 0° - 00' - 00"
= Y Ordinate

Data supplied by U. S.
Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	477.3255	490.0610	97.6301	477.3129	489.8253	97.7666	+0.0126	-0.2657	+0.1285
2	477.7814	490.0164	97.6388	477.7035	489.7772	97.7486	+0.0221	-0.2392	+0.1098
3	478.2097	489.4976	97.6398	478.2376	489.2638	97.7293	+0.0279	-0.2338	+0.0895
4	477.7138	489.0773	97.6421	477.7474	488.8389	97.7126	+0.0316	-0.2384	+0.0705
5	477.1531	488.6150	97.6374	477.1387	488.3686	97.6846	+0.0356	-0.2464	+0.0472
6	476.6876	489.1645	97.6431	476.7053	488.9007	97.7036	+0.0157	-0.2638	+0.0605
7	476.2654	489.6801	97.6431	476.2585	489.4002	97.7196	+0.0069	-0.2799	+0.0705
8	476.8234	490.1828	97.6401	476.8043	489.8443	97.7516	+0.0011	-0.2815	+0.1115

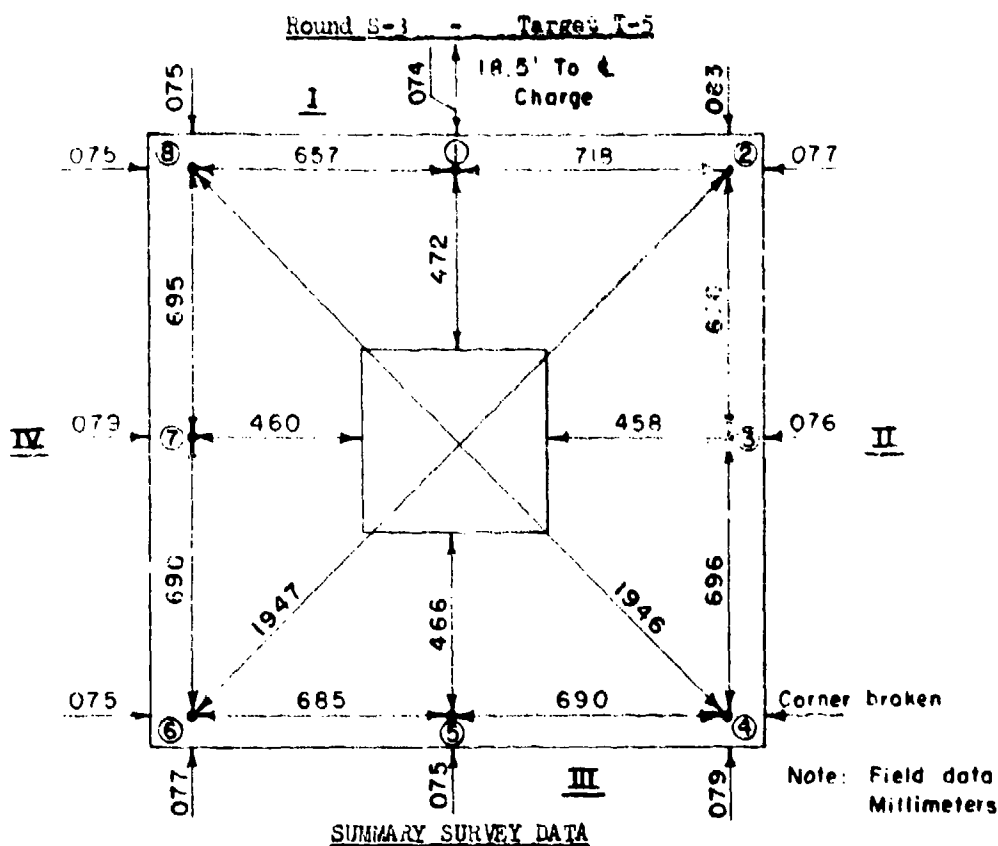
Center of Charge X = 476.3817 Y = 495.9499

CONFIDENTIAL
SECURITY INFORMATION

FIGURE 19

CONFIDENTIAL SECURITY INFORMATION

SUPPLEMENTAL SKEW STRUCTURE PROGRAM



Station "C" - X=500 & Y=500
 Azimuth "A" - 0° - 00' - 00"
 = Y Ordinate

Data supplied by U. S.
 Coast & Geodetic Survey

Point	BEFORE DETONATION			AFTER DETONATION			DISPLACEMENT		
	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Coord. Meters	Y Coord. Meters	Elev. Meters	X Meters	Y Meters	Elev. Meters
1	473.5182	491.0035	97.6341	473.3401	490.7509	97.7617	-0.1781	-0.2666	+0.1272
2	474.1390	490.6408	97.6321	473.9735	490.3821	97.7313	-0.1655	-0.2587	+0.0992
3	473.8062	490.0519	97.6321	473.6399	489.7928	97.7066	-0.1663	-0.2591	+0.0745
4	473.4584	489.4460	97.6314	473.2934	489.1899	97.6839	-0.1650	-0.2561	+0.1525
5	472.8576	489.7837	97.6314	472.6895	489.5241	97.6876	-0.1681	-0.2596	+0.0562
6	472.2614	490.1204	97.6311	472.0877	489.8599	97.6866	-0.1737	-0.2605	+0.0555
7	472.6050	490.7200	97.6338	472.4266	490.4606	97.7126	-0.1784	-0.2594	+0.0788
8	472.9478	491.3255	97.6391	Destroyed by explosion					

Center of Charge X = 476.3817 Y = 495.9499

CONFIDENTIAL
 SECURITY INFORMATION

FIGURE 12



SUPPLEMENTARY SKID STRUTCHES PROGRAM

TARGET MOVEMENTS

RELATIVE TO CENTER LINE OF CHARGE

ROUND S-2

<u>Structure</u>	<u>Type</u>	<u>Radius Feet</u>	<u>Radius Scale $\frac{\lambda}{\lambda}$</u>	<u>Skew Angle Degrees</u>	<u>Rivet No.</u>	<u>Radial + = Out</u>	<u>Movements - Feet</u>	
							<u>Tang.</u> + = CW	<u>Vert.</u> + = Up
R-5	Open Box	33	2.42	45	1	+ 0.144	+ 0.007	- 0.010
					2	+ 0.132	+ 0.002	- 0.011
					3	+ 0.123	- 0.021	- 0.14
					4	+ 0.117	- 0.015	- 0.19
					5	+ 0.116	- 0.012	- 0.25
					6	+ 0.129	- 0.032	- 0.24
					7	+ 0.144	- 0.001	- 0.21
					8	+ 0.146	- 0.005	- 0.14
R-3	Open Box	29	2.12	45	1	+ 0.169	- 0.003	+ 0.007
					2	+ 0.160	- 0.008	- 0.009
					3	+ 0.155	- 0.021	- 0.011
					4	+ 0.130	- 0.011	+ 0.006
					5	+ 0.121	- 0.001	+ 0.002
					6	+ 0.129	- 0.003	- 0.002
					7	+ 0.141	+ 0.017	+ 0.001
					8	+ 0.160	+ 0.003	- 0.004
R-2	Open Box	25	1.83	45	1	+ 0.046	+ 0.079	+ 0.013
					2	+ 0.044	+ 0.029	+ 0.022
					3	- 0.023	- 0.019	+ 0.031
					4	- 0.043	+ 0.008	+ 0.030
					5	- 0.067	+ 0.036	+ 0.035
					6	- 0.000	+ 0.068	+ 0.015
					7	+ 0.054	+ 0.120	+ 0.007
					8	+ 0.076	+ 0.087	+ 0.010
R-1	Open Box	29	2.12	Zero	1	+ 0.192	+ 0.037	- 0.008
					2	+ 0.170	+ 0.049	+ 0.003
					3	+ 0.157	+ 0.044	+ 0.004
					4	+ 0.159	+ 0.040	+ 0.003
					5	+ 0.168	+ 0.037	- 0.008
					6	+ 0.184	+ 0.019	- 0.016

R-1	Open Box	25	1.83	45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</
-----	----------	----	------	----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----

Note: Radius = Distance from center-line of charge to closest point on the target
 Radius Scale - λ = Radius λ (Weight of Charge) $-1/3$
 CW = Clockwise movement

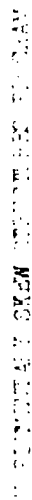
SUPPLEMENTARY SKEW STRUCTURES PROGRAMTARGET MOVEMENTSRELATIVE TO CENTER LINE OF CHARGEROUND S-3

<u>Structure</u>	<u>Type</u>	<u>Radius Feet</u>	<u>Radius Scale λ</u>	<u>Skew Angle Degrees</u>	<u>Rivet No.</u>	<u>Radial + = Out</u>	<u>Movements - Feet</u>	
							<u>+ = CW</u>	<u>+ = Up</u>
R-4	Open Box	23.96	1.75	Zero	1	+ 0.748	- 0.032	+ 0.093
					2	+ 0.694	+ 0.016	+ 0.084
					3	+ 0.698	- 0.017	+ 0.080
					4	+ 0.697	- 0.004	+ 0.076
					5	+ 0.646	- 0.045	+ 0.087
					6	+ 0.707	- 0.100	+ 0.093
					7	+ 0.708	- 0.073	+ 0.098
					8	+ 0.696	- 0.095	+ 0.102
R-7	Open Box	24.08	1.76	30	1	+ 0.623	+ 0.040	+ 0.159
					2	+ 0.544	- 0.083	+ 0.134
					3	+ 0.529	- 0.150	+ 0.108
					4	+ 0.358	- 0.108	+ 0.089
					5	+ 0.335	- 0.106	+ 0.070
					6	Destroyed by detonation		
					7	+ 0.561	+ 0.027	+ 0.122
					8	+ 0.682	- 0.018	+ 0.138
R-6	Open Box	25.00	1.83	Zero	1	+ 0.449	- 0.061	+ 0.115
					2	+ 0.354	- 0.040	+ 0.114
					3	+ 0.364	- 0.061	+ 0.083
					4	+ 0.362	- 0.046	+ 0.053
					5	+ 0.321	- 0.069	+ 0.058
					6	+ 0.342	- 0.091	+ 0.064
					7	+ 0.345	- 0.069	+ 0.088
					8	+ 0.332	- 0.090	+ 0.124
T-7	Hollow Cube	17.46	1.28	45	1	+ 0.225	- 0.258	+ 0.472
					2	+ 0.271	- 0.208	+ 0.365
					3	+ 0.446	- 0.861	+ 0.253
					4	+ 0.372	- 0.901	+ 0.199



R-7	Open Box	24.08	1.76	30	1	+ 0.623	+ 0.016	+ 0.084
					2	+ 0.541	- 0.017	+ 0.080
					3	+ 0.529	- 0.004	+ 0.076
					4	+ 0.358	- 0.045	+ 0.087
					5	+ 0.335	- 0.100	+ 0.093
					6	+ 0.335	- 0.073	+ 0.098
					7	+ 0.561	- 0.073	+ 0.098
					8	+ 0.682	- 0.095	+ 0.102
R-6	Open Box	25.00	1.83	Zero	1	+ 0.623	+ 0.040	+ 0.159
					2	+ 0.541	- 0.083	+ 0.134
					3	+ 0.529	- 0.150	+ 0.108
					4	+ 0.358	- 0.108	+ 0.089
					5	+ 0.335	- 0.106	+ 0.070
					6	Destroyed by detonation		
					7	+ 0.561	+ 0.027	+ 0.122
					8	+ 0.682	- 0.018	+ 0.138
T-7	Hollow Cube	17.46	1.28	45	1	+ 0.419	- 0.061	+ 0.115
					2	+ 0.354	- 0.040	+ 0.114
					3	+ 0.364	- 0.061	+ 0.083
					4	+ 0.362	- 0.046	+ 0.053
					5	+ 0.321	- 0.069	+ 0.058
					6	+ 0.342	- 0.091	+ 0.064
					7	+ 0.345	- 0.069	+ 0.088
					8	+ 0.332	- 0.090	+ 0.124
T-6	Hollow Cube	17.58	1.29	30	1	+ 0.275	- 0.058	+ 0.472
					2	+ 0.371	- 0.008	+ 0.365
					3	+ 0.446	- 0.061	+ 0.253
					4	+ 0.372	- 0.001	+ 0.199
					5	+ 0.264	- 0.094	+ 0.146
					6	Destroyed by detonation		
					7	+ 0.095	- 0.060	+ 0.328
					8	+ 0.182	- 0.064	+ 0.404
T-5	Hollow Cube	18.50	1.35	Zero	1	+ 0.866	+ 0.110	+ 0.422
					2	+ 0.737	+ 0.251	+ 0.360
					3	+ 0.713	+ 0.297	+ 0.294
					4	+ 0.748	+ 0.251	+ 0.231
					5	+ 0.792	- 0.201	+ 0.155
					6	+ 0.862	- 0.091	+ 0.198
					7	+ 0.918	+ 0.040	+ 0.251
					8	+ 0.921	+ 0.053	+ 0.366
T-5	Hollow Cube	18.50	1.35	Zero	1	+ 0.161	+ 0.944	+ 0.417
					2	+ 0.573	+ 0.830	+ 0.325
					3	+ 0.561	+ 0.840	+ 0.144
					4	+ 0.545	+ 0.838	+ 0.172
					5	+ 0.466	+ 0.901	+ 0.184
					6	+ 0.369	- 0.059	+ 0.182
					7	+ 0.347	- 0.073	+ 0.259
					8	Destroyed by detonation		

Note: Radius = Distance from center-line of charge to closest point on the target
 Radius Scale - λ = Radius X (Weight of Charge) $-1/3$
 CW = Clockwise movement



6
12
E
D
S
C
T
L

Target No.	Location	From	To	Range	Rel. W	Grace	Field %	Field Penalties - lbs. per Cu. Ft.		
								Det	Natural	Backfill
								Dry Weight		
								Before	After	After Blast
ROUND 2										
2-1	Center of Target	1.4		4.0			11.3	82.0	-	-
	" "	1.4		4.0			11.7	82.0	-	-
	" "	1.4		4.0			12.0	82.0	82.0	-
	Back "	4.0		4.0			11.0	82.0	-	82.0
10	" "	1.1		1.2			1.7	99.3	-	99.3
2-2	Center of Target	1.2		1.3			10.8	91.1	-	-
	" "	1.3		1.9			9.9	96.3	-	-
	" "	2.1		2.3			15.9	91.7	-	-
	In Front of Target	1.4		6.1			12.6	94.1	81.6	-
15	Back "	1.0		1.7			10.4	90.0	-	90.0
1-3	Center of Target	1.2		1.3			12.5	100.7	-	-
	" "	1.0		6.2			14.4	92.0	-	-
	In Front of Target	1.0		5.7			14.0	96.1	91.1	-
	Back "	4.0		4.6			13.2	94.0	-	94.0
2-5	Center of Target	1.0		1.3			9.1	112.2	-	-
	" "	1.0		1.1			17.1	9.3	-	-
	" "	1.0		1.0			11.0	9.7	-	99.3
	45' Back "	1.0		4.6			11.6	90.1	-	-
	In Front of Target	4.0		4.6			11.6	90.1	-	-
1-1	Center of Target	1.0		1.9			10.6	90.9	-	-
	" "	1.0		6.9			11.4	91.1	-	-
	Front "	4.0		4.7			11.9	101.8	89.1	-
	" "	1.0		1.0			10.8	96.1	86.7	-
	Back "	1.3		1.1			10.1	94.4	-	95.7
	Left "	4.0		4.6			7.0	91.7	-	95.0
1-2	Center of Target	1.3		1.9			9.7	97.4	-	-
	" "	1.0		6.9			10.1	90.1	-	-
	Front "	1.0		2.0			13.7	91.5	80.5	-
	" "	4.0		4.7			11.6	97.1	85.5	-
	Right "	4.0		4.0			10.3	99.2	-	99.2
15	Back "	1.0		1.0			10.9	91.7	-	91.7
1-3	Center of Target	1.3		1.9			9.3	95.6	-	-

[illegible]

3-0111



Targets prepared for detonation.



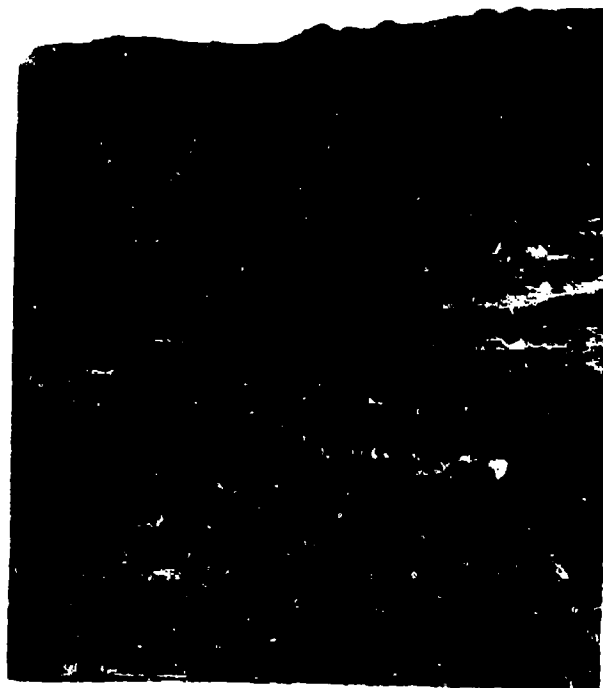
Crater.

Supplementary Skew Structures Program.
CONFIDENTIAL - SECURITY INFORMATION

Round 3-2
Photo No. 1



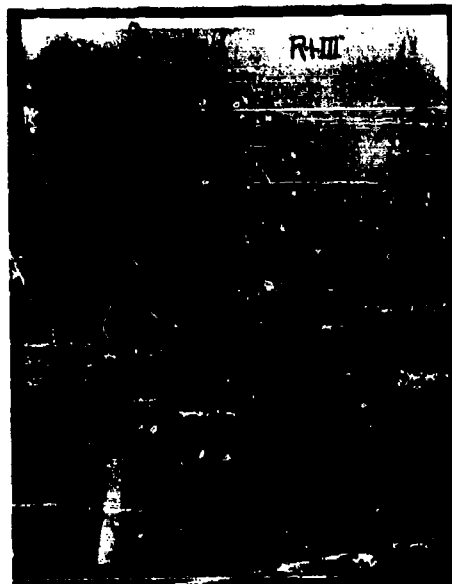
Detonation.



Crater.

Supplementary Slow Structures Program.
CONFIDENTIAL - SECURITY INFORMATION

Round 3-4
Photo 11. 11



R-1-IV
No Visible Cracks

1

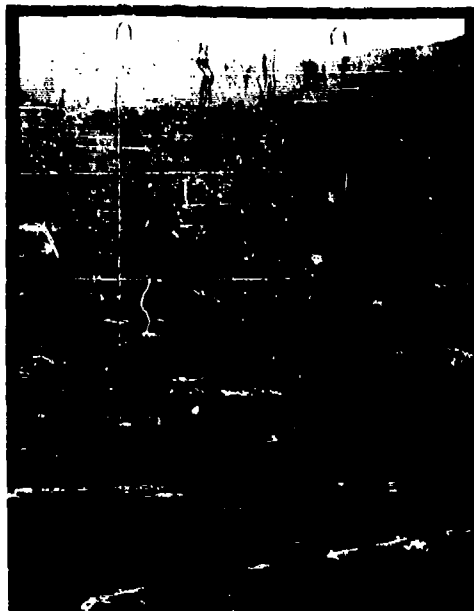


R-1-III
No Visible Cracks



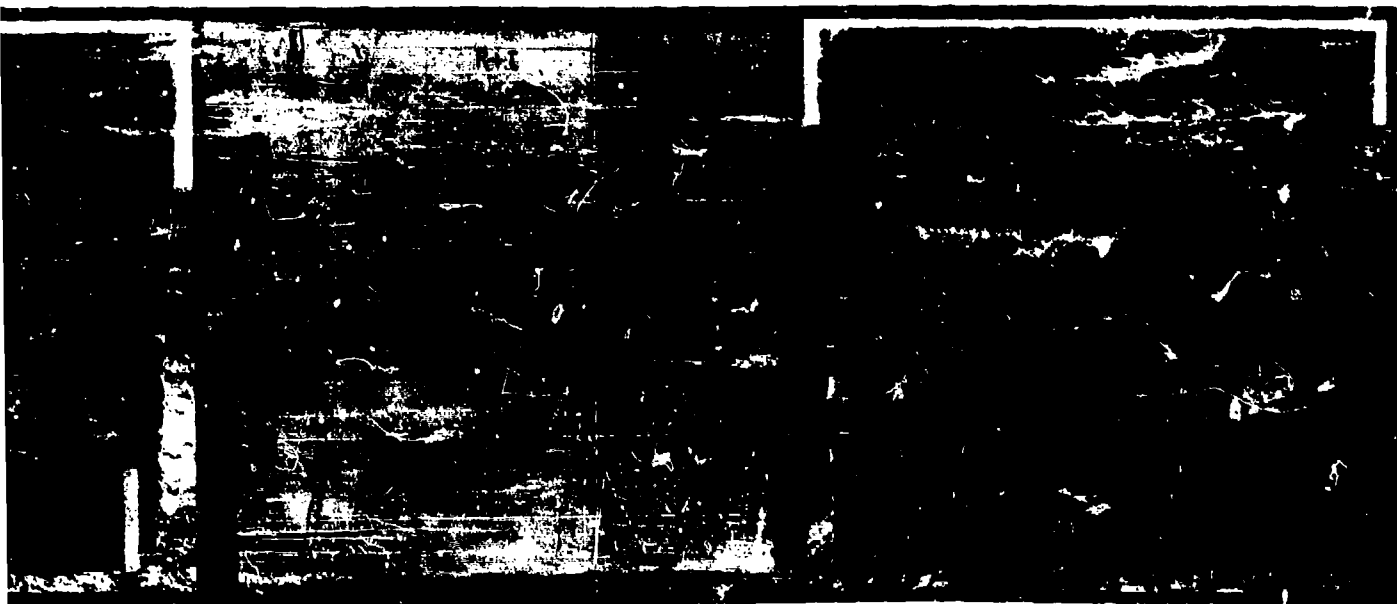
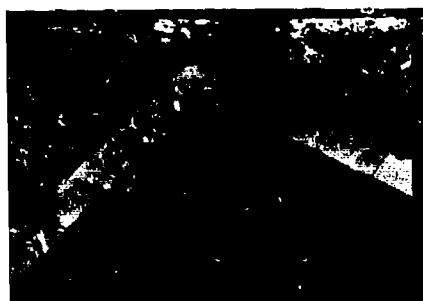
Supplementary Skin Structures Program.

R-1-IV
No Visible Cracks



R-1-II
No Visible Cracks

2

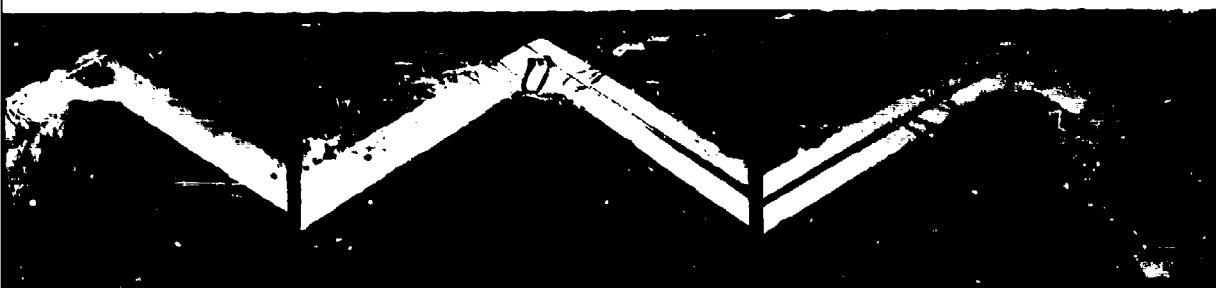


1





2

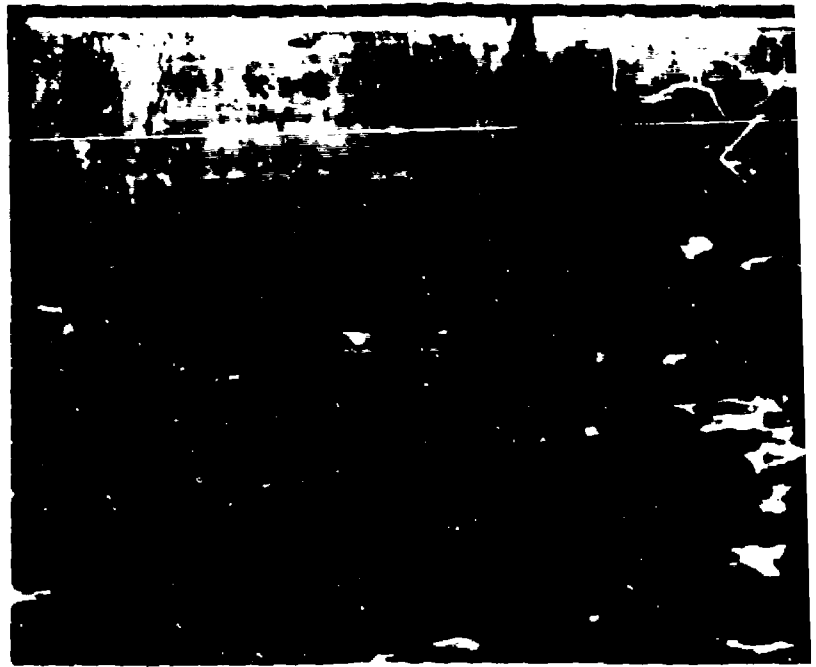


CONFIDENTIAL - SECURITY INFORMATION

CONFIDENTIAL - SECURITY INFORMATION
bound S-2 Target R-2 Photo No. 4

7

1



Supplement

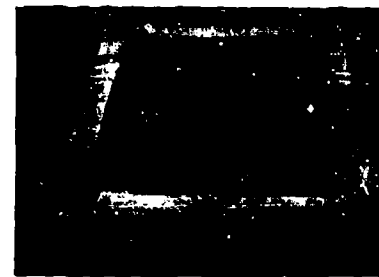
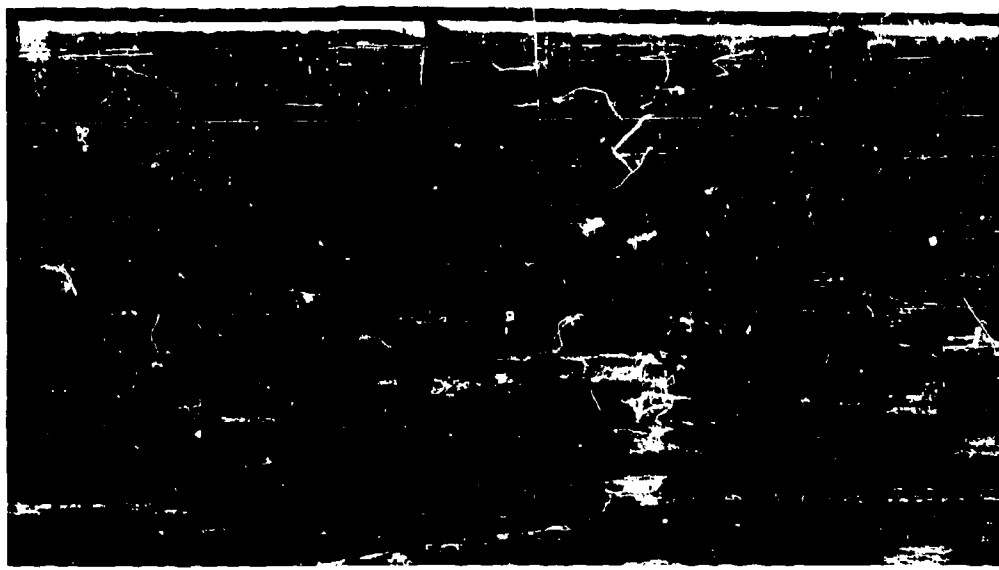
2



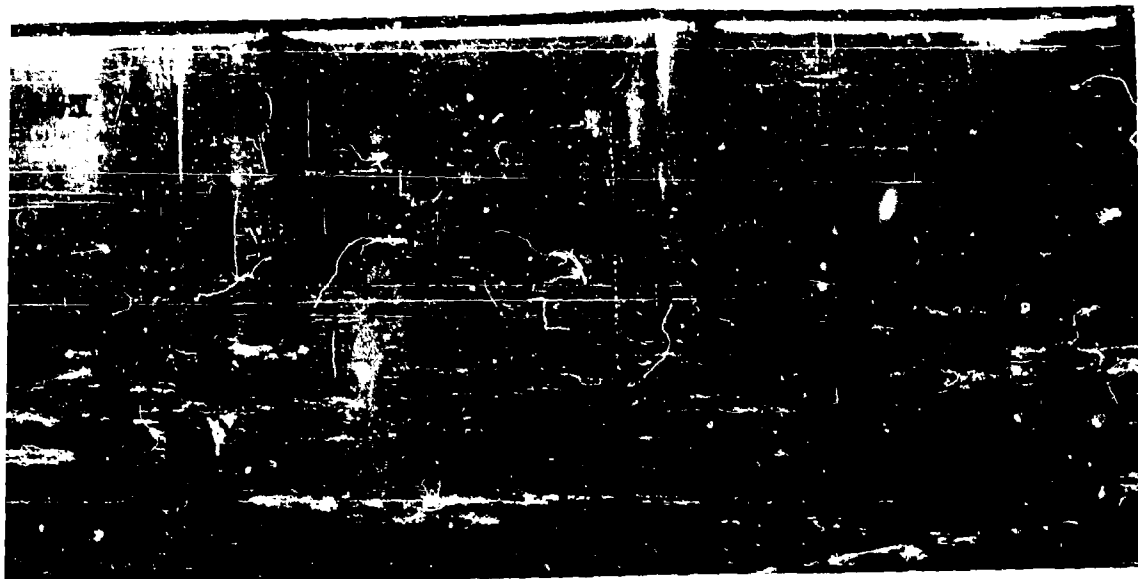
Supplemental Glow Structures Program.

CONFIDENTIAL - SECURITY INFORMATION
round S-2 target R-3 Photo No. 5

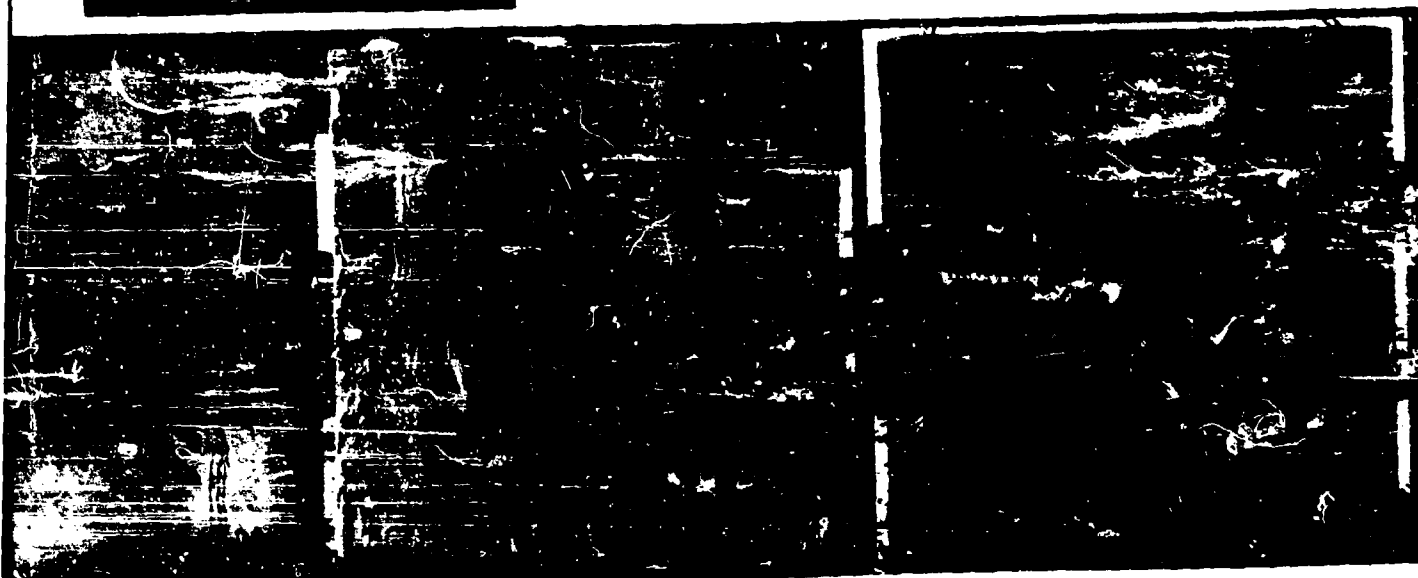
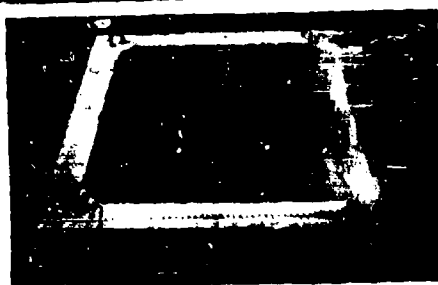
1



Supplementary Sheet of pictures for

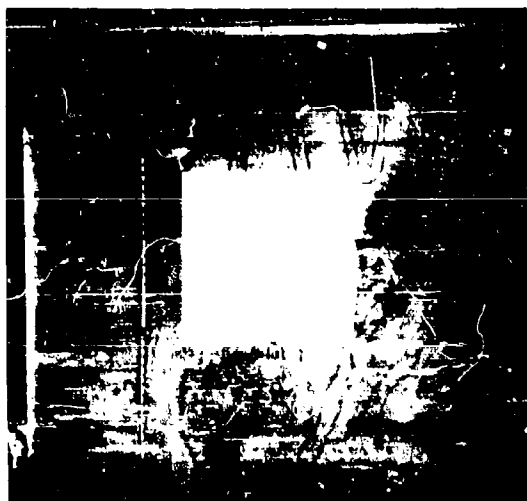


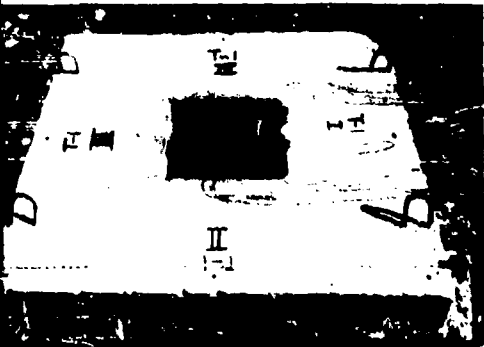
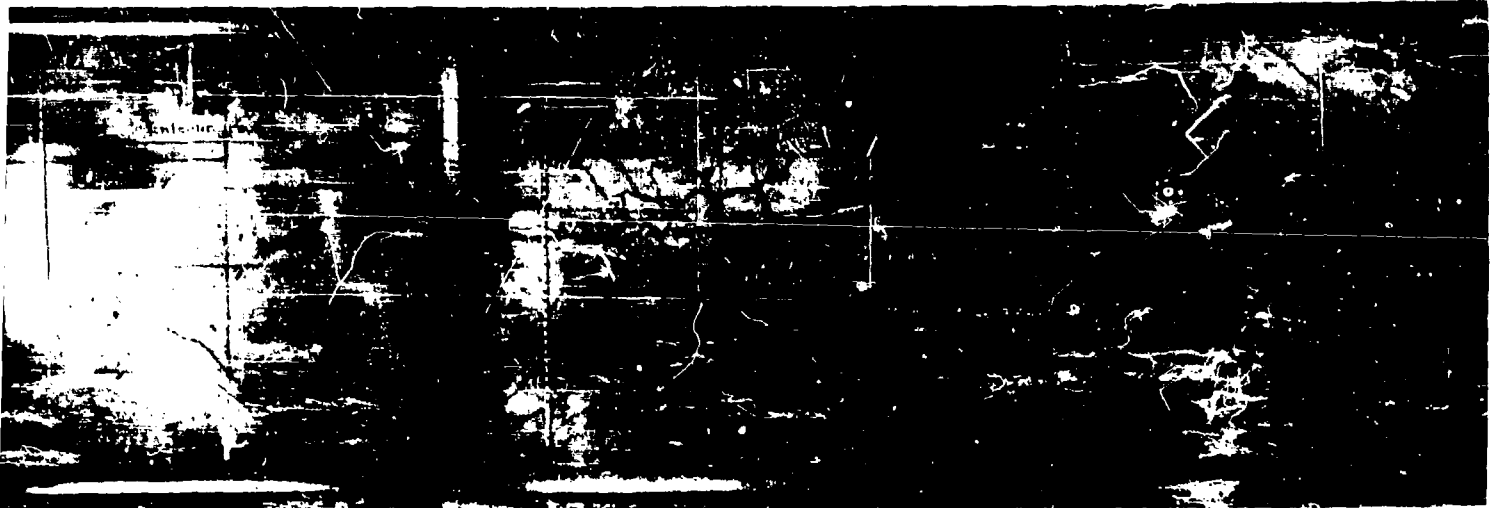
2



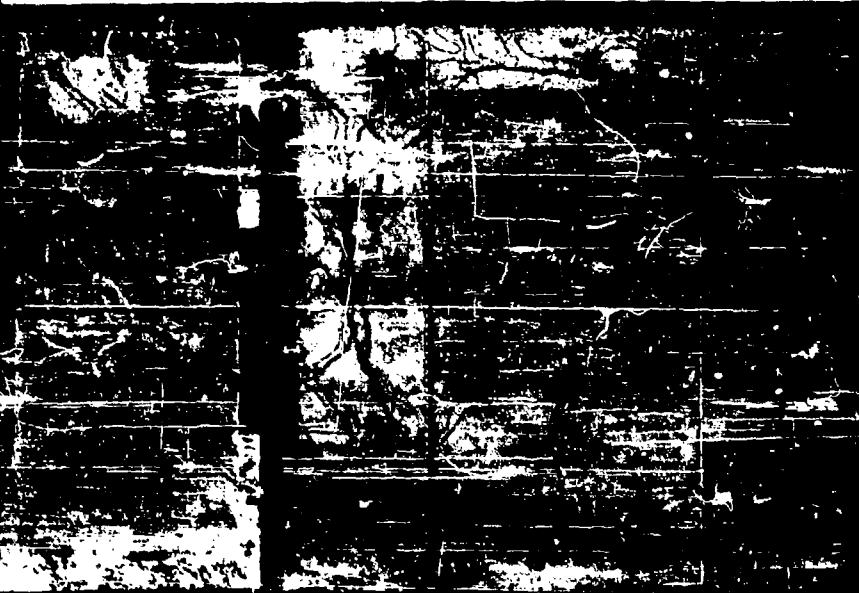
Supplementary to a document in a program.

CONFIDENTIAL - SECURITY INFORMATION
Revised 5-5-77 Target 10-5 10-10-77

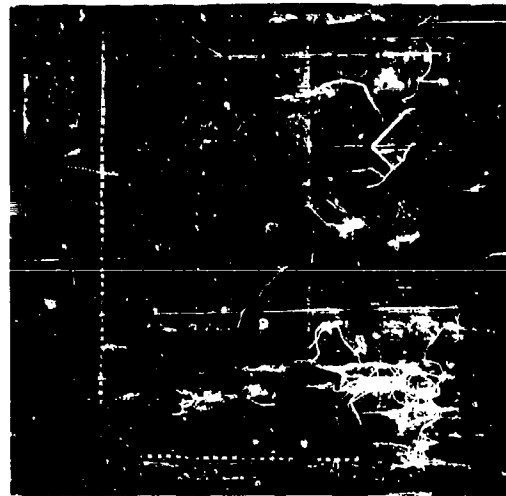
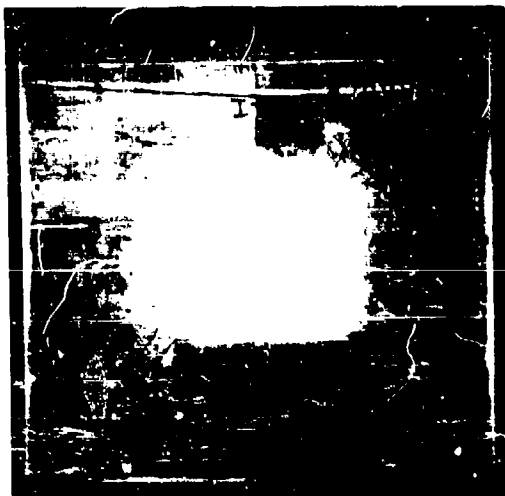




2

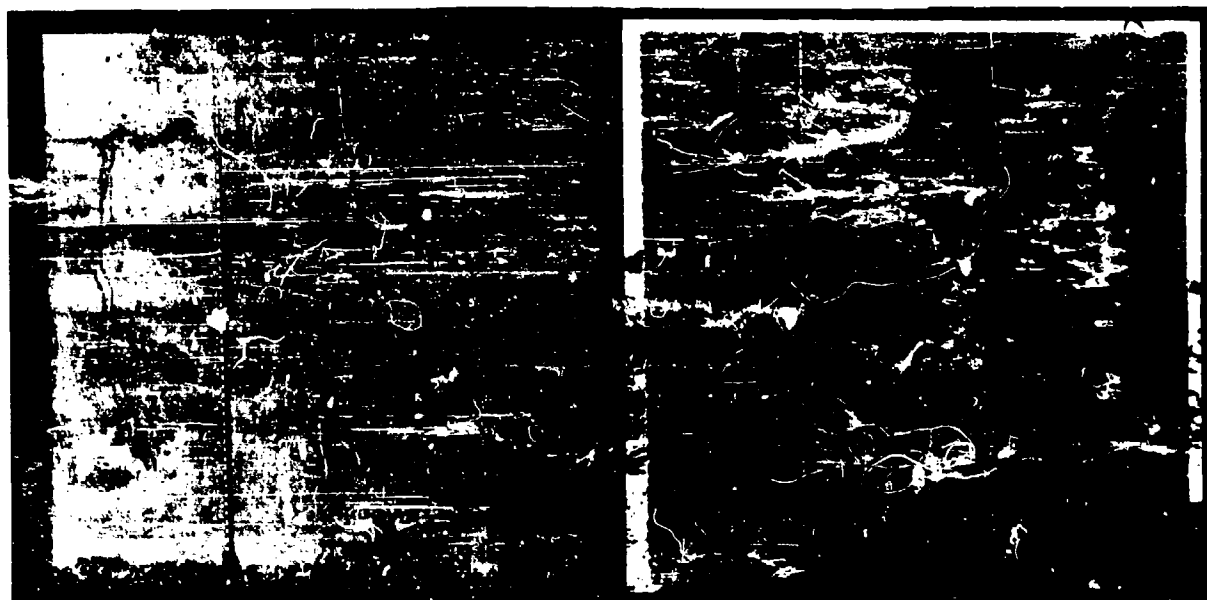


Supplementary S&W Structures 1 - gram.

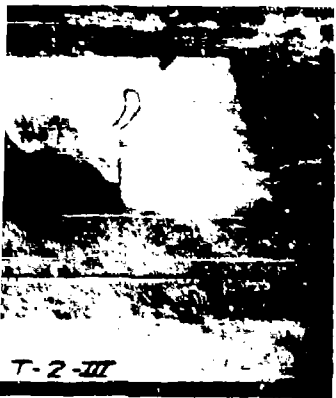


Co-1
No Visible

1

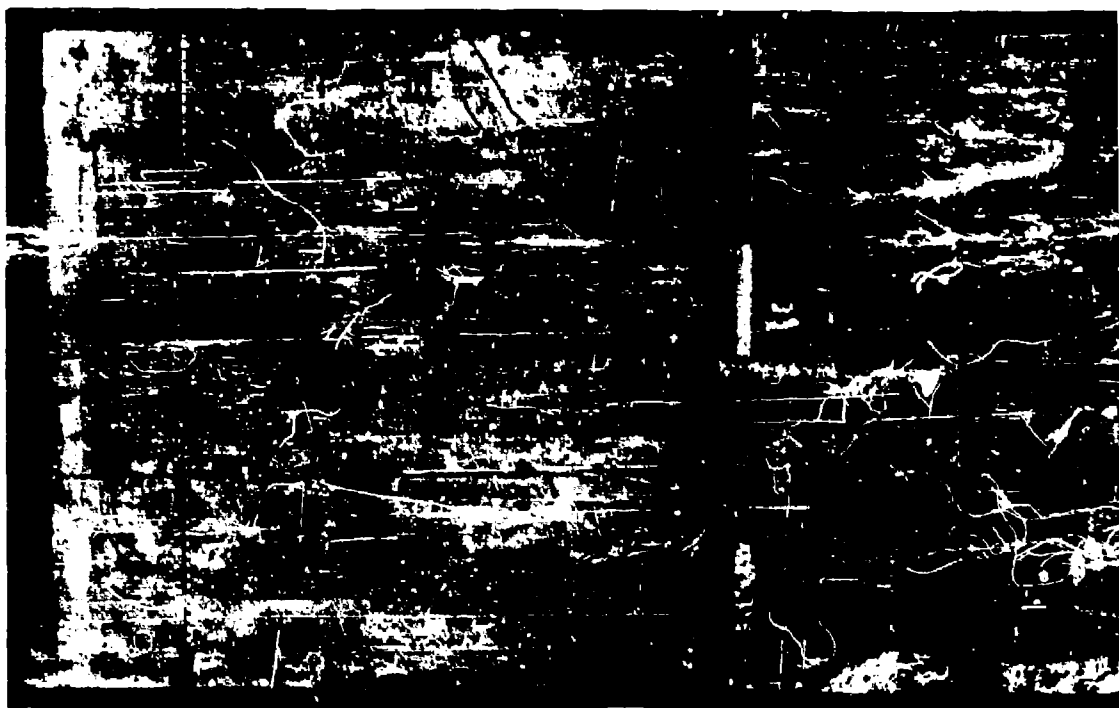
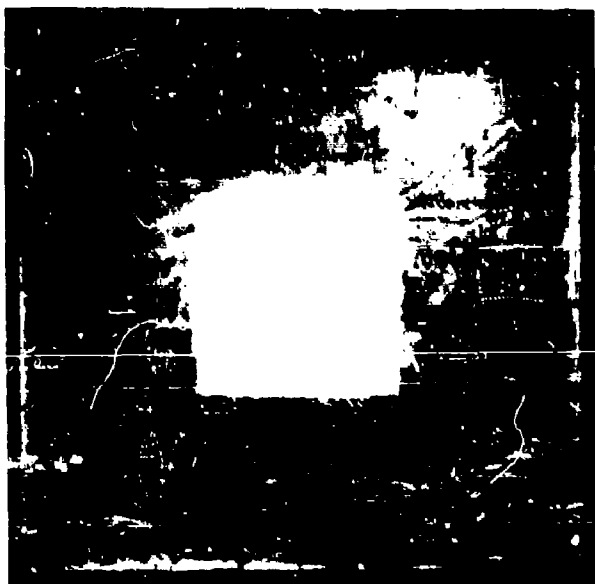


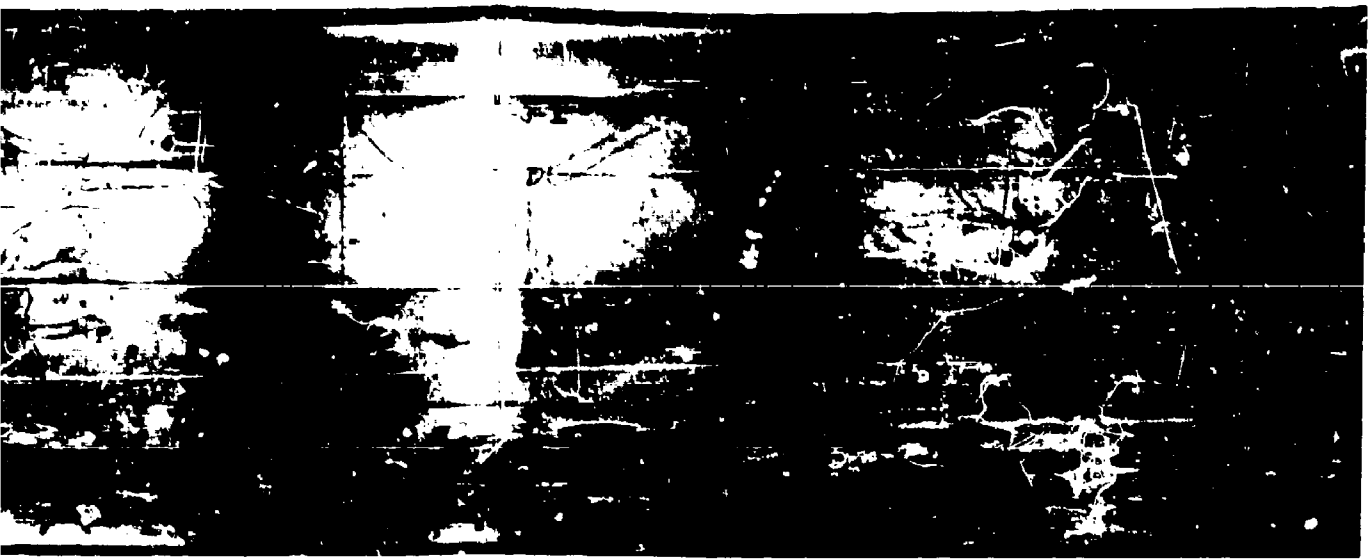
Supplementary Show St:



P-2-I
No Visible Cracks

P-2-IV
No Visible Cracks





2

no. VI. 11. Cracks

no. VI. 11. Cracks



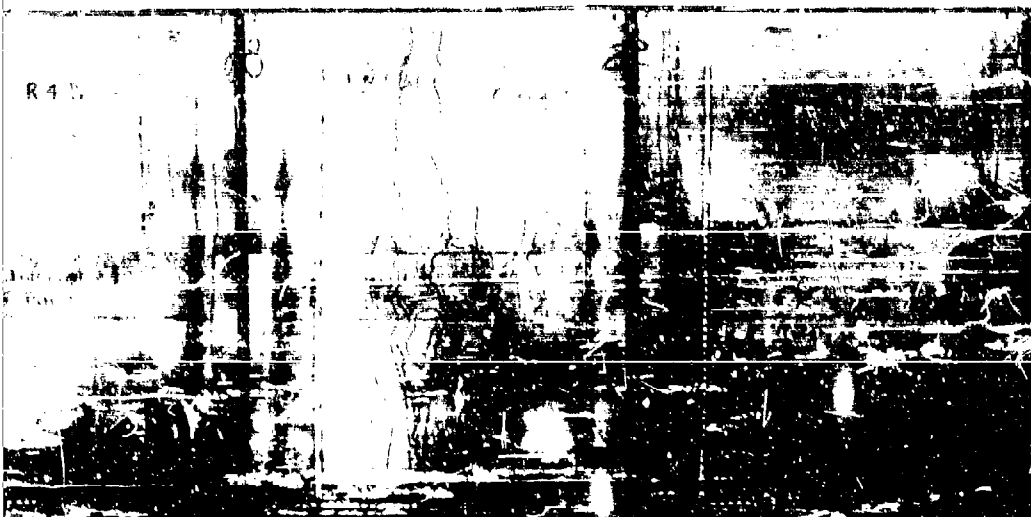
no. VI. 11. Cracks

no. VI. 11. Cracks

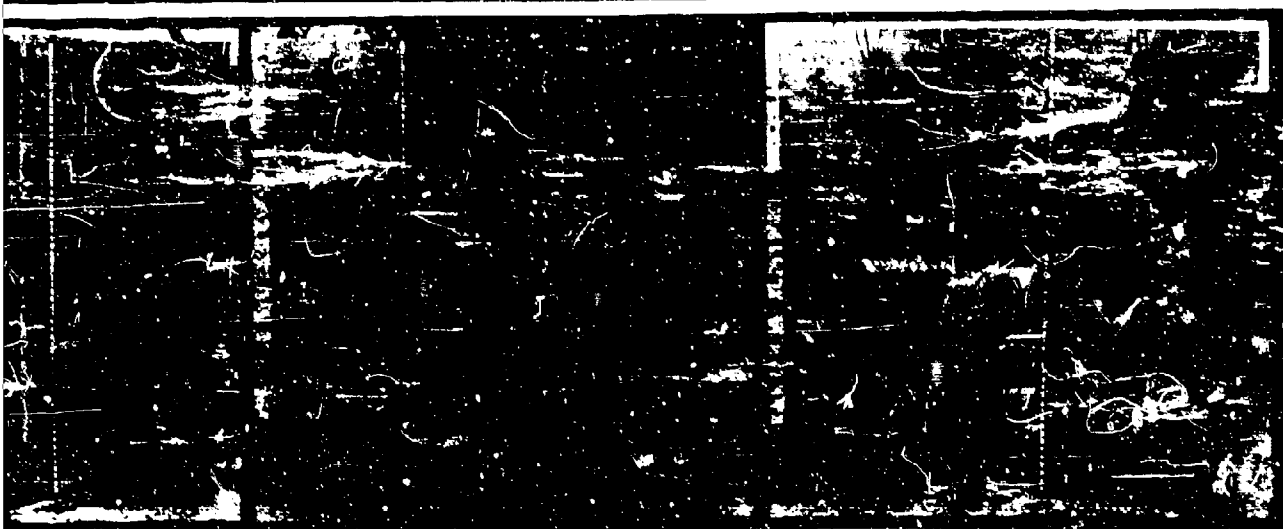
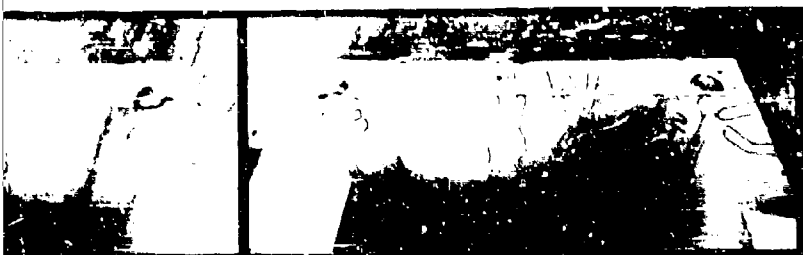


1



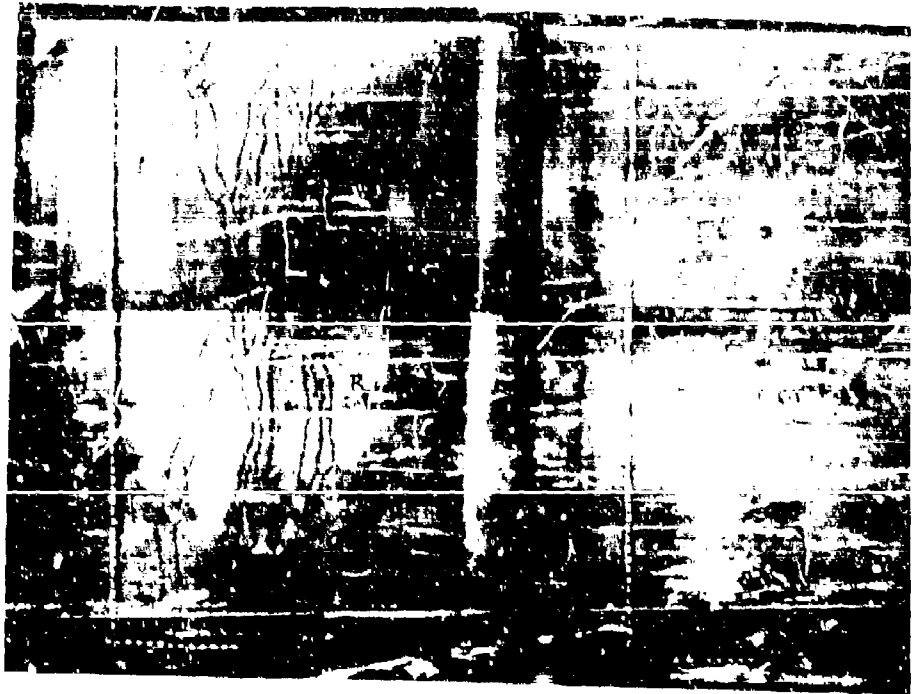


2



11-11-68 11:00 AM 11:00 AM

11-11-68 11:00 AM 11:00 AM



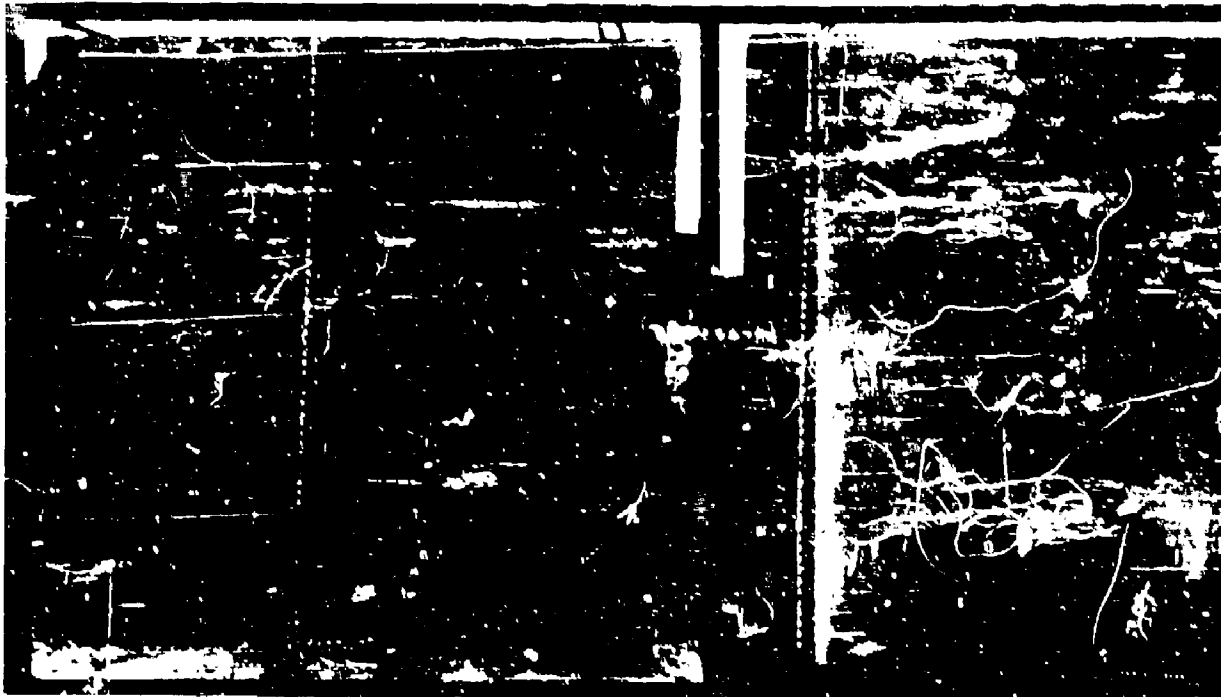
1







1

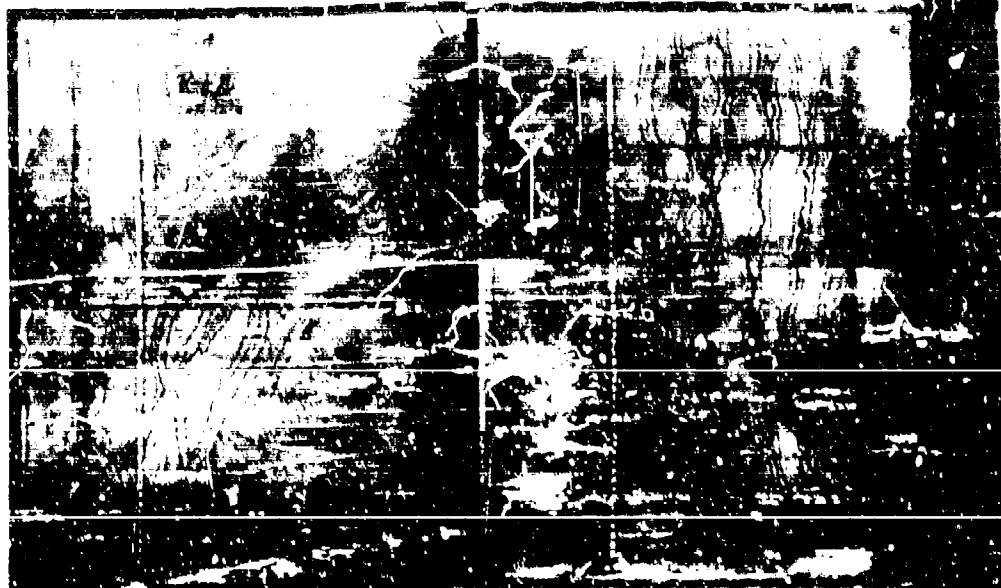




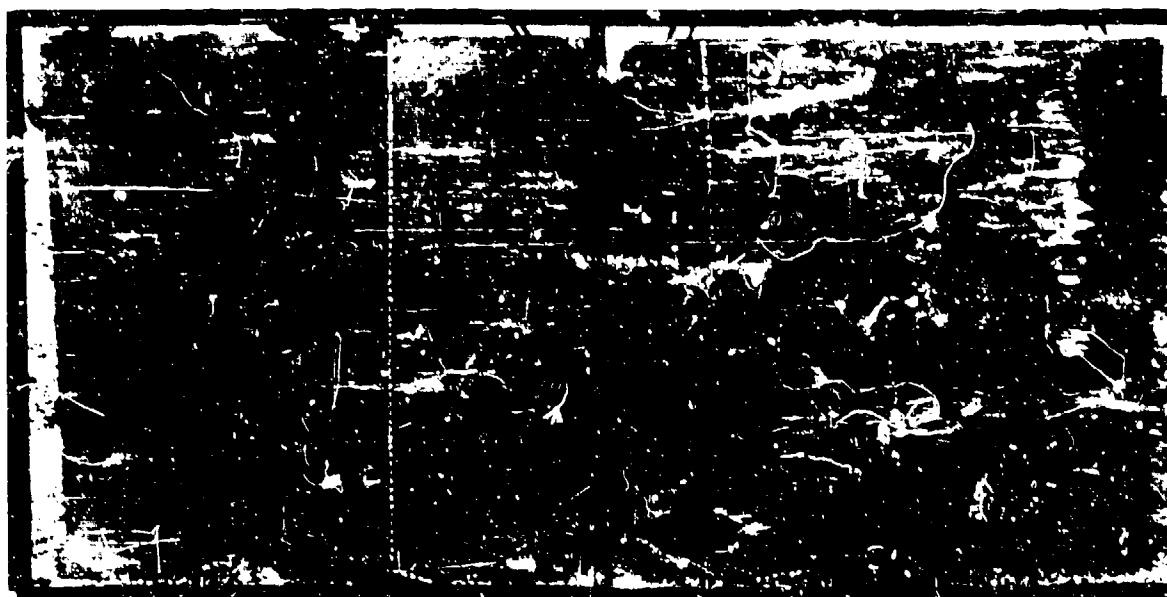
2



...



1

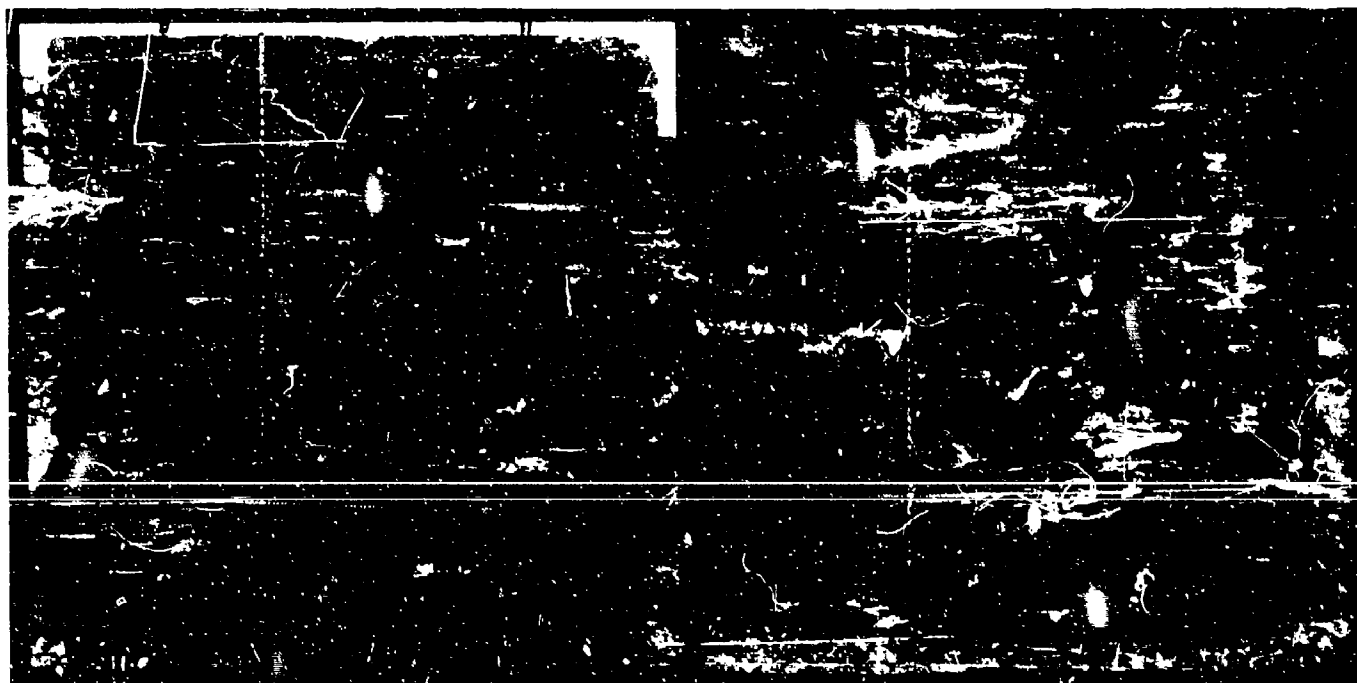
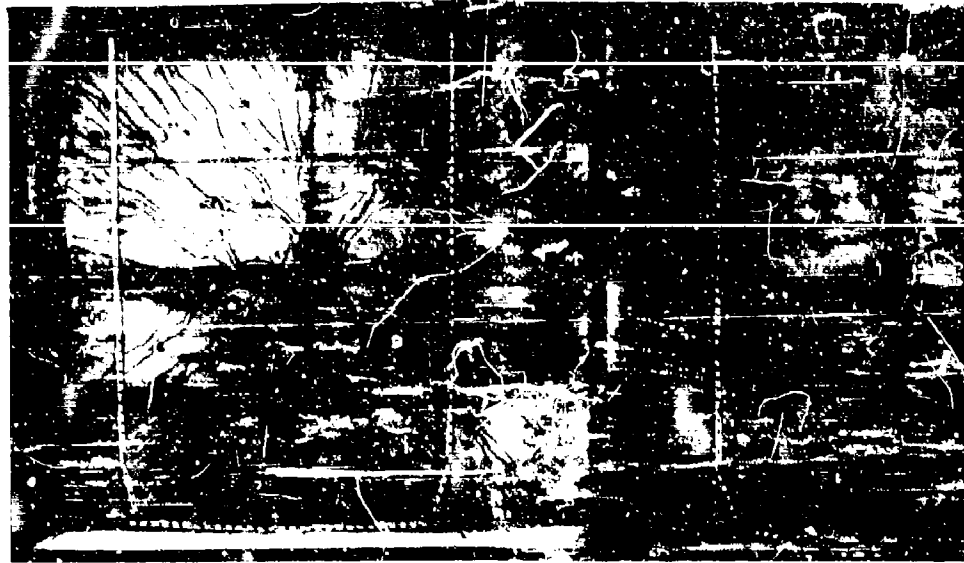




2

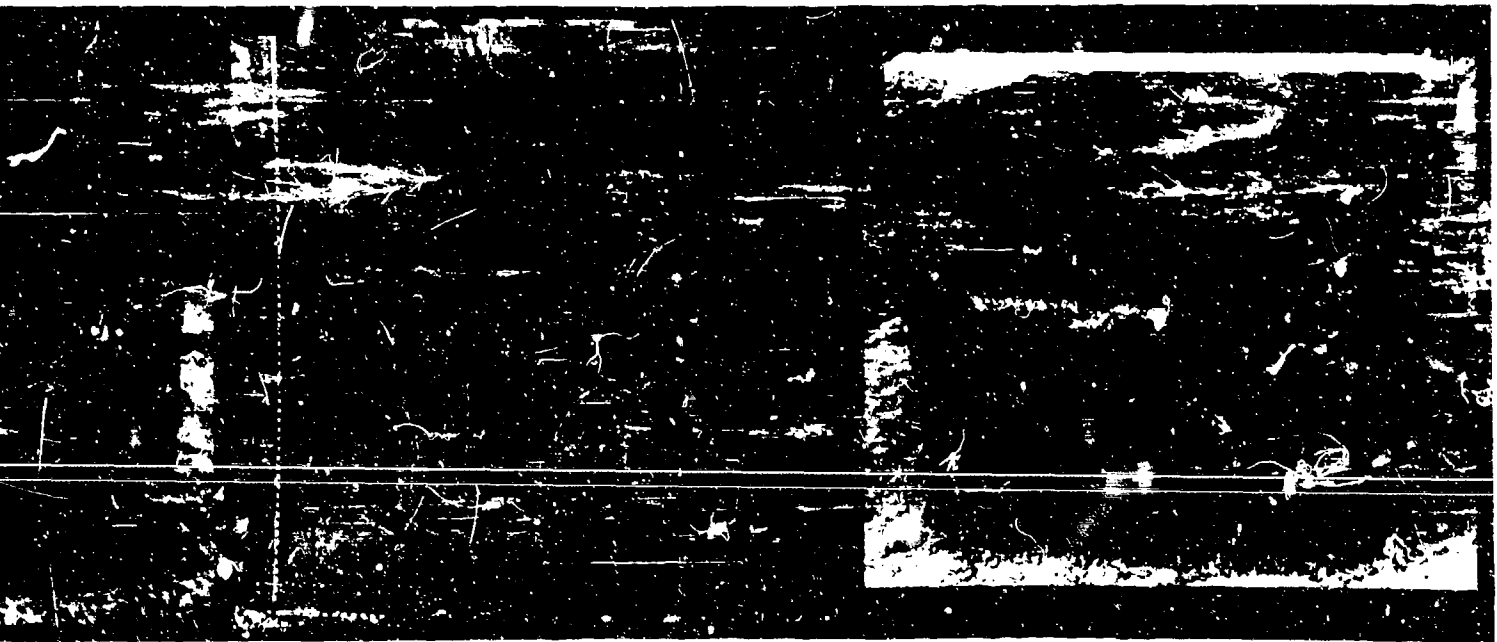


CONFIDENTIAL - SECURITY INFORMATION
 Round S-3 Target B-7 Photo No. 12



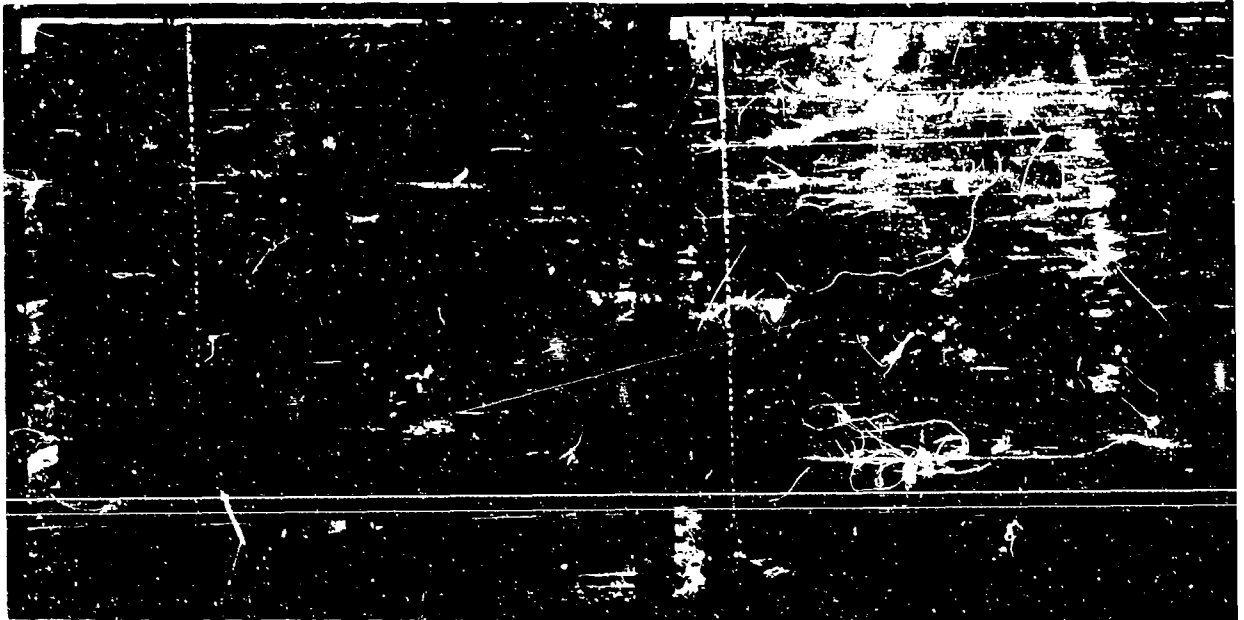


2

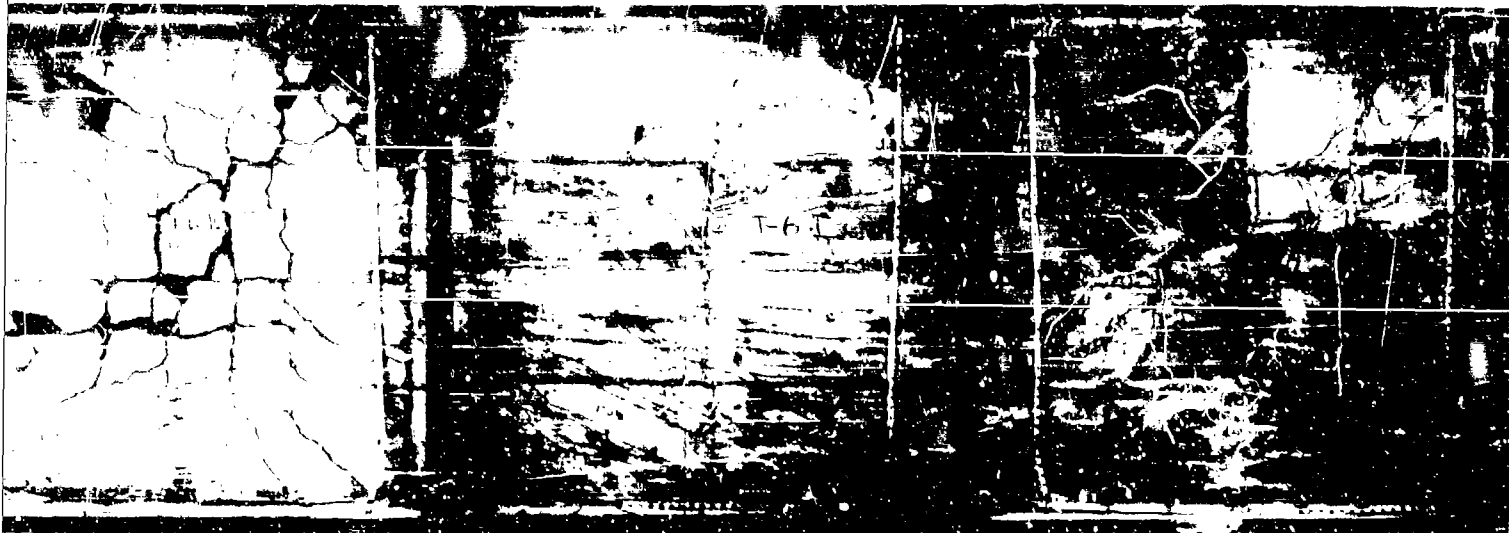


1. The Board of Directors shall have the authority to:

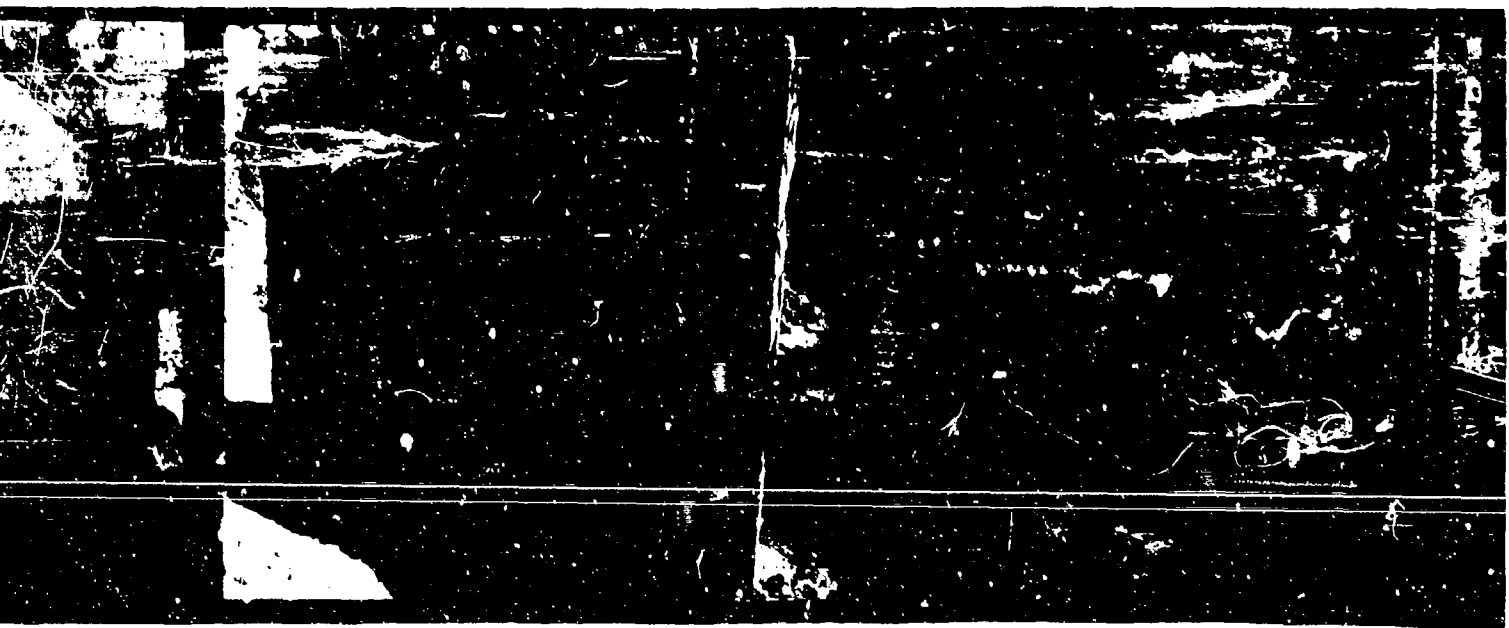
- a. To determine the general policy of the Corporation;
- b. To elect and remove the President and the members of the Board of Directors;
- c. To determine the compensation of the President and the members of the Board of Directors;
- d. To determine the compensation of the officers and employees of the Corporation;
- e. To determine the compensation of the directors and officers of the Corporation;
- f. To determine the compensation of the directors and officers of the Corporation;
- g. To determine the compensation of the directors and officers of the Corporation;
- h. To determine the compensation of the directors and officers of the Corporation;
- i. To determine the compensation of the directors and officers of the Corporation;
- j. To determine the compensation of the directors and officers of the Corporation;
- k. To determine the compensation of the directors and officers of the Corporation;
- l. To determine the compensation of the directors and officers of the Corporation;
- m. To determine the compensation of the directors and officers of the Corporation;
- n. To determine the compensation of the directors and officers of the Corporation;
- o. To determine the compensation of the directors and officers of the Corporation;
- p. To determine the compensation of the directors and officers of the Corporation;
- q. To determine the compensation of the directors and officers of the Corporation;
- r. To determine the compensation of the directors and officers of the Corporation;
- s. To determine the compensation of the directors and officers of the Corporation;
- t. To determine the compensation of the directors and officers of the Corporation;
- u. To determine the compensation of the directors and officers of the Corporation;
- v. To determine the compensation of the directors and officers of the Corporation;
- w. To determine the compensation of the directors and officers of the Corporation;
- x. To determine the compensation of the directors and officers of the Corporation;
- y. To determine the compensation of the directors and officers of the Corporation;
- z. To determine the compensation of the directors and officers of the Corporation;

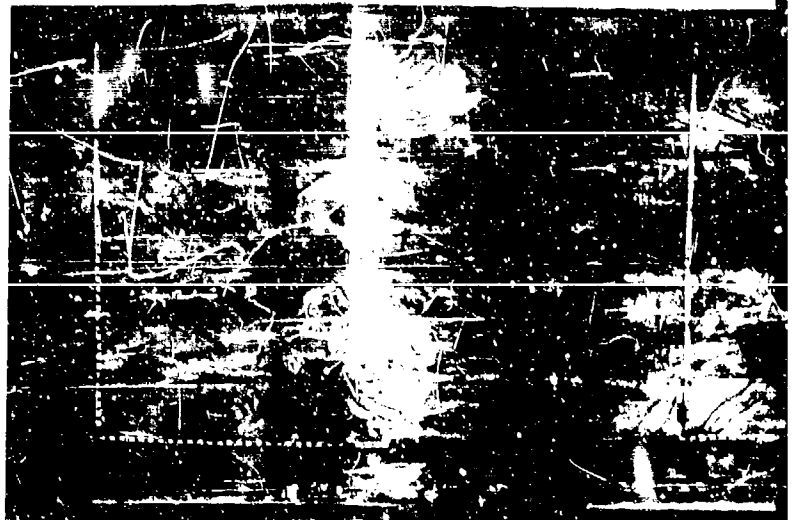
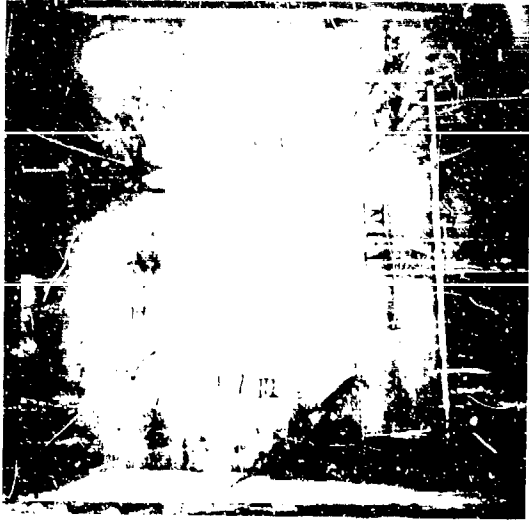


Suppl. 1. n. 1. a

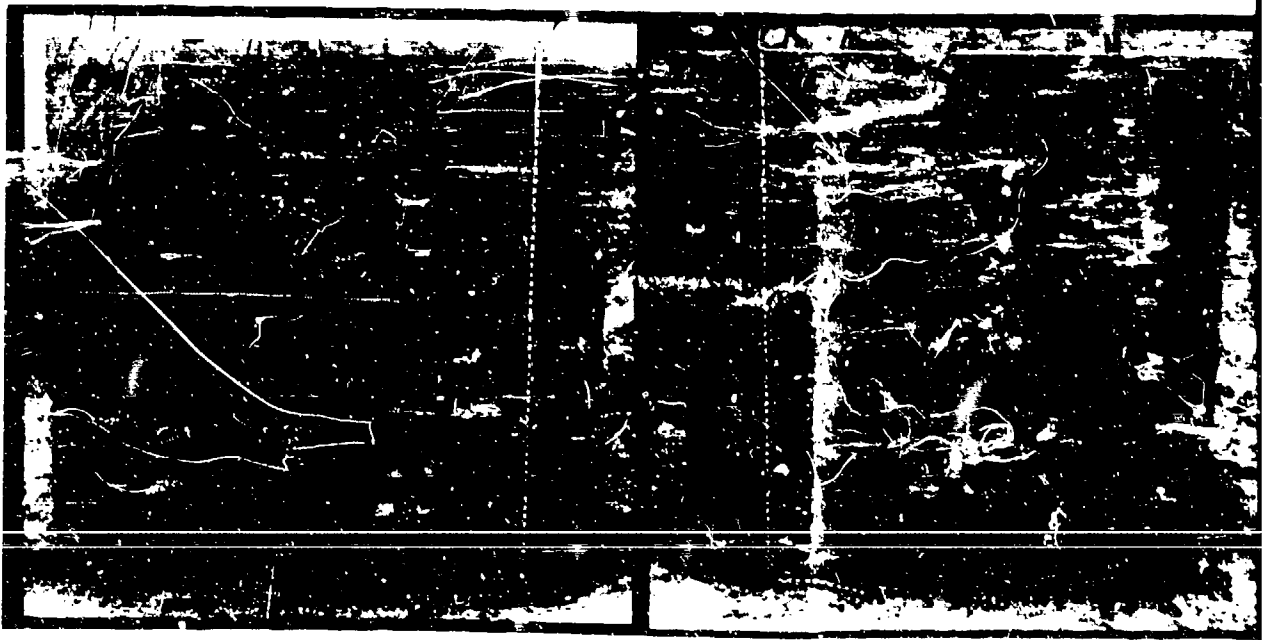


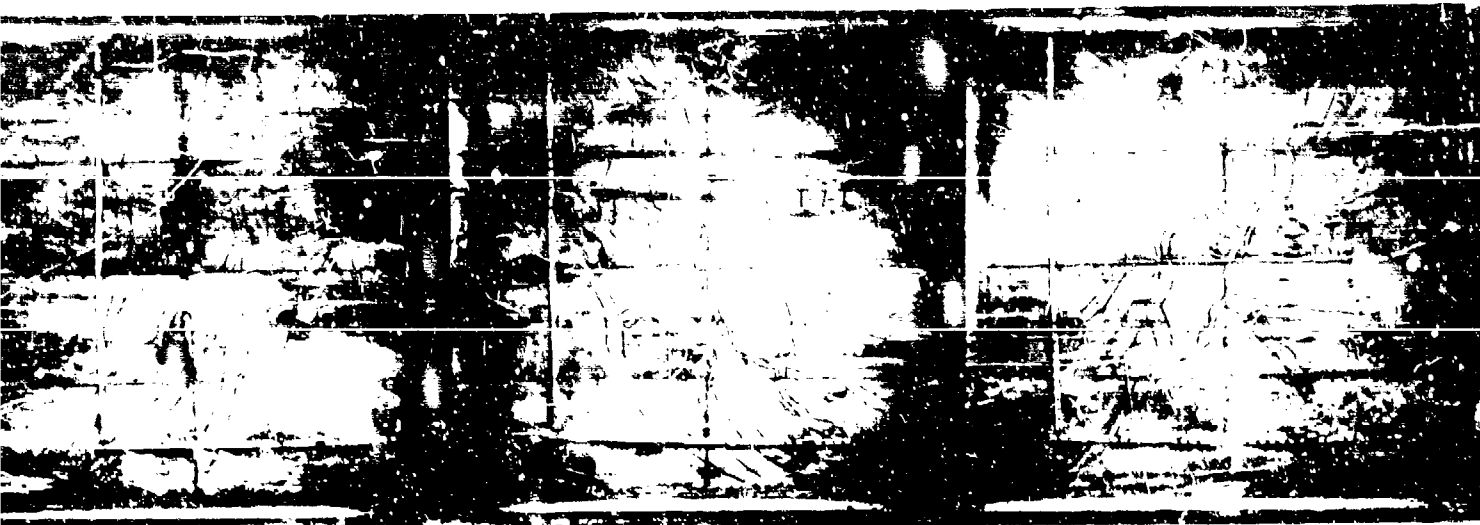
2





1





2



of

UNCLASSIFIED

UNCLASSIFIED