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U. S. ARMY
CORPS OF ENGINEERS
BALLISTIC MISSILE CONSTRUCTION OFFICE
[CEBMCO]

HISTORICAL SUMMARY
PLATTSBURGH AREA OFFICE

ATLAS F
CONSTRUCTION DIRECTORATE

1 AUG [illegible] - 31 OCT 1962

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HISTORICAL SUMMARY REPORT

OF MAJOR I.C.B.M. CONSTRUCTION

PLATTSBURGH AREA, PLATTSBURGH AIR FORCE BASE, NEW YORK

REF: CEBMCO CIRCULAR NO. 61-74, 27 OCTOBER 1961

ENGMA-VK-2

This Historical Summary Report concerns mainly Contract DA-30-075-ENG-9522 for construction of WS-107A-1 Operational Bases, Sites 1 thru 12, Missile Launch Complexes near Plattsburgh, New York.

Also included in this report are Missile Support Facilities located on the Plattsburgh Air Force Base Proper, and at the missile sites. Only a brief narrative report is made of these support facilities.

This report, prepared in the office of the Area Engineer at Plattsburgh, New York is based on records available as of the date of 30 July 1962 except in those instances noted otherwise.

The last site No. 11 Sugarbush was substantially complete on 25 May 1962, with punch list items remaining.

L. E. Bremkamp
Lt. Colonel, CE
Area Engineer
Plattsburgh Area

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FOREWARD

Plattsburgh Missile Contract

Invitation to bid No. Eng-30-075-60-116 dated 13 May 1960 was issued for bids by the U. S. Army Engineer District, New York, Corps of Engineers, 111 East 16th Street, New York 3, New York, with bids due 3:00 P. M., EDST, 10 June 1960.

Bids were for construction of Launch Facilities for WS-107A-1 Operational Bases Sites 1 thru 12 near Plattsburgh Air Force Base, Plattsburgh, New York.

Contract No. DA-30-075-eng-9522 was awarded 14 June 1960 in the sum of $24,408,000.00, the low bid, to Raymond International, Inc., Henry J. Kaiser Co., Macco Corporation, Puget Sound Bridge and Dry Dock Company, a joint venture, 140 Cedar Street, New York City, New York. A field office for construction was established at 177 Margaret Street, Plattsburgh, New York, P. O. Box 857.

Notice to proceed was received by the Contractor on 16 June 1960 and work began on 17 June 1960. The original contract completion date was 27 November 1961. extension of time established the new contract completion date (Site No. 11, last site completed) as 25 May 1962. Substantial completion dates for each site shown Section I, page 20.

The high bid for the project was $46,973,500.00.

SECTION I

A. Mission - Weapons Systems Launch and Control Facility.

1. The Plattsburgh Area Office was established as a field office of the New York District (North Atlantic Division) Corps of Engineers, 111 East 16th Street, New York, New York on 2 May 1960 at Plattsburgh Air Force Base, Plattsburgh, New York. The office is located in Building 100 on the Second Floor. Lieut. Colonel Sidney Stern, C.E., was selected as the Area Engineer when the office was established.

Colonel Charles M. Duke, C.E. was the New York District Engineer.

2. Originally, the mission of the Area Office at Plattsburgh consisted of the supervision of a number of Military Construction Projects, both Army and Air Force, as well as a Civil Works Program and was known as Area No. 1. Later, and immediately prior to May 1960, it operated as a Resident Engineer's Office.

The Plattsburgh Area Office continued supervision of the various other projects until [illegible]400 hours on 30 September 1960, at which time the responsibility for the supervision of the Area Office by the New York District Office, C. E. was transferred to the Corps of Engineers Ballistic Missile Construction Office, Los Angeles, California. Colonel W. W. Wilson then became the Contracting Officer.

The New York District provides support for Disbursements, Payrolls, Procurement, Real Estate Activities, Technical Assistance and Issuance of Plans and Specifications for bids.

3. The U. S. Air Force has the responsibility, with the highest

national priority, for the development and employment of the ICBM/IRBM and Associate Weapons Systems. As an exception to normal procedures for handling design of Air Force Facilities, the Air Force Ballisitc Missile Division (AFBMD) of the Air Research and Development Command has design responsibility for the prototype and early operational systems. It is the responsibility of the Corps of Engineers to construct for the Air Force certain technical and operational facilities for the interconti-nental and intermediate range ballistic missile (ICBM/IRBM) and Associate Weapons System. The Los Angeles Field Office - OCE was assigned the responsibility of coordinating with Design Agencies and the review of plans for construction feasibility prepared under jurisdiction of AFBMD. The Los Angeles Field Office became a part of the CEBMCO organization when CEBMCO was formed.

There are actually two phases of construction, one, the actual construction of the Base, consisting of underground Control Center and silo, with mechanical, electrical and power features to house and contain the missile, and two, the installation of the missile and certain control features. The Corps of Engineers (CEBMCO) is concerned with only the first phase, construction of the Ballistic Missile Bases, as set forth below.

4. MISSION OF PLATTSBURGH AREA OFFICE

The mission of the Plattsburgh Area Office is to perform those portions of the contract supervision, construction inspection, field engineering, and contract administration which are delegated from Atlas F Director of the Corps of Engineers Ballistic Missile Construction Office to the Plattsburgh Area Office. The contracts this mission applies to are those under which twelve Atlas ICBM, Launch Base Complexes and their related on-base support facilities, are being constructed.

B. Topography, Geology, Ground Water

1. Topographic Characteristics.

The Plattsburgh Ballistic program consists of twelve (12) missile sites located in Northeastern New York and Northwestern Vermont, more or less on the perimeter of a circle with Plattsburgh Air Force Base as the center. The topography of the sites varies from flat pasture or meadow land of the Lake Champlain vicinity to the mountainous, rough, boulder strewn and forested land of the Adirondack Mountains.

Sites 1 (Champlain, New York), Site 2 (Alburg), Site 3 (Swanton, Vermont), and Site 4 (Willsboro, New York) are fairly level, located in meadows and require very little clearing.

Sites 8 (Ellenburg), 11 (Sugarbush), and 12 (Harrigan Corners) required some clearing of trees and brush.

Sites 5 (AuSable Forks), 6 (Clayburgh), and 7 (Chazy Lake) required rather heavy clearing in the Missile Site Area; however, the entrance road areas were more or less cleared land with only a few trees requiring removal.

Site 10 (Bouquet) required clearing of dense small trees and a considerable number of large evergreens; removal of large boulders and decomposed vegetation in a low area, this low area is considered as swampy. Considerable fill was required in the low area for the access road.

Site 9, (Moores Forks), fairly open with grass areas, required only light clearing and some of the area is swampy.

2. <u>Geologic Character of Construction Area</u>

The Adirondack Mountains are comprised of the oldest formations of rock in geological time, known to man, consisting of the Archeozoic and Proterozoic divisions; only the Azoic antedates the Adirondack formations. In recent time the topography of the region has been modified by glaciation. The advancing glaciers scraped off the old residual soil and loose weathered rock and redeposited the materials during both the advancing and retreating stages of the ice front to form the almost universal mantle of glacial drift which comprises the overburden throughout most of the Missile Site Area.

This overburden of glacial origin contains sand, gravel, cobbles, boulders and at times clay. Where the sand is fine and silty it may contain water in sufficient quantities causing it to become highly unstable during excavation.

The following table sets forth elevations at which rock was encountered. The exact elevation may vary since the surface was unusually rough or presented a sloping shelf; top of the silo (concrete) is elevation 1000.

Site No.	Depth Overburden (Feet)	Elevation Top of Rock	Rock Type
1	4	992.5	Quartzite
2	7	985.5	Shale
3	14	980	Shale
4	4	982	Limestone and Shale
5	30-45	962 to 947	Granite
6	46	946	Syenite
7	76 ±	921	Gneiss
8	4	990	Sandstone
9	64	931	Quartzite
10	8	985	Granite and Gneiss
11	115 ±	893 to 875	Syenite
12	60	944 to 922	Sandstone

Site 1 - The overburden consisted mostly of topsoil, approximately 4 feet in depth to rock, the top layer of bedrock reported as an 18 foot thick layer of quartzite, underlaid with siliceous sandstone, dense and hard with fine shale layers was found to be quartzite, full depth of the silo.

Site 2 - The overburden consisted of a silty sand for first 4 to 7 feet in depth to top of rock. The first 80± feet in depth consisted of a dark gray shale, then, for remainder of shaft a dark grey sandstone.

Site 3 - The overburden consisted of sandy gravel the first 5 to 10 feet, changed to sticky brown clay with traces of blue clay, to within 2 feet of bedrock where gravel again appeared. The bedrock was weathered shale with some calcite seams, becoming harder below 100 feet. There were numerous calcite filled fractures with a dip from 45 to 90 degrees.

Site 4 - The overburden of glacial till, consisted of 3 to 4 inches of top soil overlaying clay with some silty sand, gravel and small boulders to a depth of approximately 4 feet where bedrock of limestone was encountered, the top 6 to 8 feet being in strata 2 to 4 feet thick, the bedding dipping 5 to 10 degrees. No other seams or crevices occurred below this depth.

Site 5 - The overburden after stripping topsoil was approximately 85 percent fine sand with some small boulders encountered just below the surface, some glacial till was encountered about 30 feet below top of ground and also contained some boulders. Bedrock encountered at Elev. 962 in the LCC area sloped to Elev. 947 in silo area, and, was composed mostly of granite and gneiss with some mica. The bedrock was very hard with little fracturing, weathering or disintegration.

Site 6 - The overburden consists of glacial till, brown silty sand with some gravel and very dense. Some boulders encountered at a depth of 46 feet, or approximately Elev. 946 were gray syenite, weathered seams, hard, dense, medium to coarse grained crystalline structure. The rock continued as syenite to the bottom of the silo.

Site 7 - The overburden consisted of brown silty sand and gravel, cobbles, also some clay and silt. Boulders were encountered at about 10 feet depth and continued to be found to top of bedrock at approximately depth of 76 feet, which occurred as pink granite gneiss with well defined lineation, fairly coarse crystalline structure, weathered and decomposed. This jointed and fractured and unconsolidated material showed less weathering and some fractures continuing. From a depth of 155 feet to bottom of the silo the material found was rock, dips of 45 to 90 degrees were clearly visible and bonding of crystals apparent.

Site 8 - The overburden is of glacial origin and consisted of brown silty sand, some clay and contained a large amount of gravel and cobbles to a depth of four feet. The bedrock is light gray quartzitic sandstone, very hard and dense, unweathered. The bedding varied from numerous fractures and voids in the upper levels to decreasing fractures and voids in the lower levels.

Site 9 - The overburden consisting of glacial till, a fine to medium gray, well compacted sand with some gravel in the upper portion to fine to coarse sand and gravel, and some boulders at bedrock level, approximate Elev. 931, the overburden to a depth of approximately 64 feet. The bedrock appeared as a light gray quartzite, medium grained, very hard and dense, with vertical fault running diagonally across center of silo shaft. From Elev. 931 to 871 the quartzite had many sand layers. At the lower depths a considerable water problem developed.

Site 10 - The overburden, spotty in depth from 2 feet at LCC to 9 feet at the silo, consisted of a glacial deposit of brown medium sand gravel, cobbles, some clay and few boulders up to 5 cu. yd. size. The bedrock is anrothosiet gneiss, unweathered with bands of garnet and dark materials dipping 10 to 45 degrees. Gabbro dike, fractures dipping 45 to 90 degrees, slicken sided, many areas of massive serpentine below

65 feet, anorthosite grading to gabbro at 125 feet and gabbro grading to anorthosite at 152 feet. At 175 feet and 185 feet rock highly fractured and increasing amounts of serpentine.

Site 11 - The overburden of brown sandy silt at the top of the open cut changed to gray sandy silt with traces of clay at 30 feet, some gravel was encountered. This gray silty sand with some cobbles and boulders continued to bedrock, which proved to be a sloping bed from Elev. 893 to 875, approximately 101 to 119 feet of overburden. The bedrock is gray syenite, hard and dense with some fractured dips to 65 degrees. At approximately 140 feet dark gray to black gabbro hard, dense and fine grained was encountered and changed to the gray syenite at approximately 160 feet to the bottom of the shaft. The sandy silt was very wet and proved very unstable, moving under surcharge and required considerable sheathing to hold the walls stable. Well points were necessary to remove the water content.

Site 12 - The overburden is of glacial origin and consists of dark brown silty sand quickly grading to a fine to coarse reddish-grey silty sand. Cobbles, gravel and some boulders at 20 to 30 feet. Rock, encountered on a slope from Elev. 944 to 922 was sandstone weathered, fractured and friable, to 75 feet, salmon pink and gray, sugary medium to coarse grained, medium hard to hard siliceous cement, occasionally argillaceous. Bedding is well defined, dipping 0 to 10 degrees with occasional cross bedding, at Elev. 904 the rock became well indurated and hard.

3. Ground Water Conditions

The following table provides elevation for height of ground water at each site, as obtained from field observations. Elevations may vary from 1 to 2 feet, depending on season of the year.

Site	Elev.	Site	Elev.	Site	Elev.	Site	Elev.
1	976	4	989	7	985	10	998
2	990	5	947	8	985	11	941
3	987	6	975	9	986	12	988

At Site No. 11, Sugarbush, an unusual condition existed, while the drilled well near the silo for the water system did not produce the required 15 G.P.M. (barely 1 G.P.M.) and presented a pronounced fine silt condition. The fluid condition of the overburden resulted in considerable difficulties while sinking the silo shaft. On 29 October 1960 the original inner row of sheet piling was started and on 3 November 1960, at Elevation 937 the contractor was forced to stop excavation due to the unstable or "fluid" condition of the fine silty soil.

Well points were required and on 24 November 1960, 11 wells 10" dia. were completed, however, it was found an additional 6 wells were required. Again this was found inadequate as movement of sheet piling was noticeable and work was stopped, approximately 30 June 1961. By 19 October 1961 existing relief wells were redeveloped and 16 additional 10" wells were drilled to lower water table. Of a total of 32 wells, 5 proved dry and 28 wells were active. It is considered that a combination of the fine silty soil and ground water caused difficulties at Site 11. Pumping data show that on 4 December 1961 the well system produced 32 G.P.M. and the sump 85.0 G.P.M.

C. UTILITIES - ACCESS ROADS.

1. Water Supply at Sites

Each site has four, each, underground water supply tanks to provide a reserve of water to support each Ballistic Missile site. This reserve capacity is approximately 90,000 gallons of water at low water level alarm; the supply is controlled automatically to maintain the maximum capacity from the site source, either local water systems, water wells or water intake plants at rivers. Sites 2, 3 and 4 are connected to the local town water supply system. Site 6 has a filtration gallery approximately 200 feet long, parallel to the Saranac River. The filter beds and piping are served at the center with a manhole, which is in turn connected by piping to pumps in the adjacent pump house. A chlorinating system is provided. This pumping plant is an off-site facility.

Sites 1, 7, 8, 9, 10 and 12 are served by drilled wells, two (2) each. At Site 5 three (3) wells were necessary to provide "minimum requirements of 15 G.P.M. each from two wells, or 30 G.P.M. per site." The drilled wells for Sites 5, 7 and 10 are off-site facilities. The wells for Site 5 are near the Ausable River; at Site 7 on shore of Chazy Lake opposite the Missile Site entrance and at Site 10 east of the site entrance on the bank of Church Brook.

Sufficient water supply was found for each site where wells were drilled except Site 11, where approximately 1 gallon per minute was found. Due to the fine silty sand, a sufficient area could not be provided by development with a gravel well and the one site well was therefore abandoned.

When it was determined that water in sufficient quantities was not available near the silo on Site 11, Sugarbush, an attempt was made to obtain water at Alder Brook, approximately one mile east of the Missile Site. An exploration test was made to a depth of 100 feet and resulted in a dry hole, in a granite formation. A study was made for a river intake for Alder Brook at the well location. This would require obtaining right of way on private property, acquiring land at Alder Brook, considerable clearing from the highway to the site, rock excavation for the pipe line, filtration gallery parallel to Alder Brook, extension into the brook, manholes, pump and pumphouses, chlorination and electric power to the site. The review proved the River Intake study a rather difficult and expensive method. Other studies of obtaining water would require review.

2. Electric Power

The electric power for each site is provided with a diesel power plant which consists of two diesel generators located in the silo. Each generator is rated at 500 KW, 480 volts, 3 phase 60 cycle at 80 percent power factor. Each generator is capable of supplying the complete load requirements for the Silo and Launch Control Center, thus the 2nd generator represents a 100 percent standby. Synchronizing and control of the generators is possible both locally and at the power remote control panel located in the Launch Control Center.

The power center supplies power to operate the water well pump at Sites 1, 8, 9, 11, and 12. Commercial power is used to operate the pumps at Sites 5, , 6, and 10 where the wells and pumping stations are remote from the Missile Launch silos. These remote sites have a 25

KW, single phase, self-contained emergency power plant in case of commercial power failure.

3. Sewage System

Each missile site has a complete sewage plant with pumps, distribution field, filtration area and chlorination.

4. Means of Access

Access to all the sites is available via Federal and State highway of concrete or bituminous concrete. Final access to Sites 3, 5, 6 and 9 is a short run over township roads. From Plattsburgh Area Office, U. S. Highway No. 9 is the beginning and main route of access, and traverses north and south through the general site area. The southern and western Sites 4, 5, 6, 7, 10 and 11 are in the Adirondack Mountains and accesses to the sites are over mountain roads that have steep grades, sharp curves and, in some instances, are narrow and require caution in driving, particularly in winter during snow and ice conditions. The following table provides site numbers, location, mileage and highway routes.

Site No.	Site Name	Mileage from Plattsburgh	Highway Route Number
1	Champlain, N. Y.	22.4	U.S. 9 and 11
2	Alburg, Vt.	29.5	U.S. 9 and 2
3	Swanton, Vt.	44.1	U.S. 9 & 2, Vt. 78
4	Willsboro, N. Y.	27.9	U.S. 9 and N.Y. 22
5	AuSable Forks, N. Y.	26.8	U.S. 9 and 9N
6	Clayburg, N. Y.	24.9	U.S. 9 and N.Y. 3
7	Chazy Lake, N. Y.	22.0	U.S. 9, N.Y. 3 & 365

Site No.	Site Name	Mileage from Plattsburgh	Highway Route Number
8	Ellenburg, N.Y.	29.7	U. S. 9, N.Y. 22 & 191 U. S. 11
9	Looers Forks, N.Y.	27.5	U. S. 9, N.Y. 22 and U. S. 11
10	Bouquet, N.Y.	26.6	U. S. 9, Local Town Rds.
11	Sugarbush, N.Y.	31.2	U. S. 9 and N.Y. 3
12	Harrigan Corners, N.Y.	37.9	U. S. 9, N.Y. 3, 374 and 190

Road improvement was necessary at Site 10, Bouquet. Approximately one half mile of the narrow mountain road from U. S. Highway 9 was improved and surfaced to provide access for Missiles hauled in by tractor-trailer to the Site. It was also necessary to widen and improve road on U. S. Route 2 across upper Lake Champlain between New York and Vermont. The Toll Booth at the bridge was also relocated. This work was under the Bureau of Roads and not a portion of the Missile Project.

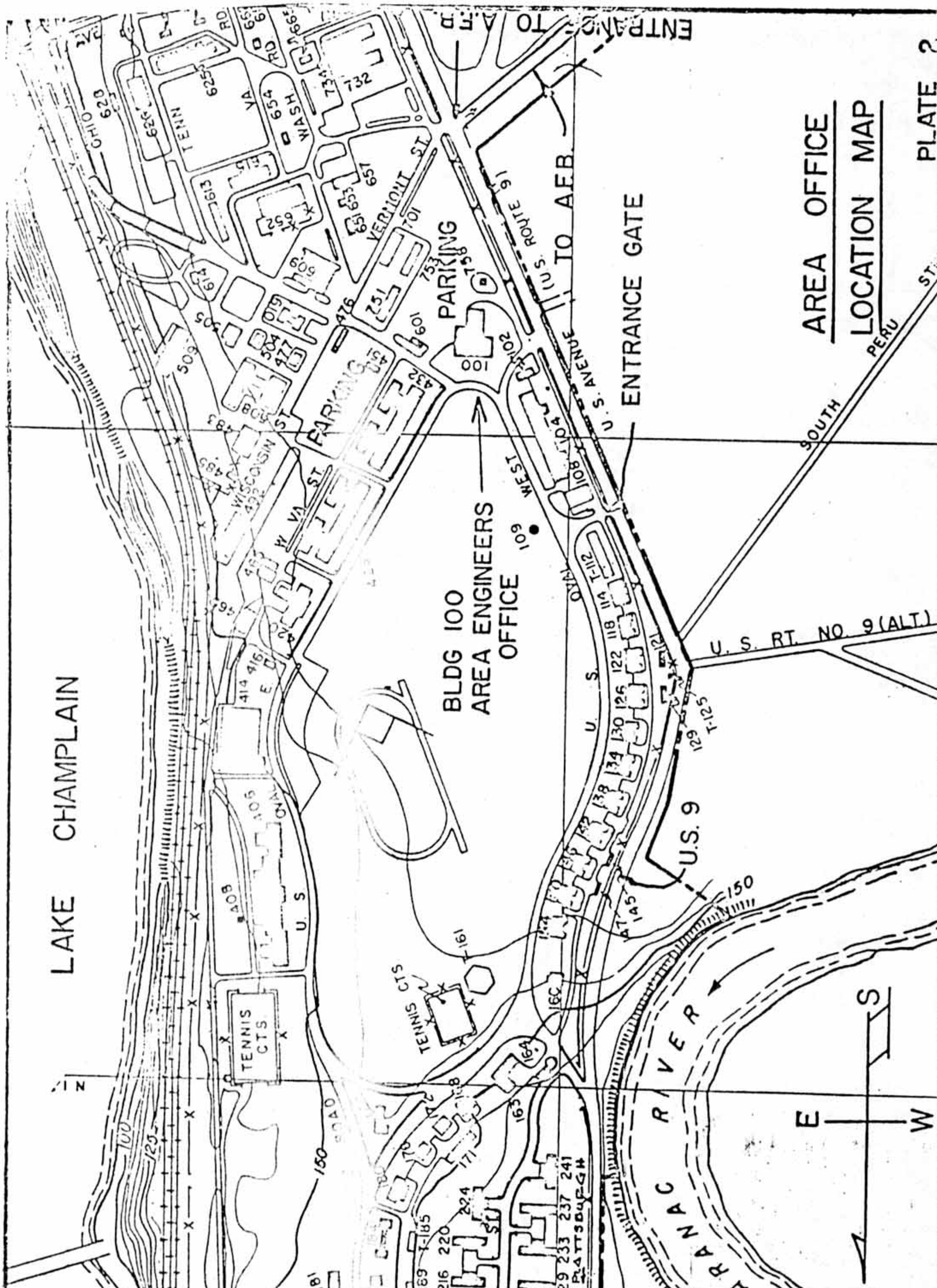
5. Maps

Two maps are provided, one showing the Area Office at Plattsburgh Air Force Base and one showing vicinity map with site locations.

D. VICINITY MAPS

1. Map showing Area Engnieer's Office. The entrance is from U. S. Avenue, on U. S. Highway No. 9. The building, No. 100, is located at the south end of the parade ground. The office is one of a group of buildings which comprise an old Army Base and is easily located, being on the south of Plattsburgh, New York.

2. Vicinity Map. This map gives the general location of each site in relation to State and Federal Highways, and general location in respect to Plattsburgh, New York.



LAKE CHAMPLAIN
AREA OFFICE
LOCATION MAP
PLATE 2
BLDG 100
AREA ENGINEERS
OFFICE
PARKING
ENTRANCE GATE
TO AFB
U.S. ROUTE 9
U.S. AVENUE
ENTRANCE TO AFB
VERMONT ST
WISCONSIN ST
W VA ST
WEST
U.S. OVAL
U.S. 9
U.S. RT. NO. 9 (ALT.)
SOUTH
PERU ST.
SARANAC RIVER
TENNIS CTS
TO PLATTSBURGH
ROAD
N
E
S
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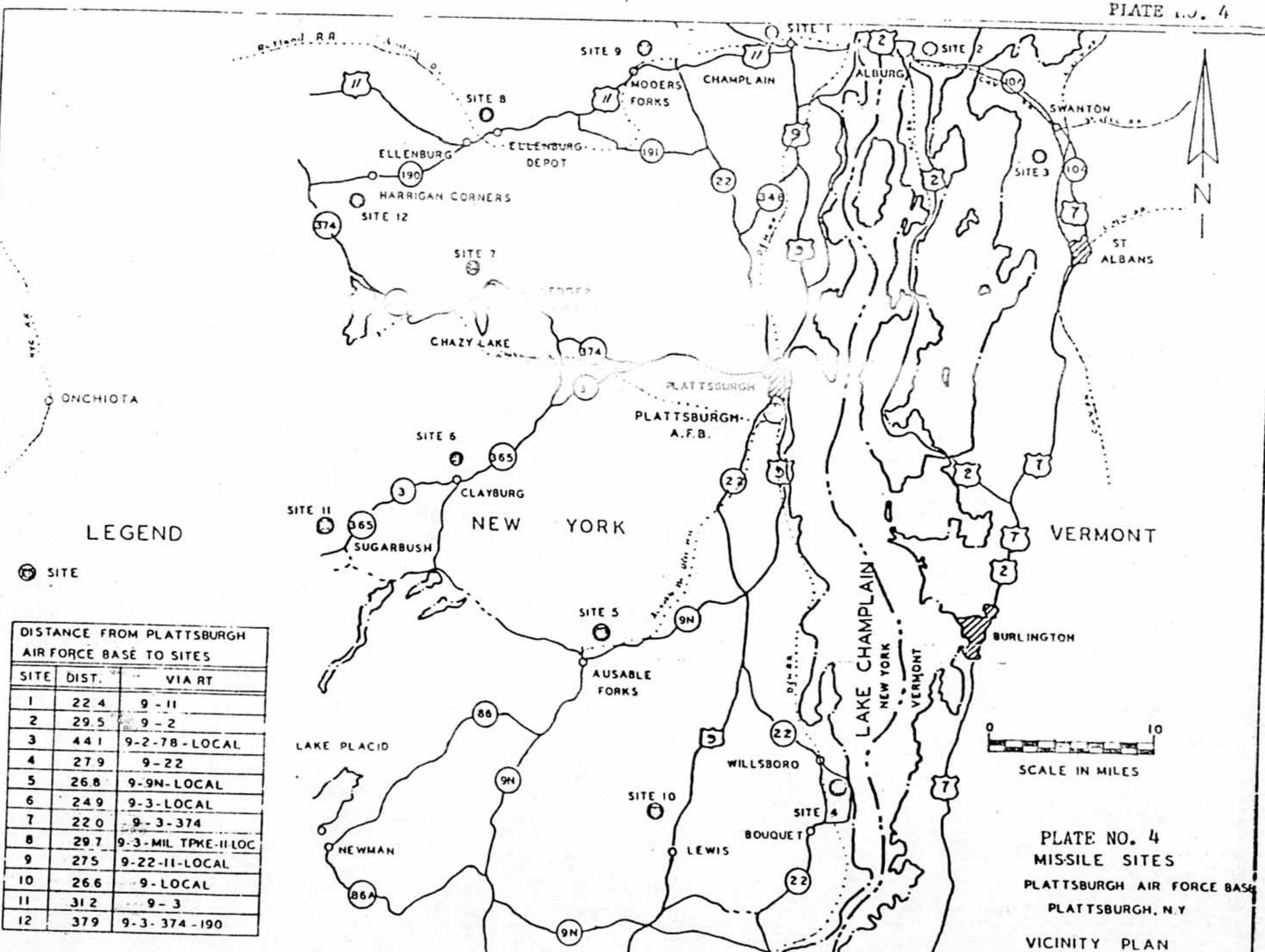


PLATE NO. 4
MISSILE SITES
PLATTSBURGH AIR FORCE BASE
PLATTSBURGH, N.Y.
VICINITY PLAN

DISTANCE FROM PLATTSBURGH AIR FORCE BASE TO SITES

SITE	DIST.	VIA RT
1	22.4	9-11
2	29.5	9-2
3	44.1	9-2-78-LOCAL
4	27.9	9-22
5	26.8	9-9N-LOCAL
6	24.9	9-3-LOCAL
7	22.0	9-3-374
8	29.7	9-3-MIL TPKE-11-LOC
9	27.5	9-22-11-LOCAL
10	26.6	9-LOCAL
11	31.2	9-3
12	37.9	9-3-374-190

E. SCOPE OF WORK

1. Construction Scope

The scope provides for construction of WS-107A-1 Operational Bases, Plattsburgh Air Force Base, Plattsburgh, New York. The bases are located at twelve sites, approximately centered on the Air Force Base. Site work includes clearing, grubbing, access roads, paving, water storage, piping, sewage disposal system, communications, manholes, and perimeter and security fencing. Construction consists of underground reinforced concrete Launch Control Center, two story, with structural steel, operation control units, lighting, living quarters, kitchens, electrical supply, heating and ventilating, water and plumbing and entrance tunnel to launching silo. The silo is underground, of reinforced concrete, structural steel, elevators, generators, power supply, electrical system, heating, ventilating, propellant loading tanks and piping systems. A suspension system for the crib and blast proofing complete a self-contained unit.

2. Architect Engineer

The plans were prepared by the Bechtel Corporation, Engineers and Contractors, of Los Angeles and adapted for the sites by Stearns-Roger of Denver, Colorado.

F. CONSTRUCTION PERIOD

1. Start of Construction

The specifications provide for the contractor " to commence work under this contract within 48 hours after the date of receipt by him of notice to proceed"...and,..."Construction of all sites shall be commenced and prosecuted concurrently." The contract was awarded 14

June 1960, the contractor received notice to proceed on 16 June 1960 and the contractor was on the sites with survey crews on 17 June 1960. The first order of work consisted of layout of access roads and site. Labor crews began at once clearing the sites of trees and brush.

Other early construction activities consisted of stripping top-soil, preparation of the LCC and silo locations for excavation, installation of communication and electrical power poles and location of contractor and Army Engineer trailers and contractor storage sheds in the work areas. At the "rock" sites air compressors and drill rigs were in operation at an early date, particularly at Sites 1, 2, 3, and 4 where only a small amount of clearing and shallow overburden was encountered.

The starting date for a major phase of construction, excavation for the LCC and silo varied with conditions at each site. At the sites requiring major tree clearing, grubbing, removal of boulders and construction of access roads, actual excavation for the silo and LCC started at later dates than cleared sites.

While the official starting date may be 16 June 1960 with surveyors out at the sites, contractor's trucks on the job and tool sheds set at the sites, a table has been prepared to show the beginning and completion of the critical starting and completion dates of construction. Beginning of excavation is shown at each site and through to final inspection date which indicated the completion of work.

	DATES				
	A	B	C	D	E
SITE NO.	EXCAVATION STARTING DATE	ORIGINAL COMPLETION DATE	REVISED COMPLETION DATE	SUBSTANTIAL COMPLETION DATE	FINAL INSPECTION DATE
1	5 Jul 60	25 Sep 61	7 Dec 61	7 Dec 61	20 Dec 61
2	29 Jul 60	11 Sep 61	10 Nov 61	9 Nov 61	2 Nov 61
3	5 Jul 60	18 Sep 61	23 Nov 61	22 Nov 61	27 Nov 61
4	25 Jul 60	2 Oct 61	9 Dec 61	9 Dec 61	22 Dec 61
5	16 Sep 60	23 Oct 61	24 Jan 62	12 Jan 62	25 Jan 62
6	24 Sep 60	13 Nov 61	10 Feb 62	5 Feb 62	14 Feb 62
7	24 Aug 60	6 Nov 61	9 Feb 62	9 Feb 62	22 Feb 62
8	2 Aug 60	9 Oct 61	9 Jan 61	25 Dec 61	15 Jan 62
9	15 Aug 60	20 Nov 61	15 Feb 62	12 Feb 62	5 Mar 62
10	1 Sep 60	16 Oct 61	28 Dec 61	16 Dec 61	4 Jan 62
11	31 Aug 60	27 Nov 61	31 May 62	25 May 62	29 May 62
12	16 Aug 60	30 Oct 61	31 Jan 62	15 Jan 62	31 Jan 62

In addition to the substantial and final inspection dates shown on the preceding chart, other important steps were necessary prior to signature on Form 290. After the final inspection teams have completed their work, it is necessary to formally turn over the sites to GD/A custody and establish that date.

The following charts set forth the dates of turnover to the various agencies.

TURN OVER TO SATAF - FORM 290

COLUMN	A	B	C	D.
SITE NO.	GD/A CUSTODY	RKMP REL. S & M.	290 TO SATAF	290 S/SATAF
1	27 Dec 61	27 Dec 61	22 Dec 61	5 Jan 62
2	13 Nov 61	13 Nov 61	10 Nov 61	13 Nov 61
3	15 Dec 61	15 Dec 61	15 Dec 61	15 Dec 61
4	27 Dec 61	27 Dec 61	27 Dec 61	5 Jan 62
5	29 Jan 62	29 Jan 62	29 Jan 62	29 Jan 62
6	20 Feb 62	20 Feb 62	14 Feb 62	14 Feb 62
7	26 Feb 62	26 Feb 62	27 Feb 62	13 Mar 62
8	20 Jan 62	20 Jan 62	18 Jan 62	20 Jan 62
9	9 Mar 62	9 Mar 62	12 Mar 62	29 Mar 62
10	9 Jan 62	9 Jan 62	8 Jan 62	15 Jan 62
11	31 May 62	31 May 62	31 May 62	1 Jun 62
12	2 Feb 62	2 Feb 62	6 Feb 62	13 Mar 62

Column A (GD/A Custody) indicates date each Missile Base turned over to General Dynamics, who will be responsible and has contract for installation of missile and check-out.

Column B (RKMP Rel. S & M) indicates date of letter to the prime contractor, Raymond-Kaiser-Macco-Puget Sound, informing them that they are relieved of Security and Maintenance at the Site.

Column C (290 to SATAF) indicates date the Form 290 was forwarded to SATAF for signature.

Column D (290 S/SATAF) indicates date the Form 290 was signed and the site formally accepted by SATAF, subject to any items on Punch List.

2. Contractor force and equipment

A comparative value of manpower and equipment use at start of the contract and at peak is outlined herewith. It is noted that drills with cranes, front end loaders, and trucks are criteria for "rock sites" (shafting in rock), with dragline cranes and dumpsters in use at "earth sites", or tractor-scrapers and dozers.

On the 15th of July 1960, the contractor reported 148 employees on the job with a progress of 1.27% and on 15 August this had increased to 384 employees.

By the 28th of September 1960, there were 621 prime contractor employees, 138 sub-contractor, 50 in the office and a shop force of 24, providing a total of 833 employees and progress of approximately 6.3 percent. Excavation equipment for 28 September 1960 on the job:

Site 1 - 2 cranes, 1 D-4 tractor, 2 front end loaders, 3 compressors, 4 twin drills.

Site 2 - 3 cranes, 1 grader, 1 compresser, 1 drill, 1 traxcavator, 1 D-4 dozer.

Site 3 - 2 cranes, 1 dozer, 2 compressers, 1 twin drill.

Site 4 - 4 compressors, 1 twin drill, 3 single drills, 1 generator, 1 traxcavator, 2 trucks.

Site 5 - 3 scraper-tractors, D-7 w/pan, D-8 w/pan, 2 D-8 dozers, 1 crane.

Site 6 - 1 dragline crane, 1 generator, 3 dumpsters, 4" pump.

Site 7 - 1-2 yd. backhoe, 2 D-8 dozers, 1 D-4 dozer, 3 Euclids, 2 pumps.

Site 8 - 4 drills, 2 cranes, 2 compressors, 2 Euclids, 2 traxcavators.

Site 9 - 1 dragline w/3 yd. bucket, 5 ten wheelers, 2 D-8 dozer, 1-6" pump.

Site 10 - 1 D-8, 1 D-7 dozer, 2 twin and 6 single drills, 1 generator.

Site 11 - 2 draglines, 2 D-8 dozers, 1 loader, 3 Euclids.

Site 12 - 2 tractor-scrapers, 2 D-8 dozers.

The major portions of this equipment began arriving on the job 15 to 23 July at Sites 1, 2 and 3; Sites 8, 9, 11 and 12 in August; and Sites 4, 5, 6, 7 and 10 in September 1960.

By the 17th of July 1961 with progress noted at 70.76% the contractor's manpower had achieved its peak with approximately 1148 employees for all crafts on the job with the prime contractor averaging 60 to 65 per day and the sub-contractors, including ASC contractors (Hardeman) contributing the remainder. It is noted the type of equipment changed with the silos and LCC's completed and with the mechanical and electrical work under way, progressively at each site. Graders, backhoes and trucks at some of the early sites indicate backfilling around the LCC's and silos is underway. Trouble had occurred at Site 11 with the driving of piling to contain the fluid soil condition encountered there. Equipment for accomplishing the work in July 1961 on the job:

Site 1 - 3 pumps, 2 compressors, 5 welders, 1 backhoe, 2 Euclids, 1 crane, 1 drill, 1 FE loader.

Site 2 - 1 compressor, 7 welders, 2 cranes, 1 trax, 4 dump trucks, 1 grader, 1 generator, 1 concrete mixer, 1 dozer.

Site 3 - 2 cranes, 1 dozer, 1 compressor, 2 welders, 2 FE loaders, 1 pump, 2 dump trucks, 1 grader, 1 backhoe.

Site 4 - 1 crane, 1 compressor, 1 pump, 7 welders, 1 generator, 1 FE loader, 1 drill, 1 dozer, 1 backhoe.

Site 5 - 1 crane, 1 backhoe, 1 traxcavator.

Site 6 - 3 cranes, 1 compressor, 5 generators, 3 pumps, 2 traxs, 3 trucks, 3 welders, 2 dozers, 3 DW-21 dumps, 1 Euclid dump, 1 stiff-leg derrick.

Site 7 - 1 compressor, 1 generator, 3 welders, 2 cranes, 2 dozers, 1 roller, 1 FE loader, 1 guy derrick, 2 Euclid dumps, 1 shovel.

Site 8 - 2 cranes, 4 pumps, 4 welders, 1 compressor.

Site 9 - 1 generator, 4 pumps, 2 compressors, 3 welders, 1 truck, 3 cranes.

Site 10 - 1 gunite mach., 1 grader, 4 FE loaders, 1 crane, 1 generator, 2 drills, 2 pumps, 2 dozers, 2 welders, 1 truck, 1 concrete mixer, 1 trax.

Site 11 - 3 cranes, 1 trax, 3 drills, 4 compressors.

Site 12 - 2 cranes, 2 welders, 1 compressor, 3 water pumps, 1 generator, 1 trax, 3 dozers, 1 FE loader, 1 sheepsfoot, 1 Euclid Dump, 1 vibrator.

From July thru to November 1961 manpower had continued at over the 1000 mark. From the 1st of November, progress at 90% complete and with all sites bottomed cut, concrete and steel in place, the sites averaged at 1110 employees (prime - 444, sub. - 605 and office 61) through to 10 November dropping to 1016 and steadying to an average of 900, plus - minus during the remainder of November and December 1961. This average began to decend as the sites reached the successful completion stage during January and February 1962. By 12 February the manpower for Punch List, clean-up and miscellaneous items had dropped to 55 for the prime contractor and 97 for the subs - with 11 of the above in the shops, the office continued at approximately 40 employees, total of 213, exclusive of Site 11, which had not reached successful completion stage and accounted for an additional 107 employees. An additional 40 to 50 average were employed on the swing and grave yard shifts at Site 11.

Clean-up, painting, punch list items, top soil and seeding provided manpower requirements thru to August 1962. March requirements were 85 on the 1st and reduced to 31 by the 15th, and, averaging 30 thru the month of April. May thru August varies from 20 to 10. Drilling concrete and grouting to repair leaks in the silos required 6 to 8 employees, May, June, July, and August 1962.

Site 11 manpower requirement averaging 100 to 125 continued to 1st of June and then dropped to 48. Manpower reduced to 18 on the 15th of June and held that as an average to 28 June 1962 when seeding and mulching was completed.

3. Sites not completed by scheduled dates - reasons therefore:

None of the sites were completed on the criginal contract completion dates as specified in Par. SC-2, Addendum No. 1, dated 17 May 1960, Items 1 thru 10. Later modifications to the contract were necessary due to change in site sequence as certain sites forged ahead of the others for various reasons. As a rule, sites that had early completion dates and lagged behind encountered changed conditions which delayed excavation and changed sequence. For details of original and final completion see Chart, Sec. V, page 5.

Site sequences were changed by RI-158, Mod. No. 61 dated 21 July 1961 and again by RI-235, Mod. No. 92 dated 26 September 1961.

Original scheduled dates were changed by modification for the following reasons, which apply to all sites in varying degrees:

1. Changes in plans and specifications
2. Abnormal severe weather
3. Claims, Clause GP-4, changed condition

Modifications issued due to unusually severe weather are No. 66 dated 4 August 1961, No. 1[illegible] dated 19 October 1961 and No. 250 dated 16 July 1962.

Modification No. [illegible] provides time extensions to all sites (except Site 11) by combining a series of changes into one modification. Site 11, under Claim No. 3, was placed in Change RI-191, Mod. 89, to provide time extension due to changed conditions.

For details of reasons for site not completed on schedule, (the original contract schedule) reference is made to Sec. V, Pages 1 to 9.

C. HISTORY OF PRIME CONSTRUCTION CONTRACT

1. Contractor and Bid

Invitation for bids, Construction of WS-107A-1 Operational Bases, Missile Launch Complexes, Sites 1 thru 12, all issued 13 May 1960, by U. S. Army Engineer District, New York, Corps of Engineers, 111 E. 16th Street, New York 3, New York. Bids were due 10 June 1960 and publicly opened 3:00 P.M., E.D.S.T., same day. The low bid was submitted by: Raymond International, Inc., incorporated in State of New Jersey, Henry J. Kaiser Company, Macco Corporation, Puget Sound Bridge & Dry Dock Company, each incorporated in the State of Nevada, a Joint Venture, with principal office at 140 Cedar Street in the City and State of New York. Raymond International, Inc. is the administrative contractor, with a field office located in Plattsburgh, New York at 177 Margaret Street.

The low bid - $24,408,000.00

2. Contract Costs

a. The contract cost, including settled modifications and exclusive of unsettled claims as of 30 August 1962 is in the sum of $40,764,759.27. Reference Payment Estimate No. 47 dated 16 August 1962.

b. The final contract cost (including all modifications) excluding appeals is in the sum of $59,461,843.91.

c. There remain a total of three appeals involving claims totalling $920,673.

d. Contract Costs. Basic Missile Contract and Missile Support Facilities - Both on-base and off-base.

The following chart is prepared to show the final contract cost of each support facility and total cost of all Missile construction work under supervision of Area Engineer.

There are many supply contracts under the supervision of other Districts, however, they are not included in the chart.

In this chart, identification is by contract number only, for description and contractor name refer to Section II, Chapter on Support Facilities.

In reference to the chart, original contract amount is shown as a reference and for comparison with final amounts.

Payment estimates were used "as of" 30 January 1962 to indicate amount of contracts on that date (unless shown otherwise). It will be necessary to fill in the last column when the contracts are completed and last payment made to get the final cost estimate. Since most of the supply contracts with large dollar value are completed and final payments made except retained percentage, this chart will indicate trend costs.

The first column indicates contract number

The second column indicates original contract amount

The third column shows payment estimate number referred to

The fourth column shows date of payment estimate number

The fifth column shows Payment Estimate Amount on that date

The sixth column shows final contract amount at completion of the contract.

FINAL CONTRACT COST

PRIME AND SUPPORT FACILITY CONTRACTS

1	2	3	4	5	6
CONTRACT NUMBER	ORIGINAL CONTRACT AMOUNT	PAYMENT ESTIMATE NO.	PAYMENT ESTIMATE DATE	PAYMENT ESTIMATE AMOUNT*	FINAL CONTRACT COST
9522	24,408,00[illegible].00	51	31 Oct 62	59,461,843.91	
9506	20,44[illegible].00	**7	8 Feb 62	58,545.59	58,545.59
9562	543,73[illegible].00	22	22 Aug 62	876,780.03	
9591	425,90[illegible].00	10	9 Jul 62	446,003.22	
9600	124,47[illegible].50	10	6 Jun 62	129,155.87	129,255.87
9848	561,34[illegible].00	17	8 May 62	563,374.44	
10036	206,24[illegible].00	7	5 Mar 62	159,801.07	
10037	59,60[illegible].00	3	31 Jul 62	73,012.96	78,165.81
5862	100,06[illegible].00		30 Sep 62	105,425.00	
5160	43,00[illegible].00	**4	Apr 62	59,767.86	59,767.86
10075	5,150.00	**1	20 Mar 62	5,150.00	5,150.00
10099	17,358.00	**5	11 Jul 62	19,544.66	19,544.66
10421	109,120.00	1	23 Jul 62	24,763.50	151,7[illegible]3.01
10601	11,580.00				11,960.00
TOTAL COSTS	26,636,015.[illegible]0				

*When appropriate includes modifications.
**Final payment estimate.

3. Data on Claims, AS OF 30 NOVEMBER 1962

a. No. of Claims at submission of report: 116

b. No. of Claims unsettled at submission of report: 0

c. No. of Appeals at submission of report: 3

4. Data on Modifications

a. No. of Changes - Design and Field: 287

b. No. of Changes cancelled: 3

c. No. of Change Orders not involving change in work: 19

Grand Total of Changes Issued: 309

It is noted that the majority of Design and Field changes fall within the "below-$10,500.00 category." The field changes were particularly small both in cost and number. Of this category, the great majority are under the $5,000.00 price, running in the range of $300.00 as a rule. In the $10,500.00 to $100,000.00 classification, all are well under the $50,000.00 price, except two modifications at $57,700.00 and $79,000.00.

When it is considered that the greater number of modifications are in the below-$10,500.00 classification, it should also be realized that this is less than $1,000.00 per silo, in Labor, Material and Mark-up. One should use this as evaluation of impact. A few comparisons are shown in the various price categories of negotiated modifications which indicates the trend and impact, keeping in mind that most dollar values are divisible by 12 to get the actual value impact at a missile site.

0.00 to 10,500 - Negotiated Modifications	- 86
10,501 to 100,000 Negotiated Modifications	- 14
Over 100,000 Negotiated Modifications	- 3
Assigned Contract - Modifications	- 17
Time Modification only	- 1
Credit Modifications	— 3

BREAKDOWN OF CHANGES BY TYPE

As of 30 March 1962

Facility & Contr. No.	Total	Design	Field	Claims	ASC	ADMIN.
Launch Complex 9522	268	100	119	23	17	9
Water Supply 9562	37	1	30	5	0	1
L.O.X. 9591	14	0	13	1	0	0
Re-Entry 9600	6	1	5	0	0	0
M.A.B. 9848	21	10	9	2	0	0
Fuel Catch. 10036	6	1	5	0	0	0
Safety Plat. 10037	6	4	1	0	0	1
Blast Sleeves 5160	2	0	1	1	0	0
Protection Alarm 10075	0	0	0	0	0	0
Modification Kits 10099	3	1	2	0	0	0

Administrative changes, example: Mods 74 and 82

CHANGE STATUS OF MISSILE & SUPPORT FACILITIES AS OF 30 MARCH 1962

FACILITY & CONTR. NO.	ORIGINAL CONTRACT AMOUNT	CHANGES DIRECTED	CHANGES FINALIZED NO.	CHANGES FINALIZED AMOUNT	CHANGES NOT FINAL NO.	CHANGES NOT FINAL EST. AMT.	CONTRACT AMOUNT
LAUNCH COMP. 9522	24,408,000.00	268	227 *(11)	9,829,690.00 (28,023.00)	41 *(12)	11,596,240.00	**34,265,713.00
WATER SUPPLY 9562	543,736.00	36	31	276,575.00	5	1,100.00	820,311.00
L.O.X. 9591	425,900.00	14	13	13,317.00	1	0.00	439,217.00
RE-ENTRY 9600	124,478.00	6	6	7,896.00	0	0.00	132,374.00
M.A.B. 9848	561,347.00	21	12	2,027.00	9	9,930.00	563,374.00
FUEL CATCH. 1036	206,240.00	6	2	8,000.00	5	2,182.00	214,240.00
SAFETY PLAT. 10037	59,600.00	6	4	5,542.00	2	Cr. 2,766.00	65,142.00
BLAST SLEEVES 5160	43,000.00	2	2	16,768.00	0	0.00	59,768.00
PROTECT.ALARM 10075	5,150.00	0	0	0.00	0	0.00	5,150.00
MOD. KITS 10099	17,358.00	3	0	0.00	2	1,325.00	17,358.00

* Claims placed in Mod.

** Does not include interim payments.

5. Modifications over $100,000.00, Comments

Modification No. 7 dated 20 August 1960 was issued in the sum of $140,026.00 decrease, and provided for the deletion of guard rails, gratings, dampers, monorails, ladders, and suspension brackets, and some minor additions to electrical work. During negotiations additional contract time was not considered necessary since the change called for deletion of work. However, upon receipt of the modification, the contractor deleted the paragraph concerning "no additional time allowed" (Ltr. 14 Oct 60, G-341) and although this was only the sixth change issued, gave his reason "we connot be sure how much this modification will contribute to the overall delay already occasioned this project by the numerous contract modifications". A review of the Modification Report, VK-16, reveals the early changes did not materially affect the Missile structure or appreciable work or cost.

Finally the contractor forwarded the modification with the following quote: "Any delay occasioned by this change cannot equitably be determined at this time. Therefore, the effect of this modification on the contract performance time will be determined when the extent of any delays are known." After this modification, the contractor qualified all his modifications for "time" and, later, introduced a claim for "impact" for all changes.

Modification No. 16, Supp. No. 5 dated 11 Jan 1962 amount $2,398,117.68. This change, No. RI-21, was first issued to the contractor on 19 Sept 1960 for changes in specifications, dated 13 Sept 1960. The modification provided for additional work in the structural, mechanical, ventilating and electrical portions of the contract. The change includes additional material and labor for valves, piping, cable trays, breakers, switches, electric panels, conduit wiring and some exterior excavation work by prime contractor. Extensive revisions were necessary to piping and ductwork and hanger for piping and ducts.

Several letters were forwarded to the contractor after 60 days to obtain his proposal, meanwhile the contractor forwarded letters of various clarifications and several meetings were held to assist the contractor. The contractor forwarded partial proposals which totaled approximately $3,000,000.00 by January 1961. By letter 24 January 1961 the proposals were withdrawn. Proposals were resubmitted by feature of work - Mechanical - Electrical, etc. In May, July, and September 1961 and January 1962, in total sum of $2,965,628.32. The contractor's proposals, as a rule, were in lump sum amounts for materials and labor, with elaborate breakdown for all the mark-up items, and only by long negotiations was it determined the details of materials and labor, and where they applied in accordance with the requirements of the change.

After preliminary negotiations to determine basis and agenda, final negotiations began for RI-21 on 26 October 1961 and concluded 10 January 1962, requiring twenty-five (25) separate meetings by negotiating teams. The mechanical and electrical items were the major portions of work, in the sum of $1,024,800.00 for mechanical and $643,257.00 for electrical at the sub-level. Structural work at sub-level accounted for $192,302.00 and the remaining costs attributed to small items of painting and work by the prime contractor.

The preliminary Government Estimate of 20 December 1960 and 7 January 1961 was prepared in the amount of $1,066,791.00 and revised upward after detailed review and estimating in the amount of $2,421,201.

The adjustment in time for this change is provided for in Modification No. 74 which supersedes interim time Modification No. 3.

Obviously, the directive for the contractor to proceed after having funds set aside based on a preliminary estimate saved much construction time, avoided re-fabrication of equipment, tear out of installed items and considerable confusion of the job. The many meetings with the contractor on the concept of the change helped to clarify the requirements for the contractor and avoid confusion and delays on the job. Interim payment and time extensions by supplement to the modification relieved the contractor of burden of cost for the changed work and provided a more realistic progress schedule based on current conditions. The original modification and later interim payment and time supplements are as follows:

Mod. No. 16 issued 19 Sept 1960 directing contractor to proceed.

Suppl. No. 1 issued 9 Feb 1961, interim payment, $867,295.80.

Suppl. No. 2 issued 14 June 1961, interim time extension, 8 to 18 days.

Suppl. No. 3 issued 4 Aug 1961, additional time extension of 1 to 8 days.

Suppl. No. 4 issued 13 Dec 1961, new total amount $1,647,138.00.

Suppl No. 5 Final Modification amount $2,398,117.68.

Modification No. 19, Supplement No. 5 (RI-24) dated 11 January 1962, amount $527,653.24.

Change RI-24 was first issued to the contractor by directive Modification No. 19, Part 1(PM-21) by date of 27 September 1960. This change provided for a continuous electromagnetic screen by utilizing existing concrete reinforcing steel in silo wall and cap, and, by increasing number of grounding straps in two flexible tunnel connections.

The work consists of welding the laps of four each outer vertical reinforcing bars on X-X and Y-Y axis of the silo from base to cap, also laps of outer horizontal reinforcing bars spaced 12 inches on center, which bars are, in turn, welded to the above mentioned four vertical bars on the axis.

At the junction of the corrugated metal tunnel and the silo, 25 additional grounding straps were added and 25 additional straps were installed around the flexible tunnel connections. The work was necessary to provide electrical continuity between vestibule and silo wall reinforcing bars.

The contractor submitted a partial proposal on 17 December 1960 in sum of $396,665.56. The final proposal was submitted by date of 15 September 1961 in sum of $621,310.00.

The initial Government Estimate dated 9 January 1961 was in the sum of $190,610.43, revised 12 Sept 1961 to $228,677.00 and final estimate 27 Dec 1961 in sum of $530,694.00 to reflect revised welding crew sizes, operating expense for equipment, crane for crew platform, overtime factors and agreed mark-up.

Five supplements were prepared. The original change, Part One, dated 27 September 1960, directed the contractor to proceed, outlining certain items of work. This was necessary since the contractor, at the lead site, would be ready to pour concrete for the grade beam and crib piers about 30 September 1960.

Supplement No. 1, 23 Nov 1960, provided additional data.

Supplement No. 2, 10 Feb 1961, provided an interim payment in sum of $51,996.00.

Supplement No. 3, 30 March 1961, interim payment increased to $99,015.79.

Supplement No. 4, 13 Dec 1961, interim payment increased to $273,336.00.

The final Supplement No. 5 dated 11 Jan 1962 in the sum of $527,653.24 was result of negotiations concluded on 3 and 4 Jan 1962.

In addition to many preliminary discussions and clarification letters, final discussions were started on 29 August 1961, where some agreement was made on crew hours, leaving open equipment and various mark-ups. Discussions were held again on 25 October 1961 which provided a basis for agreements for concluding negotiations, for crew hours, equipment, allowance, job factors and mark-up.

Modification No. 70 (RI-62), amount $123,555.12.

By letter dated 7 March 1961, under Mod. Control No. U-9, the contractor was given notice to proceed for changes in specifications dated 15 Feb 1961. This change provided for changes in respect to L/P guide roller interference, added power panel in battery room of LCC, Missile erection system, guy red on LO_2 topping tank, E. M. pulse protection and water chiller units malfunction annunciation. Interim payment was issued 7 August 1961 as Mod. 70 in sum of $73,560.00, and final modification issued as Supplement No. 1, dated 16 Jan 1962, for total cost of $123,555.12, and, an adjustment in time to be provided in a Supplement to Mod. No. 74.

The original Government Estimate dated 13 July 1961 was in the sum of $86,558.00, revised 31 October 1961 for total sum of $125,955.00. The contractor submitted his proposal dated 14 June 1961 in sum of $132,879.61, plus added amount of $2,600.09 on 20 Dec 1961 for a total of $135,479.70.

A total of five negotiation sessions were required with the contractor beginning 6 September 1961 and concluding 20 December 1961. During early discussions, the contractor, providing supporting data for electrical items, proved supplier costs for Surge Panels and Relay Cabinets, consequently, the Government Estimate was revised upwards in sum of $26,546.00 at sub-level, with other small labor costs. The Government Estimate was finalized in sum of $125,955.00 which was less than agreed final adjustment based on the contractor's proposal.

5a. The following data presents settlements of changes with the contractor prior to discussions during week of 7 June 1962.

STATUS OF SETTLEMENTS AS OF 28 AUG 62

Original Contract & Negotiated Changes as of 6 June =	$37,866,211.31
Less Interim Payments as of 6 June	2,552,225.00
	$35,313,986.31

Settlements Since 6 June 1962

MOD NO. - DESCRIPTION	PAID TO DATE
130 - Piezometers, Site 11 (RI-174)	$ 42,215.31
17 - Foster Wheeler (RI-17)	50,489.00
94 - Foster Wheeler (RI-111)	6,649.00
259 - Foster Wheeler (RI-322)	13,106.00
264 - Chicago Bridge & Iron (RI-325)	8,248.00
266 - Gustav Hirsch (RI-323)	1,426,000.00
267 - Griswold (RI-324)	1,054,000.00
269 - Carter Arace (RI-327)	340,969.86
271 - Rust & Corrosion (RI-330)	50,000.00
272 - Leaks in Utility Tunnels (RI-331)	65,000.00
273 - Concrete Leaks (RI-332)	222,000.00
270 - American Bridge (RI-326)	929,917.77
268 - Add'l Sump Pump, Site 12 (RI-279)	14,569.00
219 - Re-examine Helium Vessel, Site 11 (RI-254)	466.67
220 - Re-examine Helium Vessel, Site 3 (RI-206)	561.67
Adjustments in changes Negotiated Prior to 6 June	-147.73
260 - Lubricate Gear of L.P. Drive Mech. (RI-306)	436.41
274 - Magnaflux Inspection, Sites 1 & 2 (RI-314)	2,299.00
275 - Cancellation of Work under Mod 255 (RI-335)	-462.93
43/3- Add'l Services, Manufacturer's Representative (RI-66)	343.56
276 - Acceleration Costs, Waterproofing Sub (RI-336)	1,128.30
277 - Adjust Face of Shock Hanger Insert (RI-337)	34,697.00
278 - Delays - Shock Hanger Assemblies (RI-301)	9,850.00
44/4- Add'l Services, Manufacturer's Representative (RI-67)	214.83
Subtotal	$39,586,537.03
274/1-Adjustment to Mod 274	110.00
Negotiated contract as of 28 Aug 1962	$39,586,647.03
Plus Interim Payments	
64 - Changed Conditions, Site 5	100,000.00
89 - Changed Conditions, Site 11	2,400,000.00
Total Contract Amount as of 28 Aug	$42,086,647.03

6. Comments on Modifications

a. Assignment Contracts

One of the provisions of this contract was the "Assignment of Procurement Contracts" under Article SC-38 of the specifications. This assignment was accomplished by modification to the contract. The specification provides for the transfer of certain listed service and equipment contracts to the prime contractor. After the award of Government contracts for furnishing scheduled equipment, such contracts or portions thereof were assigned by the Government to the prime contractor, who administered, assumed all rights, duties and obligations that the Government had, including all payments. Assignment was to be made not more than 120 or less than 30 days before first scheduled delivery. Seventeen (17) modifications were processed thru the Area Office to provide for the adjustment in bond.

Modification No. 40 on 14 February 1961 thru Modification No. 56 dated 25 March 1961.

Modification No. 42 (RI-51) dated 24 March 1961, Contract DA-41-443-ENG-5765 being the Assigned Contract for P.L.S. prefabs and piping and installation, Paul Hardeman, Stanton, California, the assigned contractor. Amount $1,032,735.16 (including Mods. 1 thru 11 inclusive).

Supplement No. 1 dated 20 July 1961 was issued in the amount of $324,762.16 as interim payment for Change Orders 12 thru 19 to Contract DA-41-443-ENG-5765 (Unit Price Schedule Item No. 3).

By letter dated 7 December 1960 to Paul Hardeman, Inc. from the Contracting Officer, Fort Worth District, the contractor was your intent to default your contract and shall take appropriate action thereto." The contractor's answer (RKMP) by TWX dated 11 April 1961 advised that the contractor was proceeding to administer Contract 5765 under protest. By letter dated 17 April 1961 RKMP reiterated its reasons for refusing to accept assignment and, by letter dated 21 August 1961 the Contracting Officer, Colonel W. W. Wilson, C. E., denied in its entirety, RKMP's claim that assignment of Contract 5765, Item III, was effected contrary to the provisions of the contract. By letter dated 5 September 1961, RKMP appealed the decision of the Contracting Officer to the Chief of Engineers.

Final as of 1 May 1962:

Contractor's Claim No. 93 appealed to Chief of Engineers. Assigned ENG BCA No. 2029 by the Board of Contract Appeals. By letter dated 31 October 1961 the appeal was ordered withdrawn and by letter dated 9 November 1961 a copy of the appeal withdrawal was forwarded to Raymond-Kaiser-Macco-Puget Sound.

7. Claims

a. General Comment

The claims for Contract 9522 have been many and varied, beginning with letter on 15 August 1960 (Claim 3) with claims for delays and reaching a crescendo on 14 May 1962, Claim 113, with submission by the contractor of his over-all claim in sum of $37,392,269.00 for Prime Contract only. Many of the claims were of the sub-surface condition variety and delays due to all types of weather. Unusual claims were, No. 13, dated 19 Oct 1960 for additional costs due to rock <u>higher</u> than expected and Claim No. 12, dated 14 Nov 1960 for additional costs due to rock lower than expected.

Weather claims, as a group, consisted of delays due to Hurricane Donna, high winds, abnormally adverse weather, heavy snow, extreme cold, workmen refusing to ork due to cold weather, freezing rain, heavy rain, snow and winds, and "humid" weather, also including power failure due to weather; an over-all "winter protection". 17 claims were submitted related to ried weather conditions encountered in each month of the year except A ust, October and December.

Water conditions, ub-surface and ground water) accounted for 4 claims encompassing tes 3, 6, 7, 8, 9, and 11, and additionally a claim (No. 100) for wate control at all Sites ($851,752.00); also a claim for sealing tunnel eaks, No. 107 ($127,963.00).

Rock claims, sub-s ace conditions, occurred at many Sites in some form, Site 1 and 1 ave 3 different sub-surface material claims. In all, 13 claims for Site , 5, 7, 9, 11, and 12, encompassing hardness of overburden, hard r , wet earth, sand layers, uneven rock surface and fluid soil condit s.

Sixteen contractor ims were submitted involving Government furnished property and ASC terial. These claims include late approval of shop drawings which aff d deliveries and/or installation of equipment.

Safety requirements r PLS testing, embedded metal, close dimension tolerances, and c steel validation procedures resulted in protests and claims for all sites by the contractor.

Claims for stoppage of work or for Union activities involving Jurisdictional disputes by pipefitters and operation engineers resulted in claims by the contractor in two instances but actual conditions did not reveal a measurable loss in time and all were withdrawn, except a work stoppage by pile drivers at Site 11 and this was due to cold weather creating hazardous conditions that were justified. One claim, No. 35, was for delay due to employees electing not to work on Christmas holiday.

Design changes, changes due to field conditions and extra work due to joint occupancy contributed to the bulk and remainder of claims.

After the contractor's over-all submission, Claim 113, additional claims continued to arrive as "back-up", etc., No. 114 and 115.

As a rule, the contractor forwarded a notice of claim or protest. Almost any letter to the contractor from the Area Engineer calling his attention to a work hazard, materials or work not up to specifications, protection of materials on job or in storage and including at times corrections on shop drawing and, particularly, deviations due to field conditions resulted in a protest or notice of costs to be submitted later to the Government or "work done to your account", including a claim of $150.00 for each letter received or written to the Government and $75.00 for a telegram.

Furnishing of adequate information by the contractor for analysis was difficult to obtain and had a slow beginning. After two discussions by the Contracting Officer with the Contractor in February and again in March 1961, information and detail submittals began to flow into the Area Engineer's Office. A review on 17 August 1962 revealed, of the 113 claims submitted, 22 had been withdrawn, 5 had been combined into one claim, and one required additional data from the contractor. For each claim, a decision was pending by the Area Engineer and by the Contracting Officer. Eventually 60 claims were approved, and 25 denied of which four were appealed.

An attempt to analyze the claims into categories outside of the main construction items such as excavation, concrete, steel, heating and ventilating is difficult. A review of the various sections of the specifications will reveal almost all were covered by some type of claim. Changed conditions developed the greater number and costs. Clause GC-5 letters, called "acceleration" by the contractor (Claims 3 and 91 combined in CI-2 3) engendered a proposal of $13,913,336.00 including "effect of floods" and changed conditions at Site No. 11 at a price of $7,843,625, later reduced to $4,630,962 on 20 Aug 1960. Open cut vs shafting; claim 68, in sum of $2,598,446.00, validation and surveillance as claim [illegible] in sum of $1,492,424.00, additional indirect costs claim 109 in sum of $1,393,731.00 are a few of the larger claims, combined in the contractor's over-all claim 113 and described in this section under paragraph I, beginning on page 48.

(1) General categories of claims are as follows:

(a) Site preparation

(b) Excavation, open cut and shafting

(c) Silo Walls, Reinf. steel, embedded metal and concrete.

(d) Reinf. Steel and concrete other than silo walls

(e) Site work, backfill and roads

(f) Structual, Mechanical and Electrical, and Pumping

b. Other contracts, missile support facilities.

Contract 9562, Water Supply, 22 claims of which 14 were found to have merit. Two were withdrawn and the remainder required additional information. A majority of these claims were engendered by changed conditions, delays caused by dry holes and interference by other contractors.

Other cl[illegible]ims; Contract 9591, 4 claims. Contract 9600, one claim, a time exte[illegible]on.

Contract [illegible]48 with 15 claims, this contractor for the MAB building, with work [illegible]mpleted 29 Jan 1961 forwarded three claims in 1961, two in May 1962, o[illegible] in July, and nine claims on the 6th and 8th of August 1962, eight [illegible]nths after completion. Total amount of claims estimated at $60,00[illegible]00. This Contractor has been exceedingly difficult to negotiate w[illegible]h insofar as submitting data in a timely manner or in conducting di[illegible]ussions for settlement of either claims or modifications.

Contract [illegible]36 and 10037 had one claim each and Contract 5160 with two that were [illegible]nd to have merit.

H. PRINCIPAL SUB-CO[illegible]RACTOR

1. General

The principal sub-contractors for the missile prime contractor are listed herewith, including some of their sub-contractors for important features of work, also some suppliers of important items for the prime contractor. The dollar value listings shown below for 1st tier sub-contractors shown were compiled from an Army Audit report of costs incurred from period 14 June 1960 to 31 December 1961 and is considered as the best information available. Reference: U. S. Army Audit Agency, Boston District ARAUD-BO report dated 16 February 1962, to CEEMCO, Attn. ENGMA-..., (Exhibit D). Amounts shown are exclusive of modifications.

SUB-CONTRACTOR	Description	Amount
Carter Arace	Mechanical	$3,000,000.00
Gustav Hirsch	Electrical	1,350,000.00
Terry Steel	Reinforcing Steel	994,000.00
American Steel & Wir	Fencing	146,000.00
American Bridge	Structural Steel	3,200,000.00
Peru Associates	Sitework	480,041.00
Lenry, Inc.	Waterproofing	96,480.00
Theodore Stay & Sons	Painting	183,600.00
Torrington Construction	Excavation	144,161.00
Selby Drilling	Site Tube Holes	5,556.00
Total Sub-Contractors		$9,599,838.00

2. Listing Sub Contractors - Ref. Specification Par. GC-6 and SC-35.

Mechanical

Carter-Arace, a Joint Venture, 125 South Eried Street, Toledo 1, Ohio, Mechanical Sub-Contractor. The scope of work for the mechanical sub-contractor:

Sanitary Sewers, waste mains, force mains, vents, drains, gravity and sewage treatment facilities and all plumbing work.

Supply and Distribution Piping in Section 38.

Ventilation and Air Conditioning System, including Automatic Controls.

Fuel Oil Storage & Piping, Water Storage and Distribution System and Water Pump. Ga detection system, utility compressed air piping including the piping, a receiver, instrument and valve, and bleeder line for the installation of Air Cylinder Spring Supports.

Also this sub-contractor was responsible for installation of Diesel Generators and H Recovery Silencers only, and installation of Blast Closures, exclusi of any electrical work.

Under Assigned C racts, this sub-contractor was responsible for "administer assigne ervice contracts .... including expediting, however, PKMP will meet requirements of Par. SC-38 insofar as the continuing of payments ssigned service contractors is concerned." Equipment included unde ove responsibility is Pumps; Sewage; Submersible Turbine; Water Ce fugal and Fans; Water Chiller; Air Washer; Dust Collector; Air Con oning Fan Coil Units; Diesel Generators; Heat Recovery Silencers Ventilation Blast Closures.

Carter-A in turn, sub-contracted certain items of work to other contracto

Furnish and insta utomatic temperature controls: Johnson Service Company, 13 Ware e Row, Albany 5, New York.

Furnish and install sheet metal work: Triangle Sheet Metal Workers, Inc. 115 New Hyde Park Road, New Hyde Park, Long Island, New York.

Receive, haul and set in place in silos, Cryogenic and Pressure Vessels: Darin & Armstrong, Inc. 2041 Fenkell Avenue, Detroit 38 Michigan.

Insulate plumbing, heating and air conditioning systems to R. A. Keesbey Company, [illegible]8 N. Manning Blvd., Albany 6, New York.

3. Electrical Sub-Contractor

Gustav-Hirsch Organization, Inc. 1347 W. Fifth Avenue, Columbus 12, Ohio. Responsible for all electrical work, exterior and interior, including electrical items embedded in concrete. Complete battery station for Diesel Generator and Switchgear Control, T. V. surveillance, Automatic Fire Detection System, installing Diesel controls for Ventilation and Air Conditioning.

Sub-Contractor to Gustav-Hirsch - Bradley & Williams, Inc. E. Thompson Road, E. Syracuse, New York. To install temporary electrical supply to Missile Launch Complexes.

4. Concrete Sub-Contractor

S. T. Griswold and Company, Inc., Essex Junction, Vermont, furnish and install plastic mix concrete ready for placement in forms. Portion of contract sub-let to Ashton Ready Mix Corporation, Saratoga Springs, New York to furnish concrete for Sites 4, 5, 6, 10, and 11.

5. Reinforcing Steel - Installation

Terry Contracting Inc., 11-11 34th Avenue, Long Island City, New York. Furnish supervision, labor, materials, supplies, tools and equipment required to install all reinforcing steel. This sub-contract also contained the following clause, by RKMP:

"In addition to the technical section requirements it is the intent of this sub-contract that the sub-contractor shall order shipment of and expedite delivery of all reinforcement steel supplied by Ryerson Steel Company" (RKMP Purchase Order No. 4). The Terry Contracting Sub-Contract was terminated 2 December 1960 by RKMP due to inability of the sub-contractor to maintain his schedule.

6. Reinforcing Steel - Supply Sub-Contractor

Joseph T. Ryerson & Son, P. O. Box 996, Buffalo 5, New York, material supplier of reinforcing steel.

7. Structural Steel Sub-Contractor

American Bridge Division, United States Steel Corporation, 71 Broadway, New York, New York, Furnish, fabricate and erect the structural steel, Blast Doors and Hatches and Miscellaneous Metal Work. Sub-Contract also includes erecting of following list of Government furnished material at each site:

Shock Hanger Assemblies (Section 58-07), Counterweight Guide Rails and Counterweight (Section 58-06), Launch Platform Drive Base and Mechanism (Sections 58-09, and 10) and Suspension Brackets (Section 58-05). Contract also includes furnishing about 48 tons of miscellaneous and embedded metal but does not include installation of embedded metal.

8. Fencing Sub-Contractor

Cyclone Fence Department of American Steel and Wire Company, 796-808 Freling-Huysen Avenue, Newark, New Jersey, furnish and install

all fencing.

9. Unclasified Excavation Sub-Contractor

Torrington Construction Company, Inc., Keeseville, New York Unclassified Excavation.

10. Site Work Sub-Contract

Clearing, grubbing, overburden on roads, access roads, culverts, topsoiling and seeding - Peru Associates Inc., P. O. Box 643, Plattsburgh, New York.

11. Waterproofing Sub-Contractor

Application, material and labor - "Waterproofing with Flintkote Monoform System to surfaces of Launch Control Center Structures and Appurtenances" ... (contractor's quote - Lenry, Inc. 630 3rd. Avenue, New York 17, New York.

12. Cleaning of Vessels, Sub-Contractor

Cleaning vessels at Site No. 8, Stellardyne Laboratories Services, Mt. Holly, New Jersey.

Cleaning vessels at Sites 6, 7, 8, and 9, Dow Industrial Services, Mt. Holly, New Jersey.

13. Drill Well, Sub-Contractor

Drill temporary water well at Site No. 12, Genest Well Drilling Inc., 72 Allong Street, Kensington, Connecticut.

14. Sight Tube, Sub-Contractor

Drilling for Sight Tube - Selby Drilling Corporation, Niagara Falls, New York.

15. Painting, Sub-Contractor

Painting work required by contract. Theodore Stay and Sons, 45 Peru Street, Plattsburgh, New York.

16. Ring Beams - Supply Contractor

Supply all required Ring Beams. Commercial Shearing and Stamping Company, 75 Logan Avenue, Youngstown, Ohio.

17. Pressure Vessels - Supplier

Vertical High Pressure Gas Storage Vessels for Propellant Loading Systems and Manifold Piping. Foster-Wheeler Corporation, 666 Fifth Avenue, New York 19, New York.

18. Liquid Oxygen Tanks, 48 pieces, in accordance with Sections 44 and 45 of the specifications, including shop cleaning, testing, painting, and inspection per specifications, including valves, pumps, clips, lugs, shop-test cases, and liquids. Chicago Bridge & Iron Company, 165 Broadway, New York 6, New York.

I. CONTRACTOR'S FINAL SUBMISSION OF CLAIMS, CONTRACT 9522

1. Method of Presentation

By letter dated 14 May 1962, Reference No. G-2930 the contractor made his final "presentation of claims", in book form, numbers I thru VII. Books I, II, and III presented claims and the remainder served as back-up and support data of the claims and project costs as a whole.

Book I, claim for remuneration of costs incurred for acceleration up to and including milestone No. 1. $15,604,503.00

Book II, claim for remuneration of costs incurred for acceleration between milestone No. 1 and the completion milestone No. 10. ....2,331,118.00

Book III, is in three parts. The first part includes twelve claims of varied nature and two changed conditions. The second and third books include the final changed conditions...$25,163,248.00

Total Books I, II, and III	43,098,869.00
a. Summary	
(1) Books I, II, and III	43,098,869.00
Less, accountable for duplication of changed conditions. Sites 1, 5, 7, 9, and 12.	-5,706,600.00
New Total	$37,392,269.00
Plus, estimated sub-contractor claims	7,181,646.00
Total Claims	$44,573,915.00
(2) ontract amount as of 27 y 1962	37,046,882.00
ss, interim mods	-2,454,385.00
Total contract amt.	34,592,497.00
(3) timated total cost of contract	

e following provides a total cost of the contract from the contracto s view point:

tal of claims, par. (1)	$44,573,915.00
timated contract amt. par. (2)	34,592,497.00
timated grand total	$79,166,412.00

(4) e above dollar value changes as the contractor presented various sma claims, alleging they were back-up after this presentation.

2. Comments - Contractor's back-up books

The contractor, to provide back-up data, forwarded books IV, V, and VI showing his break down of costs for the entire missile project.

a. Book IV, in two Sections A and B, is essentially cost back-up data on an "as built estimate" basis. "A" Section, is an estimate for "Rock Sites" 1, 2, 3, 4, 8, and 10 and "Earth Sites" estimate for 5, 6, 7, 9, and 12.

Section "B" presents cost estimates for Site No. 11, in the same theme, which is separated from other sites.

The contractor states this book is essential to all calculations for all claims in reference to crew make-up or structure and the cost per crew hour to accomplish the various tasks per trade, equipment rentals, wage rates, time to accomplish work or jobs, break down in office equipment, clerks, labor, and supervisory personnel of all types.

b. Book V, deals with back-up for acceleration, "modifications and conflicts".

c. Book VI, concerns contract schedule progress and delays.

3. Review of contractor's submission.

Upon receipt of the contractor's claim, an analysis was prepared by the Area Engineer Staff. Reviews and recommendations for disposition were made in conference with the Area Engineer to prepare for a visit to the Plattsburgh Area by the Contracting Officer, CEEMCO, and subsequent discussion with the contractor.

On 4 June 1962, Col. W. W. Wilson, the Contracting Officer with Col. T. F. Spencer and members of their staff, arrived at the Plattsburgh Area. After briefings and review of the contractor's over-all claim, arrangements were made for discussions with the principals of the contractor.

4. Meeting with the Contractor

a. A meeting was convened in the Area Engineers Office on 7 June 1962 for the purpose of settlement of all claims of the contractor. The principals of RKMP for the meetings were Mr. G. W. Bailey, Vice President, Mr.E. W. Simpson, Project manager and H. A. Federa, Secretary and General Counsel. Leading the team for the Corps of Engineers, Col. W. W. Wilson, Col. T. F. Spencer, Lt. Col. L. E. Bremkamp, Area Engineer, and M. D. Denney, Area Counsel.

Negotiations continued each day until 12 June 1962. Among the items discussed were the following claims:

Foster Wheeler, Sub-Contractor claim, Cleaning of Vessels, Nozzles, and Manifolding, Radiography and Pickeling.

RKMP over-all acceleration claim, loss in efficiency due to 7 day week, premium effort of men and equipment, supervision, etc.

Claim by Griswold, concrete sub-contractor, increased plant ready-mix trucks, acceleration, winter concrete.

RKMP claim of close tolerences for validation of crib steel, delays due to interference of I and C Phase Contractor.

Proposed shafting of all silos and LCC's. Due to directed schedule the contractor was forced to open cut, to LCC foundation level which was an expensive method at earth sites.

Acceleration after milestone No. 1 because of changed conditions.

Pumping water after milestone No. 1.

Humidity in silos caused additional cleaning, rust and corrosion control, replacement of materials.

Winter silo protection, heating and snow removal.

Gustave - Hirsch claim, electrical sub-contractor. The total claim of this sub-contractor was agreed to in the sum of $1,150,000.00 at the prime contractor level, meeting on 10 June 1962 in the Area Engineers Office, and confirmed by Mr. G. W. Bailey on 11 June.

b. At the meeting on 11 June 1962, Mr. G. W. Bailey, Sr. Vice President of MKMP made a proposal of $68,700,000.00 for the total final contract amount, including all claims, with no exclusions. An agreement was made to meet on 12 June 1962 for further discussions.

c. On 12 June 1962 at an early morning meeting an agreement was made concerning the S. T. Griswold sub-contractor claim, (concrete Sub-) in the sum of $1,054,000.00 at prime level.

d. Final negotiations were held in the office of the Area Engineer at 1445 hours on 12 June 1962 for final settlement of outstanding items in dispute. Attending this meeting:

Col. W. W. Wilson, Contracting Officer, Atlas F CEBMCO

Col. T. F. Spencer, Exec. Officer, Atlas F CEBMCO

Lt. Col. L. E. Bremkamp, Area Engineer, Plattsburgh AFB

Mr. S. D. Broselow, Ch. Contr. Adm. Br., Atlas F CEBMCO

Mr. G. W. Bailey, Senior V. P., Raymond International

Col. Wilson presented the following list of exclusions that would form a part of any settlement agreement:

Field Clean[illegible]ng of Vessels	Claim 102
CBI, 304 St[illegible]	Claim 4
Ring Beams, [illegible]ite	Claim 16
Magnaflux [illegible]p. and Grinding	Intent to Claim
Repair of [illegible]er Leaks	RI-309-322
Add'l Magn[illegible]ux, Sites 2 and 3	RI-314

Other claims and appeal[illegible]re to be withdrawn on the basis that the joint venture could char[illegible] $2\frac{1}{2}\%$ to cover Raymond's home office expense. Mr. Bailey said that if [illegible]eement on settlement was made, he would request nothing on coll[illegible] of ring beams.

Col. Wilso[illegible]en showed Mr. Bailey a list of current contract values based on l[illegible]t agreements:

(1)	Adjust[illegible]Value of Contract, 6 June [illegible]2	35,313,985.31
(2)	Less - [illegible]rge to RKMP for Liquid [illegible]rogen ($108,327.60)	35,205,657.71
(3)	Plus - [illegible]tlement since 6th June	37,755,901.71

(Hirsch 1,4[illegible]0 - Foster-Wheeler 70,244 - Griswold 1,054)

To this Col[illegible]lson offered 15,950,000.00 as a full settlement for all outstand[illegible] claims except the stated exclusions, for a new contract total amo[illegible] of $53,705,901.71. Mr. Bailey requested time to consider and later in the day, advised that he could not accept the offer.

5. Additional Submis[illegible]on of Claims

After the meeting with Col. Wilson in June 1962 to discuss all of the claims, the contractor later forwarded additional letters concerning claims.

Although the contractor has referred to his letter of 14 May 1962 (G-2930) as his "com[illegible]te claim presentation", by letter dated 3 August 1962 (G-3038) th[illegible]contractor forwarded a claim for additional costs caused by interfere[illegible]s from others. In this second letter, the previous claimed amount o[illegible]316,032.00 (9 May 1962, G-2918) was reduced to $223,334.00 by excludi[illegible]overhead items, and then in turn, increased $1,357,613.00 for a new t[illegible] of $1,580,947.00. The increase was for "those factors which were [illegible] to the presence of other government agencies interfering with [illegible] performance of the contractor; affects of supernumerary inspection a[illegible] surveillance personnel; and costs for crews standing by waiting for th[illegible]xt item of work to be released" (validation and check out for punch l[illegible]). By contrast, another claim for only $1,152.44 was forwarded b[illegible]tter dated 23 July 1962, (G-3029) for the waterproofing sub-contrac[illegible] "... due to acceleration".

A third letter d[illegible] 16 August 1962, Ref. G-3054 was submitted by RKMP to "supplement" t[illegible] presentation of 14 May 1962 Ref. G-2930, as "revised requests ..." [illegible]d on "manhours of work required for conformed estimate of Original Conditions and for the as built estimate." Listed in the presentation were 14 items in a general man-hour summary. The contractor requested a lump sum settlement, "due to inseparable interrelationship of all items variously called acceleration, impact, effect of Mods, loss of sequence, loss of learning curve, surveillance, change of design, effects of Government Direction". Also included were interest and legal fees.

The contractor's "revised request" of 8 August 1962 arrived at a contract amount (Payment Estimates) of $39,664,072.00 excluding interim payments for changed conditions. In addition the contractor requested $29,769,380.00 or a total settlement of $69,433,452.00, as compared to his offer of $68,700,000.00 made at meeting in Area Engineer Office on 11 June 1962. The government had offered $53,705,901.71 on 12 June 1962.

6. Based on the revised data submitted by the contractor an analysis was prepared, as of 20 August 1960, in preparation of a visit by the Contracting Officer for negotiations with the contractor.

7. Discussion of the Contractor's claim was held during the week of 27 August 1962. Personnel from CEBMCO Headquarters, including Mr. S. Ribakoff, Chief, Counsel, and Mr. S. Broselow, Chief, Contract Administration Branch (Atlas F) of the Directorate arrived 23 Aug 62 to participate in final discussions in an attempt to settle the contractor's over-all claim (Contract 9522). The Area Engineer briefed Col. Spencer and Staff prior to discussions with the Contractor.

During the discussions with the contractor, areas of differences were pinpointed between the contractor's presentation and the Government findings for allowable items. The meeting was then suspended to allow additional time for analysis of the various items brought out during discussions and a new date of 19 September 1962 was agreed upon for renewal.

At subsequent meetings, each claim was negotiated and settled and on 22 September 1962 the last item, acceleration, was settled. Except for the three remaining appeals, the final contract amount became $59,461,843.91. The major claim settlements were as follows:

Changed Conditions,	Site #1	$ 271,000
" "	Site #5	126,200
" "	Site #7	703,900
" "	Site #9	1,247,500
" "	Site #11	3,641,704
" "	Site #12	233,400
Open Cut and Shafting		538,130
Silo Pumps		303,910
Supernumeraries		1,377,100
Acceleration		11,601,450

SECTION II

MISSILE SUPPORT FACILITIES

SECTION II

MISSILE SUPPORT FACILITIES

A. GENERAL

1. In addition to the Atlas Missile Launching Sites, other support facilities are required to provide a completely operational base. Planning and construction for the Atlas ICBM indicated the need for Water Supply Facilities at the Sites, and on-base support facilities which includes Guided Missile Warehouse, and a Liquid Oxygen Plant.

Proposed modification and repairs to various buildings on the base are necessary to complete the requirements of ICBM support facilities.

Administration approximately 47,500 sq. ft. required, proposed use of Buildings [illegible], 104, and 432 for temporary use. At the completion of the project, these facilities would be released back to the base.

Warehouse, approximately 60,500 sq. ft. required. The base had allocated a Nose Dock with 26,000 sq. ft. In Hanger 2763, 10,000 sq. ft. and Building 26[illegible] 14,000 sq. ft. To support this interim warehouse space, only m[illegible] re-hab work will be required.

Shops, approximately 17,500 sq ft. required. Utilizing Building No. 2801 which [illegible] approximately 13,500 sq.ft. for use, leaving a shortage of 4000 sq. ft. A major project to convert this building for use was necessary.

Laboratory, approximately 7500 sq. ft. required. To satisfy this requirement the bas[illegible]t of Building 100 could be used for the

Photo and Chemical Laboratory and the Instrument test facility to be installed in Building 108.

Open storage, required 50,000 sq. ft. An area adjacent to the Motor Pool situated parallel to the Railroad. This area requires some type of surfacing for storage use.

2. To provide office space for the Area Engineer and Air Force Field Offices (AFBMD and SATAF) it was necessary to rehabilitate Building No. 100 at Plattsburgh Air Force Base. The plans called for work in Basement, 1st and 2nd floors. Work consisted of Partitions, Patching Plaster Walls and Floors, Tile Floors, Painting, New Electric Conduit and Wiring, New Lighting, New and Reconditioning Heating, New and Reconditioning Plumbing and Toilet Rooms.

Invitation for bid No. ENG-30-075-60-110 was issued with bids due 21 April 1960. Contract No. DA-30-075-eng-9506 dated 27 April 1960 was awarded to Garfield Therrien Electrical Company, Plattsburgh, New York, in the sum of $20,447.00. Contract completion date was scheduled 17 June 1960.

Due to on the job needs and changing criteria for the Air Force it was necessary to issue three (3) modifications to the contract. The final contract cost was $58,545.59 and completion date modified to 10 January 1961.

B. WATER SUPPLY FACILITIES - OFF-SITE AND ON-SITE

1. Description

To provide water at all Atlas Missile Launching Sites, invitation for bids No. 30-075-60-96, dated 24 June 1960, was issued by the New York District Office to interested bidders with bids due 21 July 1960. The plans call for two wells, well houses and appurtenant work and piping each at nine (9) sites and a chlorinator manhole and water mains for connecting to town water mains at three (3) sites, namely Alburg and Swanton, Vermont and Willsboro, New York.

On 28 July 1960, Contract DA-30-075-eng-9562 for construction of the Water Supply Facilities was awarded to Mechanical Utilities, Inc., 60 E. 42nd. Street, New York, New York in the sum of $543,736.00, which was the low bid. Notice to Proceed was issued on 1 August 1960. Seven (7) bidders submitted bids, the high bid for the project was $1,077,104.00. The contract was to be completed by 1 May 1961.

2. Completion Dates

Although the contract was to be completed by 1 May 1961, it was necessary to provide time extensions at most of the sites for various causes.

Sites No. 2 Alburg, 3 Swanton, and 4 Willsboro were completed on the contract completion date, and it is noted that the contract called for providing connections to the Town water system at these sites, rather than drilled wells as at remainder of the sites.

At all sites where drilled wells were specified, time extensions were necessary and new contract completion dates were provided by modification.

New completion dates are as follows:

Site No. 1	Champlain	31 July 1961
Site No. 5	AuSable Forks	12 October 1961

*Site No. 6	Clayburg	30 August 1962
Site No. 7	Chazy Lake	14 September 1961
Site No. 8	Ellenburgh	31 July 1961
Site No. 9	Mooers Forks	2 October 1961
Site No. 10	Bouquet	1 September 1961
*Site No. 11	Sugarbush	15 July 1962
Site No. 12	Harrigan Corners	11 September 1961

2. Modifications

A review of this contract on 30 January 1962 revealed that thirty-eight (38) changes to the contract had been issued, with ten (10) changes pending for an estimated value of $34,000.00, one (1) change cancelled, two (2) changes for a few days time extension (subject to cancellation) and twenty-five (25) changes negotiated for a value of $219,400.00. (15 Sept 62, 44 Mods., value $393,130.00).

The number of changes is attributed to the nature of this contract, which requires drilling for water at a particular site, and the uncertainty of finding water. The contract proved to be, to some extent, an exploratory contract. A few of the changes of the greater amounts are listed.

Change RI-1?, Mod. No. 18 dated 21 July 1961 and Supplement, in the sum of $77,743.00. Since water was not found in sufficient quantities it was necessary to issue change in specifications dated 3 March 1961 to provide for an infiltration gallery at the Saranac River to supply water for Site No. 6, Clayburg. This change required extension of water main and electric power, a filtration gallery and

*Completion dates extended, Site 6, Mod. 31 and Site 11, Mod 32.

porous piping at the Saranac River, pump, pumphouse, chemical feed system, site work, access road and fencing.

Change RI-24, Mod. No. 22 dated 15 November 1961 in sum of $33,870.00. Two wells drilled to provide water for Site No. 5, AuSable, did not provide sufficient water in the required amounts and it was necessary to issue a change for an additional well, well house, pump, extend access road, grading, fill area, seeding and additional fencing.

Change RI-26, Mod. No. 23, dated 4 January 1962. A stop order was placed on Sites 5, 6, and 11, 9 December 1960 since dry holes and insufficient water were found during drilling operations. The stop order was lifted with the issuance of changes for additional well at Site 5 and the infiltration gallery at Site 6. Site 11 work was terminated until a later date. As a result the contractor claimed loss due to suspension of work in the sum of $28,031.00 and invited an audit of his books by the Government to prove this amount, which was promptly accepted, and, as a result of the audit, an equitable adjustment was made in the sum of $23,395.00.

Change RI-30, Mod. No. 27 dated 21 February 1962 in sum of $28,500.00. This Mod involved Site No. 4, Willsboro. A 3" water main was installed along State Highway Route 22 from Station 49-74 to 50-67 including work to place the line around the end of a concrete culvert. The change was necessary as the original main, installed under the contract, was placed over the top of the concrete culvert with insufficient cover. The insufficient cover and lack of use by local residents caused the line to freeze during the winter weather. It was necessary to route the water piping around end of existing concrete culvert, excavate 6 feet into rock.

and lay the 3" pipe to provide a safe constant source of water, free from freezing.

4. Claims

The contractor presented 22 claims in the total sum of approximately $82,000.00. These claims were caused by a variety of reasons, the outstanding one was due to the nature of the contract which developed into a search for water at missile sites 5, 6, and 11 where water was not found in sufficient quantities and further search was necessary. This condition caused a stop order to be issued for Sites 5, 6. and 11 and subsequent claims for delays, overhead costs and increase in labor costs. Sub-surface conditions and severe winters caused other claims. Extensions of contract time from original completion date of 1 May 1961 to fall of 1962 were necessary.

As of 30 July 1962, nine claims were transferred to modification status, two withdrawn, two were concurrent time claims and nine under review or awaiting further "justification" from the contractor.

5. Liquidated Damages

Special conditions SC-2-a provides for penalties of $100 per day, each site, for failure to commence drilling one well within 10 days of notice to proceed. SC-2-b provides penalty of $200 per day, each site, for failure to complete the work on the contract completion date.

For failure to begin drilling within 10 days of notice to proceed at Sites 5 - 10 the sum of $5,700.00 was withheld from payment to the contractor under Clause SC-2-a, until full review of the circumstances could be made by the Area Engineer. The contractor protested the action. Upon final review by Area Counsel, recommendations were made that withheld funds be released.

6. Water Supply Source, by Site

a. General

The following information provides source of water and gallons per minute from wells at the various sites. At each of the twelve sites are four (4) each, 25,000 gallon underground storage tanks, total capacity of approximately 100,000 gallons, which serve as a reserve supply. Where water is obtained from town water supply, the tanks are connected to the town's water mains.

Site [illegible] Alburg, Site 3, Swanton, Vermont and Site 4, Willsboro, Vermont use town water. Site 6, Clayburg, has a sand filtration gallery and intake with manhole on the Saranac River.

b. Chart of gallons per minute, Wells at Sites

SITE NO.	GALLONS PER MINUTE		
	Well No. 1	Well No. 2	Well No. 3
1	30	30	
5	14.50	9	17
7	16.7	(2A)15.5	
9	16	16	
10	(1A)15.50	17	
11	Well "C" average 25 G.P.M.		
12	35	15	

c. Wells requiring special treatment

(1) Site No. 6 Clayburg, Modification No. 31(RI-39) dated 9 June 1962, and in the sum of $32,233.00 provided for water treatment equipment (floculation pressure filter system) to filter out fine sand, sediment and organic matter from water pumped at the intake plant manhole located on the filtration gallery at the Saranac River. A time extension provided for completion 30 August 1962.

(2) Site No. 21 Sugarbush. Modification No. 32(RI-40) dated 8 June 1962, in sum of $55,805.00 provided for utilizing well "C", a dewatering well for the silo excavation under contract 9522, as a source of water supply. Work included pipe line, pump, pumphouse, electrical work and hypochlorite feeding machine. This well had tested out at 25 G.P.M.

An analysis made on 25 May 1962 recorded 15 ppm turbidity. The fine sand sediment made it necessary for review and recommendations by the Architect-Engineer to eliminate or reduce the turbidity to acceptable criteria. A recommendation (July 1962) was made for a flocculation-pressure filter system estimated at approximately $30,000.

C. LIQUID OXYGEN PLANT - OFF-SITE FACILITY

1. Description

To provide liquid oxygen facilities to support Atlas Missile Launching Complexes, invitation for bids No. Eng-30-075-61-8, dated 7 September 1960, was issued by the New York District Office to interested bidders with bids due 28 September 1960. The plans and specifications call for construction of a metal building with masonry lean-to; liquid oxygen and liquid nitrogen above ground storage tanks with valves and piping; asphaltic concrete paving; Portland cement concrete paving; exterior utilities including water lines, sanitary sewers, and electrical work; grading; drainage and fencing.

On 12 October 1960, Contract DA-30-075-ENG-9591 for construction of the 25 Ton Liquid Oxygen Plant was awarded to Herrick L. Johnston, Incorporated, 659 Marion Road, Columbus 7, Ohio; in the sum of $425,900.00, which was the low bid. Notice to Proceed was issued on 13 October 1960. The pre-construction meeting was held at the office of the Area Engineer at the Plattsburgh Air Force Base on 14 October 1960, wherein the terms and conditions of the contract were explained to the contractor. Work began on the 18th of October 1960. Schedule I, Buildings and Utilities, to be completed by 3 April 1961, and Schedule II, Roads, Grading, Seeding and Fencing to be completed by 2 May 1961. Eight (8) contractors submitted bids, the high bid for the project was $579,189.00.

2. Completion Dates

Schedule I, Buildings and Utilities, Scheduled and completed on 3 April 1961.

Schedule II, Roads, Grading, Seeding, scheduled and completed on 2 May 1961 (except Paving).

Schedule IIA, Modification No. 10 provided a time extension and modified Schedule II to allow completion of Paving for Roads on 29 May 1961.

3. Modifications and Contract Amount

a. A total of fourteen (14) modifications were issued in the total sum of $20,203.22, lowest being Mod. 2 at $240.00 and highest, Mod. No. 14 at $6,886.00.

b. To al Contract Amount $446,103.22.

4. Claims

Four ( ) claims were presented by the contractor.

No. 1, 13 days additional time, withdrawn by the contractor.

No. 2, Stokes gages found payable transfered to Mod. No. 14.

No. 3, nsulating valves, denied by CO, decision VL-1-F-172.

No. 4, emoval of concrete, denial recommended by Area Engineer.

D. RE-ENT FACILITIES - OFF-SITE FACILITIES

1. De ription

To rovide necessary inspection and storage facilities to support Atlas issile Launching Complexes, invitation for bids No. Eng-30-075-61-33 dated 7 October 1960, was issued by the New York District Office interested bidders with bids due 3 November 1960. The plans and sp ifications call for construction of a concrete block and reinforced c crete additions, 65' long x 33' wide, to existing Maintenance and spection Building No. 3578 and concrete paving. Included in the wo is modification to Igloo No. 3546 and modification to Base Spares B lding No. 2, Sanitary Sewers, Septic Tank System, 2" Water Service iping, Electrical work; grading and seeding.

On 16 cember 1960, Contract No. DA-30-075-eng-9600 for construction of e Facilities was awarded to Plant Supervision Corporation, 97 Boy on Ave., Plattsburgh, New York in sum of $124,477.50, which was the lo bid. Notice to Proceed was issued by letter dated

29 December 1960 and acknowledged by the Contractor 30 December 1960. The pre-construction meeting was held in the office of the Area Engineer at Plattsburgh Air Force Base on 21 December 1960, wherein the terms and conditions of the contract were explained to the contractor. Work began on the 6th of January 1961. Completion date for the contract is 15 September 1961. Seven (7) contractors submitted bids, the high bid for the project was $169,943.00.

2. Contract Completion Date

The original contract completion date was 15 September 1961. By modification No. 1 dated 8 April 1961 the contract completion date was extended thirty-six (36) calendar days to 21 October 1961, completion of the project, except Sanitary Filter Bed and Septic Tank.

Modification No. 5 dated 26 October 1961 provided a time extension of seven [illegible] calendar days for completion of Sanitary Filter Bed and Septic [illegible] due to field conditions for a new completion date for this portion of the contract on 28 October 1961.

The contr[illegible] was completed on schedule in accordance with the new completion [illegible].

3. Modifications

Six ([illegible]) modifications were issued, the lowest, Mod. No. 6 in sum of [illegible]1.00 a[illegible] highest, Mod. No. 3, in sum of $7,400.00. Total amount of modificati[illegible] $7,893.82.

4. Claims

The contractor submitted one (1) claim for additional contract time to com[illegible] the project due to delay in receiving notice to proceed, which was found to be justified and placed in Mod. No. 2 for additional thirty-six (36) calendar days.

E. PROTECTIVE ALARM SYSTEM FOR RE-ENTRY VEHICLE FACILITIES

1. Description

A Missile Support Facility, the Re-Entry Vehicle Building, was completed under Contract DA-30-075-eng-9600. For the Protective Alarm System, Invitation for Bid No. Eng-30-075-62-31 with plans and specifications was issued for bids on 12 December 1961 by the New York District Corps of Engineers, New York City, New York. Bids were due on 27 December 1961.

Contract No. DA-30-075-eng-10075 was awarded on 4 January 1962 in the sum of [illegible],150.00 to the low bidder, Kenworthy and Taylor, Inc., 11 Spalding Street, Everett, Massachusetts. Notice to Proceed was issued 15 January 1962 and receipt thereof acknowledged 22 January 1962. The contractor was required to commence work within five (5) calendar days after receipt of Notice to Proceed and complete the work within fourty-five (45) calendar days, after receipt thereof. The pre-construction conference was held with the contractor on Tuesday, 23 January 1962, in the Area Engineer's Office.

2. Completion of Contract

Contract completion was 8 March 1962. The contract was completed on time and the final inspection was also 8 March 1962. There were no modifications to the contract. Eng Form 290 signed by using agency 10 April 1962.

F. MISSILE ASSEMBLY AND MAINTENANCE SHOP, AND TECHNICAL SUPPLY BUILDING. OFF-SITE

1. Description.

To provide necessary assembly and maintenance space also technical and supply services, plans and specifications have been prepared for issuance to bidders. The Assembly and Maintenance Shops will consist of alterations to a portion of Building No. 2763, an area approximately 160 feet x 190 feet, to provide new ceilings, lighting and floors for shop area, included are office, communication and quality control rooms. Alerations to Building No. 2612 an area of 37 x 60 feet will provide warehousing, machine room and inspection areas. Exterior work consists of tank farm, paving, grading and fencing.

It is planned to begin construction in January and complete the Technical Supply Facilities in Building No. 2616 by 1 August 1961 and the modification of Building No. 2763 for Missile Assembly and Maintenance Area, and Utilities, tank farm, paving, and grading by 30 October 1961.

Invitation for bids No. 30-075-61-67, dated 1 December 1960, was issued by the New York District Office to bidders with bids due 5 January 1961. Contract No. DA-30-075-eng-9848 was issued 18 January 1961, to Herrick L. Johnston, Inc., 659 Marion Road, Columbus, Ohio in the sum of $561,347.00, the low bid. Notice to Proceed was issued 27 January 1961 and acknowledged on 30 January 1961, by the contractor. The pre-construction conference was held in the Area Office on 30 January 1961. Twelve bids were submitted, the highest bid being $677,000.

2. Completion Dates. Original Schedule and Completion Date

a. Technical Supply Building, including revisions to Building No. 2616. Contract completion date, 1 August 1961. Completed on schedule.

b. Shops Missile Assembly and Maintenance Building, Modification of Building No. 2763. Utilities, Tank Farm Area, Grading, Paving, Drainage. Contract completion date, 30 October 1961. Actual completion date, 27 December 1961.

c. Master Equipment Lists, Equipment and Operation data, drawings, spare parts, special tool and equipment lists, completion date, 15 September 1961. Actual completion date, 27 December 1961.

d. Communication Duct System, Contract completion date, 2 August 1961. Completed on schedule. (Payment Estimate No. 16, dated 8 January 1962 withholds $33,947.63).

3. Contract Modifications

By review on 30 January 1962 there were twenty-two (22) changes issued on this contract.

One change, No. 2, cancelled

One change, Credit Modification, for 150.00 issued.

Eleven (11) changes issued in eleven (11) Modifications, total sum of $2,177.44.

The ten (10) remaining changes have an estimated value of $9,950.

It has been difficult to obtain proposals from the contractor so that final negotiations may be arranged.

4. Claims

Four (4) claims were presented by the contractor.

Claim 1, transfered to Change RI-14

Claim 2, withdrawn by contractor

Claim 3, transfered to Change RI-22

Claim 4, recommended for denial

5. Liquidated Damages

The contractor failed to complete the Missile Assembly Shop, etc. (Item 2-b, Page 16) on schedule by 30 October 1961 and Master Equipment Lists (Item 2-c, Page 16) on schedule by 15 September 1961 and was informed by letter dated 11 January 1962 that the following amounts were being retained to cover possible liquidated damages:

Item 2-b - 58 days at 500.00	$29,000.00
Item 2-c - 103 days at 100.00	10,300.00
Total	$39,300.00
Payment Estimate No. 16, dated 8 Jan 1962 retains	$33,947.63
Amount of Remaining Modifications (Est)	9,900.00
Total	$43,847.63

By letter dated 20 April 1962 the contractor requested an extension of time of 197 days. After discussions on 21 April 1962 it was mutually agreed that 60 calendar days was an equitable adjustment in time. This additional time placed the contractor on schedule and voided the possibility of liquidated damages. New completion schedule date, 29 December [illegible]1. The contract was substantially complete on 27 December 1961.

G. FUEL CAT[illegible]ENT TANKS AND SAFETY PLATFORMS. ON-SITE

1. Desc[illegible]tion

Invi[illegible]ion for bids No. 30-075-62-19, dated 26 July 1961, was issued by the [illegible] York District Office to bidders with bids due 17 August 1961 and ch[illegible]ed to 23 August 1961 by Addendum No. 5, dated 11 August 1961, for F[illegible] Cat[illegible]ment Tanks and Safety Platforms. Bids were awarded separ[illegible]ly, as follows:

a. Fuel Catchment Tanks, Herrick L. Johnston, Inc., 659 Marion Road, Columbus, Ohio, was low bidder in the sum of $206,240.00 and Contract No. DA-30-075-eng-10036 was awarded on 14 September 1961. Notice to Proceed was issued and acknowledged by the contractor on 21 September 1961. Original "ready" for shipment date for 1st tank was 6 October 1961, however, due to delay in Notice to Proceed the first "ready" for shipment date was changed to 25 October 1961 by modification to the contract. The whole contract is scheduled for completion by 30 May 1962.

b. Safety Platforms, Phillip Formel Company, 45 East Putnam Avenue, Greenwich, Connecticut, was low bidder in the sum of $59,600.00 and the Contract No. DA-30-075-eng-10037 was awarded on 14 September 1961. Notice to Proceed was issued by letter dated 2 October 1961 and acknowledged on 9 October 1961. Due to delay in issuing Notice to Proceed the first "ready" to ship date of the first platform was extended to 10 November 1961, with a platform to be ready each succeeding 7 days for each 12 sites.

2. Contract 10037 - Safety Platforms (Phillip Formel Co.)

a. Completion Dates

Par. [illegible] 1, b, Schedule II, provides for Safety Platforms to be completely installed in silos within 24 days after receipt by contractor of each separate Notice to Proceed for each site.

The following chart indicated delivery of platforms, starting and completion of work and contract completion date. Due to changes in specifications the final contract completion dates were revised.

Site No.	Platform Delivery Date	Platform Starting Date	Final Contract Completion	Original Completion Date
1	23 Dec 61	5 Jan 62	26 Feb 62	28 Dec 61
2	15 Dec 61	4 Jan 62	21 Feb 62	21 Dec 61
3	21 Dec 61	5 Jan 62	16 Feb 62	21 Dec 61
4	10 Jan 62	24 Jan 62	21 Mar 62	11 Jan 62
5	10 Jan 62	22 Jan 62	19 Mar 62	1 Feb 62
6	19 Jan 62	19 Jan 62	15 Mar 62	11 Feb 62
7	18 Jan 62	26 Jan 62	13 Mar 62	11 Mar 62
8	6 Jan 62	15 Jan 62	9 Mar 62	11 Jan 62
9	28 Dec 62	12 Jan 62	1 Mar 62	15 Jan 62
10	13 Jan 62	23 Jan 62	23 Mar 62	1 Feb 62
11	5 Feb 62	*	*5 Feb 62	5 Feb 62
12	8 Jan 62	16 Jan 62	8 Mar 62	11 Jan 62

*Specifications require delivery only to Site 11. However, Change No. RI-6 was issued to provide for installation of platform in silo. Installation will be coordinated with progress of Contract 9522.

b. Liquidated Damages

Par SC-2, b, Schedule II, provides penalty of $100.00 per site, for each day of delay. No liquidated damages were accessed.

c. Changes in Specifications

As of 30 July 1962, seven modifications were issued, in total sum of $17,114.00. Mod. No. 1 provided for 35 days contract time extension due to delay in award.

3. Contract 10036 - Fuel Catchment Tanks (H. L. Johnston, Inc.)

a. Contract Completion Dates

Par. SC-1, a, Schedule I, (2) provides for fuel catchment tanks to be completely installed within five weeks after receipt by contractor of each separate notice to proceed for each site (except Site 11). Seeding, all sites, to be completed by 30 May 1962. Receipt of Notice to Proceed established the first site to be completed on 6 December 1961 and 11th site by 14 February 1962.

b. Liquidated Damages

Par SC-2, a, Schedule I, provides penalty of $100.00 per site for each day of delay until work is completed (except seeding). Since the contractor did not complete the work as scheduled, he was warned of possible liquidated damages, in accordance with letter, ENGMA-AB-2 (SEC K) dated 14 March 1962, "subject to possible liquidated damages for late completion of all work at all sites except Map Site 11. Total 322 days @ $100.00 = $32,200.00."

The following chart provides dates for various construction phases:

Site No.	Notice to Proceed Date	Actual Starting Date	Substantial Completion Date	Contract Completion Date
1	8 Nov 61	6 Nov 61	11 Jan 62	13 Dec 61
2	2 Nov 61	12 Oct 61	30 Dec 61	7 Dec 61
3	1 Nov 61	24 Oct 61	14 Dec 61	6 Dec 61
4	10 Jan 62	4 Jan 62	16 Mar 62	14 Feb 62
5	27 Dec 61	18 Dec 61	14 Mar 62	31 Jan 62
6	20 Dec 61	20 Dec 61	27 Feb 62	24 Jan 62
7	13 Dec 61	30 Dec 61	29 Mar 62	17 Jan 62
8	7 Dec 61	10 Nov 61	17 Feb 62	11 Jan 62
9	7 Dec 61	14 Dec 61	31 Jan 62	11 Jan 62
10	3 Jan 62	16 Dec 61	27 Mar 62	7 Feb 62
11			*17 Jan 62	
12	15 Nov 61	16 Dec 61	5 Feb 62	20 Dec 61

*Specifications require delivery of material only.

c. Changes in Specifications

As of 30 July 1962, seven (7) changes were issued, with 4 in Mod, in sum of $11,854.00 and, Mod. 4 a credit of $2,400. Mod. 1, provided 19 days time extension, Mod. 2, provides for installation of tank at Site 11.

H. BLAST DETECTION SYSTEM. ON-SITE. CONTRACT 5862

1. Description

Invitation for bids Eng-04-203-61-49 issued 15 August 1960 with bids due 8 September 1960. This invitation was issued by Army Engineer District, Corps of Engineers, 180 New Montgomery Street, San Francisco, California, Colonel John A. Morrison, CE, Contracting Offi r.

Platts rgh Area Engineer was involved only with the items in this inviatio nder Schedule C, Group III. In this group certain items were to be nufactured and under jurisdiction of the U. S. Army District, San Fra isco as follows:

1) Blas Detection System Electronic Rack, including three (3) Radio Receivers Test Oscillators, two (2) Optical Amplifiers, Output Circuitry and ower Supply.

2) Loop ntenna with Test Loop and Cables.

3) Optic l Sensor and Cable.

4) Optic l Test Light and Cable.

4a) Opti l Sensor and Test Light Mast.

The followin items provided for Installation of the System, under the Area Engineer, lattsburgh:

5f) Deliver and install complete one (1) Blast Detection System in one Atlas Complex as described in Completion Schedule included herein and located at the following sites:

Plattsbu h AFB, New York - - - - 12 each

6) Field esting of the Blast Detection Systems specified above in one Atlas Complex, complete.

7) Data, Equipment Operating and Maintenance, as specified above in paragraph SC-5C herein.

The contract as awarded by date of 14 September 1960, DA-04-203-eng-5862 to ITT Kellogg, A Division of International Telephone and Telegraph Corporation, 500 North Pulaski Road, Chicago 24, Illinois. Schedule C, Group III, Plattsburgh AFB, New York.

Estimated costs for items as follows for GROUP III:

ITEM	QUANTITY	UNIT PRICE	TOTAL
1	12	3,487.18	41,846.16
2	36	168.53	6,067.08
3	24	455.03	10,920.72
4	24	436.85	10,484.40
4a	24	98.32	2,359.68
		Sub-Total	71,678.04
5f	12	1,856.53	22,278.36
6	12	90.64	1,087.68
7	40	125.40	5,016.00
		GRAND TOTAL	$100,060.08

a. Pre-Construction Conference

On 6 April 1962 a pre-construction conference was held in the Area Engineer's Office, Plattsburgh, New York.

2. The following completion dates are set forth for this contract.

LOCATION	START NOT EARLIER THAN	START NOT LATER THAN	COMPLETE BY
Complex 1	8 Jan 62	8 Apr 62	8 Jul 62
Complex 2	17 Jan 62	17 Apr 62	17 Jul 62
Complex 3	26 Jan 62	26 Apr 62	26 Jul 62
Complex 4	6 Feb 62	6 May 62	6 Aug 62
Complex 5	15 Feb 62	15 May 62	15 Aug 62
Complex 6	26 Feb 62	26 May 62	26 Aug 62
Complex 7	7 Mar 62	7 Jun 62	7 Sept 62
Complex 8	16 Mar 62	16 Jun 62	16 Sept 62
Complex 9	27 Mar 62	27 Jun 62	27 Sept 62
Complex 10	5 Apr 62	5 Jul 62	5 Oct 62
Complex 11	16 Apr 62	16 Jul 62	16 Oct 62
Complex 12	30 Apr 62	30 Jul 62	30 Oct 62

I. GASEOUS [illegible] ENT BLAST CLOSURE ASSEMBLIES

1. Desc[illegible]ion

Invi[illegible]ion [illegible]r Bid No. Eng-23-028-61-88 dated 23 May 1961 was issued by the [illegible]. [illegible]y Engineer District, Kansas City, Corps of Engineers, 1800 Fe[illegible]l [illegible]ice Building, 911 Walnut Street, Kansas City, Missouri with bids [illegible] 1[illegible] June 1961. This work provided for manufacture and delivery [illegible] 75 b[illegible]st closures for the gaseous oxygen vent systems of the launchi[illegible] sil[illegible]. Contract No. DA-23-028-eng-4964 was awarded to Henry Pr[illegible]t Co[illegible]any, 319 West Van Buren Street, Chicago 7, Illinois in the sum [illegible] $3[illegible],148.00. Delivery of 12 each blast closure plates was schedule[illegible] [illegible]ot [illegible]ter than 19 January 1961 and Installation to be accomplished by [illegible] Air Force integrating Contractor.

Twelve (12) each of the Gaseous Oxygen Vent Blast Enclosures were delivered to the installation contractor, General Dynamics, and signed for on Voucher No. 1, dated 22 March 1962.

J. BLAST CLOSURE SLEEVE, SILO WALLS, CONTRACT 5160

1. Description

The Kansas City District issued Invitation No. Eng-23-208-62-15 dated 24 October 1961 with bids due 7 November 1961 for providing an opening in the existing reinforced concrete silo wall and installing therein a metal blast closure sleeve at each of the 12 sites. Contract No. 5160 was awarded to M. K. Hill Construction Company, Inc., Salina, Kansas, on 7 November 1961 in the sum of $43,000.00.

2. Completion dates

Reference Par. SC-1, a, Schedule F. The following chart shows critical construction phases:

Site No.	Site (date) Available to Start Work	Actual Starting Date	Substantial Completion Date	Contract Completion Date	Form 290 Signed Date
1	2 Jan 62	5 Jan 62	15 Jan 62	15 Jan 62	22 Jan 62
2	8 Jan 62	13 Jan 62	22 Jan 62	22 Jan 62	31 Jan 62
3	15 Jan 62	20 Jan 62	29 Jan 62	29 Jan 62	31 Jan 62
4	22 Jan 62	29 Jan 62	7 Feb 62	5 Feb 62	27 Feb 62
5	5 Feb 62	9 Feb 62	17 Feb 62	19 Feb 62	29 Mar 62
6	26 Feb 62	1 Mar 62	7 Mar 62	12 Mar 62	29 Mar 62
7	5 Mar 62	22 Feb 62	2 Mar 62	19 Mar 62	29 Mar 62
8	29 Jan 62	1 Feb 62	11 Feb 62	12 Feb 62	27 Feb 62
9	12 Mar 62	5 Mar 62	*8 Mar 62	26 Mar 62	29 Mar 62
10	12 Feb 62	12 Feb 62	21 Feb 62	26 Feb 62	29 Mar 62
11	19 Mar 62	28 Jan 62	30 Jan 62	2 Apr 62	29 Mar 62
12	19 Feb 62	19 Feb 62	26 Feb 62	5 Mar 62	29 Mar 62

*The work was completed on 8 March 1962 (ahead of schedule). Final inspection was made on 9 March 1962 at Sites 6 and 9.

3. Modifications

Supervision of the contract was exercised by the Area Engineer, however, CEBMCO retained control of negotiations and assignment of modifications. Colonel W. W. Wilson to sign all modifications.

Change RI-1 was issued for miscellaneous changes; Removing #18 reinforcing steel in opening in lieu of No. 8; Chip concrete to install flange of Blast Closure Sleeve and cut out and remove portion of existing ring beam. This change was issued as Modification No. 6 in sum of $13,190.00 by date of 26 February 1962.

Change RI-2, formerly a claim, was issued for splitting and rewelding steel sleeves. Piping in the silo and vent shaft prevented installation in one piece and it was necessary to split the sleeve, insert and reweld. This change was issued as Modification No. 7 in sum of $3,578.00 by date of 8 March 1962.

Change R-3, in Mod. 11, issued in sum of $3,087.00, costs due to water in fill and vent shaft. Formally claim No. 1.

Change R-4, in Mod. 10, issued in sum of $519.00, welding, repairs, and expenses, Sites 5, 6, and 8. Formally claim No. 2.

K. 42" MODIFICATION KIT. SILO BLAST CLOSURE

1. General

The Kansas City, Missouri District awarded several Supply Contracts. The following information is furnished concerning the 42" Modification Kits since installation is to be accomplished under the supervision of the Area Engineer.

2. Description

a. Supply - Mod. Kits, Contract 5173

42" Modification Kit, Silo Blast Closure

Contract No. 5173

Awarded - 24 November 1961

Completion Date - 15 February 1962

Amount of Contract - $13,635.70

Contractor - Henry Pratt Company, Chicago, Ill.

b. Installation - Mod. Kits, Contract 10099

Invitation for bid No. Eng-30-075-62-64, dated 15 January 1962, was issued on 22 January 1962 by the New York District Engineer with bids due on 7 February 1962. The work to be performed consists of installation of Government Furnished Blast Closure Kits containing sufficient material to modify four (4) Blast Closures at each missile site.

Contract No. DA-30-075-ENG-10099 was awarded on 14 February 1962 in the sum of $17,358.00 to the low bidder, Dinger Contracting Company, 174 Richmond Hill Road, Staten Island 14, New York.

The pre-construction conference was held in the Area Engineer's Office at 1300 hours on 7 March 1962 wherein the terms and conditions of the contract were reviewed with the contractor.

(1) Completion Date

Notice to Proceed dated 28 February 1962 was forwarded to the contractor who acknowledged receipt thereof by date of 3 March 1962.

Special Condition SC-1, provided for completion of first site by 5 March 1962 and last site by 16 March 1962. Also the foregoing completion dates were based on Notice to Proceed within 10 calendar days after opening of bids. SC-1 also provides for extension of completion dates in equal number for days in excess of the allotted 10 days time.

No. 3 was issued to cover time due because of miscellaneous unavoidable delays.

Site No.	COMPLETION DATES Scheduled	Substantial	Site No.	COMPLETION DATES Scheduled	Substantial
1	9 April	4 May	7	1 April	31 March
2	8 April	22 May	8	10 April	19 May
3	7 April	18 May	9	30 March	21 April
4	6 April	11 May	10	4 April	23 April
5	3 April	20 April	*11		
6	2 April	11 April	12	31 March	2 April

Dates shown are for Year 1962.

*Site 11 Mod. Kits installed by Carter-Arace, a sub-contractor of RKMF.

Amendment No. 2-1 dated 30 Jan 1962 provided for elimination of all work at Site No. 11, Sugarbush.

Contract 10099 continued--

(2) Modifications

Change RI-1, Mod. 3 Amount $958.00 increase*

Change RI-2, Mod. 1 8 days time extension

Change RI-3, Mod. 4 Amount $1,819.00 increase*

Change RI-4, Mod. 2 Amount $500.00 Decrease*

Change RI-5, Mod. 2 Amount $50.00 Decrease*

(3) Final Contract Amount

Original contract	$17,358.00	
By Modification	2.227.00	(*difference)
Total	18,585.00	

(4) Liquidated Damages

No liquidated damage clause in contract, therefore, no assesment for failure to complete the contract on schedule.

Last Site - scheduled, 10 April 1962 - Site No. 8

Last Site actual completion, 22 May 1962 - Site No. 2

(5) There were no claims

(6) Engs. Form 190, one for each site, dated 23 May 1962 covering transfer of accountability was accepted by using agency by date of 26 June 1962.

L. MISCELLANEOUS CONTRACTS

A number of small item contracts related to the missile sites were also awarded and are listed herewith briefly. The Kansas City, Mo. District was responsible for soliciting bids.

1. Duct Heaters
   Contract - 7485
   Awarded - 9 November 1961
   Completion Date - 1 August 1962
   Amount - $3,191.04
   Contractor - Industrial Engineering & Equipment
   St. Louis (Brentwood 17) Missouri

2. Electric Hot Water Heating Package
   Contract - 7486
   Awarded - 9 November 1961
   Completion Date - 1 August 1962
   Amount - $25,260.00
   Contractor - Precision Parts Company
   Nashville, Tennessee

3. Switch Gear
   Contract - 7487
   Awarded - 15 November 1961
   Completion Date - 1 August 1962
   Amount $18,810.00
   Contractor - Central Electric Company
   Fulton, Missouri

4. Air Intake Dampers
   Contract - 7496
   Awarded - 15 November 1961
   Completion Date - 1 August 1962
   Amount - $5,173.44
   Contractor - Mable City Furnace Company
   Falmouth, Illinois

M. AZIMUTH MARKERS, CONTRACTS 8327 AND 10601

1. Supply: Contract DA-25-066-eng-8327 dated 4 April 1962 was awarded to the Omaha Steel Works, by the Omaha District Engineers in the sum of $1,806.00 to supply Plattsburgh with 24 Tribrach plates and 24 Protective covers, also 12 Sighting Point Markers. All material was delivered and received on 21 May 1962.

2. Installation: Invitation for bid, eng-30-075-62-147 dated 21 June 1962 was issued by the New York Army Engineer District with bids due 18 July 1962. Contract DA-30-075-eng-10601 was awarded on 30 July 1962, in the sum of $11,580.00 to North Hills Engineering Co., Inc., Heckert Building, Bakerstown, Pennsylvania, to provide for installation of the Azimuth Markers. Notice to Proceed was issued on 13 August 1962 and receipt thereof acknowledged by the contractor on 16 August 1962. Work is to begin within 10 days after N.T.P. and to be completed by within 30 days (Sept. 15, 1962). The pre-construction conference was held in the Area Engineers Office on 16 August 1962.

(1) The high bid for installation was $25,700.00.

(2) There are no provisions for liquidated damages in this contract.

N. DRAINAGE IMPROVEMENT, ACCESS ROAD TO WATER TREATMENT PLANT SITE 6, [illegible]AYBURG

Purchase Order No. 27-5909 dated 8 May 1962 in the sum of $1,075.00 was issued to [illegible]ott Construction Corporation, Plattsburgh, New York. Notice to Proceed was issued 16 May 1962 and acknowledged by the contractor on [illegible] May 1962. Work to be completed 30 days after

Notice to Proceed.

The work provides for necessary excavation, shoulder grading, fill area, seeding, and rip-rap in ditches, each side of access road to the Water Treatment Plant, to prevent excessive erosion due to sandy soil. (Change Order Conference No. 22-13, dated 22 November 1961).

Plans and specifications were prepared for this work by the Area Engineer. Six proposals were requested on 27 March 1962 from local bidders. Two lowest received, $2,381.00 and $1,075.00. The Government Estimate - $1,934.00.

This purchase order was necessary since a proposal received from the contractor of Contract DA-30-075-eng-9562, in the sum of $6,039.44, was considered as excessive and unrealistic.

Work was started on 24 May 1962 and completed 1 June 1961, except for seeding.

C. TUNNEL BLAST DOORS. CONTRACT 10421

Invitation for bid No. Eng-30-075-62-118 dated 5 April 1962 was issued by U. S. Army Engineer District, 111 E. 16th Street, New York, New York with bids due 1 May 1961. The plans and specifications provide for furnishing and installing a steel blast door in Utility Tunnel from LCC to Silo at opening to stair well, at each of the twelve missile sites.

Contract DA-30-075-eng-10421 was awarded on 9 May 1962 in the sum of $109,920.00 to Phillip Formel Company, 45 East Putnam Avenue, Greenwich, Connecticut.

Next highest bid above Phillip Formel Company was $126,000.00 and the highest bid was $378.864.00.

Notice to Proceed was issued on 14 May 1962 and receipt of notice thereof on 16 May 1962 by the contractor. The first site is specified as available to the contractor on 4 June 1962 and to be completed by 3 August 1962, with the last site to be completed on 19 October 1962. Work is to be accomplished on the third shift. Pre-construction conference was held in the Area Engineer's Office on 22 May 1962.

Liquidated damages are specified in the sum of $100.00 per day, per site.

SECTION II

1. Contract Data.

a. Modifications 10 (incl. 3 Claims)

b. Claims 3

c. Liquidated damages None

d. Contract completion date

	1st Site	Site 12
Original contract date:	4 June 1962	19 October 1962
Actual completion date:	15 August 1962	8 October 1962

e. Form 290

Form 290 dated 28 September was signed by the using agency by date of 19 October.

SECTION III

BALLISTIC MISSILE FACILITIES

PERSONNEL

SECTION III

A. ORGANIZATION AND PERSONNEL

1. Original Organization and Responsibilities

The Plattsburgh Area Office is a field office, established 2 May 1960, for the supervision of construction of the WS-107A-1 Operational Base Missile Complexes. When established, the office was under the supervision of the New York District Engineer. At 2400 hours, 30 September 1960, the responsibilities of supervision over the Plattsburgh Area Office were transferred to the Corps of Engineers Ballistic Missile Construction Office (CEBMCO), Los Angeles, California, Atlas "F" Directorate, Colonel W. W. Wilson, Director and Contracting Officer.

2. Organizational Change - Secretary of Army and Air Force

An organizational change occurred in April 1961 at higher level, and while it did not directly affect the structure of supervision of the missile site below the Area Engineer, did provide changes in line with the following agreement:

In accordance with a 1 April 1961 agreement signed by the Secretary of the Army and the Secretary of the Air Force to provide the means for a completely integrated Army - Air Force effort on the ICBM Program the following terms of the agreement are set forth:

By means of the agreement, the United States Army Ballistic Missile Construction Organization was placed under the joint operational control of the Air Force which is charged with the execution of the ICBM Program.

The agreement arranged for the establishment of a Deputy for Site Activation responsible for control of Site Activation Activities, including Design, Construction and Installation and Checkout.

The agreement provided that the Army would support the ICBM construction effort with personnel and personnel spaces; administration and pay of the Army Military and Civilian personnel would continue through Army channels; funding documents and construction directives would be issued through Air Force Command channels to the Commander, CEBMCO; contractual and contract administration matters for the ICBM Construction Program would remain in Corps of Engineers channels following Engineer Contract Instructions; the Chief of Engineers would continue to exercise normal technical and staff supervision in the execution of the ICBM Construction Program; and the Corps of Engineers, as the principal construction agency, would continue to render Construction, Engineering, Real Estate, and other support to the program.

3. The attached Organization Chart under date of 1 May 1961 indicates the Area Office Organizational set up as originally formed and staffed under which the greater part of the missile site project was supervised and constructed with the exception of the Staff Area. All other Areas, or branches indicate the key personnel.

Under the original staff, Lt. Colonel Sidney Stern was Area Engineer, with Major Howard D. Rhodes as Deputy Area Engineer. Lt. Colonel Stern assumed the duties of Area Engineer on 2 May 1960. Mr. J. E. Trolier was Assistant Area Engineer, Civilian.

By Area Field Order No. 61-7, dated 13 March 1961, Lt. Colonel Louis E. Bremkamp was designated Deputy Area Engineer and Major Howard

D. Rhodes was designated Executive Officer. Upon the retirement of Lt. Colonel Stern, by Area Field Order No. 61-18, dated 7 June 1961, Lt. Colonel L. E. Bremkamp assumed the duties of Area Engineer, effective 6 June 1961. Major H. D. Rhodes was assigned the principal duties of Deputy Area Engineer, effective 6 June 1961.

Major H. D. Rhodes was transferred on 1 January 1962 to the Command and General Staff School at Fort Leavenworth, Kansas and his duties were assumed by Major J. J. Kohler as Assistant Area Engineer.

4. Organization Charts and Changes

(a) Chart dated 1 May 1961, Lt. Col. Stern, Area Engineer, indicates key personnel and minimum requirements of Area Office under normal operations.

(b) Chart dated 1 January 1962, Lt. Col. Bremkamp, Area Engineer, indicates re-organization and pending phase-out. The Operations Branch was established with former Construction, Engineering, and Technical Branches now as Sections. On 16 January 1962, Mr. R. D. Denney, Attorney, became Counsel vice B. Zimberg resigned and later on 3 March 1962, Mr. J. Trolli[illegible], Civilian Assistant Area Engineer transferred to the Baltimore District.

5. Functions of Plattsburgh Area Office

Atlas F Construction Directorate

The functions of the various Assistants and Branches of the Plattsburgh Area Office are included in this history. This inclusion will not only indicate the functions of the office but will present a guide for establishing an Area Office in the Ballistic Missile Program in new areas. This statement of functions represents the duties and

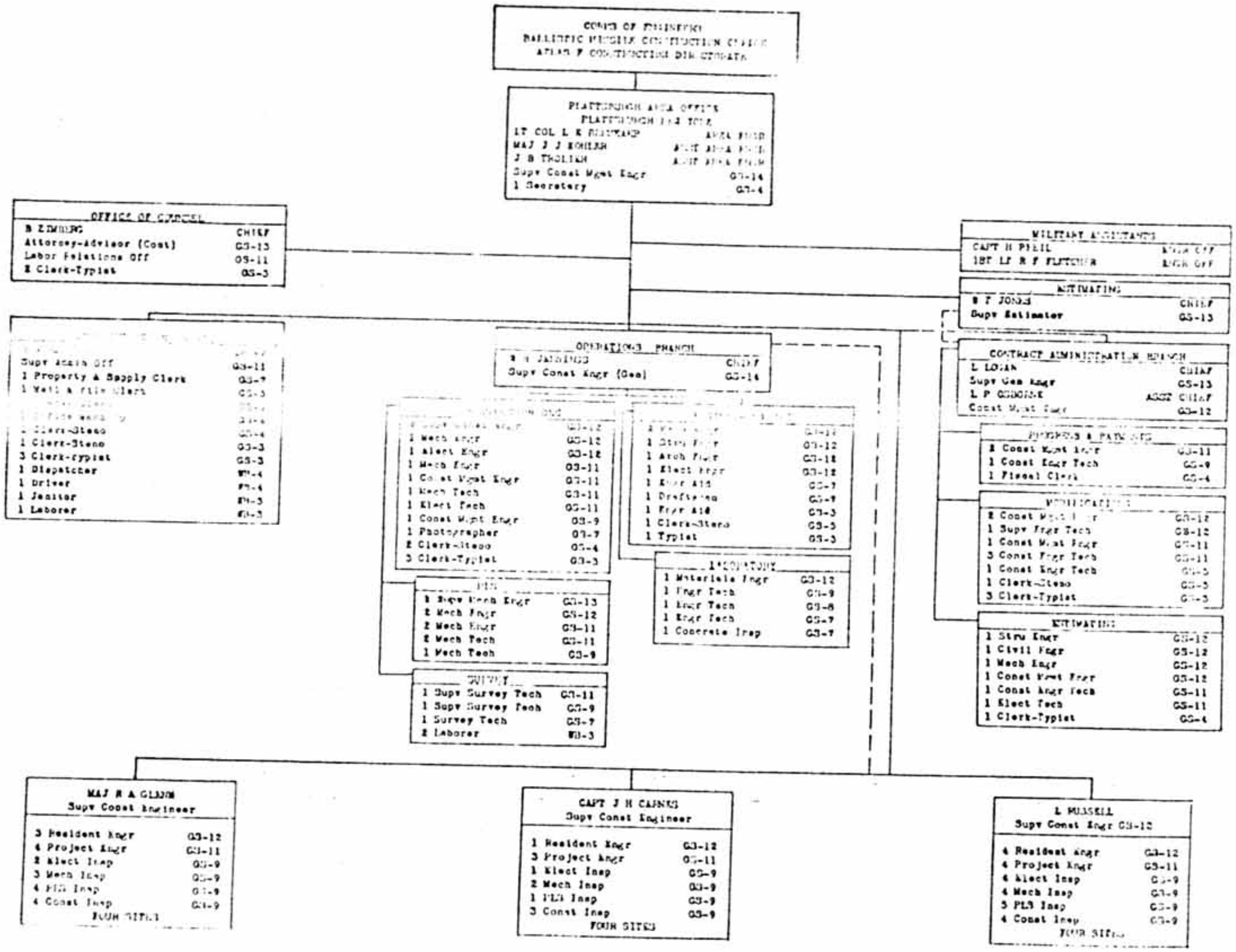


Chart showing Area Office at beginning of Phase-out.

Officers 6
Civilians 147
Graded 141
Ungraded 6

1 January 196?

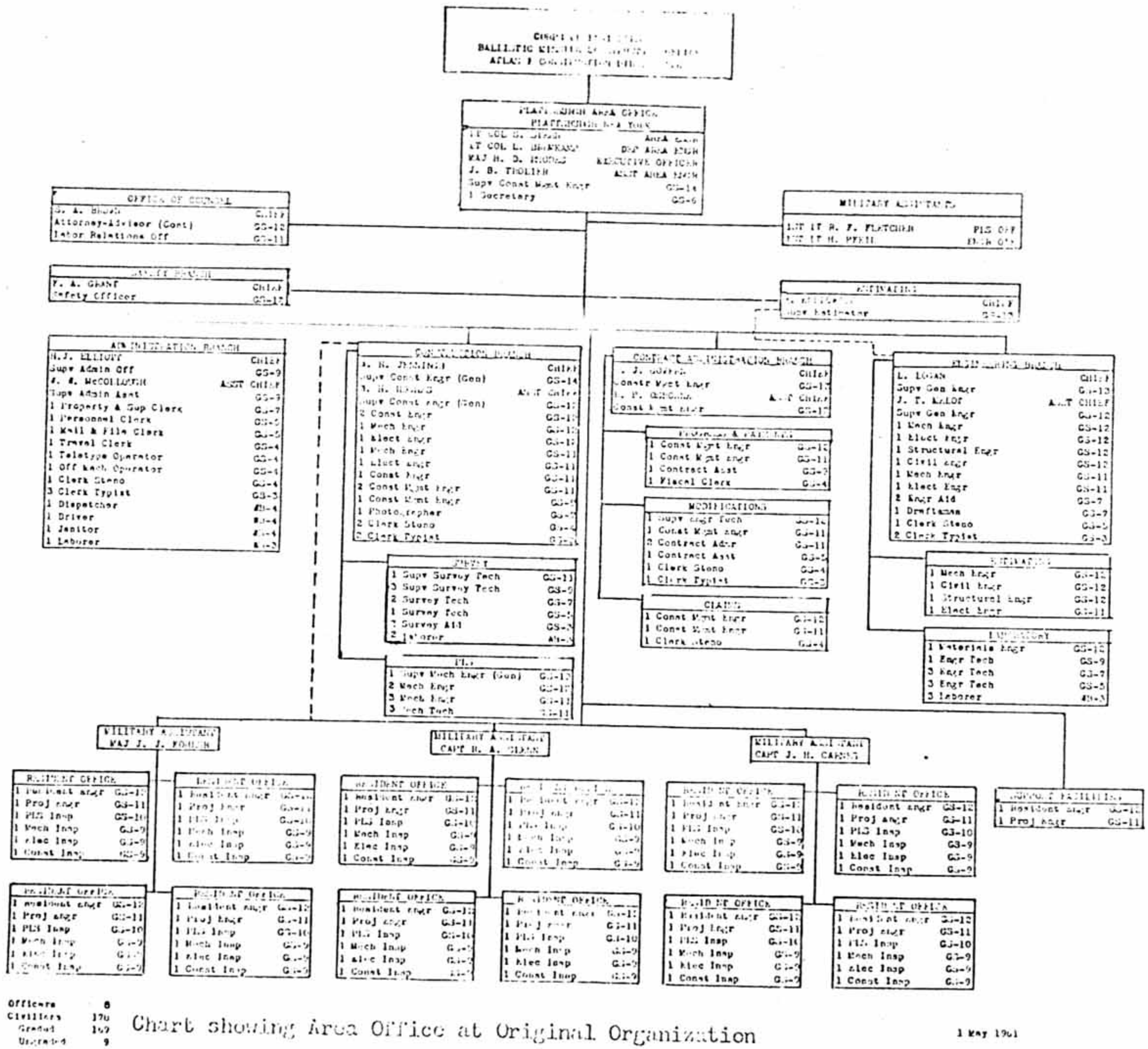


Chart showing Area Office at Original Organization requirements of a Ballistic Missile Area operating at normal and peak load during the major portion of construction time.

In establishing a new Area Office, this statement of functions, with the Organization Chart, is recommended for immediate use in organizational set-up. Some variations may be required after the office is in operation to suit local needs or field conditions.

An important recommendation is a strong Estimating Section at the establishment of the office.

General

The Plattsburgh Area Office is responsible for performing the following functions:

Inspection - Testing and Sampling - Field Review of Plans and Specifications - Government Estimates - Enforcement of Labor and Safety Provisions - Coordination between Contractors - As-Built Drawings - Modifications to Contracts - Necessary Job, Administrative, and Fiscal Records - Information for Processing Claims - Payment Estimates - Inspection and Control of Government Furnished Property - On-The-Job Training - Field Coordination of Real Estate - Public Relations at Field Level - Travel Orders and Transportation - Coordination with various Government missile agencies.

The Area Office is the parent organization of several site offices designated as project and resident offices which perform supervision and inspection functions. These residencies report directly to the Area Engineer; however, their activities are coordinated by the elements of the Area Office having functional responsibility. For example, the Engineering Branch is their Technical Supervisor on functions normally assigned to the Engineering Branch. Project and Resident Engineers will be responsive to instructions from Technical, Administrative, and Advisory elements. However, the Construction Branch is the coordinator of all actions required of Project and Resident Offices by elements of the Area Office. Therefore, any requests made by elements should be coordinated through the Construction Branch prior to being issued to the field.

OFFICE OF THE AREA ENGINEER

Directs administration, supervision and inspection of all contract construction work assigned to the Area Office.

Deputy Area Engineer

1. Assists the Area Engineer and acts as the Area Engineer during periods when the Area Engineer is absent from the Area

2. Provides direction to the technical and advisory and administrative staff in all matters of a technical nature.

3. Formulates and recommends general policies, procedures and regulations.

4. Performs such additional duties as may be assigned by the Area Engineer

Executive Officer

1. Assists the Area Engineer and the Deputy Area Engineer in a staff capacity in delegated matters not requiring the immediate or personal attention of those officials.

2. Acts as Area Engineer during periods when both the Area Engineer and the Deputy Area Engineer are absent from the Area.

3. Normally, assumes duties which include coordination, re-

view or approval of matters where guidelines of action have been clearly defined.

4. Serves as focal point in all matters relating to the Administrative and Advisory staff.

5. Coordinates matters of organization, personnel staffing and space allocations.

6. Serves as Liaison Officer with SATAF and local USAF Command.

7. Supervises military personnel administration.

8. Performs additional duties as specifically assigned.

Military Assistants

1. Furnish staff assistance to the Area Engineer of a nature inappropriate for inclusion in other units of the Area organization, i.e., technical assistants, technical advisors and coordination of special non-recurring projects.

Assistant Area Engineer

1. Assists the Area Engineer in a staff capacity as principal civilian assistant.

2. Acts as technical consultant to the Area Engineer.

3. Coordinates, reviews and evaluates the effectiveness of the administrative and operating policies and makes recommendations thereon.

4. Supervises special projects as may be assigned.

5. Performs additional duties as may be specifically assigned.

SAFETY BRANCH

1. Assists the Area Engineer in administration of the Corps of Engineers Safety Program within the area.

2. Provides for frequent safety inspections at all work sites.

3. Advises the Area Engineer of potential safety hazards on all sites which he is unable to have corrected.

4. Prescribes and coordinates a balanced program of Safety activities.

5. Assures prompt reporting of accidents.

6. Prepares formal reports of findings with recommended corrective action on all accident and serious hazards which hamper efficient, uninterrupted construction progress.

OFFICE OF COUNSEL

1. Assists and advises the Area Engineer and his supporting elements on legal matters except Real Estate.

2. Renders staff advice in the negotiation and preparation of contractual documents and reviews all contract actions for legal sufficiency.

3. Reviews action concerning all contractual and non-contractual claims for the Area.

4. Staffs requests concerning contractual documents as requested by the Office of Counsel, CEMCO.

5. Prepares action on appeals made by contractors to decisions made by the Contracting Officer.

6. Prepares litigation reports as required.

7. Performs labor relations functions, including processing of contractor payrolls, assuring enforcement of contract labor standards and promoting good working relationships between the Corps of

Engineers, organized labor and contractors.

ADMINISTRATIVE BRANCH

1. Furnishes administrative services to all elements of the Area and Project and Resident Offices as required.

2. Processes all incoming and outgoing communications.

3. Maintains the Area general files.

4. Provides for the establishment and operation of electrical communications facilities.

5. Operates the motor pool.

6. Monitors Security Program, Management Improvement Program, and other similar special activities as assigned.

7. Monitors civilian personnel program for the Area, time and attendance reporting, maintenance of leave records, and other related records and reports.

8. Handles property and supply functions, including procurement, accounting, issuance of supplies and other related activities.

9. Prepares for signature all ENG Forms 290 and related transfer documents and provides for the distribution of ENG Forms 290 and other documents required in conjunction with transfer of construction.

10. Supervises custodial services.

11. Provides stenographic and typist assistance to other branches when required.

12. Monitors imprest fund and small purchase procedures for the Area.

13. Provices reproduction services.

14. Prepares transportation requests, travel orders, bureau vouchers, and arranges transportation and reservations as required.

15. Assumes initial responsibility for any function not assigned to another branch.

CONTRACT ADMINISTRACTION BRANCH

1. Assists the Area Engineer in the supervision of all contract administration work for contracts assigned to the Area Office.

2. On receipt of recommendations from the Engineering Branch, initiates change order action with the contractor, procures Government Estimate from Engineering Branch, conducts negotiations and prepares and distributes modification documents. Initiates and carries to comletion administrative modifications and maintains master contract modification files.

3. Maintains budget control of contract construction cost.

4. Prepares contractor pay estimates from information received from the Construction Branch and from the contractor.

5. Prepares progress reports from information received from the Construction Branch.

6. Reviews specifications prior to bid openings and furnishes Engineering Branch with comments for addenda changes.

7. Maintains a register of proposed Change Orders and modifications within the Area Office.

8. Furnishes to CESMCO current and projective contractor's earnings for incorporation into Area cost reports.

9. Insures that property list included in the construction transfer documents is compatible with modifications.

10. Prepares reports required by EM 415-4-331 as revised by current CEBMCO circulars and related instructions.

11. Prepares justification for additional funds when the need is generated by proposed modifications or claims.

12. Prepares finding of facts for resolution of contractor claims, with assistance from Office of Counsel.

13. Assists the Office of Counsel in processing contract terminations and negotiation of settlement.

14. Contacts Construction Branch and Engineering Branch and other elements of the Area Office and the Atlas F Directorate as necessary in connection with processing of contract modifications.

CONSTRUCTION BRANCH

1. Supervises and inspects all contract construction work assigned to the Area Office.

2. Coordinates and formulates construction schedules for effective prosecution of the work.

3. Initiates changes to resolve existing field conflicts.

4. Assists as requested in the preparation of estimates, the negotiation of modifications, and the review and settlement of contractual claims.

5. Compiles daily reports of work accomplished, decisions made, action taken, working conditions, comments on progress, and evaluates the current status of all construction.

6. Coordinates closely with the Safety Branch and takes expeditious action to implement safety features agreed to be necessary.

7. Monitors record drawings concurrently as the work

progresses, for prep ration and processing of as-built drawings. (Furnishes SATAF cop s of as-being-built sketches and marked prints for silo facility co racts in coordination with Engineering Branch).

8. Conduc inspector training program.

9. Superv es the operations of Project Engineers and Resident Engineers a conducts frequent inspections of construction activities.

10. Provi s Contract Administration Branch with feeder reports upon which pay estimates and progress reports are based.

11. Revie all proposed changes for construction feasibility and time and accele ion impact, making appropriate recommendation to both the Contract Ad inistration Branch and Engineering Branch.

12. Arran s for all transfers of construction to the using agency, providing A inistration Branch with necessary data required from the field for eparation of ENG Form 290 and related transfer documents.

13. Promp y advises Engineering Branch of any conflicts in design deficiencies s soon as they are noted.

14. Revie plans and specifications prior to bid openings and furnishes comme as to desirable addenda changes to the Engineering Branch.

15. Estab hes and furnishes to Contract Administration Branch construction ompletion and acceptance dates.

16. Direc the Area Survey crew.

17. Arran s for photographs of project features at important stages of prog ss.

18. Supervises PLS SECTION, as follows:

a. Provides specialized technical procurement, installation, and testing of propellant loading systems.

b. Acts as the liaison element with the PLS Division of CEBMCO.

c. Provides technical advice during the construction, installation and field operational testing stage for final acceptance.

d. Coordinates activities of PLS inspectors and provides PLS inspection service to operational sites.

e. Conducts PLS inspector training.

f. Coordinates with all branches of the Area in phases of their work involving PLS equipment or materials.

ENGINEERING BRANCH

1. Provides general engineering and specialized technical services in support of construction activities.

2. Provides for the procurement, receipt, technical review, approval and proper distribution of plans, specifications, shop drawings and material samples.

3. Supervises contracts for services of A-Es and special consultants in connection with their fields of responsibility.

4. Furnishes technical advice and assistance for special tests as required.

5. Initiates or reviews requests for changes in design to meet existing conditions.

6. Prepares revised plans and specifications, Government cost estimates, and other engineering data required for contract modi-

fications.

7. Performs emergency design and prepares supplemental drawings, layout sheets and similar material for field office.

8. Performs miscellaneous drafting for all elements of the Area Office.

9. Initiates action and follow-up on all Government furnished equipment from commencement of construction until arrival at job site or railhead.

10. Initiates action, maintains records, and prepares reports for all expediting of construction materials.

11. Maintains shop drawing record files.

12. Maintains a suspense register for samples, shop drawings, test results and similar data required under each contract, and insures timely receipt and approval.

13. Operates Area soils, concrete, and materials testing laboratory.

14. Supervises contracts for AE services or testing services in connection with its field of responsibility.

15. Performs technical and engineering approvals of soils, concrete, and other materials.

16. Resolves conflicts in design and, where necessary, recommends Change Order action to Contract Administration Branch.

17. Controls Government and contractor-supplied materials and equipment, and expedites and administers the Defense Materials System to insure timely arrival of materials and equipment.

18. Contacts manufacturers and suppliers and assists in

obtaining delivery by required dates.

19. Assists as requested in negotiation of modifications and the review of a settlement of contractual changes.

20. Performs engineering inspections of construction to insure adequate construction standards in compliance with all design criteria.

21. Maintains liaison with architect-engineer, using agency, Atlas F Directorate, supporting district, and other concerned agencies on engineering and technical matters.

22. Maintains master equipment list.

23. Assembles, reviews, and transmits RPIE Technical Data and Provisioning Material.

6. Personnel Branch Organization Changes

Branch functions were changed to meet the needs of efficient administration and due to Phase-out of the missile program.

Effective 1 July 1961 the Contract Coordination Branch was redesignated the Contract Administration Branch. The Claims Section and Modification Section were merged into one Section entitled "Modification Section." The Estimating Section, as shown in the preceding functions of the Area Office, was transferred from the Engineering and Technical Branch to the Contract Administration Branch.

Effective 23 July 1961, the Chief of Engineering and Technical Section, Mr. Leland Logan, was transferred and made Chief of the Contract Administration Branch and Mr. E. J. Govern, Chief of the Contract Administration Branch was transferred and made Chief of the Engineering and Technical Branch.

Effective 20 November 1961, the Construction Branch was redesignated Operations Branch and re-organized into two sections, the Construction Section and the Engineering Section. Effective the same date, the Engineering and Technical Branch was dissolved and all functions and personnel thereof reassigned to the newly designated Operations Branch.

With the completion of the Prime Missile contract only a few small contracts in support of missile construction or contracts effecting design changes were in operation. Other work consisted of clean-up of claims and changes of the various missile support contracts as well as the outstanding over-all claim for the Prime Missile Contract. With this reduction in work load by August 1, 1962, only 39 civilians remained at the Area Office with nine on TDY at other missile sites. Three officers were on duty. The space requirements being reduced, room was made available in the Contract Administration Branch for the Operations Branch and the move was accomplished on 1 and 2 August 1962 with the Administration Branch occupying the former mail and record room.

7. Comments on Effectiveness of Organization

The organization set-up and the functions were quite adequate for their mission, qualified by the following recommendations:

A full and complete staff of estimators should be established at the very beginning of the project to cope with the large load of change orders required under missile contracts with the many design changes as well as the field changes due to urgency of the project and the "concurrency" concept. The estimators require sufficient time to properly prepare an estimate by careful perusal of the plans as well as trips to the field in many instances to properly evaluate the change and its impact on related work. Delays in preparing estimates cause delays in negotiating with the contractor. Hastily prepared or "shot gun" estimates cause repetitions in paper work in obtaining funds, modification control records, also review for future fundings can result in inadequate budget requests by higher echelon.

8. Contract for Estimating Assistance

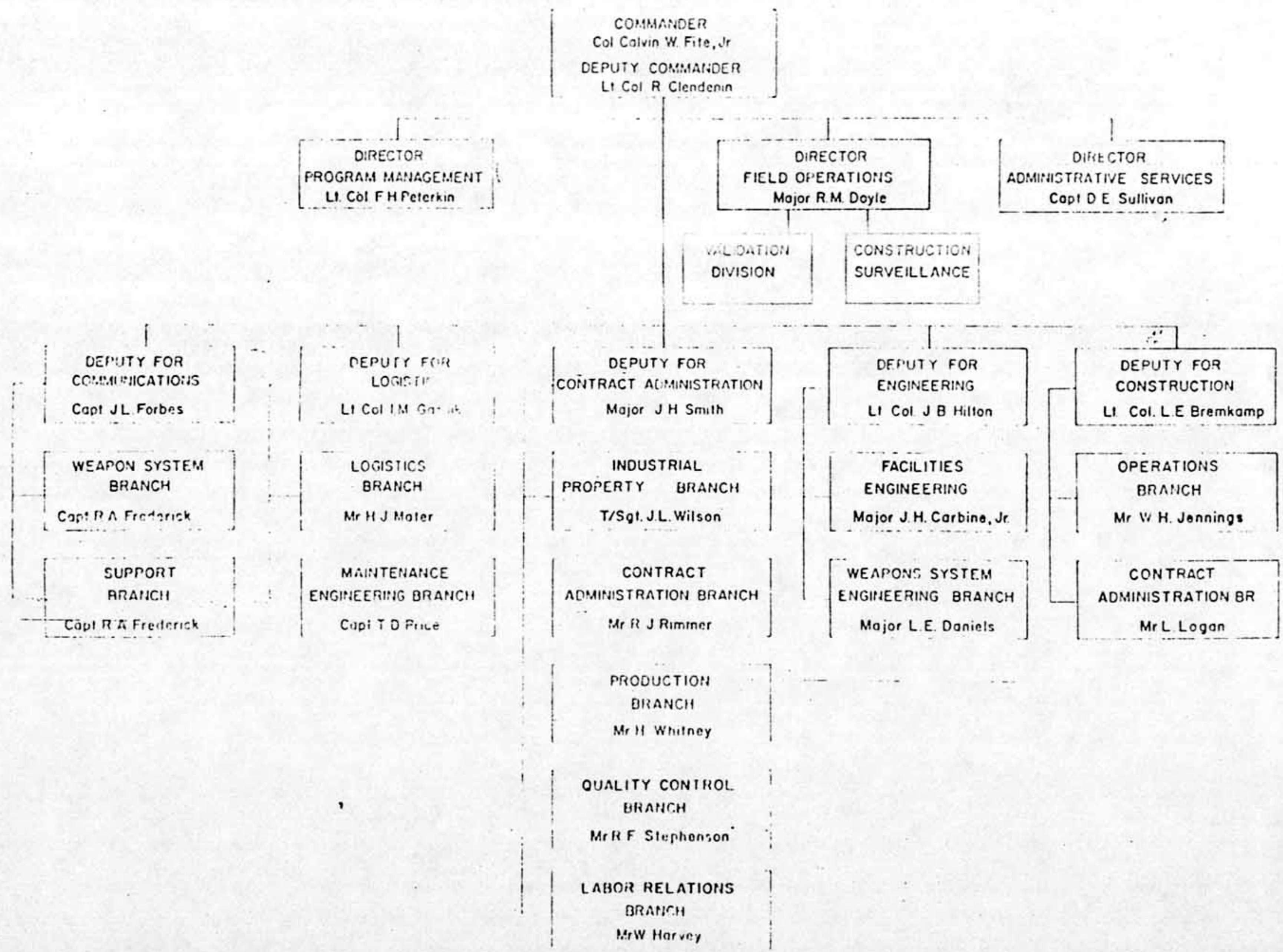
Due to the work load incurred by the many changes in specifications it was necessary to augment the Estimating Section and obtain six estimators by contract, in the Mechanical, Electrical, Civil and Structural fields.

B. SATAF ORGANIZATION CHART WITH KEY PERSONNEL

The following chart indicated the SATAF organization set-up during the major construction phase of the Missile Sites.

Changes in SATAF Organization Chart

By memorandum dated 22 Jan 62, effective 23 Jan 62, Major R. M.Doyle, the Director of Field Operations, became "Director Programs Management", (vice Lt. Col. F. H. Peterkin), also the sections "Validation Division" and "Construction Surveillance" each were automatically transferred to and under supervision of the Director of Program Management. The Director, Field Operations, was eliminated and the block is automatically eliminated from the chart.


COMMANDER
Col Calvin W. Fite, Jr
DEPUTY COMMANDER
Lt Col R Clendenin
DIRECTOR
PROGRAM MANAGEMENT
Lt. Col F H Peterkin
DIRECTOR
FIELD OPERATIONS
Major R.M. Doyle
DIRECTOR
ADMINISTRATIVE SERVICES
Capt D E Sullivan
DIVISION
CONSTRUCTION
SURVEILLANCE
DEPUTY FOR
Capt J.L. Forbes
WEAPON SYSTEM
BRANCH
SUPPORT
BRANCH
Capt R A Frederick
DEPUTY FOR
LOGISTICS
BRANCH
Mr H J Moter
MAINTENANCE
ENGINEERING BRANCH
Capt T D Price
DEPUTY FOR
CONTRACT ADMINISTRATION
Major J H Smith
INDUSTRIAL
PROPERTY BRANCH
T/Sgt. J.L. Wilson
CONTRACT
ADMINISTRATION BRANCH
Mr R J Rimmer
PRODUCTION
BRANCH
Mr H Whitney
QUALITY CONTROL
BRANCH
Mr R F Stephenson
LABOR RELATIONS
BRANCH
Mr W Harvey
DEPUTY FOR
ENGINEERING
Lt Col. J B Hilton
FACILITIES
ENGINEERING
Major J.H. Carbine, Jr.
WEAPONS SYSTEM
ENGINEERING BRANCH
Major L.E. Daniels
DEPUTY FOR
CONSTRUCTION
Lt. Col. L.E Bremkamp
OPERATIONS
BRANCH
Mr W H. Jennings
CONTRACT
ADMINISTRATION BR
Mr L. Logan

SECTION IV

CONSTRUCTION HISTORY

Appendix attached to SECTION IV:

App. No. 1, Item [illegible] PLS ACTIVITIES - IV - PLS Sheets 1-2-3-4.

SECTION IV

A. CHRONOLOGICAL LIST OF SIGNIFICANT EVENTS

1. Pre-construction History

Prior to actual start of construction, several events occurred that should be noted to provide facts and background for continuity.

Area Office established 2 May 1960, Building No. 100, Plattsburgh Air Force Base.

Pre-bid Conference held in Air Force Theater Building, 0900 hours, 24 May 1960 to acquaint the prospective bidders with terms and conditions of the contract, slides showing missile building and construction conditions in the Area.

Colonel C. H. Duke, C.E., the New York District Engineer of New York District, New York City, who presided at the meeting, stressed the operational urgency of the Missile project, and introduced officials of the various Governmental Agencies. In addition to the host, Colonel Van Arb, Base Commander of Plattsburgh Air Force Base, representatives were introduced from Air Force Ballistic Missile Division, Inglewood, California, the Field Representative of the Air Force Regional Civil Engineering, New York City, the Los Angeles, California Field Office of the Chief of Engineering, New York District and the Area Office, Plattsburgh, Corps of Engineers and representatives of the Bechtel Corporation and Stearns-Roger Manufacturing Company.

After the introduction, Major Cowart of AFBMD, Inglewood, gave an introduction to the Ballistic Missile Program. Major Cowart stressed the term "concurrence" and its important relation to the program, the prospective bidders were made aware of the change that would occur during the construction phase of the program. Major Cowart said ... "We have been speaking of this a lot in Headquarters and many of you gentlemen have been to our meetings before and you have heard this term, concurrence. We mean by this that the Air Force in its design effort for the Missile Program, beginning the design and actually beginning the construction of the facilities at the same time, that we develop the missile itself."

The Major then exhibited a series of slides showing the various types of missiles under construction. One slide exhibited was a full scale mock-up of the silo crib, and the contractors who were interested in the Plattsburgh project were invited to visit the Convair Plant in San Diego, California to aid in working out actual construction conditions. After the slides, an Air Force film was shown of the Propellant Loading System.

Following the films, Lt. Colonel S. Stern, Area Engineer was introduced for the purpose of calling the prospective bidders attention to portions of the contract of primary interest in preparation of bids. The following clauses and paragraphs were reviewed: IB-16, SC-1b; SC-2, SC-5 a(2), and SC-5 c(2), SC-8, SC-16b, SC-22, SC-24, SC-25, SC-26, SC-27, SC-29, SC-38 and SC-43. Particularly emphasized were Accident Prevention, Lt. Col. Stern "... there will be no relaxation of any requirements of this paragraph." Also, brought to attention "a full time Safety Engineer" and "... hard hat area." Another item was requirement of starting work 48 hours after Notice to Proceed.

After the discussion concerning contract requirements, Mr. M. Press of the Engineering Division, New York District Office, was introduced for the purpose of conducting a "question and answer period", for the contractors. Mr. Press was assisted by the various Engineer Specialists of the Corps of Engineers concerning all phases of the contract plans and specifications. Approximately thirty-six questions were asked by the contractors concerning various terms, conditions, materials and construction conditions.

After the question and answer period, the meeting was adjourned at 1200 hours, 24 May 1960, by Colonel C. M. Duke. The following representatives of Raymond International, Inc., New York, are noted on the list of contractors attending the meeting: 33, B. R. Livingston, 34, P. R. Mathews, 35, B. C. Moore, 63, Clyde C. Turner.

2. Pre-Construction Conference, Office of Area Engineer, 0900 hours, 17 June 1960. Colonel C. M. Duke, opened the meeting and outlined authority of the Area Engineer. Mr. G. W. Bailey, Vice-President and Mr. E. W. Simpson, Project Manager, represented RKMP, Lt. Col. Stern introduced the members of his staff, Major Rhodes, C.E., Assistant Area Engineer, J. Trolier, Civilian Assistant Area Engineer, L. Logan, Chief Engineering Branch, E. Govern, Chief Contract Administration, H. Elliott, Chief Administration, and W. Jennings, Chief Construction. Others introduced were representatives of AFBMD, The Architect-Engineer, New York District Office, Resident Engineers and Assistant Chiefs.

Lt. Colonel Stern checked off the pertinent clauses of the contract and discussions were held in detail as to the specification requirements. The meeting adjourned at 1045 hours, 17 June 1960.

3. Significant events directly related to construction are set up in chart form, start and completion, by dates, which forms a complete calendar indicating length of time for accomplishing each task. Separate charts are made for LCC and silo. This phase is "Brick and Mortar" and does not indicate "hardware" or mechanical or electrical items. Excavation, Reinforcing Steel, Concrete, Structural Steel Cribs, Process Vessels and the Concrete Cap, a contractual milesonte, are shown.

It should be noted that these charts are up to and including 30 January 1962 unless otherwise noted.

First Chart - Launch Control Center events and dates.

Second Chart - Launch Control Center w/final completion dates.

Third Chart - Silo events and dates.

Fourth Chart - Silo events and final completion dates.

On Chart No. 3, Site 11, Sugarbush, silo, haunch concrete column. Note that date for <u>beginning</u> pour of concrete is 30 January 1962. The concrete pour proceeded to Elev. 962 until 0900 hours (Wednesday) 31 January when operations were stopped due to extreme cold weather reducing the batch plant capability. Final placement and leveling of this pour was completed at 1100 hours at Elevation 962. The slip form was raised above the concrete and set for later resumption of pour. The final pour began on Monday, 5 February 1962.

CHRONOLOGICAL LIST OF SIGNIFICANT EVENTS
EXPERIENCE DATA - - LAUNCH CONTROL CENTER - - 1960-61-62

SITE NO.	DATES	EXCAVATION	L.C.C. FLOOR REINF. STEEL	L.C.C. FLOOR CONCRETE	L.C.C. WALLS REINF. STEEL	L.C.C. WALLS CONCRETE
1	Began Finish	5 Jul 60 25 Aug 60	1 Nov 60 3 Nov 60	4 Nov 60 5 Nov 60	8 Nov 60 15 Nov 60	26 Nov 60 27 Nov 60
2	Began Finish	29 Jun 60 22 Aug 60	22 Sep 60 27 Sep 60	28 Sep 60 29 Sep 60	20 Oct 60 28 Oct 60	17 Nov 60 18 Nov 60
3	Began Finish	5 Jul 60 20 Aug 60	4 Oct 60 7 Oct 60	7 Oct 60 8 Oct 60	12 Oct 60 27 Oct 60	31 Oct 60 1 Nov 60
4	Began Finish	25 Jul 60 6 Oct 60	2 Dec 60 5 Dec 60	5 Dec 60 6 Dec 60	7 Dec 60 16 Dec 60	13 Jan 61 14 Jan 61
5	Began Finish	16 Sep 60 6 Oct 60	5 Nov 60 10 Nov 60	11 Nov 60 12 Nov 60	20 Apr 61 8 May 61	9 May 61 10 May 61
6	Began Finish	24 Sep 60 21 Oct 60	12 Nov 60 18 Nov 60	19 Nov 60 20 Nov 60	26 Nov 60 10 Dec 60	6 Jan 61 7 Jan 61
7	Began Finish	24 Aug 60 10 Oct 60	12 Dec 60 16 Dec 60	21 Dec 60 21 Dec 60	5 Jan 61 14 Feb 61	1 Mar 61 2 Mar 61
8	Began Finish	2 Aug 60 29 Sep 60	2 Dec 60 11 Dec 60	12 Dec 60 13 Dec 60	15 Dec 60 15 Jan 61	23 Jan 61 24 Jan 61
9	Began Finish	15 Aug 60 29 Sep 60	5 Dec 60 14 Dec 60	16 Dec 60 17 Dec 60	23 Dec 60 17 Jan 61	31 Jan 61 1 Feb 61
10	Began Finish	1 Sep 60 31 Oct 60	12 Jan 61 22 Jan 61	24 Jan 61 25 Jan 61	31 Jan 61 22 Feb 61	2 Mar 61 4 Mar 61
11	Began Finish	31 Aug 60 17 Oct 60	21 Nov 60 24 Nov 60	26 Nov 60 27 Nov 60	8 Dec 60 10 Nov 61	16 Nov 61 17 Nov 61
12	Began Finish	16 Aug 60 5 Oct 60	29 Nov 60 2 Dec 60	3 Dec 60 4 Dec 60	17 Dec 60 4 Feb 61	14 Feb 61 15 Feb 61

CHART 1

CHRONOLOGICAL LIST OF SIGNIFICANT EVENTS
EXPERIENCE DATA - - LAUNCH CONTROL CENTER - - 1960-1-62

SITE NO.	DATES	L.C.C. ROOF REINF. STEEL	L.C.C. ROOF CONCRETE	L.C.C. CRIB STEEL	COMPLETION DATE & ACCEPTANCE OF L.C.C. SUBSTANTIAL	COMPLETION DATE & ACCEPTANCE OF L.C.C. FINAL
1	Began	14 Dec 60	17 Dec 60	6 Dec 60	-	-
	Finish	14 Dec 60	17 Dec 60	24 Feb 61	2 Aug 61	*30 Aug 61
2	Began	5 Dec 60	9 Dec 60	29 Nov 60	-	-
	Finish	9 Dec 60	9 Dec 60	21 Feb 61	20 Jul 61	*23 Aug 61
3	Began	18 Nov 60	20 Nov 60	1 Dec 60	-	-
	Finish	20 Nov 60	21 Nov 60	21 Feb 61	28 Jul 61	*10 Aug 61
4	Began	10 Feb 61	20 Feb 61	31 Jan 61	-	-
	Finish	13 Feb 61	20 Feb 61	13 Apr 61	7 Aug 61	*16 Aug 61
5	Began	22 May 61	8 June 61	15 May 61	-	-
	Finish	7 June 61	8 June 61	21 Jun 61	1 Sep 61	*13 Sep 61
6	Began	16 Mar 61	23 Mar 61	24 Jan 61	-	-
	Finish	21 Mar 61	23 Mar 61	18 May 61	25 Aug 61	*6 Sep 61
7	Began	26 Apr 61	4 May 61	19 Apr 61	-	-
	Finish	3 May 61	4 May 61	1 June 61	19 Sep 61	*23 Sep 61
8	Began	24 Feb 61	2 Mar 61	10 Feb 61	-	-
	Finish	1 Mar 61	2 Mar 61	17 Apr 61	11 Aug 61	*22 Aug 61
9	Began	28 Mar 61	3 Apr 61	21 Feb 61	-	-
	Finish	30 Mar 61	3 Apr 61	17 May 61	25 Sep 61	*2 Oct 61
10	Began	28 Mar 61	4 Apr 61	16 Mar 61	-	-
	Finish	30 Mar 61	4 Apr 61	19 Apr 61	18 Aug 61	*31 Aug 61
11	Began	12 Dec 61	1[illegible] Dec 61	27 Nov 61	-	-
	Finish	14 Dec 61	15 Dec 61	11 Jan 62	12 Apr 62	12 Apr 62
12	Began	20 Apr 61	21 Apr 61	28 Mar 61	-	-
	Finish	21 Apr 61	21 Apr 61	18 May 61	11 Sep 61	*19 Sep 61

*"Final" represents final inspection date and turn over to Air Force. Punch list items remain to be completed.
Date of 290 Eng

CHART 2

CHRONOLOGICAL LIST OF SIGNIFICANT EVENTS
EXPERIENCE DATA - - - LAUNCHING SILO - - - 1960-61-62

SITE NO.	DATES	EXCAVATION	SILO WALLS REINF. STEEL	SILO WALLS CONCRETE	HAUNCH REINF. STEEL	HAUNCH CONCRETE
1	Began	5 July 60	3 Nov 60	20 Nov 60	28 Nov 60	14 Dec 60
	Completed	17 Oct 60	15 Nov 60	24 Nov 60	12 Dec 60	17 Dec 60
2	Began	29 June 60	10 Oct 60	5 Nov 60	15 Nov 60	1 Dec 60
	Completed	20 Sept 60	27 Oct 60	11 Nov 60	30 Nov 60	3 Dec 60
3	Began	5 July 60	10 Oct 60	13 Nov 60	20 Nov 60	4 Dec 60
	Completed	22 Sept 60	7 Nov 60	17 Nov 60	3 Dec 60	6 Dec 60
4	Began	25 July 60	30 Nov 60	15 Dec 60	23 Dec 60	10 Jan 61
	Completed	16 Nov 60	9 Dec 60	21 Dec 60	9 Jan 61	13 Jan 61
5	Began	16 Sept 60	15 Dec 60	30 Dec 60	10 Jan 61	25 Jan 61
	Completed	6 Dec 60	22 Dec 60	5 Jan 61	25 Jan 61	28 Jan 61
6	Began	24 Sept 60	28 Jan 61	13 Feb 61	21 Feb 61	20 Mar 61
	Completed	9 Jan 61	4 Feb 61	18 Feb 61	14 Mar 61	23 Mar 61
7	Began	24 Aug 60	8 Feb 61	22 Feb 61	7 Mar 61	28 Mar 61
	Completed	15 Jan 61	14 Dec 61	25 Feb 61	25 Mar 61	31 Mar 61
8	Began	2 Aug 60	27 Dec 60	11 Jan 61	21 Jan 61	6 Feb 61
	Completed	29 Nov 60	7 Jan 61	17 Jan 61	5 Feb 61	9 Feb 61
9	Began	15 Aug 60	11 Apr 61	24 Apr 61	3 May 61	17 May 61
	Completed	18 Mar 61	18 Apr 61	28 Apr 61	15 May 61	19 May 61
10	Began	1 Sept 60	29 Dec 60	16 Jan 61	24 Jan 61	9 Feb 61
	Completed	13 Dec 60	7 Jan 61	22 Jan 61	8 Feb 61	12 Feb 61
11	Began	31 Aug 60	13 Dec 61	2 Jan 62	10 Jan 62	30 Jan 62
	Completed	30 Nov 61	27 Dec 61	7 Jan 62	28 Jan 62	7 Feb 62
12	Began	16 Aug 60	10 Jan 61	19 Jan 61	15 Feb 61	8 Mar 61
	Completed	12 Dec 60	9 Feb 61	12 Feb 61	3 Mar 61	12 Mar 61

CHART 3

CHRONOLOGICAL LIST OF SIGNIFICANT EVENTS
EXPERIENCE DATA - - - LAUNCHING SILO - - - 1960-61-62

SITE NO.	DATES	CRIB STEEL LEVEL 7	PROCESS VESSELS	CRIB STEEL TOP LEVEL	CONCRETE SILO CAP
1	Began Completed	20 Dec 60 8 May 61	12 April 61 24 April 61	19 Jan 61 8 May 61	22 May 61 21 Aug 61
2	Began Completed	14 Dec 60 31 May 61	27 Feb 61 17 Mar 61	29 Dec 60 31 May 61	1 May 61 2 Aug 61
3	Began Completed	16 Dec 60 8 May 61	27 Mar 61 7 April 61	29 Dec 60 8 May 61	8 May 61 10 Aug 61
4	Began Completed	16 Jan 61 12 May 61	14 April 61 1 May 61	7 Feb 61 12 May 61	9 June 61 29 Aug 61
5	Began Completed	9 Feb 61 11 July 61	1 June 61 12 June 61	13 March 61 11 July 61	3 July 61 18 Sept 61
6	Began Completed	19 Apr 61 8 Aug 61	14 July 61 27 July 61	1 May 61 8 Aug 61	14 Aug 61 17 Oct 61
7	Began Completed	21 Apr 61 21 July 61	28 June 61 12 July 61	9 May 61 21 July 61	28 July 61 11 Oct 61
8	Began Completed	21 Feb 61 23 May 61	10 May 61 17 May 61	2 Mar 61 23 May 61	7 June 61 25 Aug 61
9	Began Completed	1 June 61 15 Aug 61	27 July 61 10 Aug 61	15 June 61 15 Aug 61	29 Aug 61 25 Oct 61
10	Began Completed	1 Mar 61 13 June 61	19 May 61 1 June 61	23 Mar 61 13 June 61	19 June 61 18 Sept 61
11	Began Completed	10 Feb 62 19 Feb 62	16 Feb 62 18 Feb 62	22 Feb 62 23 Apr 62	22 Mar 62 9 May 62
12	Began Completed	12 Apr 61 13 July 61	20 June 61 5 July 61	26 Apr 61 13 July 61	18 July 61 27 Sept 61

CHART 4

Other completion dates of significant items of construction for milestones, Assigned Service Contracts and Government furnished property are shown in the chart below and along with it the date work started and date work completed, under the starting date of each item and by each site.

Item No. 1, PLS Cryogenic Vessels and valves, a contract milestone.

Item No. 2, PLS Prefabs and interconnecting piping, an Assigned Service Contract.

Item No. 3, Diesel Generator, Switchgear and Panels, milestone and ASC.

Item No. 4, Heating, Ventilating, Air Conditioning and Pumps, milestone and ASC.

Item No. 5, Electric Conduit wire and fixtures, a contract milestone.

All dates are for Year 1961 except Site 11 or otherwise noted.

DATES COMPLETED

Site No.	Item No. 1	Item No. 2	Item No. 3	Item No. 4	Item No. 5
1	11 Apr 24 Apr	28 Apr 27 Aug	22 Apr 21 Sep	21 Mar 7 Dec	15 Jul 23 Oct
2	24 Feb 27 Mar	7 Apr 20 Jun	12 Apr 28 Apr	5 Apr 21 Jul	15 Sep 7 Oct
3	27 Mar 7 Apr	14 Apr 14 Aug	27 Apr 11 Sep	21 Apr 20 Oct	15 Sep 22 Nov
4	2 Apr 1 May	8 May 9 Dec	5 May 17 May	5 May 9 Dec	30 Nov 9 Dec
5	1 Jun 9 Jun	19 Jun 21 Dec	16 Jun 22 Oct	26 Jun 15 Dec	19 Jan 9 Jan 62
6	14 Jun 25 Jul	17 Jul 27 Sep	17 Jul 17 Dec	2 Aug 5 Feb 62	22 Jul 5 Feb 62

Site No.	Item No. 1	Item No. 2	Item No. 3	Item No. 4	Item No. 5
	DATES COMPLETED				
7	5 Jul 11 Jul	17 Jul 9 Feb 62	25 Jul 14 Nov	21 Jul 9 Feb 62	18 Jan 9 Feb 62
8	10 May 17 May	23 May 25 Aug	19 May 1 Jun	8 Jun 21 Nov	5 May 16 Dec
9	27 Jul 10 Aug	20 Aug 12 Feb 62	14 Aug 5 Dec	14 Aug 12 Feb 62	30 Mar 12 Feb 62
10	19 May 1 Jun	5 Jun 9 Aug	2 Jun 13 Jun	5 Jun 24 Nov	5 May 16 Dec
11	16 Feb 62 18 Feb 62	9 Mar 62 13 Apr 62	10 Mar 62 7 May 62	6 Mar 62 16 May 62	6 Mar 62 23 May 62!
12	21 Jun 3 Jul	7 Jul 15 Dec	7 Jul 12 Jan	6 Jun 12 Jan	17 Jun 12 Jan 62

All dates above are for year 1961 unless otherwise noted.

For details of many other construction items and installation of the mechanical and electrical phases and equipment, reference is made to "Corps of Engineers Ballistic Missile Construction Office Summary Construction Status Report," (Form ENGMA AB 28/2). This report will provide in detail a construction history throughout the entire missile program at Plattsburgh, and should be referred to where the preceding charts do not indicate a needed item. The narrative report accompanying the status report contains a verbal sequence of various construction phases.

B. MAJOR OPERATIONAL PROBLEMS

Many of the operational problems, eventually became claims or modifications to the contract, by reference to Area files, either by claim number or modification number a full history may be obtained of each problem. Where problems are listed and briefly reported, notations will be made where they became claims or modifications so that complete details may be referred to on the appropriate folders or files when required.

For other operational and problem areas, reference is made to Plattsburgh Area file, "Dissemination of Information of Problem Areas", many of these problems were localized to a site and small in nature and not considered as major problems.

1. Rust and Corrosion

Reference is made to file "Rust and Corrosion Investigation, Site No. 3" and to Modification Control No. RI-274 (Inspection for Rust and Corrosion Damage, Site No. 8), Modification No. 184. Also reference to Area file Section K, Construction and Operations Branch, Rust and Corrosion correspondence.

The problems of rust and corrosion at the Plattsburgh Missile sites were recognized in early March 1961. CEBMCO has become concerned as evidenced by TWX dated 24 April 1961 to Area Office to provide a survey and report. Meetings were held with the contractor, and lists of deficiencies were prepared and discussed, and compliance of RKMP's remedial program had proven unsatisfactory, although some corrective measures were undertaken. By letter, 7 September 1961, the contractor informed the Area that he considered the conditions leading to corrosion were due to design deficiency and/or changed conditions. On 26 September 1961 a detailed survey listing all deficiencies was conducted by a corrosion survey team, jointly organized by Corps of Engineers, SATAF, General Dynamics and Bechtel.

CEBMCO, by Memo, ENGMA-ABO, dated 1 December 1961, Colonel

W. W. Wilson to BSSS, outlined steps to be taken and procedures to be followed, as a "Joint Resolution Problem". A team composed of representatives from Hq. BSD, OCE, CEBMCO, and GD/A, including electrical and mechanical engineers, held a meeting in Plattsburgh on 11 to 15 December 1961.

The rust and corrosion, apparently due to humidity conditions, occurred on structural steel, other metals, fans, valves, drive mechanisms, pumps, electric motors and switchgear.

A list of items to be inspected was prepared and a Clause 3 change recommended for internal inspection of the various listed items was proposed. On 27 December 1961, change RI-274 was issued for a proposal and, on 4 January 1962, a proposal was received in amount of $56,916.84. Modification No. 184 in sum of $30,039.75 was issued for disassembly, inspection and reassembly of the listed equipment at Site No. 8.

Rust, corrosion, and, in some instances, fungus growth may prove to be serious to operational conditions. Proper ventilation must be taken into consideration in design of any underground facilities. Findings of the inspection teams are summarized in an appendix.

2. Wet Soil Condition at Site 11

a. Foreword

One of the most serious operational problems in construction of the missile sites developed at Site No. 11, Sugarbush. In fact, not only did this site prove an operational problem to the highest degree, but became costly and time consuming, an extension of time being necessary with expected completion about 15 August 1962.

After the open cut excavation for silo and LCC was completed and shafting was begun for the silo, a fluid soil condition developed that increased in difficulty as excavation progressed. The soil, of a very fine, silty sand carried sufficient moisture in suspension to provide constant movement, thus testing the ingenuity of the Contractor and the Corps to solve the new problems that arose thru approximately sixty-three feet of this saturated glacial till.

The difficulties encountered at Site No. 11 and subsequent delays which set back completion in this site until 25 May 1962, (which is the substantial completion date) generated the largest claims for this contract, exclusive of the "acceleration claim". (The original completion date for Site 11 was 20 Nov 1961.) By letter dated 28 Oct 1960, the contractor presented a claim (C-11) for changed conditions in the sum of $7,508,068.00 and 450 days of additional contract time. The claim was transfered to change RI-191, and new contract completion dates scheduled.

A chronological construction sequence is presented for Site 11 which outlines the various difficulties encountered during excavation of the silo. After excavation was completed, the learning curve, experience gained at other sites, was valuable in that construction moved along to an early completion date. Furthermore, through selective items of work by CEBMCO, Site 11 was completed 25 May 1962, eighty-two (82) days ahead of the contract scheduled completion date of 15 August 1962 and twenty-one (21) days ahead of the target completion date of 15 June 1962. Beneficial occupancy of the silo cap and surrounding paved areas became effective 15 May 1962 for assembly of the Launch Platform, and the entire Launch Complex was turned over to the Installation and Check Out phase 31 May 1962. Lost time totaling eight (8) days due to inclement weather in January and February was also gained back. Extra time was gained during the construction period by installing reworked shock hangers and accomplishing many other small but time consuming tasks which at other sites were necessarily accomplished during the I and C period. Based on the above extra effort we firmly believe that the Air Force will experience no lost time attributable to construction in turning over Site No. 11 to SAC.

b. Construction difficulties

At the beginning, the open cut work was performed by a sub-contractor, who started operations on 31 August 1960 using a D-8 dozer, for grubbing, followed by actual excavation using two draglines with one and one half cubic yard buckets, loading into three Model 122-W Euclid dump trucks. The material was placed into a stockpile near-by. The base of the open cut was about eight feet below ground water level and a sump was provided, however, considerable difficulty was experienced with the material becoming muddy throughout the excavated area. Approximately 43,000 cubic yards of material was removed in the open cut area, which operation was completed on 8 October 1960 when the prime contractor began his portion of the shafting Operations.

The prime contractor installed a concrete shaft collar and working platform on 10 Oct 1960 and began the shaft excavation on 17 Oct. Shoring for shafting consisted of ring beams and wood lagging as specified. After the second ring beam was set, 5 feet below the open cut, the walls of the excavation caved before the lagging could be set.

On 21 Oct the contractor began driving a ring of M-112 sheet piling at a diameter several feet greater than the shaft (approximately 60 feet) to a depth of thirty-five feet. Ring beams were used as temporary walers, which were placed as the material was mucked out. By 29 Oct a second ring of M-112 sheet piling was slightly larger than the silo shaft. By the 3rd of November it became impossible to continue shaft operations because of the fluid condition of the fine sandy soil or glacial till, in spite of the installed sheet piling, also the shaft continued to fill with water after excavation, and sump pumping was stopped.

At the same time, 29 Oct 1960, the contractor had begun installation of eleven each, ten inch diameter relief wells, perimeter of silo, to bedrock. The wells proved that the rock surface sloped, thickness of till being fifty-three feet minimum to seventy-three feet started by the 29th after the casings were slotted and wells gravel packed. Deep well pumps were used, however, the sandy silt being pumped with the water destroyed the bearings and air lift pumps were installed and used. On 3 Dec 1960 installation of an additional six, twenty-four inch diameter wells were started and completed on 4 Jan 1961 on contact with bedrock.

However, during well drilling the contractor drilled perimeter grout holes, at 6 foot centers, through the concrete shaft collar, beginning the work on 12 November 1960 until fifty holes, progressively, were completed, to rock. Grouting started while drilling was under way, on 17 November, was completed by 31 December 1960, using a total of 1204 barrels of silicate of soda and 24,400 pounds of calcium chloride. During this grouting operation, the local Equipment Operators Union insisted on operating the grouting equipment, with which they were unfamiliar, consequently much time was lost due to the solution "Setting-up" in the pipes. It was found the glacial till was too impervious to accept much grout, therefore, the majority of the solution was used in developing a quick condition, which was substantiated by only very small amounts of solidified grout being encountered later in the excavation.

On 13 December 1960 an attempt was made to resume excavation and installation of sheeting. By 6 January 1961, at shaft elevation 910, the movement of the sheeting caused suspension of excavation, and additional sheet piling was driven into the sheeting ring on the south and southwest sides, to regain proper radius. The original sheets were removed.

On 21 January 1961 excavation was resumed on a limited scale, with the piling being driven down in two foot increments. As the excavation progressed, additional ring beams were placed as walers. The excavation continued to elevation 898 and at this point, on 17 Feb the concrete collar beam collapsed into a cavity at the top of the shaft due to undermining, and, as a consequence, excavation was suspended while voids were filled. Later, fragments of this collar had worked down outside the piling and entered the excavation area at the bottom, this is an indication that the glacial till around the sheet piling had liquified. The concrete collar had collapsed in spite of concrete grout being placed in voids during October and December, and a program of gravel packing that had been instituted to fill voids. The sheet piling had again crept out of round so a second "blister" of sheet piling was driven on the north and northeast sides and the old piling was removed.

On 26 March 1961 excavation was again resumed and carried to elevation 873. (The full shaft now in rock. Rock encountered at elevation 894 and sloped down to elevation 875.)

On 17 May half of the sheet pile ring started to settle in segments, some as large as 3 feet. In spite of the use of four sets of 16 inch steel pipes as supplemental shoring, the shaft was declared unsafe, and on 30 June excavation was again discontinued.

From 30 June 1961 to 19 October existing relief wells were redeveloped and 16 additional 10 inch wells were drilled to bedrock and gravel packed. Of the 33 wells drilled, 5 proved dry and 28 relief wells were used. The water table was lowered to approximately thirty feet above bedrock. Jet eductor pumps were employed.

Due to the movement of the original sheet piling, which decreased the radius of the shaft the contractor elected to drive new piling in three tiers to regain the proper radius. On 9 May 1961, Cell No. 1 with a radius of fourty feet seven inches was started at elevation 959 and driven to a depth of thirty five feet. On 8 June 1961, Cell No. 3 with a radius of thirty five feet seven inches was started at elevation 937 and driven to a depth of fourty feet. On 13 September 1961 Cell No. 3 with a radius of thirty one feet three inches was started at elevation 902 and driven to rock, all cells were completed on 18 October 1961. The Z piling was tied in to bedrock by a concrete thrust collar and the original piling was removed from the silo excavation.

Full scale excavation was resumed at elevation 873 on 24 October 1961 and the silo shaft bottomed out on 30 November 1961 at elevation 822.5.

A list of completion dates of important features of silo work is listed for the record. Silo walls reinforcing steel 27 December 1961 and Concrete 7 January 1962. Haunch reinf. steel 28 January and concrete 7 February 1962. Structual Steel (crib level 7) began 10 February and completed (top level) 23 April 1962. Process vessels completed 23 April 1962. PLS prefab and interconnecting piping 13 April 1962. Diesel Generators Switch Gear and Panels 7 May 1962 and Heating, Ventilating Air Conditioning and pumps 16 May 1962.

Increased effort on pacing items of work were directed by modification in February 1962 which advanced the completion date from 15 August to May 25, 1962. Among the selected pacing items were, erection of crib steel, fill and vent shaft, 18 inch curtain wall, silo vestibule, utility tunnel, water tanks, selected backfill. Also included all major equipment in the silo, diesel generators, switch gear, cable trays, electrical and mechanical system. Air intake and exhaust plenium.

3. Seized Shock Strut Assemblies.

Considerable difficulty was experienced with the threaded portion of hanger rods and couplings while assembling suspension springs and rods. The very fine threads on the ends of the rods and interior of the couplings required extreme care during the assembly. Before assembly, first the rods are thoroughly cleaned, deburred, brushed and air cleaned, and regardless of the caution used, seizing occurred at several sites.

Site No. 2, Alburg, coupling No. 4, 17 January and coupling No. 6 on 18 January 1961.

Site No. 4, Willsboro, 7 March 1961.

Site No. 8, Ellenburg, 28 March 1961.

Site No. 5, AuSable, 1 May 1961.

The method of assembly, after cleaning, was to run the coupling on the first rod and check for bind. Then the rod was placed horizontally in a jog and the coupling rod threaded into the coupling for connecting the two rods. At one site penetration was all the way and on the back off for adjustment, seizure occurred, at other sites seizure occurred at 2" penetration. Pipe wrenches failed to move the rods and it was necessary to cut the coupling along the top with a mason saw, and break open the coupling with wedges, taking care to avoid marring the threads on the rod. Additional couplings were obtained at downstream sites to avoid immediate delay.

Investigations were made and the contractor was relieved of responsibility for damage (CEEMCO Form No. 40 was prepared 11, 15, and 16 January 1962).

4. Problems of Water Supply System

a. In General

Although the Water Supply Contract (9562, Mechanical Utilities, Inc.) provided for additional test wells when justified, the problem of finding water to meet the design criteria of wells producing 15 gallons per minute became acute at times, until the problem was solved at various sites. The Adirondack Mountains region abounds with natural and artifical ponds and lakes, mountain creeks and rivers course throughout the region, springs are abundant, swamps in low places and on mountain plateaus, water cascades over rock cliffs from snow areas, snow and rain contribute to a land seemingly abundant in water, however, obtaining water for some of the missile sites by drilling wells proved that "water, like gold is where you find it."

Sites 5, 6, 7, and 11 proved the troublesome areas and eventually results became so barren that a stop order was necessary for Sites 5, 6, and 11, dated 9 December 1960, until a study could be made of the situation and a course of action determined. The Architect-Engineers, Alexander-Potter Associates were requested to furnish assistance as required. For the record, the stop orders were lifted on the following sites, as listed:

Site 6, 5 May 1961, work under Mod. No. 18.

Site 5, 6 April 1961, work under Mod. No. 16 and No. 22.

Site 11, 13 April 1961, work under Mod. No. 17.

It became necessary to cancel out remainder of work at Site 11 under Changes RI-29, dated 25 July 1961.

b. Site 5, AuSable, Water Supply

Conditions at Site 5 were bleak at the beginning relative to water supply before a successful solution was found. The fine sand in the water bearing levels of 100 feet at first failed to achieve criteria requirements. Well No. 1 developed only 11 G.P.M. and No. 2 only 7 G.P.M. at the time of the stop order on 9 December 1960. After review it became apparent that, unless water could be obtained in sufficient quantities, it would be necessary to drill or prepare a river intake on the Little AuSable River, approximately a mile easterly of the missile site, a costly method. A decision was made to drill an additional 50' at Well No. 1.

TWX dated 24 January 1961 from CEBMCO lifted stop order on Well No. 1 (Mod. No. 14). Drilling began on 15 February 1961 and at 6 feet of drilling the cap rock was penetrated. Immediately the hole was plugged and type of well changed to use of Layne No. 5 screen and Cape May No. 3-W gravel (a coarse gravel). As a result the well produced the required 15 G.P.M. The stop order was wholly lifted on 6 April 1961 (Mod. No. 16) to develop Well No. 1 and proceed with the work, using same type screen and gravel. Only 9 G.P.M. was obtained and other means were in order to obtain water. A decision was made to drill Well No. 3 at 75 feet east of Well No. 1 and a directive was issued to the contractor by date of 25 May 1961 (Mod. No. 22). Ample supplies of water were found at 90 feet and the well developed out at 15 to 18 G.P.M. on 18 July 1961.

c. Site 6, Clayburg, Water Supply

Well No. 1 was drilled to approximately 150 feet on 17 October 1960. After 72 hours of pumping on 10 November 1960 the well pumped dry and was abandoned. After study, drill tests were directed to take place near the Saranac River, apparently a more suitable location, and approximately 400 feet east of the original location of Well

No. 1. Well 2a began on 10 November 1960. At 41 feet rock was encountered and arrangements were made to drill Well 2b nearby. On 24 November 1960 bedrock was encountered at 36 feet with no water, therefore, all drilling for wells ceased at this Site. On 9 December 1960 a stop order was placed on the drilling of wells.

The Architect-Engineer, after study, recommended a river intake and filter gallery near the well sites on the Saranac River and plans were prepared. The Notice to Proceed dated 5 May 1961 lifted the stop order and work proceeded under Mod. No. 18 to install a 100 foot long infiltration gallery 25 feet from the Saranac River, manholes, pump house, pumps, power, extend road to pumphouse, fencing, topsoiling and seeding. Work was completed on 14 September 1961 and provided ample supplies of water, with another problem, organic matter, light tan in color and sediment became evident during pumping. An item for filtration had been omitted from the plan to save funds since at the time no indication was apparent it was needed. In February (after pumping in an attempt to clear up the sediment) samples were prepared and forwarded to the laboratory for testing.

Tests of the water proved that hardness, turbidity and color were excessive. Change Order Conference No. 225-39, dated 4 April 1962 authorized corrective measures and obtaining a proposal to accomplish the work. Change RI-39, dated 18 April 1962, with plans and specifications, provided for filtration equipment to be installed in existing pump house consisting of flocculation and settling unit, settled water tank, pressure sand filters, pumps and necessary controls. Modification No. 31 dated 9 June 1962 was issued in the sum of

$32,233.60 to accomplish the work with a completion date of 30 August 1962.

d. Site No. 7, Chazy Lake

At completion of tests on 28 December 1961, Well No. 1, at a depth of 125 feet produced 15 G.P.M., however, Well No. 2 produced only 5 G.P.M. in a rock formation, on 13 December. A resumption of drilling in January to 135 feet failed to produce additional water supply in the No. 2 well and it was abandoned. After study, and on recommendation of the Architect-Engineer an additional well, No. 3, was authorized 50 feet North of Well No. 1 on 1 February 1961 (Mod. No. 10). Fortunately, the water bearing strata was found at 105 feet and on 25 February 1961 Well No. 3 developed 15 to 17 G.P.M. thus insuring ample supplies of water for Missile Site 7.

e. Site No. 11, Sugarbush

As of 30 January 1962, the source of water supply at this site had not been determined. The test well at the missile site proper failed to supply the criteria needs.

Records reveal that rock was encountered at 127 feet while drilling this well on 8 September 1960 and the well was cased to this depth with 12" casing. Only a very small flow of water was available due to the fine silty soil condition. Drilling continued and on 11 October all work on the well stopped at 246 feet. A bailing test was made on 12 October, 3 hours at 20 G.P.M. and 1 hour at 12 G.P.M. The well screen was installed on 4 November 1960 with very little water showing. Development began on 14 November and on 18 November the maximum yield appeared not to exceed 7 G.P.M. and work was suspended.

On the recommendations of the Architect-Engineer, a test well was initiated on Alder Brook, approximately 4500 lin. ft. east of the missile site under Mod. No. 8, dated 20 January 1961. On 21 February 1961 the rig was set up and drilling began. On 2 March at 16.5 feet rock was encountered. On 6 March 1961 the well depth was 100 feet, with no appreciable amount of water, the last 26 feet in solid limestone, therefore the well was capped and the site abandoned.

Another attempt was made at Well No. 1 in June 1961. Under Mod. No. 17, re-development of No. 1 well began on 8 June 1961 and on 24 July 1961 recovery tests were made with the result being approximately 1 G.P.M. After removing the top screen and 36 feet of casing, the lower screen and casing broke off and the well was abandoned.

The soil condition at Site 11, above rock, is composed of preconsolidated, dense silts and fine sands with small lenses and seams of coarser sand. Under this condition, while wells could not meet the criteria of 15 G.P.M., the condition was ideal to produce a "fluid soil" or soil "susceptibility to liquifaction." The contractor for the main launcher contract installed a dewatering system, at times pumping up to 75 G.P.M.

On 20 April 1962, at a meeting held in the New York District Office, attended by representatives of CEBMCO, NYDO, BSSFB, A-E and Area Engineer a decision was made to use Well "C" as the source of Water Supply. This well, a 24" casing driven to bedrock under the missile contract (9522) as a means of dewatering the silo, tested out 20 to 24 G.P.M. after a 12" casing, slotted, was installed and the well rock and gravel packed. The 24" casing was withdrawn after packing.

Plans and Specifications were prepared and the Contractor directed to proceed by issuance of RI-40 dated 2 May 1962. The plans proposed to utilize Well "C", installing pump, pumphouse, waterpiping, electrical work, and hypochlorite feeder. Modification 32, dated 8 June 1962, in the sum of $55,805.00 provided for completion of work on 15 July 1962.

During implementation of the modification, the Contractor was required to supply water to the site by pumping from Well "C" into the storage tanks (wasting water until clear before charging the storage tanks). Eventually the turbidity increased (5 hours pumping and test of 15 PPM turbidity) and a temporary tank for settling the water was installed. This was successful in supplying clear water, except at times turbidity would recur. Meanwhile the New York District Engineer Division was requested to consider necessary design for filtration or other means of eliminating the turbidity (DF #604, 14 June 1962). TWX, dated 13 August 1962, from CEBMCO authorized negotiations with contractor for modification to redevelop Well "C" and provide sufficient acceptable water.

Negotiations with the contractor indicated the costs for removing pump, re-entering well, redevelopment and new screen would be excessive, approximately $36,400.00.

On 30 August 1962 the Area Engineer was advised by the Air Force that Well "C" would be accepted, without the proposed redevelopment. Change RI-50 was cancelled.

C. UNUSUAL, UNFORESEEN AND CHANGED CONDITIONS

1. A reference to the Claims Register will provide those items under this category. Possibly the most notable of the unusual conditions will be claim for Site No. 11, Sugarbush, Claim No. 11. Details may be found in RI-191, Mod. No. 89 and preliminaries under Claim No. 11. While the claim is for wet soil conditions and fluid type of soil, this condition is in contrast to Contract 9562, Water Supply, where wells on Site 11 were abandoned due to lack of water. See Section IV-B MAJOR OPERATIONAL PROBLEMS, Items 2 and 4, as of 28 February 1962.

2. List of Claims - Unusual Conditions:

Claim 7, Subsurface Conditions, Clause 4, Change RI-96, Mod. No. 64.

Claim 13, Rock at higher elevation than shown on plans, Change RI-229.

Claim 16, This claim is the result of an unusual condition. On 29 November 1960, at Site No. 8, Ellenburg, the contractor was trimming rock in the area of the Launch Control Center tunnel by blasting (the silo was bottomed out and all ring beams in place) causing loose rock or rocks to fall on top ring beam with such force as to dislodge it, which in turn caused a successive collapse of all ring beams in the silo. This claim was denied by the Contracting Officer 10 April 1961 and the Corps of Engineers Board of Contract Appeals overruled and allowed on 8 March 1962.

Claim 24, Unstable material at Site 12 caused closer spacing of ring beams. Transferred to Change RI-230.

D. PROPELLANT LOADING SYSTEM

1. General

The Propellant Loading System is an integrated process assembly consisting of fuel and cryogenic oxidizer tankage, transfer pressurizing equipment, sensing and instrumentation devices and valving and associated piping to provide for safe fueling of the missile within time permitted by the operational count-down procedures. The characteristics of liquid oxygen and RF-1 fuel used as the missile propellant required maximum prefabrication of assemblies and components under controlled environments in order to maintain the required cleanliness standards. Design developments resulted in the assembly of most valves, controls and other sensitive components into six prefabricated assemblies, skid-mounted and generally confined to a separate system. These assemblies are identified as follows:

Pressurization Prefab

Liquid Oxygen Control Prefab

Liquid Oxygen Fill Prefab

Liquid Nitrogen Prefab

Instrument Air Prefab

RP-1 Fuel Prefab

The foregoing were subjected to functional and cleanliness tests after assembly and prior to transfer to point of installation in order to assure standards compatible with the missile requirements.

Another major portion of the Propellant Loading System is the interconnecting piping consisting of approximately 165 stainless steel spool pieces of various sizes, dimensions and configurations. These prefabricated items were also cleaned, inspected and sealed under controlled environmental conditions at point of fabrication in order to assure required cleanliness standards.

The third major portion of the Propellant Loading System consists of ten large vessels identified as follows:

Liquid Oxygen Storage

Liquid Oxygen Topping

Liquid Nitrogen Storage

Liquid Nitrogen Helium Heat Exchanger

Ground Pressurization

Helium In-Flight #1

Helium In-Flight #2

Gaseous Nitrogen Storage

Gaseous Oxygen Storage #1

Gaseous Oxygen Storage #2

2. Organization

The accomplishment of necessary field inspections, surveillance of installation and in-silo testing of the Propellant Loading System was ultimately vested in a supervisory staff section consisting of a Supervisory Mechanical Engineer, GS-13, as Chief with a 1st Lieutenant Military Assistant, two Mechanical Engineers, GS-12, two Mechanical Engineer Technicians, GS-11 and a Secretary, GS-3.

4. Arrival of PLS Vessels

The first process vessels arrived for the lead site #2, Alburg, Vermont, on 8 February 1961. The last vessel for Site #1 was off-loaded at Cadyville on 25 July 1961.

Vessels were inspected upon arrival at the railroad sidings and again at the sites. Inspections were made for evidence of external damage and level of purge pressure. Cryogenic vessels were not shipped with vacuum gauges, however, the system thermocouple gauges were subsequently used at the site to spot check the vacuum pressure.

There were seven instances of damage to vessels in shipment or during off-loading operations. In-transit damage was attributed to improper connection of stay rods resulting in damage lugs and improper supports and shocks resulting in minor indentations in the vessel outer shell. Of more concern were the three instances where vessels were damaged in off-loading. Damage resulted from slippage of slings, sinking of crane outriggers and improper relative positions of crane and vessel during off-loading. Damaged vessels were returned to the factory for repair.

The first vessels were lowered into the silo at lead site #2, on 2 March 1961. The last vessels were placed in the silo at Site #11 on 18 February 1962.

5. Arrival of PLS Prefabs and Interconnecting Piping

The PLS prefabs, interconnecting piping, brackets and miscellaneous components were shipped from the factory and/or assembly area at Stanton, California, by truck, without transfer, directly to the site concerned in the Plattsburgh Area. Three trucks were required for the transport of material for each site.

Shipment for lead site #2 arrived on 31 March 1961 and for final site #11 on 22 June 1961. Materials were inspected and inventoried at the time of off-loading at the sites. Damaged items were red-tagged and segregated for repair or replacement.

6. Problem Areas

In the earlier shipments, certain items sustained major damage in transit. The upper assembly of the L-2 valve on the LOX control prefabs for the two lead sites was damaged, reportedly due to the excess height, which resulted in striking a low clearance obstruction (underpass). In subsequent shipments the upper portion of the L-2 valve was removed at the factory and shipped separately. Other in-transit damage sustained included damaged PBJ-1 on the LOX Control Prefab and broken nipple in the C-600 line on the LN_2 Prefab. The latter occurred in five (5) instances and is attributed to vibration on the Filter 230 assembly to which the nipple is attached. The PBJ-1 was shipped separately in later shipments, and reinstalled in the silo.

Prefabs arrived with K - bottles of nitrogen gas connected to provide a constant purge. If purge reading was zero at time of arrival, prefabs were red-tagged as suspect. Removal of red-tag was contingent upon acceptability determined by subsequent inspection at time of connection to the interconnecting piping.

7. Installation of Prefabs

The six (6) prefabs were lowered into the silo by using a truck-mounted crane, the sway braces between Levels 6 and 7 having previously been removed to permit drifting of the five prefabs on to Level 7 and into position. The Fuel prefab was lowered to its position on the floor of Level 8 and covered with a plywood roof to prevent damage from falling objects during subsequent construction.

8. Inspection and Installation of Interconnecting Piping

Hardeman personnel started with site organization at lead site #2 on 31 March 1961. The pattern of operations was generally consistent for all sites. Initial work consisted of locating critical points preparatory to installation of pipe hangers. Simultaneously, sorting of piping and double-spooling (above ground) was undertaken. Double-spooling (approximately 50% of total spools) was accomplished in a dust-free structure (4' x 8') constructed of plywood and lined with polyethylene. Two Hardeman fitters and one Corps of Engineers inspector worked inside the structure. Two additional Hardeman personnel were utilized outside to handle spool pieces.

Pipe spools were received in a sealed condition, utilizing a solid polyethylene gasket, carbon steel blind flange (with $\frac{1}{4}$" threaded tap) and four bolts. The tapped opening was taped and a band of pressure-sensitive tape was placed around the pipe spool flange to prevent entrance of contamination.

To maintain the as-received cleanliness condition during double-spooling, the polyethylene gasket was perforated through the blind flange tapped opening and a purge hose introduced. Both spools being connected were treated in the same manner. After connection, pressure-sensitive tape was placed around the two mating flanges and the pre-assembled sections were stored temporarily awaiting lowering into the silo.

In-silo connection of PLS piping was accomplished under controlled conditions by using a polyethylene shroud over the flanges and a dual purge. The contractor followed no particular sequence in installation, but rather worked in various parts of the silo as permitted by other contractor operations.

9. Process Vessels

At approximately the time that PLS testing would have otherwise been undertaken, it was considered advisable to make an internal examination of all PLS pressure vessels under General Provisions of the contract. This position was based on earlier finding of contaminated pressure vessels at Al[illegible] AFB where vessels were fabricated by the same supplier, Foster-Wheeler. Consequently, all pressure vessels (Ground Pressurization, Helium Inflight (2), Gaseous Oxygen (2), and (Gaseous Nitrogen) for all 12 sites (total of 72 vessels) were inspected internally.

A tabulation was made of a vessel by serial number, and as a result of the inspection a "Special Report, High Pressure Vessels" was prepared by the PLS Section. This report indicates the Pressure Vessel by type, serial number, site number, date of installation in silo and date of internal inspection.

Of the 72 vessels inspected, two (2) were found acceptable (He. Infl. 7-49-504) Site 3 and (Ground Pressurization 7-49-533) Site 11, and four (4) were found so contaminated as to require chemical cleaning rather than the use of blowdowns. (Final, 49 High Pressure Blowdowns and 21 Chemical Cleaning required).

The contractor formally objected to the applicability of specification clause, General Provision 9c, for inspection of the vessels, however, cooperated fully in preparing for and participation in the inspection. (See Claim No. 102, Pressure Vessels)

The following general procedure was used in internal inspection of vessels:

a. Bleed off purge pressures.

b. Remove blind flange from upper nozzle (under polyethylene shroud).

c. Black light, white light and wipe test, flange face and inside of nozzle.

d. Lower light bulb into vessel and inspect upper head by using inspection mirror.

e. Insert purge hose in upper nozzle and cover upper nozzle while blind is removed from lower nozzle.

f. Lower light bulb from top to bottom of vessel while observing inside of vessel through lower nozzle.

g. Inspect lower head by inserting inspection mirror.

h. Make black light, white light and wipe test on lower nozzle and flange.

i. Remove light bulb.

j. Clean and reinstall cover blind flange.

k. Clean and reinstall upper blind flange.

l. Pressurize vessel to approximately 15 psig.

Ten (10) of the seventy-two (72) vessels were inspected jointly by the Corps of Engineers and Cosmodyne Laboratories. The latter was contracted as an independent laboratory to inspect, take samples of contaminants and analyze same. Their report concluded that vessel condition did not meet cleanliness requirements of the specifications.

The four (4) vessels which required chemical cleaning contained keel markings and/or a terry formation in the upper head. These were Gas. Oxygen Vessels 7-49-556 and 553 and Gas. Nitrogen Vessel 7-49-540 at Site 8 and Gas. Oxygen Vessel 7-49-567 at Site 9. (10 October additional vessels required cleaning.)

The contractor formally declined any responsibility for "cleaning" of rejected vessels, (Claim 102), contending specification cleanliness requirements had been met at the factory, which was the extent of contract obligation. Eventually, after several requests from the Area Engineer as to plans for making vessels acceptable, the contractor suggested the use of high pressure blowdowns. From this suggestion, CEBMCO developed a blowdown procedure which was used by the contractor. The prime contractor, Raymond-Kaiser-Macco-Puget Sound, issued a purchase order to Hardeman for accomplishing the blowdowns. The results of blowdown were prepared as a "Special Report, High Pressure Vessels" showing vessel and serial number, site number, number of blowdowns and appropriate remarks. The report was prepared and maintained by the PLS Section. At Site 11, vessels were inspected and rejected, except one, which was acceptable after visual inspection. No blowdowns had been accomplished as of 28 February 1962. The contractor verbally stated he will blowdown the remaining five (5) pressure vessels for acceptance.

The blowdown procedure was established and a letter was forwarded to the contractor under date 22 July 1961, ENGMA-AB-P-4 (SEC K) 145. This letter concerned the following vessels:

a. Gaseous Nitrogen Vessels (4000 psig).

b. Gaseous Oxygen Vessels.

c. Gaseous Nitrogen Vessels (6000 psig).

The Area Engineer's authorization to the contractor for accomplishing blowdowns specified that work would be done at no additional cost to the Government and that liquid nitrogen would be furnished from Government sources on a reimburseable basis.

Prime contractors and assigned service contracts were modified to exclude the requirement that the assigned service contractor satisfy himself as to the cleanliness condition of the vessels before making connections. Therefore, after vessels were found acceptable by blowdowns, the contractor was directed to make connection to the interconnecting piping. The inspection at time of connection consisted of inspection of flange face and inside of nozzle.

In latter part of October 1961, RMMP discontinued blowdowns of vessels and indicated a preference to chemical cleaning the balance of vessels. RMMP made an agreement with Stellardyne to chemically clean vessels, with initial operations at Site 8.

During the period 4 October 1961 to 27 November 1961, Stellardyne undertook chemical cleaning of three (3) vessels at Site 8. Stellardyne did not achieve a standard of cleanliness which would warrant an inspection by the Corps of Engineers. In late November

1961 RKMPS terminated the services of Stellardyne and contracted for the services of Dow Industrial Services. Dow chemically cleaned the three (3) vessels at Site 8 (including degreasing), six (6) vessels at Site 6, six (6) vessels at Site 7 and six (6) vessels at Site 9 (including degreasing of GOX vessel 7-49-567 at the latter site). The chemical cleaning of the twenty-one (21) vessels was accomplished during the period 5 December 1961 to 29 December 1961.

During the foregoing period, RKMPS chose to resume blowdown of vessels at Sites 5 and 12 in order to eliminate further delays which had been aggravated by Stellardyne's inability to clean vessels during the month of November 1961.

10. Propellant Loading System, (PLS) Blowdown and Testing

a. Blowdown

PLS testing started at lead site 2 on 5 September 1961 and was completed at Site 9 on 9 February 1962. A chart was prepared by the PLS Section, with system lines plan reference designation, site number and the number of blowdowns by principal lines in the system. The number indicated is the blowdown pad number found acceptable from the standpoint of particle size. At the earlier sites (2, 3, 1, 4, and 10), the local SATAF Commander generally adhered to specification requirement of 150 micron standard of cleanliness. At the later sites (5, 12, 8, 6, 7, and 9), there was some relaxation of cleanliness requirements, in that the SATAF Commander did, on occasions, authorize deviations to accept a system on the basis of a test pad with a particle or particles exceeding 150 micron size.

For systems blown from the pressure vessels, the particle sizes accepted are shown on "Special Report - High Pressure Vessels", prepared by the PLS Section. The report shows each vessel, by number, tabulated with line number shown, number of system blows, site number and particle size accepted (micron).

b. PLS Testing

PLS Testing consisted of the following five operations:

Leak Test

Proof Pressure Test

Blowdown Test

Cold Test

RP-1 Test

(1) Leak Test

The performance of the leak test was made by using the tape around the flanges. The tape was perforated at one point and Leak-Tek applied. For helium lines, removal of the tape and application of Leak-Tek directly to the O-ring was necessary to determine if leaks existed.

(2) Proof Pressure Test

The proof pressure test consisted of raising the pressure (with gaseous nitrogen) to 1-$\frac{1}{4}$ times operating pressure.

(3) Blowdown Test

The blowdown test consisted of installing a test horn containing a gauze pad, at a specified point and discharging gaseous nitrogen gas through the pad at a specified pressure, for a specified time period. The entrapped particles on the pad were analyzed for size in microns and weight in terms of parts per million.

(4) Cold Test

The cold test consisted of introducing a given quantity of liquid nitrogen into specified systems and vessels and inspecting for leaks, distortion and rupture. The liquid nitrogen was then discharged to the surface through temporary lines by pressurizing the vessels.

(5) RP-1 Test

The RP-1 Fuel Test consisted of circulating RP-1 fuel through the fuel system and prefab, inspecting for leaks, taking of samples and analyzing to assure conformance with specification cleanliness requirements.

c. PLS - Starting and Completion of Tests

The status of PLS testing, as of 20 August 1962, shows all tests were completed at all sites, 1 thru 12, the last, Site 11, Sugarbush, with a completion date of 14 May 1962. Five different operations were made, according to the needs of the system, as indicated in preceding paragraphs (1) to (5). Detail site by site and dates were maintained in reports by the Construction Branch, PLS Branch.

In the items shown (1) to (5) testing began at the lead site #2 and proceeded in the following order: 3, 1, 4, 10, 8, 5, 12, 6, 7, and 9, the last site; the following shows test number, facility tested, beginning date at lead site #2 and date for completion of last site #9.

Test No. 1 - Instrument Air, began Site 2 on 5 September 1961, completed 9 September 1961, final Site 9 began 16 January 1962, tober 1961, completed 4 November 1961. Final Site 9, began 9 February 1962, completed 12 February 1962.

Test No. 11 - Standby. Began Site 2 on 31 August 1961, completed 4 November 1961. Final Site 9, began 7 February 1962, completed 15 February 1962.

SITE NO. 11

Test No. 1 began at Site 11 on 18 April 1962 and all tests to and including Test No. 11, Standby, were completed on 14 May 1962.

d. PLS - Inspection and Cleaning, Results

Seventy-two (72) vessels were inspected for cleanliness. Results were prepared in report form and included as a record of Claim File No. 10[illegible]. Final total of the 72 vessels, 2 were found acceptable and 70 were found contaminated. Twenty-one were cleaned by chemical cleaning and 49 by high pressure blowdown. Inspection and examination were accomplished by letters to the contractor, under General Provisions 9, Inspection, Paragraph c, of the contract.

11. Acceptance of the Propellant Loading System

The pre-final and final inspections of the Propellant Loading System generated a number of items of a controversial nature. Interpretation and intent of specifications and drawings (where unclear) became of major concern and had to be overcome on an item-by-item basis in discussions with the local SATAF Commander and his staff. To place the PLS in a status acceptable for the Air Force to accept, it was necessary to complete critical punch list items (determined by the AF) of which standby configurations and pressures were an essential part.

Turnover to the Air Force for security and maintenance usually occurred on an average of three days after completion of PLS testing.

12. Safety Consideration

The PLS testing requirements included inherent safety hazards as follows:

a. High Pressures

b. Excess gaseous nitrogen resulting in Oxygen-deficient atmosphere

c. Liquid Nitrogen (-321° F)

d. Hazardous and volatile RP-1 fuel and vapors

The Safety Program required precautionary measures which resulted in satisfactory completion of PLS testing without a single accident. Safety requirements included the following:

a. During periods when high pressure systems (systems with operating pressures in excess of 1000 psig) were at pressures in excess of operating pressure, only essential test personnel were allowed in the silo levels where such vessels were located and through which the lines passed.

b. Adequate ventilation in silo when lines were blown down in silo, to dissipate and evacuate gaseous nitrogen.

c. Provision of individual oxygen-breathing equipment to test personnel.

d. Availability of evacuation means - i.e., silo elevator, crane, etc.

e. Isolation of areas containing liquid nitrogen, except for essential test personnel.

f. Use of safety lamps.

g. Availability of fire extinguishers.

h. Evacuation of silo during RP-1 test except for essential test personnel.

13. Modifications Affecting the PLS System

a. During the course of construction it was necessary to issue modifications to the contract (9522) affecting the Propellant Loading System (Assigned Contract 5765, Paul Hardeman, Inc.), Item No. 3, "Installation and Tests", in accordanee with SC-38 "Assignment of Procurement Contracts."

These changes were in relation to technical specifications, Section 13, "Installation of Prefabs and Interconnecting Piping" and Section 14, "Testing, Propellant Loading System" of the assigned contract and in related work performed by the assigned PLS sub-contractor.

b. Modification No. 216 of Contract 9522

Sixteen changes were issued and are identified by the following Modification Control Numbers (as of 15 March 1962):

RI-41	RI-118	RI-151	RI-245
RI-85	RI-123	RI-176	RI-253
RI-97	RI-126	RI-216	RI-293
RI-113	RI-132	RI-231	RI-294

It was considered in the best interests of the Government to negotiate all of the above changes as a group; therefore, a negotiating team from Plattsburgh was formed for discussions with the contractor to be held jointly with Fort Worth District personnel in Fort Worth, Texas. As a result of negotiations conducted in Fort

Worth District Office on 20 February 1962, an adjustment was reached with P. Hardeman at $24,000.00 with prime mark-up, the sum of $29,757.37.

Subsequent negotiations at Plattsburgh for items of the changes directly affecting the prime contractor resulted in a total agreed equitable adjustment in the sum of $60,042.39 for Modification No. 216.

c. Modification No. 42 of Contract 9522

Separate negotiations were held by Fort Worth personnel with the PLS contractor and certain items, among other things, were of interest to Plattsburgh in relation to Modification No. 42.

Cost of additional effort to complete Site 11 by 15 June 1962 in lieu of 22 weeks schedule contained in Contract 5765 as previously amended prior to assignment. The cost, as negotiated by Fort Worth District, is included with other items as assigned Item No. 3, Contract 5765, to be written into Modification No. 53 (5765).

Modification No. 42, Contract 9522, to be supplemented (Supplement No. 2) upon finalization of Modification 53, Contract 5765, Fort Worth District, containing the following:

Modification 42, Item 3, Contract 5765 amount, plus Item 3 amount, changes 1 through 11, including bond adjustment for Contract 9522	$1,032,735.16
Supplement No. 1 to Modification No. 42	324,762.16
Fort Worth District CO No. 13 (5765)	770.28
Fort Worth District CO No. 53 (5765)	211,28[illegible].74
Total Final Amount - Modification No. 42	$1,569,552.34

d. Claims Affecting the PLS System

(1) Claim No. 102. By letter dated 22 June 1962, ENGMA-AB-P-4 (SEC K), the contractor was informed Vessel No. 7-47-570 at Site 9 (later corrected to Site 6), required inspection under GP-9-c. Later, similar action at other sites became necessary, also Contract DA-04-548-eng-54 (Atlas F) was issued to Cosmodyne Corporation, for inspection of ten High Pressure Vessels at Sites No. 1 and 4, including visual and chemical analysis. All vessels were found to be contaminated as outlined in Section III of the report.

By letter dated 28 March 1962 the contractor (Ref. G-2728) presented his claim for alleged extra work in sum of $616,848.74 for inspection and in-place cleaning of 70 High Pressure Gas Storage Vessels, and requested a decision from the Contracting Officer (see Claim File 102).

14. Test Equipment and Test Fluids

Propellant Loading System testing equipment and test fluids were not assigned to the Prime Contractor but remained under contractual control of the Fort Worth District. Test equipment consisted of the following for the Plattsburgh complexes:

Item	Number	Sources
LN_2 Rechargers	11 ea.	3 AF furnished 8 C. of E. furnished
LN_2 Trailers	6 ea.	3 AF furnished 3 C. of E. furnished
Tube Bank Trailers	12 ea.	6 AF furnished 6 C. of E. furnished
RF-1 Trailers	2 ea.	2 AF furnished
Helium Compressors	4 ea.	1 AF furnished 3 C. of E. leased

Test liquids consisted of the following items and quantities (for eleven sites):

Item	Quantity	Source
Liquid Nitrogen	1,145,200 gallons	597,100 gal. Govt. LOX Plant 548,100 gal. Commercial
Helium	951,600 scf	Commercial
RP-1	6,600 gal	AR (Consumption - approx. 2200 gal).

PROPELLANT LOADING SYSTEM

Reference is made to Paragraph 9, Process Vessels, Page IV-33 concerning blowdown procedure established for high pressure vessels and letter, ENGMA- 3-P-4 (SEC K) 145 dated 22 July 1961. The following procedure was established and used at Plattsburgh Area for blowdown tests of the referenced vessels:

a. Gaseous Nitrogen Vessel (4000 psig)

(1) Install a pressurizing valve, pressure gauge, relief valve and blow horn on the end of the GN_2 vessel manifold.

(2) Pressurize the vessel to 4500 psig with filtered gaseous nitrogen.

(3) Reduce vessel pressure to 4000 psig with pressurizing valve fully open.

(4) Install test strainer cheese cloth pad in the blow horn.

(5) Blowdown vessel from 4000 to 3500 psig.

(6) Remove the test strainer pad for analysis and install another test strainer pad.

(7) Repeat blowdowns through test strainers in 500

psig pressure drop increments until vessel pressure reaches 1000 psig.

(8) A total of six (6) test strainer pads will be taken and analyzed by your independent certifying laboratory to provide total number of particles, size of each, and composition of each. Pre-reading of all pads is required. Black Light reading of the pads is required.

(9) Upon completion of the analysis of the six (6) test strainer pads the results will be forwarded to the PLS Branch, Plattsburgh Area Office. Further instructions will then be issued as to the action required, i.e. to repressurize and repeat blows, connect vessel to the system, or take other action.

b. Gaseous Oxygen Vessels

(1) Install a pressurizing valve, pressure gauge, relief valve and blow horn on the end of the GOK vessels manifold. The two (2) vessels are to be pressurized and blown simultaneously.

(2) Pressurize vessels to 4500 psig with filtered gaseous nitrogen.

(3) Reduce vessels pressure to 4000 psig with pressurizing valve fully open.

(4) Install test strainer cheese cloth pad in the blow horn.

(5) Blow down vessels from 4000 to 3500 psig.

(6) Remove the test strainer pad for analysis and install another test strainer pad.

(7) Repeat blowdowns through test strainers in 500 psig pressure drop increments until vessel pressure reaches 1000 psig.

(8) A total of six (6) test strainer pads will be taken and analyzed by your independent certifying laboratory to provide total number of particles, size of each and composition of each. Pre-reading of all pads is required. Black Light reading of the pads is required.

(9) Upon completion of the analysis of the six (6) test strainer pads, the results will be furnished to the FLS Branch, Plattsburgh Area Office. Further instructions will then be issued as to the action required, i.e., to repressurize and repeat blows, connect vessels to the system or take other action.

c. Gaseous Nitrogen Vessel (6000 psig) and Helium In-Flight Vessels.

(1) Install a pressurizing valve, pressure gauge, relief valve and blow horn on the end of the GN_2 vessel manifold and on the end of the Helium In-Flight vessels manifold. The two (2) Helium In-Flight vessels are to be pressurized and blown simultaneously.

(2) Pressurize vessels to 6200 psig with filtered gaseous nitrogen.

(3) Reduce vessel pressure to 6000 psig with pressurization valve fully open.

(4) Install test strainer cheese cloth pad in the blow horn.

(5) Blow down vessels for two (2) minutes.

(6) Remove the test strainer pad for analysis and install another test strainer pad.

(7) Repeat blowdowns through test strainers in two (2) minute pressure drop increments.

(8) A total of three (3) test strainer pads will be taken and analyzed by your independent certifying laboratory to provide total number of particles, size of each, and composition of each. Pre-reading of all pads is required. Black Light reading of the pad is required.

(9) Upon completion of the analysis of the three (3) test strainer pads, the results will be forwarded to the PLS Branch of this office. Further instructions will then be issued as to the section of action required, i.e. to repressurize and repeat blows, connect vessels to the system or take other action.

E. AREA LABORATORY, CONCRETE QUALITY CONTROL

1. General

With the contract awarded and the concrete supplier established, meetings were held between the prime sub-contractor and Corps of Engineers Area Laboratory personnel to discuss over-all operations, equipment, materials, procedure and general contract specification requirements.

2. C. of E. Laboratory Personnel and Plant

During the peak period of concreting, the Area Laboratory performed their work with a staff of 17 men, 2 of which were TDY personnel. The requirements of quality control necessitated decentralization of the laboratory force to inspect concrete placements at several sites delivered from two and three plants concurrently. (Laboratory, a section under Engr. and Tech. Branch).

Disposition of personnel was such that the several plants were covered during all shifts by a batch plant inspector whenever concrete was being produced and a concrete technician was at each site receiving concrete during all placements.

The Headquarters laboratory at Plattsburgh performed technical support by maintaining gradation and organic check tests on the various aggregates, gathering cylinder specimens, curing, t esting and keeping records of compression tests. Also during this period all soils work for the 12 sites was being handled by the staff of the Area Laboratory.

Each laboratroy representative at the site had a primary function of maintaining concrete quality control and a secondary function of maintaining records through field logs and plant logs as well as documentary records of tests, policy changes, precedures and interoffice memorandums compiled by the Headquarters laboratory.

The supervisory staff consisted of a Supervisory Material Engineer and his assistant, a Supervisory Materials Technician. They coordinated the activities, performed major changes on the mix design and acted as consultants to the Chief, Construction Branch and Resident Engineers on-site in facilitating solutions to construction problems dealing directly and indirectly with control and placement of concrete and soil.

They were also responsible for the training and technical education of laboratory and inspector personnel, sometiems formal but often informal, however, a continuous program throughout the life of the project was maintained.

3. Concrete Mix and Testing

Concrete aggregate materials, proposed cement, admix and equipment for production of concrete were submitted for approval.

After preliminary testing at the Area Laboratory tentatively acceptable materials were forwarded to the Ohio River Division Laboratory in Cincinnati, Ohio, for Petrographic Analysis, Reaction of Alkali with cement and for compliance with physical and chemical criteria specified, (Fed. Spec. SSA-281b). Arrangements were made to have the National Bureau of Standards store, sample, test and release cement from the Glens Falls Cement Company at Glens Falls, N.Y. as required. Total quantity of cement ordered tested was 167,000 Bbls. Admix for air-entraining agent, Neutral Vinsol Resin, was tested and released by Ohio River Division Laboratories.

Concrete mix design and trial batches for the required strengths of 3750 and 5000 psig were made by the contractor at Essex Junction, Vermont, Headquarters of the concrete supplier and on site with Corps of Engineers Area Laboratory supervision as advisor and observer.

Forty trial batches were required to establish the design since materials proposed for use were to be as local as possible to the 12 construction sites. Four natural washed sands for fine aggregate and crushed gravel and two sources of crushed limestone, Fed. Size 67 and four coarse aggregates were utilized.

4. Contractor's Plant and Operation

Cement was delivered to the plant sites by trailer tank trucks from a storage yard established in Plattsburgh, New York. This yard was receiving point for tank trailers delivered to Plattsburgh from the cement company in Glens Falls, New York, approximately 110 miles away. The arrangement was made to preclude closed or impassable winter roads while extensive concrete placement was taking place.

The contractor originally proposed and planned to erect two portable concrete plants and to relocate them as concrete progressed from site to site. This plan was found inadequate, because delays at upstream sites would pyramid and cause extensive delays for the downstream sites. Further scheduled overlap would not permit plant movement at the desired time. Further, the large number of smaller placements both miscellaneous and Launch Control Center would also be delayed due to silo concrete overlap and excessive distances of trucking concrete.

Four C. S. Johnson Jumbo Concrete Plants were finally erected, whose individual normal capacity was 80 CY per hour at locations where they could efficiently supply a number of sites. Three plants were on site and one established off site. One plant was relocated on site twice.

The proposed and approved method of concrete mixing and delivery was by transit mixer truck with conventional crane and bucket placement for LCC, flat slabs and miscellaneous concrete. However, for the silo walls pumpcreting was provided utilizing a 6 foot steel slip form, with concrete delivered by mix truck to a model 200 Double Rex Pumpcfete machine, capacity 50-65 CY per hour.

Since it was known that a large portion of the concrete would be placed during winter weather the proposed method of winterization and heat supply was discussed at the early stages of the contract. Meetings were held and questions raised as to the adequacy of the proposed method under sustained production and winter conditions.

The method and equipment advanced was to supply heat to the aggregate hoppers by means of hot oil coils around the bins and to heat a 2000 gallon capacity water storage tank by the same means. Hot oil was to be generated by trailer mounted, Hy-Way Hot Oil Boilers, 56 RS, Model L-1057 capable of a maximum input of 3,000,000 B.T.U. per hour.

Doubt of adequacy led to a meeting with the Manufacturer's Design Engineer, Distributor personnel, Concrete Sub-contractor and the Area Laboratory personnel at which time production and winter conditions of placement were discussed and the Government was assured that production could be met using one heater and, should it be required, two heaters would be installed since they would be trailer mounted and quite mobile.

5. Production

The first concrete placement was at Site 2, Alburg, Vermont, 28 September 1960, with the placing of the LCC foundation slab and column base. By 1 November 1960, 1700 CY of structural concrete was placed together with approximately a similar quantity of contractor's construction purpose concrete, i.e., collar beams, mud slabs, counterweights, etc. Toward the end of November and the beginning of December it became evident that the heating arrangement for winter concrete production was insufficient and the manufacturer installed larger oil jets, more coils and additional insulation. The measures taken were not able to cope with comparatively mild winter temperatures and concrete placements of the silo walls at Sites 1 and 4 had to be postponed until steam generators, 90 HP, 150 PSI were installed and live steam incorporated in the aggregate hoppers. Thereafter, oil heaters were used to heat the water storage tanks only.

Concrete placement proceeded on a "when ready basis", that is, any time of the day or night, all days of the week. Quantities placed between 1 November and 1 March 1961 averaged 530 CY/calendar day. The 1 March to 1 June average was 210 CY/calendar day, 1 June to 1 October 120 CY/calendar day.

Of the estimated total of 105,000 CY of concrete for placement at all sites, 63,000 CY were placed from November 1960 to February 1961.

6. Plant and Production Problems

A variety of difficulties in the production, delivery, and placement of concrete arose due to plant inadequacies, contractor and sub-contractor, oversight, equipment, method of placement and general winter conditions.

Common difficulties at the plants were lack of sufficient standby equipment and shortages of material due to lack of coordination or miscalculation.

In the early stages, winter weather developed as a problem. Precautions taken were often times temporary which could not withstand the rigors of heavy construction during inclement weather. Heating systems failed and admix dispensors, compressors, pumps, mechanical piping and plant shelter were too light under the conditions, communication was poor and the limited stockpile areas, which could not be protected due to rapid turnover, all contributed to the problems.

The later installed steam system introduced moisture problems in the aggregate and the erratic quantities of concrete produced for delivery further complicated control.

The indiscriminate use of steam, by contractor personnel, when not properly coordinated with other factors such as rate of production or temperature of mixing water caused produced concrete to vary substantially from specified temperatures and slump and thus wasted unnecessary yardage.

Steam in the aggregate hoppers and its condensation sometimes caused material to freeze and arch in the upper areas of the hoppers and completely stop production until free flow could again be restored. This stoppage caused further delays which triggered more problems of plant maintenance and production.

Intermittent production and such variables as condensed steam, ice, snow, inoperable water and admix meters caused difficulties in the control of temperature, air entrainment and slump of the concrete. When other than normal production conditions were encountered the batch plant inspector was instructed to detain one truck per hour and mix the batch at the plant site, to check the concrete for compliance with the specifications. Changes, as necessary, were made to avoid delivery of excessive quantities of unsatisfactory concrete to the job sites.

Winter weather contributed to a large extent the failures encountered in the water supply and to equipment for maintaining this supply. At all four plant sites and during placement of concrete at some job sites the water supply had to be augmented by the Volunteer Fire Department of the locale. Many placements would have suffered extreme consequences had not the Fire Department delivered water when necessary.

Transportation was complicated by the necessity to travel on ice and snow, poor visibility, breakdowns and frozen lines and pumps. These factors inhibited progress and could not be predicted effectively.

Breakdowns of batch plants and batch trucks became so frequent that the contractor was directed to have specific equipment on standby when placing concrete. The standby equipment was used quite often to fill in for inoperable equipment.

In conclusion it must be stated that many of the problems encountered with the production of concrete would not have been experienced if the placement site had been adequately prepared and if proper precautions had been taken at the plant prior to problem development.

F. INCREASED COSTS, PREMIUM RATES, ACCELERATION

1. Increased Costs - Job Factors

Many factors enter into the over-all cost of missile site construction and these factors are no doubt inherent in all missile site construction and the Plattsburgh Area is not an isolated instance. The urgency of the program resulted in tight schedules, and this short time for construction under a compressed schedule required continuing comprehensive attention to maintenance of a complex schedule for delivery of supplies and materials. Likewise this compressed schedule required close attention to scheduling of the various skilled tradesmen and labor, and attendant equipment to use the incoming supplies and materials. It can readily be seen that any breakdown of sequence of operations, from whatever cause, required extraordinary efforts on the part of the contractor to overcome construction delays and maintain the schedule.

These conditions required an intensive supervision of all elements of construction, and increased the ratio of supervision, procurement and follow up over and above that required for a normal construction job.

a. Safety

Other factors, i.e., safety, contributed abnormally to costs. Normal construction of multi-storied buildings involves danger from height and fallen objects. This common hazard is associated with missile construction (approximately equal to a 15 story building). However, the confined working area in the silo with an concentration of several trades, dispersed at the various levels, aggravated the danger of falling objects. This combination of factors presented serious safety hazards. In many stages of construction safety belts and ropes were mandatory and typing on and off contributed to additional labor. Efforts to overcome this lost time, which individually may appear minor, but multiplied by the number of workmen in hazardous areas plus 12 sites contributed appreciably to lost time. So important was the use of safety ropes that at least one death may be attributed to lack of this simple safety precaution in an unguarded moment. The extraordinary precautions necessary to safeguard the workmen contributed materially to the added costs.

b. Equipment

Crane service required careful scheduling for the flow of materials into the silo, and to some extent, the LCC. Practically all material comprising the missile installation required the services of a crane, and, as a rule, two cranes were used for the silo. When other work, such as excavation for the fuel tanks, was under way a third crane was used and, again, to some extent for work during construction of the LCC. Later, after the concrete cap was poured, there remained only the opening for the missile to lower the multitude of material items into the silo. Efforts were made by the contractor to save on equipment cost. As an example, to avoid having the additional crane on the site for only occasional lowering of materials into the silo (after crib steel was in place), two weeks were scheduled and set aside to lower tanks, equipment, skids, other heavy items and appurtenant materials into the silo, and place at the various levels on the crib steel frame work. This proved to cut costs on crane use but served to present a crowded condition at the various levels in the silo. There was so much material and equipment around that there was no place to work for installations, connections and use of small items to complete the work. This crowded situation made it so difficult to work that it required a month to clear up the situation, thus providing dubious savings of time for equipment rentals. Each time a change was issued, equipment costs were a major factor of discussions during the negotiations. Quite often seemingly simple changes became complex situations involving materials included in the change, the effect on other trades working in same area and ripple effect upon downstream sites. Requirement of equipment is a major factor of increased costs in missile work.

c. Weather

Weather also proved a factor, while it was known when bids were prepared by the contractor that winter work was a requirement. Who could predict on what date snow, sleet and ice storms would occur? Sleet and snow were expected at critical periods of construction and known precautions taken. Sudden storms can and did upset the sequence of operations, including delivery of materials and delays in labor arriving at the site. It is a matter of record that weather created hazardous conditions and delays in the month of December 1960 at Site 5 and also ice conditions at Site 4 at Willsboro. While it may be contractor requirements to plan for winter operations and he may have a well prepared plan, experience has proven that severe storms may cause disruption of work. It has been necessary to provide time extensions to the contractor due to weather. Winter storms have repercussive effects on various follow-up installations of the various skilled trades and sub-contractors. This type of cost, effects on downstream work and all the involved mechanical and electrical items as well as the various sub-contractors are difficult to pinpoint insofar as actual costs are concerned, yet they are there and must be taken into consideration.

The contractor was not able to mobilize early enough to utilize all of the summer construction season in 1960 nor did he start excavation immediately on all sites. This resulted in most of the silo reinforcing steel and concrete being placed during the winter of 1960-61. However, contract milestone dates inferred sequential work as completion of principal work features were scheduled at weekly intervals, and milestone No. 1 (silo concrete) contemplated extensive winter concrete operations. Accumulation of ice on the excavated sides of the silo walls and later on installed reinforcing restricted construction progress in the winter and sub-zero temperatures reduced the efficiency of the workmen.

A review of the records reveals that important phases of work, such as placing reinforcing steel in LCC and silo walls, placing of forms and concrete for LCC walls and silo walls and haunches occurred at all sites except Site 9 during November, December, January, February, and March. Crib steel was placed in the silo in half of the sites during winter weather. At the "rock" sites, where reinforcing steel was placed in the silos during winter, ice formations formed on the walls due to water seepage. In addition to the safety hazard, removal of ice from the silo walls became a time consuming and costly operation. Since seepage was constant, ice removal became a constant chore that continued until completion of the concrete pour for silo walls.

d. Close Tolerances and Dimensions

One of the factors which contributed to a great degree to increased costs was the close tolerances to dimensions more precise than normally encountered in construction. Of particular note were tolerances required for steel inserts embedded in concrete, - one, the inserts for shock hangers and another the inserts for collimator plates. The shock hanger inserts, four each, were required to be set with only a ½" tolerance and required careful checking and re-checking by the survey crews, with the weight, special care was required in setting both for safety and accuracy, After setting, another item for these inserts, 33" WF columns approximately 13 feet long, 3 each, used for framing and structural support for the one inch thick insert plate were drilled for the 1-¼" Ø reinforcing bars; it was necessary to thread 170 each horizontal reinforcing bars through the holes when placing the haunch reinforcing steel.

Another time consuming item was the collimator plate insert which allowed only 1/16" tolerance. This bulky and heavy item required extraordinary effort on the part of survey and engineer check-out crews, also the work was done under unfavorable weather conditions, during the winter. Datum was an established bench mark by the Coast and Geodetic Survey team. From this point another bench mark was established as an axis line monument. Another datum was set at the silo, thence by measurement to the vicinity of the collimator plate 90 feet down in the silo. To validate this elevation and establish the correct positioning of the collimator plate, check and re-check became the order of the day, and usually on ice coated walls. So important was this setting that sign-off for validation was required by contractor, Corps of Engineers and General Dynamics as a coordinated effort. No concrete could be poured for the concrete silo walls until validation was completed, any delay in validation would delay downstream work.

Numerous inserts were required and all required careful vertical and horizontal measurement to their respective reference datum or lines. Thus it is noted that preparation for concrete placement in the silos was time consuming, involving extraordinary effort in validating precise measurements and placing of inserts in the forms. Extraordinary care and special effort in placing concrete was required and thus another contributing factor in costs for the effort expended.

e. P. L. S.

Another item, while not large, concerned the check and re-check necessary during installation of the propellant loading system with the use of large volumes of nitrogen gas, at extremely high pressure and release of large volumes of nitrogen gas creating an explosive hazard or danger of asphyxiation. Due to the inherent hazards, all work areas were required to be cleared while the checks were being made causing delays to all other working trades.

f. Changes

Under the design concept of "concurrency" with the missile system being constructed while development was in progress, facility changes became numerous. Many were field changes and required rapid review and solutions to avoid stoppages of work, other items of work were reviewed so that relocation of duct work, electrical panels, etc. or piping already installed would be held to a minimum, however, relocations often were unavoidable. The diversity of design features and numerous changes contributed to over-all delay and many costly changes were necess ry under design, development, construction concept. In fact, the contractor used the numerous changes issued as a basis for continual complaint for "delays", "additional costs", "repercussive effects" and qualifications of all changes negotiated, so that it became impossible to obtain a 100% agreement on price and time with the contractor.

In review of the many causes noted for increased costs, it is known that a prudent contractor would consider all these circumstances and provide for them in preparation of his bid. Another factor, downstream sites out for bids would have an advantage by the contractor's review of work under way. A factor at Plattsburgh was the pre-bid conference and an invitation for contractors to view the full scale crib model provided at a location in California and with the dispensing of this information the over-all low bid should accurately reflect the true costs. However, this may not always be true since missile site construction is an entirely new type of construction to many contractors.

After awarding of contract, these many factors relative to delays outlined in preceding paragraphs, became facts and are reflected in costs, as actual experience has proven in the estimating and negotiating of change orders with the contractor. Also these costs that have become apparent to the contractor are reflected in the many claims. Where claims are found justified, when these costly items are again reflected in negotiations.

2. Premium Time - Shift Factors

Premium time contributed to increased missile site construction insofar as changes and modifications are concerned and increased the cost of the work considerably where labor of all types is concerned. As a rule the contractor conducted his work in three shifts; however, premium time accrued here since the 8 hour shift received 9 hours pay for 8 hours work, 8 hours pay for the two remaining 7½ hour work shifts. This would account for the estimated increase of approximately 10%. Other factors, Saturday being an entire 24 hour overtime period. On swing shift work, lost time occurs and continuous 24 hour work period is not achieved although paid for, since, when the second (or third) shift arrives, it will spend, as a rule, a half-hour orientation period to familiarize with work accomplished in preceding period. This inefficiency must be taken into account.

Some of the small sub-contractors whose schedule did not require three shifts, often worked a 10 hour day, 2 additional hours overtime, and, as a rule, these sub-contractors worked a 10 hour day on Saturday. This type of work shift, while not constant, was difficult to pinpoint as to actual hours when making an estimate on a change, nevertheless contributed extensively to increased costs. An example, the PLS piping installation and the testing of PLS by Hardeman consisted of a 10 hour day.

Non-productive labor, obtaining materials, loss of time obtaining small materials or tools that do not require crane service, but use of stairs, becomes a factor for consideration. Working in an area where heavy materials and tools are subject to use of a crane for lowering or moving into silo will provide labor waiting time when scheduling is inadequate while the material is being obtained. Other non-productive labor is waiting time while other trades are completing their portion of work. At best this can only be estimated at 25%, and became a debatable item with the contractor during negotiations.

The short time available for completion of the missile site work made it necessary to accomplish work simultaneously by several trades in the same work areas and such action usually directly affected the rate of accomplishment of all trades. The installation of an intricate and complex electrical and mechanical system and equipment and in an unusually restricted space where mechanics are working and others passing to and from work areas, interference with each other becomes inevitable. With so much equipment being crowded into confined work areas one might consider that the equipment was in competition for space with the mechanics who were to install the equipment. This crowded working condition is very difficult to estimate under any circumstances, especially where it concerns several trades in a modification. However, it must be taken into account and particularly in later stages of construction when skilled mechanics are working out a complex installation of motors, pumps, tanks, piping, control panels in restricted working areas. Each modification accounted for these intangibles and contributed to the over-all increased cost.

3. Acceleration

One of the contract provisions was that it was extremely important that the contract completion dates be met and the contractor was advised that he must maintain his schedule and complete the contract within the specified completion date due to the urgency of the missile program. However, several factors accrued that defeated this concept:

a. Errors and omissions in the plans and specifications resulting in many changes and clarification letters, and review to determine course of action.

b. Design changes requiring additional time, many of them large changes, especially Change No. RI-26, the "big mod" (Mod. 16), and the numerous small changes.

c. No time was allowed for additional changed work, changed conditions under Clause 4 in which no additional time was allowed; since the contractor was not allowed additional time on the early modifications, an acceleration claim was forthcoming.

The above conditions resulted in a "time compression" by the contractor and as a result the contractor instituted a claim for acceleration. Also, the contractor is claiming acceleration as a result of Clause GC-5 letters that were sent to the contractor when he was behind schedule and requested to regain his schedule. See Claim No. 3, 15 August 1960, "contractor alleges directed acceleration as a result of GC-5 letters."

This claim is under investigation as of this preparation, 1 March 1962, and requires additional documentation at a later date.

G. ASSESSMENT OF LIQUIDATED DAMAGES

1. Contract DA-3[illegible]075-ENG-9522, Construction of Missile Bases

The specifications provide for liquidated damages. The contractor is to complete the work, except seeding, within contract time or extensions thereof, failure to complete the work provides for liquidated damages [illegible] $400.00 for each calendar day, for each site, for Item [illegible] of the specifications. (Launch

Par SC-2a (as noted above) 5,700.00

Discussions are required with the contractor to justify outstanding time extensions and completion of all modifications. The contractor has been advised that he must bring in all of his data so that discussions may be held to determine his status insofar as assessments withheld in the payment estimate, also to complete his punch list items.

b. Contract 9591, Construction of 25 Ten Liquid Oxygen Plant.

Liquidated Damages, Schedule I, 300.00 per day and Schedule II, 300.00 per day.

No liquidated damages were withheld on this contract, although the contractor was informed by letter, 15 July 1961, they were being held in abeyance due to a possible time extension which was subsequently granted.

c. Contract [illegible]600, Re-Entry Vehicle Building.

Liquidated Damages, 200.00 per day.

No liquidated damages assessed on this contract.

d. Contract [illegible]48, Missile Assembly Building.

Liquidated Damages:

(1) Technical Supply Building and Rev. to Bldg 2616 100.00 per day

(2) Missile Assembly Shops and Maint. Bldg. 500.00 per day

(3) [illegible]ter Equipment Lists 100.00 per day

By letter dated 9 November 1961 the contractor was informed that liquidated damages were being held in abeyance since the contractor may be entitled to extension of time, however, the Government was withholding retained percentage on Payment Estimate No. 14 in sum of $48,892.95. The contract was due for completion in the original performance schedule on 30 October 1961. The contractor was notified by letter dated 2 Nov 1961 that work was not substantially complete.

Again on 1 December 1961 the contractor was informed the work was not substantially complete and retained percentage was being withheld by Payment Estimate No. 15 in sum of $28,150.00 to protect the Government's interest although no assessment for liquidated damages was being made pending time extensions under consideration. The retained percentage was estimated as follows:

36 days delay in completion @ 600.00		$21,600.00
Punch List Items		5,000.00
Master Equipment List		1,550.00
Total	=	$28,150.00

Payment Estimate No. 16 dated 8 January 1962, the sum of $33,947.63 was retained to protect the interests of the Government, pending discussions with the contractor to clear up delinquent items, possible time extensions and Punch List items.

Upon approval, by the Contracting Officer, of time extension for 60 days, April 1962, the retained percentage was reduced to $3,000.00, Payment Estimate No. 17. This amount retained to cover submissions of Master Equipment List and Punch List items.

e. Contract 10036, Fuel Catchment Tanks

Paragraph SC-2a provides for liquidated damages in the sum of 100.00 per day for each day of delay. The contract has two completion schedules (par. SC-1), one for fabricating the tanks and one for delivery and installation.

Schedule for completion of fabrication for all of the tanks was 10 January 1962, and this portion was completed in accordance with the schedule.

Completion of the installation portion of the schedule, the first site on 6 December 1961 and last site on 14 February 1962, fell behind schedule at the first four sites.

The following schedule is for completion of the installation phase of the tanks as originally specified and in accordance with the approved Progress Schedule submitted 20 Nov 1961:

Site No.	Date	Site No.	Date
3	6 Dec 1961	7	17 Jan 1962
2	7 Dec 1961	6	24 Jan 1962
1	13 Dec 1961	5	31 Jan 1962
12	20 Dec 1961	10	7 Feb 1962
9	11 Jan 1962	4	14 Feb 1962
8	11 Jan 1962	11	20 Jan 1962

Site 11 required only delivery of tank to site, this was accomplished as scheduled. (Mod #2, dated 6 April 1962 provided for installation of tank).

Seeding scheduled for completion on 30 May 1962.

By letter dated 11 January 1962 the contractor, Herrick L. Johnston, Inc. was informed that the contract was not considered substantially complete at Sites 3, 2, 1, and12, and liquidated damages would be held in abeyance since the contractor may have additional contract time provided due to RI-3.

Payment Estimate No. 7 dated 13 March 1962 retained $17,755.68 to protect the interest of the Government, for possible Liquidated Damages.

f. Contract 10037 - Safety Platform

Par. SC-2b, Schedule II, provides for liquidated damages of 100.00 per day for each site. The contract provides for two completion schedules (Par. SC-1b - II), (1) for fabrication of platforms and (2) for installation of the platforms. The completion of the 2nd portion is subject to separate notices to proceed for each site, work to be completed 24 calendar days after receipt of notice to proceed.

The contractor, Phillip Formel Company, by letter dated 16 November 1962 acknowledged receipt of notice to proceed at the following sites on dates as listed:

Site No.	Acknowledged Date	Sched. Completion Date	Sub. Completion * Date
2	27 Nov 1961	21 Dec 1961	21 Feb 1962
3	27 Nov 1961	21 Dec 1961	16 Feb 1962
1	4 Dec 1961	28 Dec 1961	26 Feb 1962
Likewise, letter dated 20 December 1961			
4	18 Dec 1961	11 Jan 1962	21 Mar 1962
8	18 Dec 1961	11 Jan 1962	9 Mar 1962
12	18 Dec 1961	11 Jan 1962	8 Mar 1962
9	22 Dec 1961	15 Jan 1962	1 Mar 1962
5	8 Jan 1962	1 Feb 1962	19 Mar 1962
10	8 Jan 1962	1 Feb 1962	23 Mar 1962
7	15 Feb 1962	11 Mar 1962	13 Mar 1962
6	22 Jan 1962	11 Feb 1962	15 Mar 1962

*Substantial Completion Dates.

Site 11 required delivery only of Platform to the site. Delivery was made on 5 February 1962.

The completion dates as shown above change due to Change No. 3 issued to the contractor.

g. Contract [illegible]62 - Blast Detection System

Liquidated Damage Clause - None.

h. Contract [illegible]160 - Installation of Blast Closure Sleeves

Par. SC-[illegible] provides for liquidated damages in the sum of 100.00 per day of delay for each site. Work to begin 2 Jan 1962 with final completion date of 2 April 1962.

No liquidated damages were assessed. The contract was completed 8 March 1962, ahead of schedule.

i. Contract 10075 - Protective Alarm System for Re-Entry Vehicle Facilities

Par. SC-2 provides liquidated damages in the sum of $50.00 for each calendar day of delay. Completion date is 8 March 1962.

No liquidated damages were assessed. The contract was completed on 8 March 1962.

j. Contract 10099 - Installation of Government Furnished Blast Closure Kits

No liquidated damages are provided for in this contract, for failure of the contractor to complete the contract on the scheduled completion date.

H. LEGAL AND LABOR

1. General

The Office of Counsel consists of the Area Counsel, as Chief, a Labor Relations Officer, a Stenographer, and a Clerk=Typist. Its function is to serve and advise the Area Engineer and his staff on all legal and labor matters.

2. Legal

a. Personnel and Duties

The first Area Counsel was Sumner A. Brown, then Bernard Zimberg, and finally Roy D. Denney. The Area Counsel rendered opinions on legal questions arising from the several construction contracts, including related modifications and claims. The Counsel also prepared appeal assemblies on the contractor appeals from the final decisions of the Contracting Officer, and handled the investigation and preparation for hearings before the Corps of Engineers Board of Contract Appeals in conjunction with the Chief Counsel, CEBMCO Headquarters.

b. Status of Appeals

As of 30 March 1962 there have been eleven (11) appeals, and one (1) hearing held at Plattsburgh, New York on which the Corps of Engineers Board of Contract Appeals sustained the appeal. The six final decisions that denied changed conditions are being reconsidered, and the appeals on these have been withdrawn. The contractor has the right to appeal any final decision of the Contracting Officer. There may be additional appeals filed on subsequent final decisions of the Contracting Officer.

c. Nature of Claims

The various claims are for time extensions and extra costs based on alleged excusable delays, including other than normal weather, changed conditions, directed extra work, acceleration of work, conflicts in the assigned service contracts, and a novel claim of "impact" based on an excessive number of modifications.

3. Labor

a. Personnel and Duties

The first Labor Relations Officer was Herbert W. Ree and then Robert Moore. They reviewed all payrolls and discussed labor problems with both the contractors and labor unions as well as an occasional interview with the construction workers. During the brief periods of work stoppage they made a close surveillance for possible solutions on behalf of the Government. This duty was later expanded by the creation of a Missile Site Labor Relations Committee on which they served as a member.

b. Man Hours and Work Stoppages

Through 20 February 1962 the contractor for the silos and launch control centers had worked a total of 799,565 man days with a total of only 98 man days lost due to work stoppages.

c. Contractor Employees and Davis-Bacon Act

All payrolls were reviewed for possible violations of the Davis-Bacon Act and 8-Hour Law. The number of all contractor employees reached a peak in excess of 2,000, and in the early stages of construction there were approximately 94 violations and all were resolved resulting in about $1,050.00 in additional payments and penalties by the contractors.

4. Office Assistance

Stenographic assistance was furnished the Area Counsel on an assignment basis until the employment of Mrs. Marylin Ross on 28 September 1961. The Clerk-Typist, Mrs. Linda Montgomery, principally assisted the Labor Relations Officer.

I. CONCLUSIONS AND RECOMMENDATIONS

1. <u>Site Investigation</u>

A review of the claims ledger will reveal that Clause 4, Changed Conditions, has been the basis of many contractor claims. These claims involving sub-surface materials touched on the hardness of rock and degree of hardness of rock, quicksand, water permeated soil, excessive ground water, fissures, and "materials other than as shown on drilling logs or sample core drillings indicated on the plans."

Recommendations:

Additional care should be exercised in logging information obtained from sub-surface explorations. A qualified geologist or personnel well versed in soils and geology must supervise the work and analyze core samples at the site. Particular attention should be given when defining hardness of rock, since any reference to "soft rock" is sure to result in a claim if rock of any degree of hardness is found. Fissures and voids, particularly those that may produce water in quantities, should be carefully evaluated and classified. Water encountered and not carefully investigated or a careless classification of water bearing strata in a core drilling operation may lead to an erroneous assumption by a contractor when preparing his bid. If doubt exists as to the sub-surface condition during drilling operations, other cores should be obtained at once to verify the conditions and classify the soil to be encountered. The money spent on sub-surface exploration will be repaid many times by reducing the number of justifiable claims.

2. Geology and Foundation Reports

It is strongly recommended that a geologist be assigned to each Area Office with the duties of maintaining records of all foundation data encountered during excavation. The geologist should also have first call on the photographer to adequately photograph geological formations.

Comparative analyses between core logs and actual conditions should be made and kept up-to-date.

The geologist should be assigned the following responsibilities and necessary assistance, as required:

a. Publish an accurate foundation report immediately after completion of excavation.

b. Anticipate and resolve excavation problems by use of learning curve from other job sites in similar geological formations.

c. Prepare finding of facts for contractor claims involving geological determinations.

3. Photography

Photography was very good at Plattsburgh. A photo lab was set up and a full time photographer employed. The 12 job sites provided a full time job and at times additional help could have been used to advantage. A rubber stamp which provided for the photo number (negative number), date, contract number, site number, check off for silo, LCC, sight tube, and direction was used in marking and identifying the photos. This proved to be a valuable aid in saving time. Each negative was placed in an individual envelope, and the envelope rubber stamped with identification number, etc. The identification number and date were placed on the bottom of each negative with india ink.

Recommendation:

A full time photographer should be assigned at the beginning of construction of major missile sites so as to develop a complete photographic record of the construction. Resident Engineers should assist in selecting location for taking photos that define progress and pinpoint subjects for potential claims, particularly during excavation. A complete photographic record of the geology should be developed and incorporated in the foundation report. Resident Engineers should be directed to be alert at all times for possible use of photography to record situations which might develop into claims against the Government.

4. Reports, Construction Logs, Inspectors Data

Missile base construction requires adequate information from the field, considerably more than is necessary for normal military construction.

Information recorded daily by the Resident Engineer must cover all phases of construction, i.e., manpower, equipment, prime and sub-contractor (by name), work accomplished, discussions between Corps representatives and contractor personnel, and materials delivered and installed. This report was submitted to the Area Office each day (See Daily Narrative Report, Section VIII, Inclosure No. 3). It is essential that the Area Office alert Resident Engineers immediately of any indications from contractors which purports a claim or potential claim, so that adequate records can be maintained on the controversy. Likewise, the Resident Engineers should provide information to the Claims Branch concerning any actual or potential changed condition. Daily Log of Construction, Form No. 2538, did not prove 100% effective in furnishing the desired information and it was necessary to design a "continuation sheet" to provide for supplement of information. These sheets have proved very useful during review of contractors claims, during preparation of Government estimates, and for back-up of decisions pertaining to changes and claims. The Daily Narrative Report, cited in detail, work accomplished, materials installed and equipment used at each site. The weekly narrative report to CEBMCO, consolidated the daily reports. The value of these detailed reports has been proven as they are a constant and reliable source of information.

Recommendation:

Form 2538 should be reviewed and revised based on recommendations from all Area Offices. The form should not be over-simplified as details have proven very valuable during claim analysis.

Resident Engineers should meet regularly with inspector personnel and instruct them in the importance of complete, accurate and factual daily logs. Criteria should be established by Resident Engineers and checks made to insure compliance.

Meetings, as required, should be held between Resident Engineers and contract administration personnel to discuss and disseminate information and provide notice of claims as potential claims.

It is recommended that Corps of Engineers Construction Manuals and Inspectors Guides be reviewed by qualified personnel and a manual specifically directed towards missile base construction be prepared to supplement present manuals. Due to the rapid pace of missile base construction, the manual should be issued as a supplement rather than as a new manual.

5. <u>Approval of Shop Drawings</u>

Bechtel Corporation, the design agency, provided representation with the Engineering and Technical Branch. This arrangement was very effective for approval of shop drawings. The contractor representatives and engineering personnel could discuss immediately delays or problems associated with shop drawings. Many times expeditious approval of shop drawings was possible. The services of the Architect-Engineer representative was very effective. During the later stages of construction, the Area Engineer representative (successor to Mr. M. DiSilvestro) reviewed equipment lists and assisted in providing nomenclature for as-built drawings.

Shop drawings submittals and approvals were handled as follows:

a. Submitted by the prime contractor directly to Bechtel Corporation with copy to Area Office.

b. If recommended for approval, returned by Bechtel Corporation to Area Office for approval, signature and for return to prime contractor.

c. If disapproved, returned by Bechtel Corporation to prime contractor for revisions and resubmittal within 14 days. Copy to Area Office.

It is important that a suspense system be established at once and a daily check be made to keep submittals flowing to avoid delays and subsequently complaints from the contractor and/or claims for delays.

Recommendation:

It is important that close liaison be established by having the Area Engineer representative located within the Engineering Branch of the Area Engineer's Office. These representatives should be on the job at an early date well before the first submittal of shop drawings.

6. <u>Personnel - General</u>

Key personnel, including Resident Engineers, should be assigned to the project substantially before start of construction. This will permit ample time for thorough review of plans and specifications, time to hold meetings to discuss the various phases of the work, time for exchange of ideas and views, and time to review and study methods of administration and construction at downstream missile bases. SOP's developed for downstream bases should be obtained and reviewed prior to establishing SOP's for a new Area Office.

Recommendation:

Qualified employees with ICBM experience should be retained in the Missile Program and should receive priority placement consideration in staffing of future project areas. The utilization of these employees will steadily increase their skill in ICBM construction and will insure that future projects will be adequately staffed. Adherence to this policy will give confidence to employees that they have a future in missile construction with CEBMCO.

7. Training

Following establishment of the Plattsburgh Area Office, it was realized that intensive training would be necessary to increase the knowledge of engineer personnel in the specialized activities involved in missile base construction. The following actions proved successful. Key Area personnel and two persons from the Construction Division, New York District, were given an intensive seven day tour to downstream Atlas F sites. The tour included briefings, visit to sites under construction, and conferences with counterparts. Two Area personnel received six days of training at Vandenberg Air Force Base. Other personnel attended the PLS School, Denver, Colorado. Five construction inspectors and four mechanical engineers assigned to Plattsburgh were placed on TDY at various Atlas F sites for assistance and training. Forty-eight Area personnel participated in and received training in a regular weekly inspection training program.

Recommendation:

It is strongly recommended that, upon establishment of an Area Office, key personnel visit other Areas where similar type construction is under way. The personnel should travel as a group, with a minimum of three days for discussion and observation and study procedures. It is important that Resident Engineers be included. Upon returning to their own Area Office, these persons should be used to brief others on the staff as to methods and techniques used at other job sites.

SECTION V

DELAYS

SECTION V

A. WORK STOPPAGE OR DISPUTES

1. General

The Plattsburgh Area has been fortunate in not having general strikes by the various labor unions during the missile site construction period for work under the Corps of Engineers. Jurisdictional disputes occurred and time was reported as lost. It is considered the proper category of classification of these disputes would be "Work Stoppages". As shown in preceding Section IV, paragraph h, 3-b, only 98 man days were reported lost at Plattsburgh due to "Work Stoppages". As a rule, the majority of the "work stoppages" were localized incidents, pertaining to some dispute at a site, jurisdictional in nature, and did not affect the complex as a whole. Timely action on the part of CEBMCO, Plattsburgh Labor Relations, the Contractor and local business agents of the Union investigating grievances, and prompt mediation contributed to prevent any spread of the work stoppage, and becoming a general strike.

Some stoppages reported in as "man days lost" could not, under analysis, be classified as actually delaying missile site construction. One instance reported as 28 man days, where , on 15 August 1960, an operating engineer protested use of non-union well drillers at Site 12 on Contract 9562, Water Supply Facilities. The drilling subcontractor for the wells (who worked with his own equipment) pulled out his equipment and quit the job, causing the prime to secure another well drilling sub-contractor to complete the work at the site.

2. List of Work Stoppages

a. Contract 9562, Site No. 12, 15-20 August 1960, jurisdictional. Operating Engineers vs. Non-Union sub-contractor drilling under water supply contract for water at Site 12 was approached at start of job by an Operating Engineer (Contract 9522). The prime contractor claimed "intimidation". The sub-contractor pulled off the job and the prime contractor obtained another sub-contractor. No further objections were made later for other sub-contractors on Contract 9562, Union or Non-Union. Man Days Reported Lost - 28.

b. Contract 9522, Site No. 11, 13 December 1960.

Jurisdictional, Operating Engineers vs. Laborers. Operating Engineers (on crane) would not accept signals from Laborers (excavation in silo). At some sites, laborers gave signals and at others the Operating Engineers. On 13 December at Site 11 a dispute arose concerning who would signal and 16 Laborers quit the job. Resolved, with the laborers at bottom of silo signalling to Oiler who relayed the message. Man Days Reported Lost - 12

c. Contract 9522, Sites 6 and 8, 29 December 1960 - 3 January 1961, Jurisdictional, Operating Engineers vs. Plumbers/Pipe Fitters. Dispute concerned which Union should install piping at Concrete Batch Plant. Mechanics returned to work pending Joint Board review and agreement. (Occurred over New Years Holiday). Man Days Reported Lost - 6

d. Contract 9522, Site No. 5, 20-21 December 1961. Plumber/Steamfitters. Sub contractor, P. Hardeman, fired two plumbers and the business agent for the Union ordered remainder of plumbers off the job - four pipe fitters. On 21 December 1961, six Pipe Fitters and one Foreman reported for work but later left the job and returned to work later in the day. Meeting between contractor and Union representative, strike averted by hiring the two men for work at another site. Man Days Report Lost - 5

e. Contract 9522, Site No. 11, 11 September 1961, 1630 hours to 2400 hours. Operating Engineers and Laborers. An unauthorized work stoppage occurred at Site 11, involving twenty-two Operating Engineers and twenty-five Laborers, over alleged failure of implementation of missile site labor commission ruling on Air Force contract for cable laying, not related to Contract 9522 (Operators reported in "sick" and laborers were sent home). Work resumed when SATAF Commander assured proper steps were being taken to implement MLSC ruling. Man Days Reported Lost - 47

Total Man Days Reported Lost - 98
(As of 1 March 1962)

B. DELAYS DUE TO CHANGES IN SPECIFICATIONS, ETC.

1. General

Delay factors in the program can be attributed, in a large degree, to the "concurrency concept", which in turn resulted in changes to:

a. Meet requirements created by improvements in the missile.

b. Changed conditions in the field.

c. Extensions of time due to adverse weather.

d. Changes due to discrepancies found in the plans.

e. Design deficiencies.

Progress at some of the sites advanced faster than at others so that the original site sequence had completely changed. At Site 11, Sugarbush, delays in site conditions had delayed completion considerably.

The following table indicated extension of time and new comletion dates at each site by comparison. Site sequences have been changed and final completion dates are indicated below by priority number in order of approved completion by Modification No. 74, Supplement No. 2. Extensions of time are under study and may be forthcoming for those sites where "substantial completion date" is later than "approved completion Date".

Original completion date: as shown in Specifications, Par. SC-2, Addendum No. 1.

Approved completion date: new completion dates as established by modification to the contract.

Substantial completion date: date missile site substantially completed, with punch list items remaining.

Number of days difference: indicated additional days required to complete the project over and above original completion date and substantial completion date.

Site No.	Priority No.	Original completion Date (spec) (1961)	Approved Completion Date	Substantial Completion Date	No. of Days Difference*
1	3	11 Sept.	25 Nov.	7 Dec.	87
2	1	18 Sept.	9 Nov.	9 Nov.	52
3	2	25 Sept.	22 Nov.	22 Nov.	58
4	4	2 Oct.	26 Nov.	9 Dec.	68
5	7	9 Oct.	12 Jan 62	12 Jan 62	95
6	9	16 Oct.	26 Jan 62	5 Feb 62	112
7	10	23 Oct.	27 Jan 62	9 Feb 62	109
8	6	30 Oct.	25 Dec.	25 Dec.	56
9	11	6 Nov.	2 Feb 62	12 Feb 62	98
10	5	13 Nov.	16 Dec.	16 Dec.	33
11	12	20 Nov.	*4 Jan 62		
12	8	27 Nov.	15 Jan 62	15 Jan 62	49

*In reference to Site No. 11 showing an approved (by Mod) completion date of 4 January 1962, the contractor has submitted a revised progress schedule for a new completion date of 15 August 1962, and approval was made by date of 11 January 1962. As of 1 March 1962 a supplement to Modification No. 74 has not been prepared to extend the 4 January 1962 date shown in the above table.

2. Modifications Providing Time Extensions

Modifications No. 16, 61, 62, 63, 64, 66, 69, 70, and 74 included time extensions to the contract. The issuance of Modification No. 74 dated 17 August 1961 provided an interim time extension for a series of modifications, RI-30 through 149. Later Supplement No. 1 dated 1 December 1961 was issued to provide time extensions for Sites

1, 2, 3, and 4 only, for changes RI-1 thru 50 and 52 thru 250 as shown in the modification. Reservations were made for adjustment in time for remainder of sites, 5 thru 12, as soon as an equitable adjustment in time could be determined.

Supplement No. 2 to Modification No. 74 dated 26 December 1961 was issued for the final equitable adjustment in time for Geographical Sites 5, 6, 7, 8, 9, 10, and 12 only, in addition to the time extension previously made in Modification No. 74. Since Supplement No. 1 and 2 did not provide an equitable adjustment in time for Site No. 11 , provision was made for later adjustment. A chart was prepared, Completion Schedule No. 1K, dated 6 December 1961, which detailed final completion dates for all items, 1 thru 10, of completion schedule SC-2 of the contract specifications. The table shown in preceding paragraph B-1 indicated the final schedule as of 1 March 1962 for completion of the work (except Site No. 11, as noted).

Modification No. 74 was issued for the series of changes in contract specifications which caused justifiable delays to the contract.

3. Delays - Time Extensions Due to Weather

a. Modification No. 66

The contractor presented a series of claims on Contract 9522 for extension of time due to adverse weather, Claims 5, 29b, 32, 36, 51, 55, and 69. These claims covered several types of weather - severe cold weather in January 1961, freezing rain, wind and snow in March 1961, also rainfall in September 1960. The claims were combined under Mod. Control No. RI-166. These delays, due to weather, were reviewed and placed in Mod. No. 66 dated 4 August 1961. Number of days extension as follows:

Site No.	Days	Site No.	Days	Site No.	Days
1	6	5	21	9	10
2	5	6	11	10	9
3	8	7	16	11	10
4	5	8	10	12	11

b. Claim 59 was combined with Claim 62, Contract 9522, for extension of time and placed under Mod. Control No. RI-174. Claim 59 concerned delays in excavation at Sites 1, 2, and 3, but the claimed delays granted were under Claim No. 62. This claim concerned adverse weather in form of snow and rain in April. Modification No. 69 dated 7 August 1961 for time extensions to cover the delays as follows:

Site No.	Days	Site No.	Days	Site No.	Days
1	3	5	3	9	0
2	2	6	2	10	2
3	6	7	3	11	0
4	0	8	3	12	3

c. Claim No. 75, Contract No. 9522 concerns adverse weather, placed under Mod. Control No. 272. This claim for adverse weather, apparently in agreement with the contractor in number of days delay, has been approved for a time extension as follows:

Site No.	Days	Site No.	Days	Site No.	Days
1	1	5	0	9	0
2	1	6	2	10	0
3	1	7	1	12	1
4	0	8	2		

C. DELAYS - RIGHT-OF-WAY

1. After award of contract for the construction of the Ballistic Missile contract, the property owners of Site 3, Swanton, Vermont, and Site 7, Chazy Lake, New York, refused to allow the contractor access to the sites for equipment or work. At Site 3, the owner allowed surveyors access to the site. However, on 29 June 1960 the owner of Site 3 was persuaded to permit the contractor to start work. Order of possession was entered during the week of 11 July 1960.

2. At Site 7, Chazy Lake, the landowner had signed two rights of entry, one for surveys and one for construction. Through some misunderstanding, the owner objected to the price offered and late in June erected a sign "Private Property, Government Employees Keep Out". After discussions, the owner was persuaded to permit the contractor entry on 8 July 1960. Order of possession was entered during the week of 11 July 1960.

3. It is considered no serious delay in construction occurred as a result of the landowners action. The surveyors were allowed to continue at Site 3, and Site 7 was a downstream site. Only a small amount of clearing was involved.

SECTION VI

SAFETY MANAGEMENT PROGRAM

SECTION VI

A. MISSION

1. Following precedent established by custom and specified in regulations and directives, the objective of the Safety Program is to minimize occurrence of unplanned events which may cause injury to persons, damage of property, or delays in operations. Some people do not learn by being told or by reading, some learn only by personal experience, and it appears that some will not learn at all. Safety is responsible for protecting these people, by engineering, advance planning of precautions, and by constantly preventing them from doing the acts that will kill or injure themselves or others, or by stopping the work until the necessary precautions have been taken.

2. Authority exists with the supervisors on the site to enforce the provisions. Effective supervision of a safety program requires a knowledge of the fundamental requirements. Continuous training is therefore required in the safety program until reaction to unsafe conditions becomes automatic or instinctive.

3. The necessity for a safety program continues until the last Corps of Engineers representative leaves the site for the last time. Constant observation of operations, iteration of the precautions, and aggressive enforcement are required.

B. CONDITIONS

1. Construction of Atlas F system by the Corps of Engineers at Plattsburgh, New York. Contract DA-30-075-eng-9522 was awarded on 14 June 1960 to a joint-venture composed of Raymond International, Inc., Henry J. Kaiser, Macco Corporation and Puget Sound Bridge and Dry Dock

Corporation (RKMP).

2. Critical precautions were specified in Paragraphs SC-43 and SC-51 of the contract specifications.

3. Recognition as a hazardous operation throughout construction was emphasized in conference held 21-22 June 1960 at Plattsburgh, N.Y. between Mr. Louis M. Welter, Chief, Safety Branch, New York District, his assistant, Mr. John Nash, and engineers of RKMP. Deep, narrow excavations in earth and rock increasing dangers of explosive fumes, falls and falling objects require shaft tunnel work comparable to mining operations. Large blowers and ducts became necessary to assure positive ventilation. After completion of concrete in the silos, increased welding and cutting, use of solvents and volatiles, testing of diesel engines, painting, etc. pollute the air. Contaminants (fumes, dusts and smoke, some of which are toxic) create unsatisfactory working conditions and tend to reduce oxygen content of the air. Particular precautions are required against additional hazards:

Structural steel placed in confined area.

Weight and size of many components.

High pressure piping systems and storage vessels.

Fumes of liquid fuels, liquid oxygen, liquid nitrogen, and epoxy resins requiring high-capacity ventilation.

Chemical cleaning agents.

Extremely low temperatures from liquid gases.

Accelerated completion schedule.

Interference prior to completion from subsequent contractors.

4. Work started 16 June 1960 under supervision of the Plattsburgh

Area Office of New York District.

5. Accident Prevention Plan dated 5 July 1960 established the fundamentals of RKMP's approved safety program. Appropriate Accident Prevention Plans were approved for other contractors.

6. Management for construction of all missile sites was assumed by Corps of Engineers Ballistic Missile Construction Office (CEBMCO) on 1 October 1960.

C. REFERENCES

AR 385-40
ER 385-1-3
EM 385-1-1
EM 385-1-20
EM 385-1-21
EM 385-1-24
CEBMCO Manual SAFETY PROGRAM (ENGMA 385-1, Change 1)
U.S. Bureau of Mines Bulletin No. 439
U.S. Bureau of Mines Circular No. 33

D. ORGANIZATION

1. The safety organization providing supervision, coordination, evaluation and advisory service for the commander is required by ER to be under the charge of a professional safety engineer. The Area Safety Branch or Safety Engineer, as a staff officer, reports directly to the Area Engineer, represents him at area safety councils or committees, and is a member of all accident investigation boards.

Safety engineering includes:

a. Providing technical information for planning and coordination of operations. Initiating timely revisions of plans or improvements in operations to decrease potential hazard.

b. Continuous study of planning and coordination for operations, including training.

c. Recommending plans, orders, or directives in executing policies established by the Area Engineer.

d. Evaluating, controlling and follow-up.

2. Effective safety management on a project of this magnitude and dispersion requires a professional safety engineer, Grade GS-12, one or more safety inspectors, Grade GS-7, and one clerk-typist. Corps of Engineers training of considerable duration and heavy construction experi-ence are desirable prerequisites. Such experienced personnel were not employed in Plattsburgh Area. After several months of construction, frequency and severity of accidents caused concern by higher headquarters. The Atlas F Directorate disapproved by letter of 28 December 1960 the recommendation of the Area Engineer against assignment of a Safety Engineer, and directed employment of one at Grade GS-12 immediately. The Chief of Engineers and the Directorate became personally concerned at the continued high accident rates. Inspections by these agencies, noted in detail below, identified inadequate appreciation of a dynamic safety program, by both Government and contractor personnel, insufficient advance planning, and indifferent enforcement. Atlas F Directorate on 8 March 1961, ordered the Area to drastically reduce accident trend; by the use of the stop order when necessary, to prevent unsafe work practices, and to include an evaluation of safety appreciation in officers' efficiency reports.

3. Safety management for the Area was assigned to the following individuals:

Carnes, Julian H. 1st Lt. CE, Acting Safety Officer,
relieved 3 February 1961.

McQuade, John J., Acting Safety Engineer,
3 February 1961 to 4 March 1961.

Grant, Freeman A., Safety Engineer, 17 March 1961 to
28 November 1961.

Hoxie, Wilbar M. (TDY, from New England Division)
4 December 1961 to 10 March 1962.

Russell, Leon N., Acting Safety Engineer from 10 March 1962.

Assistance was given from time to time by other engineers assigned to this area.

4. a. Safety supervision by the contractor's management included the following assignments responsible for the accident prevention program:

Kilpatrick, Charles C. Safety Engineer, July 1960 - April 1961.

Szwabowski, Leon J. Asst. Safety Engineer, Sept 1960 - April 1961.

Szwabowski, Leon J. Safety Engineer, April 1961 - March 1962.

b. Frequent valuable assistance was given as requested by the contractor by the following engineers:

Mr. William Machunis and Mr. Thomas Curry,
U. S. Bureau of Mines, 329 Federal Building
Albany, New York.

Mr. Reginald Acherman, State Dept. of Labor and
Industry, Alfred E. Smith Building, Albany, New York.

Employers Group Insurance Company,
90 State Street, Albany, New York

Employers Mutual of Nassau, 2 Normanskill Blvd.
Delmar, N. Y.

c. Other contractors than RKMP employed no professional safety engineers.

d. Protective equipment available for issue to Area personnel as needed:

Safety helmets and liners
Raincoats
Welders Goggles, Shade 8 lens
Ear plugs
Illumination light meters
Flashlights
Ultra-violet lamps for detection of hydrocarbon contamination
First Aid Supplies

Technical Equipment required was provided by the contractor.

Gas detection and measuring meters.
Methane concentration meter
Gas analyzer
Explosive vapor meter
Carbon dioxide meter
Nitrogen dioxide meter
Inhalator
Chem-Oxygen mask
SCOTT Airpak
Mine Safety Lamp
Carbon Monoxide ampoules
General air analysis tubes
Nitrous oxide analysis tubes
Air velocity meter
Hydrogen sulphide detector
First Aid supplies for individual protection
Telephonic communication in silos.

E. OPERATIONS OF SAFETY PROGRAM

1. Pre-construction conference held with each of the contractors emphasized particular hazards of their projects, provided guidance in preparing contractor's Accident Prevention Plan, and furnished information on accident reporting procedure, safety requirements, and training as appropriate.

2. Special problems resulting from the nature of the missile sites required consideration in planning beyond the customary features of heavy construction familiar from long experience. To general requirements in EM 385-1-1, additional essentials for these applications are summarized:

a. Excavations required mining practice. Backfill around silos was left two feet below shaft collar until after the cap was placed. Substantial guard rails were required. Walls of excavation were thoroughly scaled, braced, protected by heavy mesh and gunite, and supported by rock bolts and straps. Bottom of excavation was divided by a vertical curtain of heavy mesh to segregate mucking area.

b. Hoisting equipment of all types was subjected to intensive maintenance and constant surveillance. Mancages were limited to 5 passengers, and were reinforced and guarded. Telephones were installed for close control. Traxcavator used for mucking was raised from the silo each weekend. Due to its weight of 19 tons, whenever it was raised, all personnel left the excavation.

c. Life nets were required within silos for

(1) Placement of reinforcing steel in walls.

(2) Concreting of silo walls by slip form.

(3) Erection of structural steel crib.

(4) Spaced to prevent a free fall greater than 25 feet.

Nets could not be installed within elevator shafts, and were not used except in the missile space. Contractor was directed to maintain life nets within the silo throughout construction by letter of 28 December 1960. Nets have been continued during operations by subsequent systems contractors. Upon installation of gratings or temporary flooring at each level, guard rails and toe boards were required. Wire rope clipped to crib steel and stretched tightly was installed for guard rail. Snow-fence was erected in addition by the systems contractor.

d. Sheet steel piling required for excavation through upper levels of earth was driven outside 16 ring beams suspended by tie rods. Driving was limited to keep bottom of sheeting less than four feet below the lowest ring beam in place. Failure by the contractor in conforming with this safeguard resulted in issue of a stop order at Site 11 on 31 August 1961. Water in the excavation was a particularly serious problem at Site 11; on 30 June 1961 at Elev. 873 near the top of rock surface, the work was stopped until the control of water assured safe excavation. Control was secured by repair of several driven wells, development of 16 additional wells, and constant pumping.

e. Propellant Loading System (PLS) of high pressure vessels and piping has numerous hazardous features. Mistakes which might have only minor consequences on other work could result in fatal injuries or extensive damage on PLS systems.

1. Special precautions are required to prevent:

(a) Tightening of joints under pressure.

(b) Removal of components from system under pressure.

(c) Use of un-calibrated gages.

(d) Exposure to leakage of chemical cleaning agents, hydrocarbon fuel RP-1, and liquid gas.

(e) Contamination. Ultra-violet light of 2,500 to 3,700 Angstroms causes fluorescence by molecular excitation in several hydrocarbons, but will not detect RP-1 or hydraulic oil MIL-O-5606.

2. Tests of PLS are run in a series with distinctive hazards for each test. Major tests and hazards are:

(1) Proof Pressure Test exceeding operating pressure.

(2) Leak Test for tightness of system affording

opportunity for personnel exposure or contamination.

(c) Blowdown Test releasing exhaust Nitrogen at high pressure within the silo and vitiating oxygen content of atmosphere.

(d) Cold Tests at the temperature of liquid Nitrogen (-321° F).

(e) RP-1 Circulation Test of low-flash point volatile hydrocarbon which becomes electrically charged by flowing through a pipe, accumulating sufficient potential to ignite with a spark if not grounded.

3. Preparations for PLS Testing require

(a) Test areas marked "Off Limits except for Test Personnel" to be enforced.

(b) Signal and communication systems.

(c) Emergency equipment available - oxygen respirators, oxygen deficiency indicator, fuel vapor detector, showers, and fire fighting.

(d) Adequate ventilation.

(e) Thorough instruction on over-pressures, malfunctioning, sounds accompanying the testing, dangerous discharge locations, decontamination, and emergency measures.

(f) Grounding of trailers and tank.

(g) Charging hose covered with flexible steel mat in the event of rupture.

4. Guidance established for minimum standards of personnel safety.

(a) Silo will be cleared of personnel, except essential test personnel and inspectors, whenever PLS testing is passing operating pressure and going to proof pressure for high-pressure systems (operating pressure 1,000 psig and above).

(b) Silo will be cleared of personnel, except essential test personnel and inspectors, from Level 6 down whenever PLS Testing is passing operating pressure and going to proof pressure for the low-pressure systems (operating pressure belwo 1,000 psig.)

(c) After PLS Testing has been to proof pressure and brought back to operating pressure, personnel may be allowed in the silo. Level 7 restricted to essential work personnel. No smoking within the silo in this test.

f. Fire protection equipment in rural locations, without water supply, required high-capacity pumps. Contractor provided for each site a 1,000 gallon tank mounted on a four-wheel trailer equipped with two LaFrance 500 G.P.M. pumps providing 100 psi and 200 feet of $1\frac{1}{2}$ inch fire hose. The usual portable fire extinguishers of appropriate types, water barrels, and rescue equipment were provided.

g. Cryogenic equipment for liquid-fuel systems requires highest standards of cleanliness throughout, protection against exposure to extremely low temperatures, and absolute freedom from hydrocarbon contamination. Handling of agents requires the precaution of protective clothing, gloves, and masks. Positive assurance is required of good operating condition for all pressure and relief valves on liquid oxygen systems and careful handling is necessary of insulated LOX containers. Tricresyl Phosphate, the lubricant for LOX pumps, is a nerve poison causing paralysis in even slight concentration.

Spillage is removed by absorptive materials and soap and water flushing. The deadly hazard of phosgene formed by heat on Trichloroethylene caused this material to be proscribed as a cleaning material. Trisodium Phosphate or Sodium Carbonate are acceptable substitutes. Adequate ventilation and auxiliary breathing equipment must be provided at all handling of PLS materials.

h. Epoxy Resins used for masonry patching or repairs are highly toxic, and require thorough ventilation. Specific precautions observed:

(1) Full face shields worn in mixing materials.

(2) Protective, clean coveralls and impervious gloves worn.

(3) Protective cream furnished.

(4) Eye washing facilities available.

(5) Fire extinguisher accompany operation, no smoking or open flame or powered machinery operating within 50 feet.

(6) Prompt clean-up of spillage and destruction of rags and absorbents.

i. Acrylamide-type proprietary materials for grout sealing of masonry structures are toxic to skin after mixing. The project employed CYANAMID AM-9 Chemical Grout with DMAPN Catalyst and Ammonium Persulphate mixed separately and combined at the point of injection. After gel formed, no neurotoxemia can occur, but manufacturer's recommend precautions were enforced in handling hose and pipe connections.

3. Inspections were made by higher headquarters at intervals throughout construction:

a. July 25-27 and August 3-4, 1960, by Mr. Louis M. Welter, Chief, Safety Branch, New York District. He indentified the normal amount of deficiencies, and reported good cooperation in corrections by Mr. Kilpatrick, Safety Engineer for the contractor, and the Superintendents.

b. December 21, 1960, by Mr. H. L. Edison, Asst. Chief, CEBMCO Safety Branch. He reported site Superintendents were operating without the supervision that would force them to correct the numerous deficiencies found on inspection; weekly safety meetings were not being held for all personnel, but for supervisory management. He recommended transcriptions of weekly safety meetings be delivered to the Area Engineer; concurred with the Area Engineer's wish that no safety engineer be on his staff, until conditions at Plattsburgh have failed to reach an accepted standard through recent improvements.

c. January 26-27, 1961, by Assistant Chief for Design and Construction, CEBMCO, and Safety Engineer, CEBMCO. Found both Area and contractor personnel inadequately appreciated a dynamic safety program; inadequate advance planning; fire hazards; hoisting equipment untested; combustible vapor seal on insulation for concrete forms. Recommendations were concentration upon correction of deficiencies, written examination of all Corps personnel on safety requirements, and direct instruction of contractor home office management by Atlas F Directorate.

d. August 28-29, 1961, by Mr. H. L. Edison, Assistant Chief, CEBMCO Safety Branch. Reported contractor's hostility to accident prevention program; inadequate guard rails; poor housekeeping; insufficient fire protection; safety council integrating activities with other agencies not favored by Area since autonomy would be lost. Recommendations were to obtain PLS Testing accident prevention plan from contractor Paul Hardeman; to correct deficiencies immediately, and to participate in integrated safety councils with other agencies.

e. February 6-9, 1962, inclusive, by Mr. H. L. Edison, Assistant Chief, Safety Branch CEBMCO. Reported effective coordination of improved safety programs, satisfactory working conditions, and good cooperation between Area, all contractors, and concerned agencies. Immediate correction of deficiencies by the contractor indicates acceptable standards of enforcement.

4. Accident Reporting System was prescribed by EM-385-1-24.

a. Accident Reports. AR 385-40 and AR 385-41 (both revised 10 April 1961) modified the method of reporting to incorporate mechanical accounting for accident analysis after 1 July 1961, and established an new DA Form 285. Identification Code No. "174" was established for Plattsburgh Area. For contractor accidents, ENG Form 3394 is prepared by the contractor. Coding of accidents was retained by CEBMCO. Modifications of Army standard reporting procedure were established by CEBMCO for close control of reporting:

(1) 1 August 1961 (Reports Control Symbol ENGMA-VS-1) requires notification to CEBMCO by telephone at the end of each month of each DA Form 285 not incorporated into ENG Form 1600.

(2) 10 October 1960, CEBMCO required a duplicate signed copy of each DA Form 285.

(3) 8 March 1961 directed priority telephone report of each fatality or serious property damage to CEBMCO who will then comply

with 5d of EM 385-1-24.

b. Exposure Reports required by EM 385-1-24 were modified by revisions of ENG Form 1600 for reporting after 1 July 1961. Cumulative rates are to be computed on a fiscal year basis after that date. Area Labor Relations Officer, in custody of contractor's manhour reports, prepared the reports until May, 1961, when Area Safety Branch assumed this function. Early reports omitted. contractor's manhours not included in specified labor reports.

5. Joint Safety Council. Scope of operations under the Area Safety Program for First Phase Launcher Complex was mostly under Contract DA-30-075-ENG-9522 by RKMP and its sub-contractors. Minor mechanical features and ancillary facilities were installed under other contracts in preparation for initiating Phase II by others. General Dynamics/Astronautics (GD/A) Systems Contractor for this subsequent work directly under supervision by others, commenced work prior to transfer of completed construction from RKMP to Plattsburgh Site Activation Task Force (SATAF). Their constant association with the work interfered somewhat with RKMP operations. To resolve conflicting interests, a Safety Council was established on 31 May 1961, by SATAF. Representatives of CEBMCO participated in the Council to exchange technical information and to assure cooperation among the several agencies concerned with safe construction.

F. SAFETY MANAGEMENT TRAINING.

1. Area training was coordinated with current construction features. Emphasis was placed upon Corps of Engineers policy for integrating safety throughout all operations. Formal instruction was conducted in specific applications:

a. Blasting and explosives by representatives of Atlas, Hercules and DuPont, with lectures, visual aids and technical publications.

b. Propellant Loading System engineering by CEBCO lasting one week for Resident Engineers, Project Engineers, and PLS technicians.

c. 25 engineers of the Corps of Engineers and contractors attended U. S. Bureau of Mines instruction on Non-Metal Mining and Tunnel Construction.

d. One engineer from Site 12 was among the 176 men completing First Aid training by U. S. Bureau of Mines on 18 November 1960.

2. Additional instruction was provided by:

a. Copy of EM 385-1-1 furnished for individual use. Check list of General Safety Requirements (App I) was given wide distribution.

b. Safety Violation Reports (App II) were initiated by the Area Engineer in December 1960. A duplicate was furnished the contractor. Each Resident Engineer was directed to report all uncorrected violations on each Friday after 4 January 1961 for further action.

c. Use of the Stop Order (App III) was initiated in March 1961.

d. Wide dissemination was given the application of SAFETY POLICY FOR THE FEDERAL SERVICE directed from the White House on 21 June 1961.

e. Fire Prevention Week (8-14 October 1961) was publicized but no demonstrations were arranged. Building Evacuation Plan and smoking control were enforced. Fire surveys were made 16-20 Feb 1961, 20-24 March 1961 and 12 June 1961.

f. Starting with November, 1961, a bulletin was distributed informally by Mr. Wilbar M. Hoxie, Chief, Safety Branch, Plattsburgh Area, with brief analysis of the month's accidents. Comparison for all sites presented occurrences which would otherwise be known only locally.

g. Safety was stressed in all staff conferences, Resident Engineer meetings, and other gatherings.

h. Publications of National Safety Council, Accident Experience comparisons published by OCE and CEBMCO, and specialized technical information were given maximum distribution.

i. Examination on individual knowledge of General Safety Requirements was given engineers 13 March 1961 and 12 January 1962. Individuals failing to attain a satisfactory rating were reexamined. Eight (8) commissioned officers and one hundred thirty-two (132) civilian engineers passed the examination, to whom Certificates of Proficiency were awarded by CEBMCO.

j. Drivers of Government vehicles were tested by Air Base facilities and licensed according to requirements of EM 385-1-20 under general supervision by the Safety Branch.

3. Contractor safety training included:

a. Frequent staff meetings among management (weekly for the first part of the project).

b. Weekly general safety meetings for all workmen.

c. Special meetings as required at irregular intervals.

d. One hundred seventy-five (175) men completed training on 18 November 1960 for Rescue and First Aid Teams given by the U. S. Bureau of Mines.

e. Publicity and frequent technical advice by Federal and State agencies and insurance carrier engineers.

f. A course of instruction on Non-Metal Mining and Tunnel Construction given 9-11 A.M. and 7-9 P.M. on 4, 6, 13, 18, and 20 April 1961, by U. S. Bureau of Mines. Representatives of the Corps of Engineers were among the twenty-five (25) students at the course.

g. Management support for enforcement of safety discipline by letter dated 20 April 1961.

h. RKCP affiliation with National Council on 20 September 1960.

G. ACCIDENT EXPERIENCE

1. Published summaries of accident experience covering construction of Atlas F missiles are issued monthly by CEBMCO and periodically by COE. Composite comparisons by months are shown in Table I attached. The period June-October 1960 is incomplete. Consolidated summary of accidents throughout construction on all sites is compared in Table II, attached. Since 1 October 1960, CEBMCO has compared Plattsburgh with other missile installations. Tables indicate totals for Government and all contractor forces and accidents.

2. Fatal Accidents

a. Ormsby, John H., age 27, driller, at 0655 on 16 September 1960, at Site 2. For reasons unknown, deceased walked from Ring Beam No. 13 on the safe side of dividing curtain across the bottom of the silo to the mucking area where he was crushed by the muck bucket. Autopsy showed instantaneous death from multiple skull damage, multiple comminuted fractures of upper body, cardio-respiratory paralysis and transverse fracture of thoracic vertebrae. There were no flashing lights but audible signals were operating, and no one saw the man walking into the unsafe area. Contractor has added at the bottom of the silo a signalman with telephone communication with crane operator.

b. McCann, John R., age 39, laborer, at 0010 on 8 November 1960, at Site 8, died instantly at the bottom of the shaft from compound basal skull fractures and multiple fractures of extremities, ribs, and vertebrae when struck by a piece of rock approximately 12" x 36" x 4" falling from about 100 feet above. Another rock weighing about 120 lbs. struck a tractor with $1,873 damage, and ricocheted to cause comminuted fracture of left leg of Damiel Hobbs, operator. A smaller piece of stone in falling struck Larkin Gogdill, laborer, age 45, in the back, but caused no injury. These men were waiting for repairs to hoisting equipment at the end of their shift. In violation of instructions, they were not close to the periphery of silo bottom. Temperature changes and freezing of percolating ground water are considered the proximate cause of rocks becoming detached from the walls, and vibrations or pressure from blasting and excavation then caused the loose rocks to fall. The stratified formation of rock was only partly covered with wire mesh and gunite in the vicinity of the LCC entrance, the source of the rock fall. Some mesh was partly curled, restraining additional rocks from falling into the silo and was not attached to the minimum number of rock bolts and steel straps specified. Correction: additional rock scaling, rock bolts, bracing, wire mesh and gunite, daily inspection of all rock surfaces, and constant training and supervision of safe working practices.

c. At Site 4 on 6 December 1960, two (2) steelworkers, Robert W. Carter, age 36, died of skull fractures and Charles E. Martin, age 31, died of crushed chest and internal hemhorrage.

Platform inside silo was being lowered with these and eight (8) other men from Elevation 960 to 900 by means of four hand-operated winches attached to platform suspended from out-riggers at the surface. Safety pawls were engaged on three of the four hooks and choker cables had been attached to the platform with cable clips. From the condition of the clips and pawls, it was determined that the fourth pawl had been disengaged from the winch and the handbrake had been released prematurely, allowing the suspension cable to unreel from the winch drum, tipping the platform. Both men fell to the bottom of the silo where their injuries caused immediate death. Correction: Rebuilt platform to be suspended from a heavy crane at the surface until secured in position. All mechanism to be inspected and maintained throughout the operation.

d. Murphy, Daniel, age 58, structural steel rigger foreman, at 1435 hours on 4 March 1961 at Site 2, died of a fractured skull.

He was making preparations for placing pressure vessels at bottom of silo, lost his balance on steel member at Level 8 and fell about 14 feet to the concrete slab to his death. Primary cause of accident was loss of balance in movement on structural steel member. Safety net being infeasible while emplacing equipment, all personnel instructed to take precautions.

e. Pearce, Michael D., age 25, shaft laborer, at 0545 hours on 17 March 1961 at Site 9, was dead of fractured skull upon arrival at the hospital after accident.

Drilling in silo required removal and relocation of drill machine upon which deceased was working. He was struck on the head by a 10-foot length of bent drill steel falling from above which pierced his helment and fractured the skull. Silo perimeter was fenced at the ground surface and steel sheeting extended above the ground serving as a barrier. Fellow workers did not see the fall of the steel, which could not be accounted for in any way. Correction: Clear collar of silo within 10 feet from edge of all loose articles.

f. Ellis, Carroll L., age 43, pipe fitter, at 1515 hours on 15 November 1961 at Site 8, died of compound skull fractures.

He fell from I-beam between missile shaft and elevator shaft at Level 5 while installing fog line. Safety belt was worn but not tied to structural steel. Net was stretched in silo, but not in elevator shaft, within which he fell. Correction: Workers cautioned to move with care on structural steel and to keep safety belts tied off at all times.

g. LaChance, Lawrence, age 42, laborer, at Site No. 11 on 31 January 1962, was struck by falling tremie and concrete while placing concrete in silo walls at Elev. 953. He was conscious when taken to Saranac Lake Hospital, but died of shock in the evening.

His injuries were broken back, fractured pelvis, broken ankle, and fractured ribs. With him was injured Dale Roussell, age 32, laborer, who sustained fractured ankle and ribs, pneumothorax, and spinal injury. The accident was caused by failure of the chain and hook linkage.

3. Exceptional Accidents

a. At Site 3 on 23 September 1960, contractor's traxcavator was being hoisted out of shaft by P&H Crane. The operator noticed the load line was descending by the passing of the yellow spacing marks painted on the 1-inch cable. Investigation showed two thimbles on the booster were too small and failed, allowing the traxcavator to fall to the bottom of the shaft with $23,000 damage. Larger thimbles were immediately installed, and closer inspections made by mechanics.

b. At Site 4 on 24 October 1960, at 0710 hours, Mr. Francis B. Townsend, age 54, Inspector GS-9 for the Corps of Engineers, sustained a fractured skull. At the signal for blasting, Mr. Townsend and others took cover against the far side of the Resident Engineer's office trailer, about 350 feet from the excavation. Flying pieces of rock from the 1,000 lb. charge showered the area, one piece piercing the roof of the trailer and another striking a utility pole and ricocheting to hit Mr. Townsend on the front rim of his helmet. The force of the blow broke the edge of the helmet and fractured his skull. First Aid was given to stop arterial bleeding by Mr. Vernon Truman, a contractor's employee who had just received First Aid Training. The attending physician credited the prompt First Aid with saving Mr. Townsend's life. He has been unable to work for 16 months although permanent total disability has not yet been determined. Unsafe act in remaining so close to a large blast was corrected by instructing all personnel to remove a distance of at least 1,000 feet from such blasts.

c. At Site 4, on 29 December 1960, during installation of curved No. 18 bars for reinforcing, insufficient ties were attached to restrain the spring action. An ironworker, not wearing his safety belt, was dislodged from his position when the end of the bar sprung from the broken ties. His fall of 26 feet to concrete wall caused fractured elbow, bruises and cerebral concussion.

d. At Site No. 4, on 4 December 1961, a steel drum used for hoisting sand and cement broke loose from the cable hook which was moused with tie wire and dropped through safety net to the bottom of the silo. Unsafe mousing of hook was replaced with safety hook, and steel drum suspension strengthened by welding. Two sump pumps in their packing cases were struck by the falling barrel with $377 damage.

e. At Site No. 5, on 12 December 1960, wall forms bulged during placement of concrete with insufficient bracing and too rapid placement of concrete. No injuries resulted, but corrective action on concrete was an additional interruption of orderly progress and additional cost to the contractor. On 25 May 1961, form collapsed just before completion of concreting LCC roof and stairwell, attributed to failure of a re-used Williams "she-bolt" 1 inch diameter, 16 inch length, and 10 thread on 30 inch center. Progressive failure of adjoining bolts dumped unset concrete into the LCC, required clearing and re-building at a cost of $40,000.

f. At Site No. 6, on 1 March 1961 at 0740 hours, reinforcing steel collapsed while installing the inner ring of No. 18 bars. The vertical bars started to bend and spiral, folding the horizontal bars together. All workmen were removed, and preparations were made to guy sulted which ignited explosive vapor from the adhesive used for application of wainscot. It was determined that the electric distribution system had a defective ground outside the structure, and the ungrounded electric drill afforded no protection. Adhesive manufacturer's precautions clearly noted the explosive nature of fumes, and the hollow partition permitted accumulation of gas. Wallboard and wainscot were replaced and instructions given to prevent smoking, provide ventilation, and to ground all portable electric tools.

4. Notable Recognition

A notable act occurred at Site 4 on 24 October 1960. (See Paragraph G-3b) Francis [illegible] Townsend, Government Inspector standing between office trailers, was struck by a rock flying after a blast. His helmet was broken and he sustained a fractured skull. Immediate First Aid for the arterial bleeding was applied by Mr. Vernon Truman, a contractor's employee who had recently received First Aid Training. The attending physician attributed the saving of Mr. Townsend's life to prompt and effective First Aid. In recognition of this effort and effective reaction to emergency, Mr. Truman was awarded a "Certificate of Honor" by the U. S. Bureau of Mines with a suitable ceremony broadcast over radio station [illegible]V on 5 April 1961.

H. CONCLUSIONS

1. Safety of future construction of similar installations would be greatly enhanced by consideration of features shown at Plattsburgh as essential:

a. Installation with Phase I of checker-plate or open grille removable covers matching adjacent flooring on all openings provided for subsequent installations.

b. Relocation or re-design of switchgear on Level 5, from which a swinging instrument panel head-high obtrudes in the head space above the circular stairway.

c. During freezing and thawing season the superintendent should give a thorough detailed examination of the shaft wall for rock loosened by freezing and thawing before work begins on the morning shift.

d. Raising of screened vents on underground storage tanks above the level of snow or windows of plowed snow.

e. Requirement for installation of elevator at the earliest possible time, and its subsequent use throughout construction for personnel.

f. Installation with Phase I of a two-rail guardrail at every level of platform composed of two horizontal light structural steel members providing clearance for erection of missile space siding.

g. Provision of automatic interlock preventing cross-connection between commercial power and the diesel generating equipment.

h. Installation of closed cover on Fill and Vent shaft to prevent disturbance of heating and ventilating within silo until sleeve is closed.

i. Installation of continuous-sounding alarm when elevator is operating, and emergency stopping control.

2. Safety supervision in future construction of similar type would be facilitated by application of the following emphasis:

a. Augmentation of safety management on the part of the Corps of Engineers through full-time staff assignment of professional safety engineers throughout construction.

b. Increased training of general construction and technical inspectors to the standards envisioned by OCE safety policy for integrated safety supervision.

c. More rigid enforcement of requirements for good housekeeping and storage as a preventive for falls and falling objects from which over half of the accidents occur.

d. Recognition of the problem of fatigue from continuous three-shift operations.

e. Incorporation into the Special Conditions of the contract specifications, in a manner comparable to the detail of wage scales, of requirements shown by experience to have required unusual efforts at enforcement.

f. Evaluation of safety appreciation on the part of all construction personnel, in terms of permanent records on individuals in the Corps of Engineers.

g. Removal, when justified, of contractor supervision deliberately indifferent to or derogatory of safety enforcement.

3. Contractor's performance evaluation report has no specific indication of safety consciousness, except as it may be remarked by the evaluator. After considerable delay and the invocation of influence with the principals of the joint-venture, RMKP implemented effectively an original determination to comply with minimum standards. The defense of urgency for completion, unanticipated expense during

construction, and unfamiliarity with a repetitious cycle of multiple structures identical except for foundations, is no defense at all. The poor safety record in the early part of this project confirms an insufficient appreciation of the contractor's responsibility, and was partly overcome only through the constant diligence of Corps of Engineers representatives.

Government and contractor combined

Period	Exposure Manhours	Disabling Injuries	Fatal Injuries	Days Time Lost	Frequency Rate	Severity Rate	First Aid Cases	Fire & Prop Damage
Jul 60	25,668	0	0	0	0	0	0	0
Aug 60	67,000	0	0	0	0	0	1	23,000
Sep 60	110,255	3	1	6,171	36.28	55.97	39	25,514
Oct 60	205,000	16	1	6,519	83.93	32.29	97	59,465
Consolidation by CEBMCO October 1, 1960								
Nov 60	407,032	26	2	12,910	69.79	31.72	192	98,465
Dec 60	615,123	36	4	25,198	65.03	40.96	251	98,465
Jan 61	[illegible]	[illegible]	[illegible]	[illegible]	67.63	33.75	292	98,465
Feb 61	1,247,453	50	4	25,483	43.29	20.43	445	98,465
Mar 61	1,726,469	55	6	37,656	35.33	21.81	512	129,598
Apr 61	2,039,789	56	6	37,698	30.40	18.48	569	129,598
May 61	2,293,844	60	6	37,758	28.77	16.46	615	129,598
Jun 61	2,649,201	62	6	37,802	25.67	14.27	676	129,598
Jul 61	2,962,497	68	6	37,859	24.98	12.73	738	169,101
Aug 61	3,368,248	72	6	37,881	23.16	11.25	803	169,901
Sep 61	3,770,411	78	6	37,983	22.28	10.07	861	169,901
Oct 61	4,035,307	79	6	37,990	21.06	9.41	901	170,455
Nov 61	4,267,616	79	7	43,990	20.15	10.31	926	172,455
Dec 61	4,506,248	79	7	43,990	19.08	9.76	951	172,832
Jan 62	4,751,478	81	8	50,155	18.73	10.56	969	172,832
Feb 62	4,927,362	82	8	50,159	18.26	10.17	1,008	172,832

TABLE I
[illegible]
Plattsburgh Area
CEBMCO

Rev ... 1962

TABLE II

Site	First Aid Cases	Disabling Injuries	Fatal Injuries	Days Time Lost	Fire & Prop Damage
1	73	6	0	216	0
2	41	7	2	12,103	0
3	69	2	0	32	$23,800
4	75	7	2	12,174	377
5	68	9	0	309	80,000
6	82	6	0	152	28,711
7	69	1	0	4	0
8	89	14	2	12,378	31,873
9	91	5	1	6,094	0
10	57	3	0	47	0
11	185	7	1	6,197	2,000
12	67	3	0	67	0
Office & Shop	25	3	0	17	0
Off-site	6	3	0	98	3,557
Government	11	6	0	271	2,514
Total	1,008	82	8	50,159	$172,832

CONSOLIDATED TABLE II

ACCIDENT COMPARISON
Plattsburgh Area

AREA ENGINEER, PLATTSBURGH
U. S. ARMY CORPS OF ENGINEERS
BALLISTIC MISSILE CONSTRUCTION OFFICE
P. O. BOX 161
PLATTSBURGH, NEW YORK

GENERAL SAFETY REQUIREMENTS

Listed below are a number of safety and fire prevention requirements. In many cases these requirements are open violations at Sites in this area. It is suggested that you use this list to spell out violations to the Contractor, by attaching it (with violations checked) to your "warning" or "stop work" orders. References indicated by "CE Para" are from the Corps Manual 385-1-1. Other references are from the special conditions of the contract specifications.

Violation — CONDITION

1. Fully equipped First Aid Station, with qualified attendant, when 100 or more persons are employed. (CE 4-4 & 4-5).
2. Warning and danger signs will be employed where fire and safety hazards exist (CE 10-7 thru 10-14).
3. Walkways, stairs and floors will be kept free of loose material which might cause tripping or other hazard. (CE 11-33 thru 11-37).
4. All scrap lumber, waste material and rubbish will be removed from the work area Daily, (CE 11-38).
5. Burning area will be established by approval of Government Representative in charge (CE 12-70).
6. Burning operation will be watched by fire guard (CE 12-72).
7. Temporary heating devices are forbidden unless authorized by the Government Representative in charge. (SC 43f and CE 12-20).
8. Spark arresters shall be provided on all smoke stacks (CE 12-29).
9. Flammable Liquids shall be stored in NO SMOKING area 50' from structures. (CE 11-4 and 13-20).
10. Fire extinguishers will be provided for each building, shop and work area (SC 44b(3)(d) and CE 13-1).
11. One fire barrel with buckets will be provided for each building (SC 44b(3)(d) and CE 13-3).

Violation CONDITION

12. Fire Alarm system will be installed. (CE 13-14, 13-15).

13. Fire patrol will be established during non-work hours. (CE 13-5).

14. Mobile fire fighting equipment will be in good operating condition (SC 43p).

15. All electrical equipment will be grounded (SC 43h).

16. Cross overs will be provided for all energized electric lines (CE 15-4).

17. Temporary wiring will be guarded or isolated from contact by workmen (CE 15-5).

18. Oxygen cylinders will not be stored withother combustible materials or cylinders containing combustible gases (CE 14-7).

19. Welding cylinder caps will be in place when cylinders are not in use (CE 14-8).

20. Cylinder valves will be closed when not in use. (CE 14-10).

21. Cylinders will be securely fastened in upright position when in use. (CE 14-8).

22. Safety lashing shall be provided at all quick makeup type connection of air hoses.

23. Air hoses shall not be laid over ladders, walkways, or scaffolds so that a tripping hazard exists (CE 16-25).

24. Powder actuated tools will be inspected and registered with Government Representative in charge (CE 16-28).

25. All ropes, cables and chains used shall provide appropriate safety factor (CE 17-1 and Plate 5).

26. All cables used for load lifting will be inspected weekly by Co and removed if kinked or if specified number of component wires are broken (CE 17-7).

27. All machinery or mechanized equipment will be inspected and determined to be in safe operating condition prior to being put into use. (CE 18-1).

Violation CONDITION

28. All cranes and derricks will be tested prior to use. Test data will be recorded in log (CE 18-4).

29. Boom stops shall be provided on all cranes (CE 18-25).

30. No motorized equipment will be fueled or lubricated while crane is running (CE 18-28).

31. Manufacturer's load ratings will be posted in view of operators for all cranes, hoists, and derricks.(CE 18-35).

32. Manufacturer's load ratings will not be exceeded. (CE 18-36).

33. Equipment or material will not be raised or lowered when workmen are under load (SC 43i, 1, (b)).

34. Skips or cages will be provided with safety line independent of hoist line (SC 43i, 1, (a)).

35. Equipment used for hoisting personnel shall comply with American Standard Safety Code for Elevators (SC 43i, (3)).

36. Cables supporting man cages shall have a safety factor of 8 (CE 20-29).

37. Scaffolds, platforms, walkways, or temporary floors shall provide a safety factor of 4 (CE 20-1).

38. Lumber used for above shall be of good quality, free of unsound knots, chocks, splits, etc.(CE 20-10).

39. Guard rails and toeboards will be provided for platforms, ramps and other working surfaces when their height is 6 feet or more (SE 20-21).

40. Other.

AREA ENGINEER, PLATTSBURGH
U. S. ARMY CORPS OF ENGINEERS
BALLISTIC MISSILE CONSTRUCTION OFFICE
P. O. BOX 161
PLATTSBURGH, NEW YORK

SITE

Original

Date:

Duplicate

SAFETY VIOLATION

(for C of E use)

NOTICE is hereby given the Contractor by ______________________
(print name and title)

of condition(s) resulting in Violation of the Safety procedures and/or requirements defined in the Contract, said violation being described as follows:

____

____

____

____

____

____

____

Corr. action taken date:

CORRECTIVE MEASURE to eliminate the above safety hazard is to be taken by the Contractor on/or before

(time)..........................
(date)..........................

____

____

I ACKNOWLEDGE receipt of original of above notice, and have acquainted myself with information and directive(s) therein.

Signed: ______________________
Title: ______________________
Date: ______________________

Completed:

____
Signed Dupl. to be sent to
Chf., Constr. Br.

Initials:

S T O P - O R D E R

DATE________________

SITE____________

TIME________________

TO: RKMP SITE REPRESENTATIVE
CONTRACT NO. DA-30-075-ENG-9522

SUBJECT:

CONDITION/S____

____

____

____

____

____

THE ABOVE SAFETY DEFICIENCY/IES HAVING BEEN DULY CALLED TO YOUR ATTENTION, AND WITHOUT REASONABLE ACTION BEING TAKEN TO RECTIFY THE CONDITION/S WITHIN 48 HOURS.

IN THE INTEREST OF THE SAFETY AND WELFARE OF SITE PERSONNEL AND/OR THE PROTECTION OF PROPERTY YOU ARE DIRECTED TO STOP ALL RKMP OPERATIONS EXPOSED TO SUBJECT CONDITION/S AT THIS SITE, EXCEPT THAT REQUIRED TO EFFECT CORRECTIVE MEASURES, UNTIL SUCH MEASURES ARE COMPLETED AND RELEASE FROM THIS ORDER IS GRANTED BY THE UNDERSIGNED.

NO TIME LOST DUE TO THIS STOP ORDER SHALL BE MADE THE SUBJECT OF CLAIM FOR EXTENSION OF TIME OR FOR EXCESS COSTS OR DAMAGE BY THE CONTRACTOR.

NAME________________________

TITLE________________________
CORPS OF ENGINEERS
REPRESENTATIVE

SECTION VII

SPECIAL EVENTS

The group departed by plane at 1615 hours from Plattsburgh Air Force Base. Later, Lt. Colonel Stern received a letter, dated 15 October 1960, Paris, from General LeGrand who conveyed his thanks for the reception at Plattsburgh, and who was joined by "Le General Thuaire et les Officers Francais" in an expression of thanks and best wishes. General LeGrand stated in his letter that the party was keenly interested in the numerous works they were fortunate to see and should profit by the particular points adopted in the diversified activities.

Members of the group of the French Army:

Lt. General Rodolphe LeGrand, Inspector General, Corps of Engineers.

Major General Robert M. Thuaire, Chief, French Army Engineers.

Colonel Pierre A. Dupont, Deputy Commander, Engineer School Angers, French Army Engineers.

Lt. Colonel Pierre G. Martin, Chief, Engineer Section, Army Research & Development Agency.

Major Jean E. Lartigue, Chief of Section, Construction Office, French Army Engineers.

c. Visits by V.I.P.

August 1960 - W. C. Sweeney, Jr., Commander, 8th Air Force Westover AFB, Mass., 30 August 1960.

September 1960 - A. C. Welling, Brig. General, U. S. Army, Corps of Engineers, CEBMCO, Los Angeles, Calif., 30 September and 1 October 1960.

October 1960 - A. M. Minton, Major General, Director of Civil Engineering, Deputy Chief of Staff Operations, Hq. USAF, Washington, D.C., 13 October 1960.

C. Renshaw, Brig. General, Director of Military Construction, O.C.E., 17-18 October 1960.

T. P. Gerrity, Major General, U.S.A.F. Hq. BSD, Los Angeles, Calif., 20 October 1960.

T. Lipscomb, Brig. General, U. S. Army, Corps of Engineers, Division Engineer, North Atlantic Division, 25 October 1960.

Mr. Bryant Houston, Civilian Aide of the Secretary of the Army, First Army Area, 25 October 1960.

C. M. Duke, Colonel, U. S. Army Corps of Engineers, New York District Engineer, 25 October 1960.

<u>November 1960</u>

E. C. Itschner, Lieutenant General, Chief of Engineers, U. S. Army, Washington, D. C., 20 November 1960.

P. M. Hoisington II, 820th Air Division Commander, 20 November 1960.

<u>December 1960</u>

None.

<u>January 1961</u>

None.

<u>February 1961</u>

None.

<u>March 1961</u>

The following personnel, as a group, visited the Plattsburgh Area on 9 March 1961 and were given a briefing by the SATAF Commander and the Area Engineer.

Hon. Thomas D. Morris - Assistant Secretary of Defense for Installation and Logistics.

Mr. Alan McCone	- Assistant Secretary of the Air Force for Installations.
A. M. Minton, Major General	- Director of Civil Engineering Hq. U.S.A.F.
H. K. Kelley, Brig. General	- Director of Civil Engineering Hq. U.S.A.F.
D. Coupland, Brig. General	- Deputy Commander BMC (Hq. AMC)O).
J. B. Lampert, Brig. General	- Office of Chief of Engineers (D.A.).
W. W. Wilson, Colonel, U.S.Army	- Corps of Engineers (CEBMCO), Director of Atlas "F"
J. B. Porter, Colonel	- Construction Operations, BMG.
Mr. Edward Sheridan	- Office of the Secretary of Defense Installation and Logistics.
Mr. John Herd	" " " "
Mr. Philip Risik	" " " "
Mr. Frank J. Vie	" " " "
Mr. W. O. Hillman	- Office, Chief of Engineers (D.A.).

April 1961

None.

May 1961

None.

June 1961

None.

July 1961

The following personnel, as a group, visited the Plattsburgh Area on 19 July, 1961, for briefing and visit to missile sites.

Walter K. Wilson, Jr. Lieut. General, U. S. Army, Chief of Engineers
Washington, D. C.

T. Lipscomb,. Brig. General, U. S. Army, Division Engineer, N.A.D.

W. W. Wilson, Colonel, U. S. Army, Corps of Engineers (CEBMCO), Director of Atlas "F".

Frank Koisch, Colonel, Military Construction, O.C.E.

M. Seltzer, Lt. Colonel, Corps of Engineers, O.C.E.

Mr. Henry C. Boschen, Contractor Representative, President, Raymond-Kaiser-Macco-Puget Sound.

August 1961

None.

September 1961

None.

October 1961

None.

November 1961

Thomas J. Hayes, Colonel, U. S. Army, Corps of Engineers, Commanding Officer, CEBMCO, 19-20 November 1961.

Party-visit, 28 November 1961:

Hon. Harry Sheppard,
Rep. California.

A. M. Minton, Major General,
Director of Civil Engineering,
Hq. U.S.A.F.

W. W. Wilson, Colonel, U. S. Army C. of E.
(CEBMCO), Director, Atlas "F".

December 1961

None.

January 1962

None.

February 1962

None.

b. Miners

During the excavation of the silos, RKMP hired 32 miners from Lyon Mountain, New York.

On 9 June 1960 the Chateaugay mine of Republic Steel Corp. had closed down, and Ignatius Yanulevitch, a timekeeper, was hired by RKMP, and he brought 31 other miners with him.

The mine reopened on 17 February 1961, but 17 miners stayed until the excavation was completed. When the mine shut down later these same miners were again available for the missile program.

B. RELATIONS WITH SATAF AND OTHER AGENCIES

1. Change Order Conference Group

The change order conference group became the initial crucible for establishing relations between the Area Engineer, Corps of Engineers and SATAF Group. At the activation of the Area Office it became apparent that a method of implementation of changes without delay would be required. From experience gained from review of downstream missile sites, the concurrency concept for construction and tight construction schedules, a change order conference group was established to expedite all changes and avoid construction delays whenever possible. The group's aim was to provide immediate review of critical field changes, other necessary field changes, and review of all CEBMCO changes in relation to conditions in the field.

Since SATAF, AFBSD was involved in all design changes and eventually in approving funds for the change, joint action was required by SATAF and the Corps of Engineers. The group was established with members from SATAF, AFBSD, Corps of Engineers personnel from the Contract Administration and Engineering and Technical Branches.

The first Change Order Conference was held 6 July 1960. Relations, as a rule, were highly satisfactory with the group. When time allowed, engineers from both groups explored the problem and recommended solutions to the Change Order Conference group. This was achieved in a spirit of cooperation and approach to a problem from an engineer's point of view. Differences in opinion were usually talked out.

Differences usually were concerned with interpretation of specifications. Where no agreement was reached, reference was made to the respective agencies. This seldom occurred. Where necessary the problem was referred to CEBMCO. Two disagreements were of any consequence and revolved around interpretation of specifications.

One, furnishing electric power for final facility testing by contractor in lieu of power by Government, Change RI-154, Mod. 65, and added pipe supports above requirements of plans and specifications, RI-265.

The over-all relations in the Change order group are considered as excellent and differences in opinion were sincere without personalities.

2. Control Group Meetings

Early during the construction period, the Area Engineer established weekly meetings between the Area Engineer and the contractor. The meetings were held for the purpose of "getting together" each week to discuss mutual problems. The first of the regularly established weekly meetings convened at 1530 hours on 5 July 1960, later on 12 October the meetings were changed to 1900 hours.

The SATAF Commander or his representative as well as members of the field office of AFBMD were invited to attend. The SATAF Commander participated in the discussions of problems with the contractor. The Area Engineer presided. Relations with this group between SATAF and the Corps of Engineers were considered as excellent.

3. Form 290 and Turn-over of Missile Sites

Difficulty was experienced with SATAF in turn-over of the completed missile sites insofar as listing of "deficiencies" on the 290's. Basically there was a difference in the interpretation of specifications and contract requirements pertaining to water leaks in LCC's and the listing of "possible latent defect in waterproofing which might allow water seepage through wall of the LCC's".

By D.F. dated 6 October 1961 (ENGMA-AB-3) from the Director, Atlas "F", CEBMCO, the Area Office was informed that construction deficiency listed on the Form 290 "concerning latent defect", as quoted above, was not proper, furthermore, that the wall in question "leaks, or it does not leak." Also, "if it is known at time of inspection that the wall leaks, it should be listed on the 290 and scheduled for correction by the contractor providing it is a construction deficiency, if deficiency is due to design, then the item may be listed as a design deficiency".

Letter dated 9 November 1961 to Deputy for Construction from SATAF Commander, recommends "latent defect" entry for Sites 2, 4, 6, 7, 8, and 12, remain on Form 290.

SECTION VII

C. PHOTOGRAPHS

ITEM	SUBJECT	PAGES
	Military	1 - 2
1	Construction	1 - 25
2	V.I.P. Visits, Inspections	1 - 6
3	Conferences	1 - 3
4	Ceremonies	1 - 10
5	Special Events	1 - 5

SECTION VII

C. PHOTOGRAPHS

1. Construction Photographs.

All negatives of construction photographs showing progress by site and month have been forwarded to CEBMCO. The photographs under this section are typical of the construction and, as a rule, are from various sites, showing various phases from start to completion, but not in considerable detail since all the negatives were not available.

2. V.I.P. Visits - Inspections

Photographs of VIP's on inspection trips to Plattsburgh.

3. Conferences

4. Ceremonies.

Ground breaking ceremonies at start of missile construction - - Transfer of Authority from New York District to CEBMCO - - Certificate of Achievement and Merit - - Service Awards.

5. Other Special Events

Area Actions - - Bowling - - Dinners - - Special Parties.

SECTION VII

C. PHOTOGRAPHS.

Plattsburgh Area, N.Y.

On Right: Lt. Colonel Louis E. Bremkamp, Corps of Engineers, U. S. Army, Area Engineer and Deputy for Construction, SATAF.

At Left: Major Howard D. Rhodes, Corps of Engineers, U. S. Army, Deputy Area Engineer.

Ballistic Missile Construction

Lt. Colonel Bremkamp becam Area Engineer 6 June 1961 upon the retirement of Colonel Sidney Stern (Par. 2, Special Order Number 27, dated 29 May 1961).


LT COL L E BRENKAMP
AREA ENGINEER

SECTION VII

C. PHOTOGRAPHS

Military Assistants - Plattsburgh Area, N. Y.

At the peak of the missile construction project there were six Corps of Engineers Officers assigned to the Area Engineer.

The Senior Officer, Major H. D. Rhodes, Executive Officer and Deputy Area Engineer.

Three of the officers were assigned to four missile sites each, and were responsible for general control and supervision of construction activities at those sites.

Major J. J. Kohler

Captain R. A. Glenn (later, Major Glenn)

Captain J. H. Carnes.

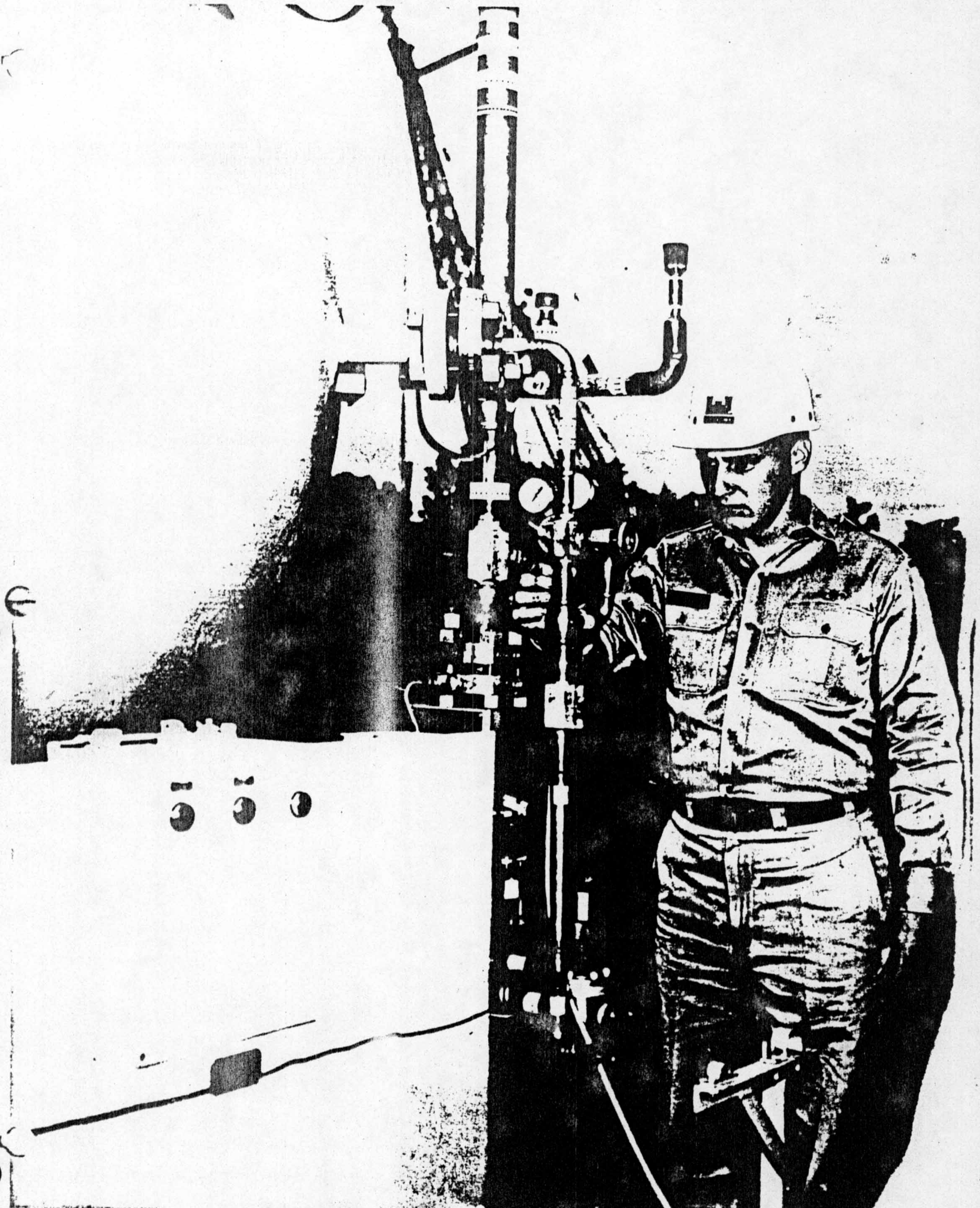
One officer, designated as PLS Officer, was assigned to assist the Chief of the PLS Section in monitoring the installation and testing of the Propellant Loading System.

First Lieutenant R. F. Fletcher

One officer, assigned to the Engineering Branch, was responsible for coordinating and expedition the delivery of all material for the missile project.

First Lieutenant Henry Pheil, Jr.

Illustrating an activity, the photograph shows the PLS Officer, First Lieutenant R. F. Fletcher, inspection of the Instrument Air Prefab of the Propellant Loading System at Site No. 9.



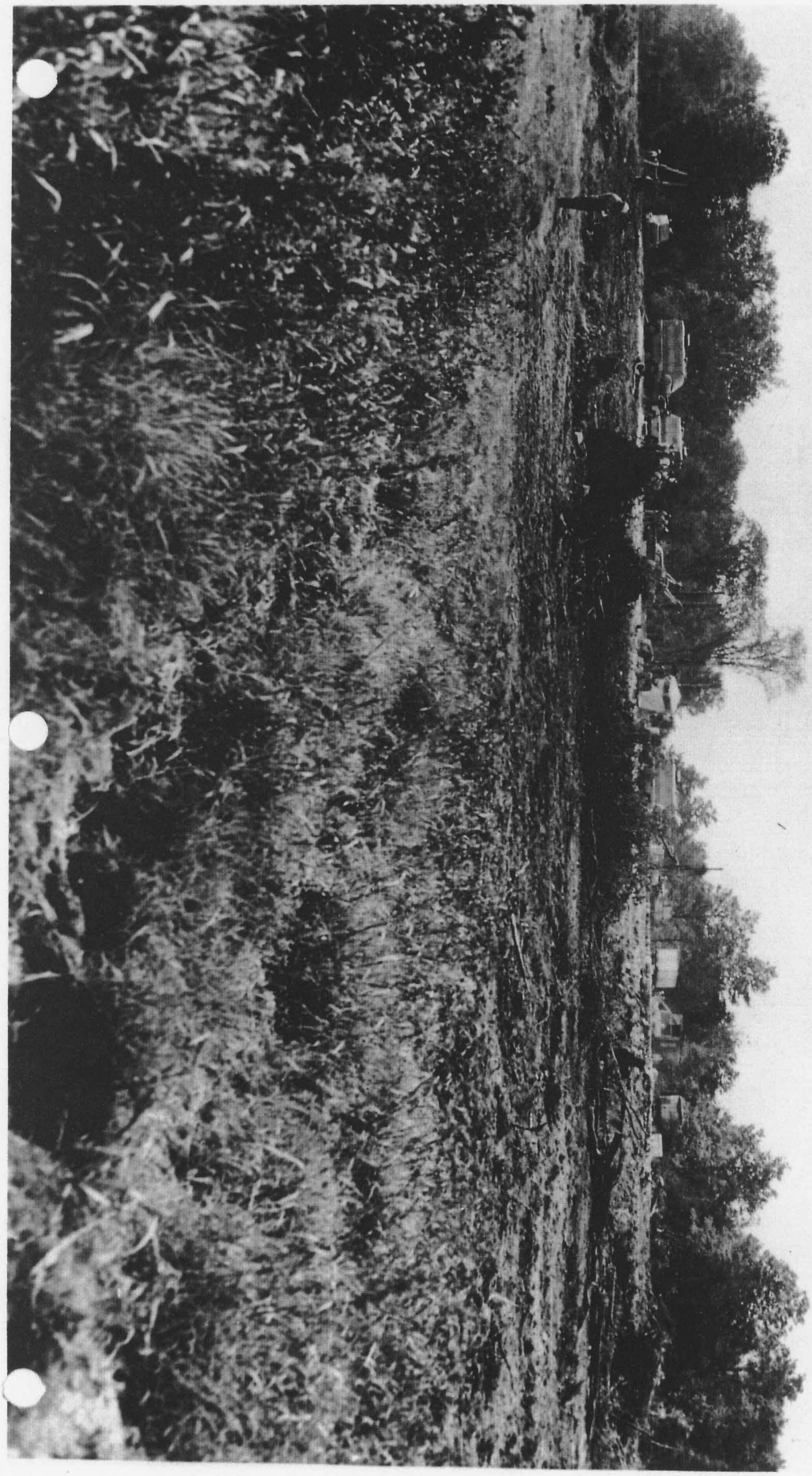
SECTION VII

C. PHOTOGRAPHS

1. Construction.

Beginning missile site construction August 1960, clearing the area at Site No. 1, Champlain.

Approximately one foot of overburden has been removed and rock drills are at work.



SECTION VII

C. PHOTOGRAPHS

1. Construction.

TYPICAL CONSTRUCTION PHOTOGRAPH

Open cut type excavation at sites where overburden was earth or gravel, the cut usually was made to depth of the LCC foundations. The silo was continued until rock was encountered as shown in this photo (Site No. 5). Large area of cut here is at LCC foundation level.

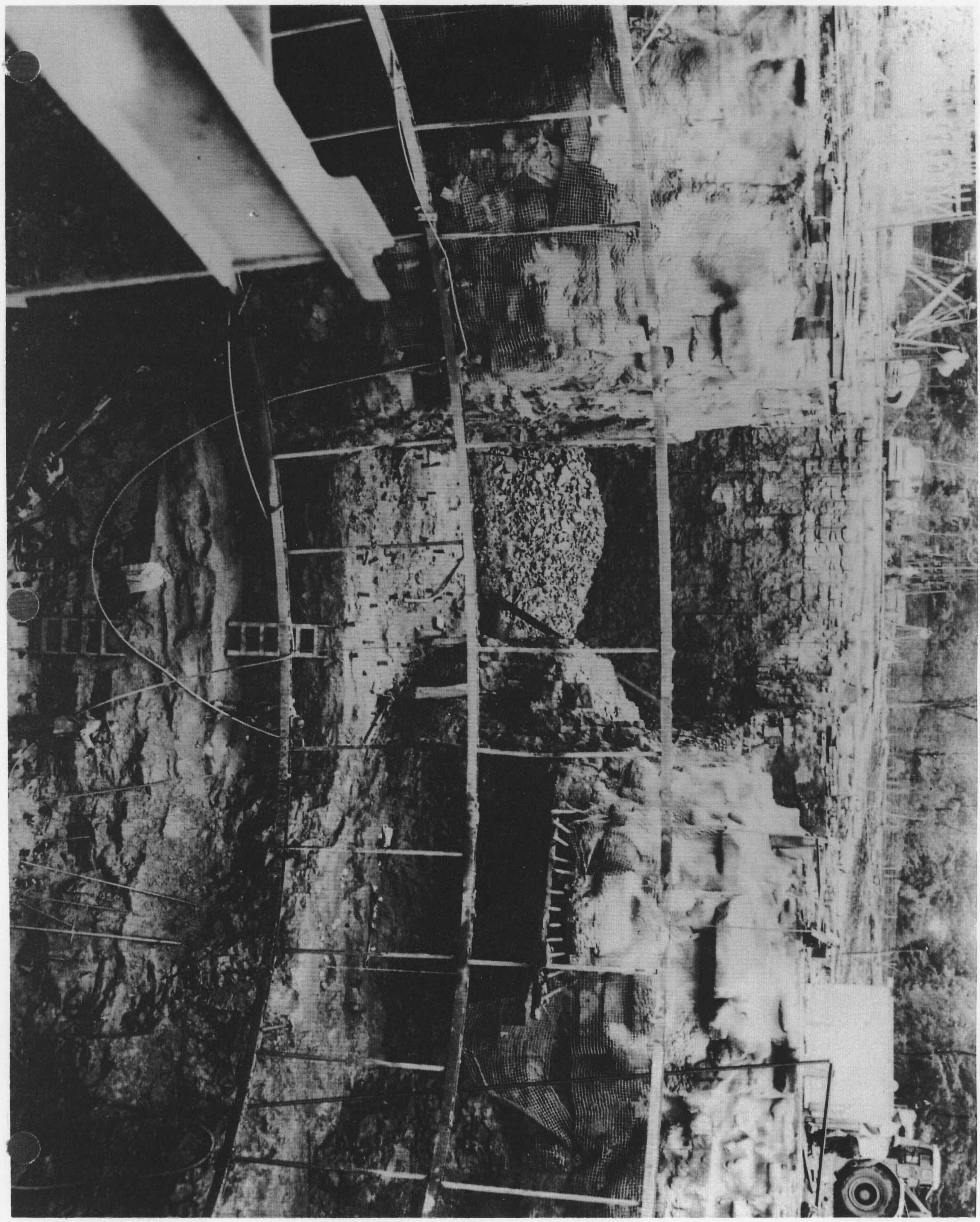
SECTION VII

C. PHOTOGRAPHS

1. Construction.

TYPICAL SILO SHAFT EXCAVATION (SITE 1)

Excavation in rock, showing drilling rig in left foreground, holes drilled for dynamiting and plugged to keep out debris until time for loading. Three ring beams are in place. Shafting beyond is for the Launch Control Center.



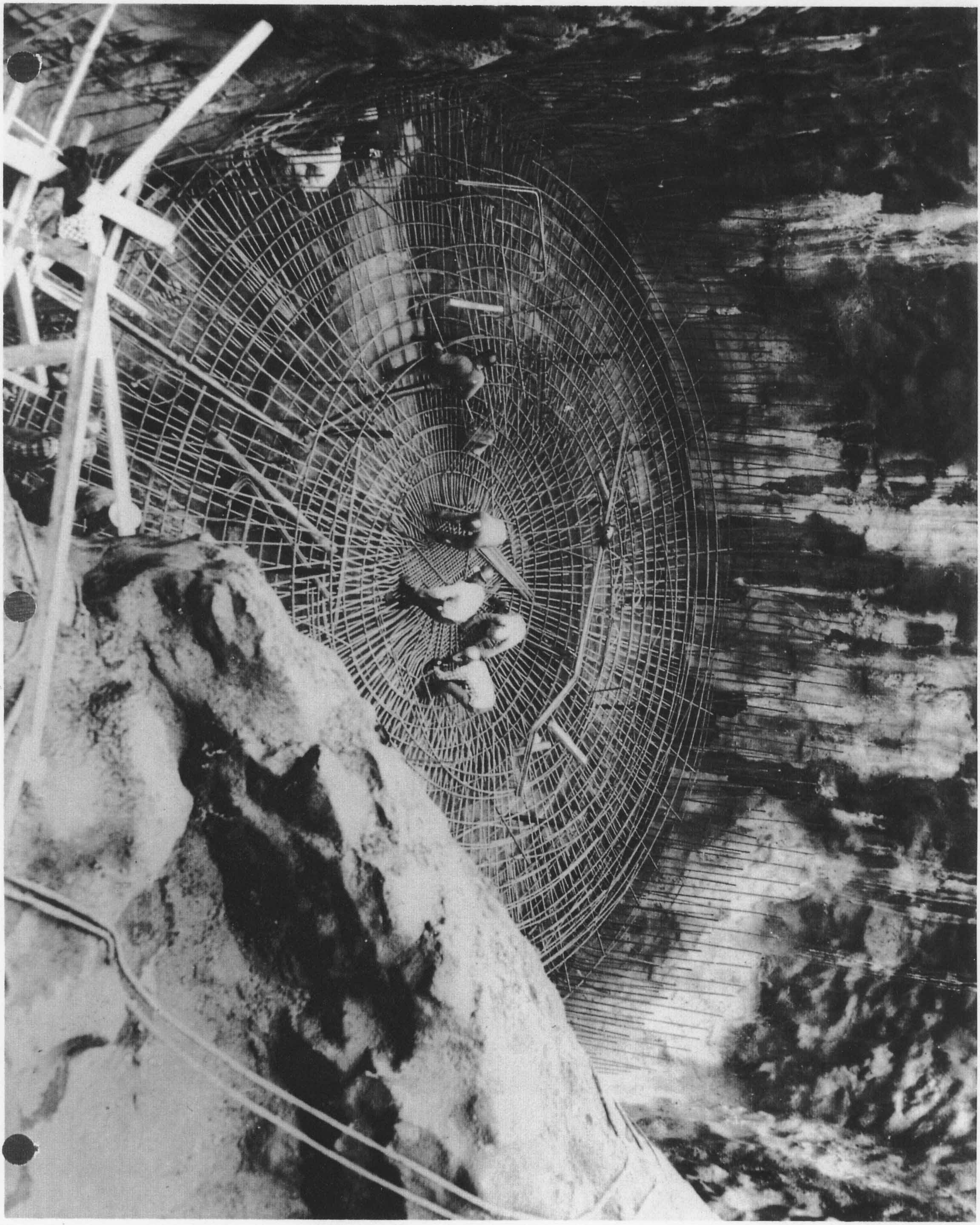
SECTION VII

C. PHOTOGRAPHS

1. Construction

Steel working crew placing reinforcing bars in floor of LCC.

This view is typical for a "rock site", where shafting for LCC and silo was in rock rather than open cut excavation. The contractor has gunited the walls, sprayed on a fibrous type water proofing over the gunite and will use the walls as back forms for the LCC concrete.



SECTION VII

C. PHOTOGRAPHS

1. Construction.

Aerial photo showing shafting for silo and Launch Control Center in foreground.

Ring beams are in place in silo.

Scaffolding and form work placed for LCC concrete walls.

SECTION VII

C. PHOTOGRAPHS

1. Construction.

TYPICAL MISSILE SITE CONSTRUCTION(SITE 2)

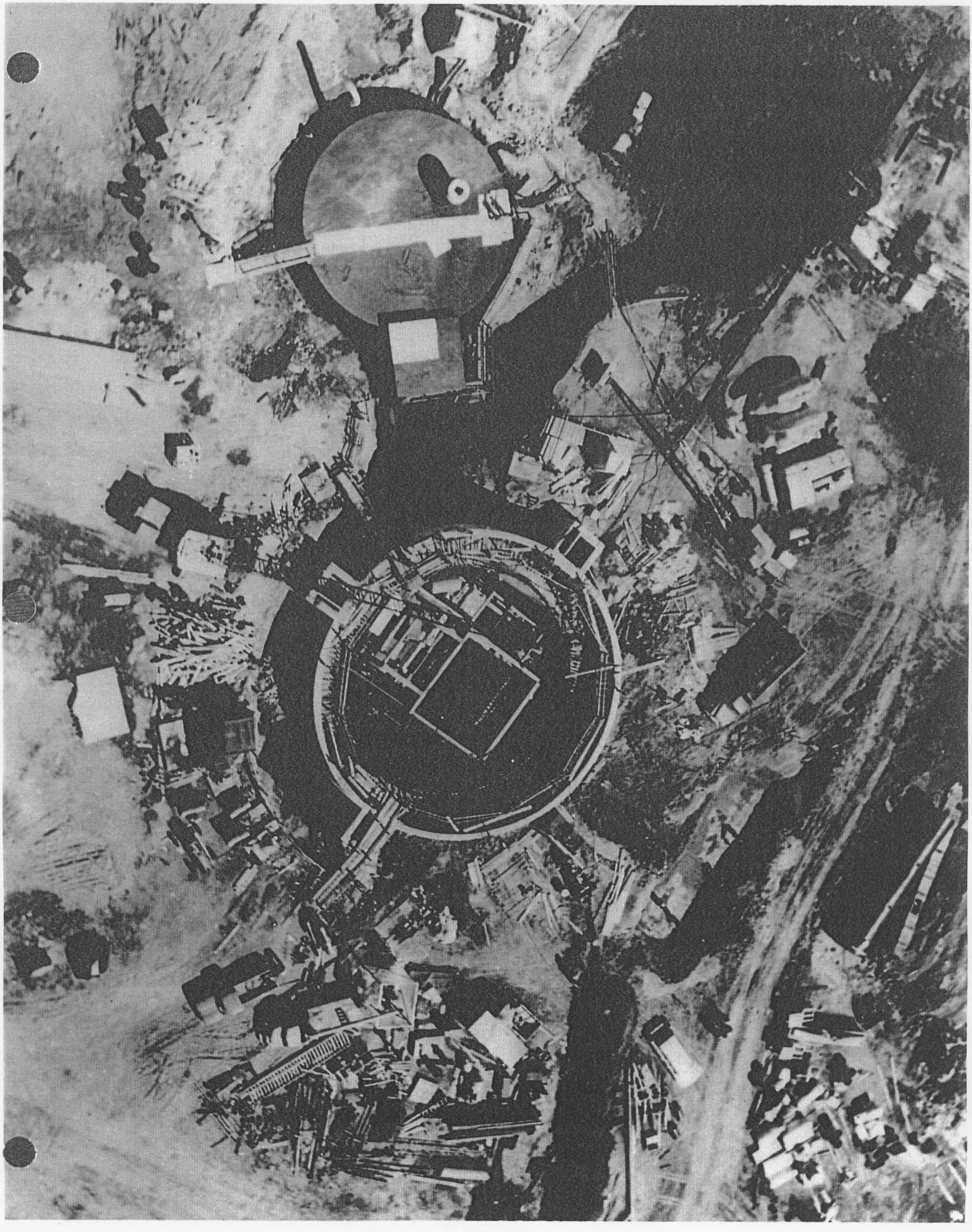
Over-all view of typical site showing Launch Control Center and stair well concrete work completed and waterproofing applied. Metal passageway between LCC and silo installed. This view indicates a "rock site", shafting in rock.

Excavation to left of photo, above the LCC is for the four water tanks, with capacity of 90,000 gallons.

Excavation above silo is for the 15,000 gallon fuel oil tank. Bottom of excavation is being compacted in this view.

In silo, the curtain wall at top has been completed, the recess provides for bearing of cap concrete. The crib steel for top level is nearing completion.

The concrete fill and vent shaft on silo is shown in foreground under crane boom and the Air Intake on "Y" axis, right side of silo and exhaust air shaft on left side of silo.



SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL MISSILE SITE CONSTRUCTION OF OPEN CUT FOR LCC
(SITE 3)

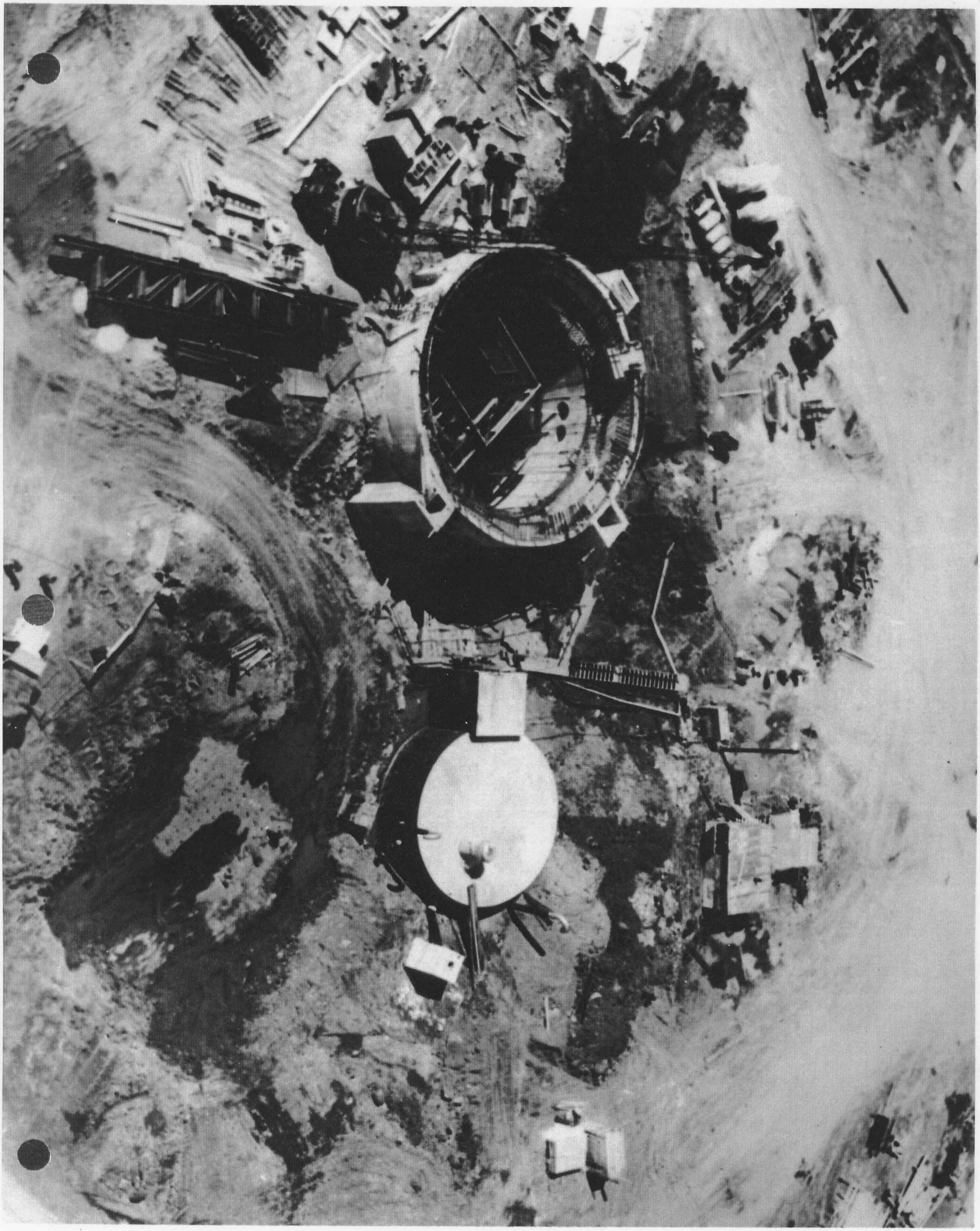
Photo showing silo on left and LCC on right, the area around the LCC is open cut excavation.

The LCC concrete walls, top and stair well completed with the walls covered with waterproofing compound.

Excavation for 4 water tanks in lower right foreground, below LCC.

The steel crib work is nearing completion with top level frame work being placed.

The large truss work in left foreground is used for supporting the concrete top form work.



SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO CONSTRUCTION

SITE TUBE

Excavation sight tube and tunnel at a rock site for the Polaris Site Tube.

Tunnel has been completed and metal sight tube being installed. The contractor was fortunate in obtaining experienced minors for this work due to iron ore miners at nearby Lyon Mountain.

SECTION VII

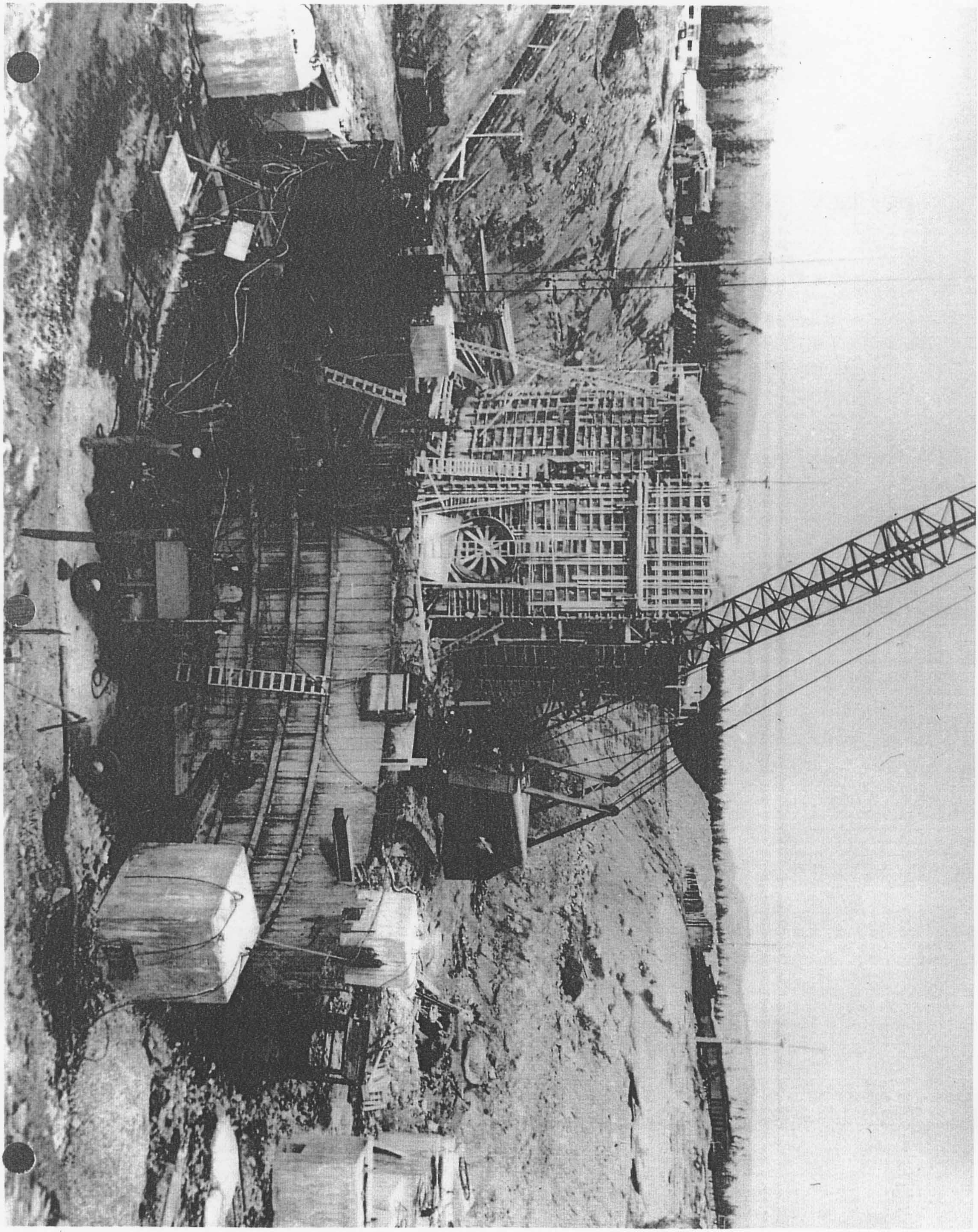
C. PHOTOGRAPHS

1. Construction

TYPICAL OPEN CUT SITE EXCAVATION (SITE 5)

Launch Control Center from work in place and concrete wall pour completed.

Steel cribbing, as shown here for silo excavation, was used at open cut sites during excavation of silo where rock was not encountered at LCC foundation level. The cribbing was used until rock was encountered.



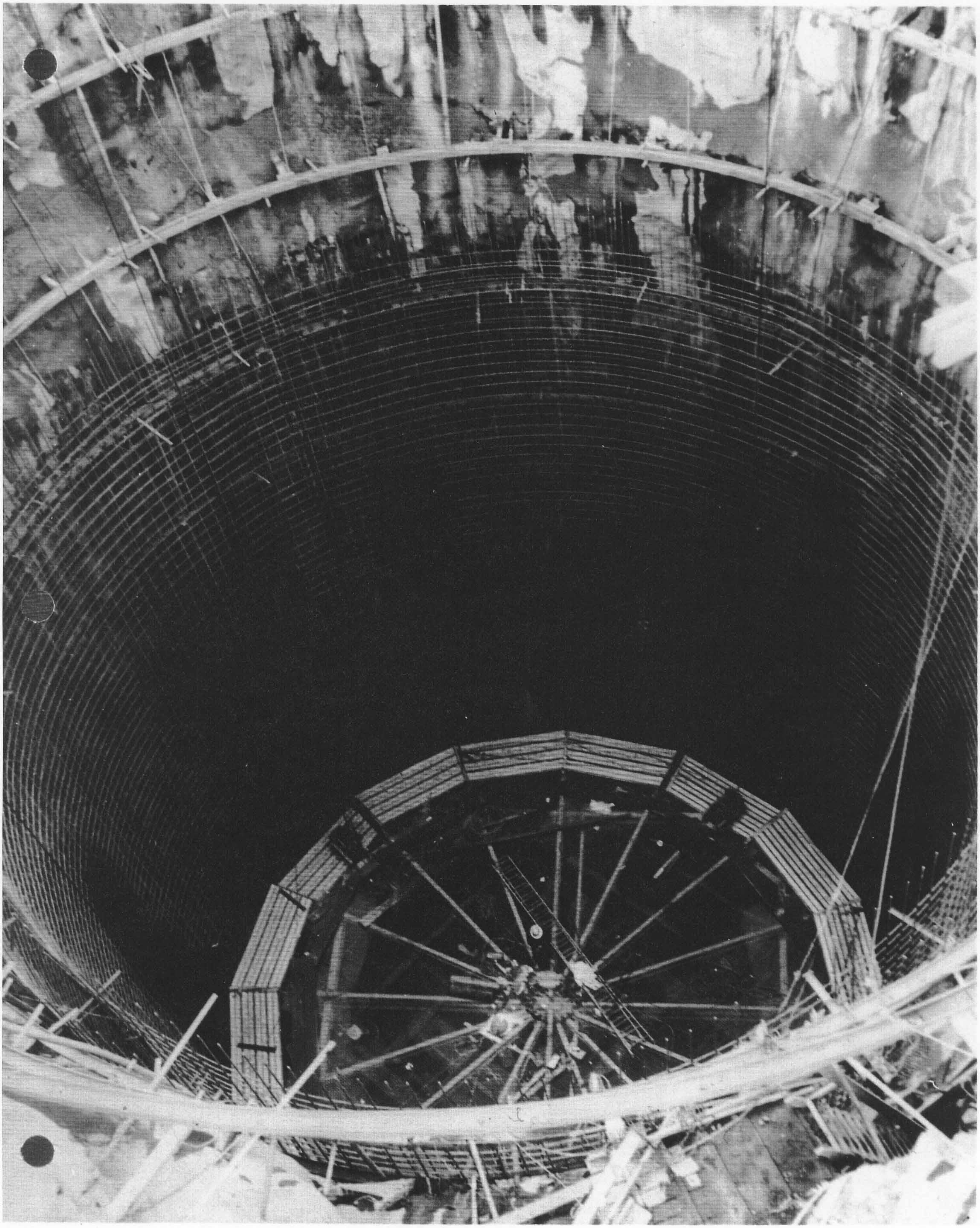
SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO CONSTRUCTION (SITE 2)

Placing reinforcing bars in silo walls. Suspended platform shown with wire netting in center. Platform is raised or lowered by winches.



SECTION VII

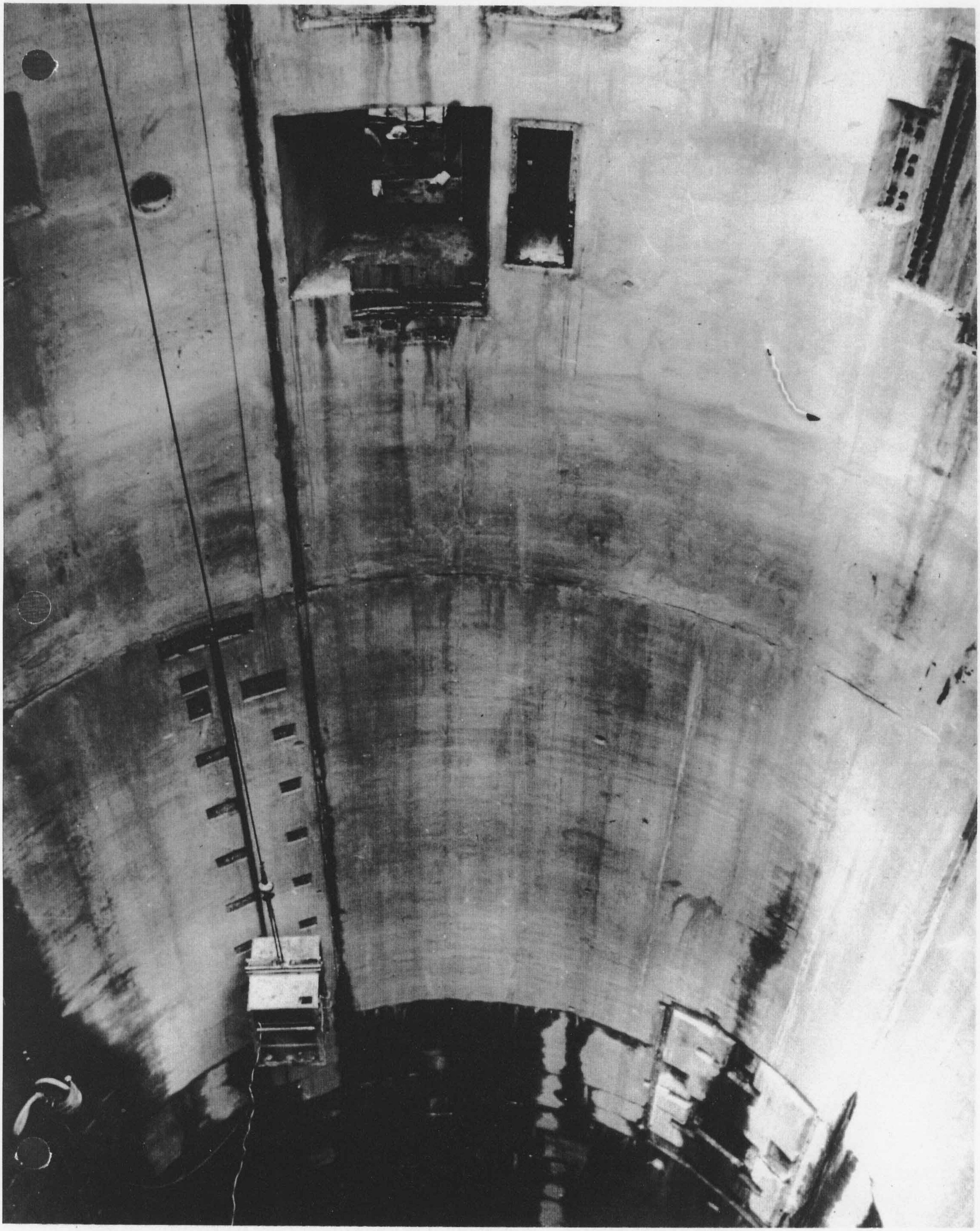
C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION

Concrete walls in silo completed, embedded item at right provides for shock hanger bracket support. Openings in silo wall are for access for tunnel to Launch Control Center.

No. 11



SECTION VII

C. PHOTOGRAPHS

1. Construction

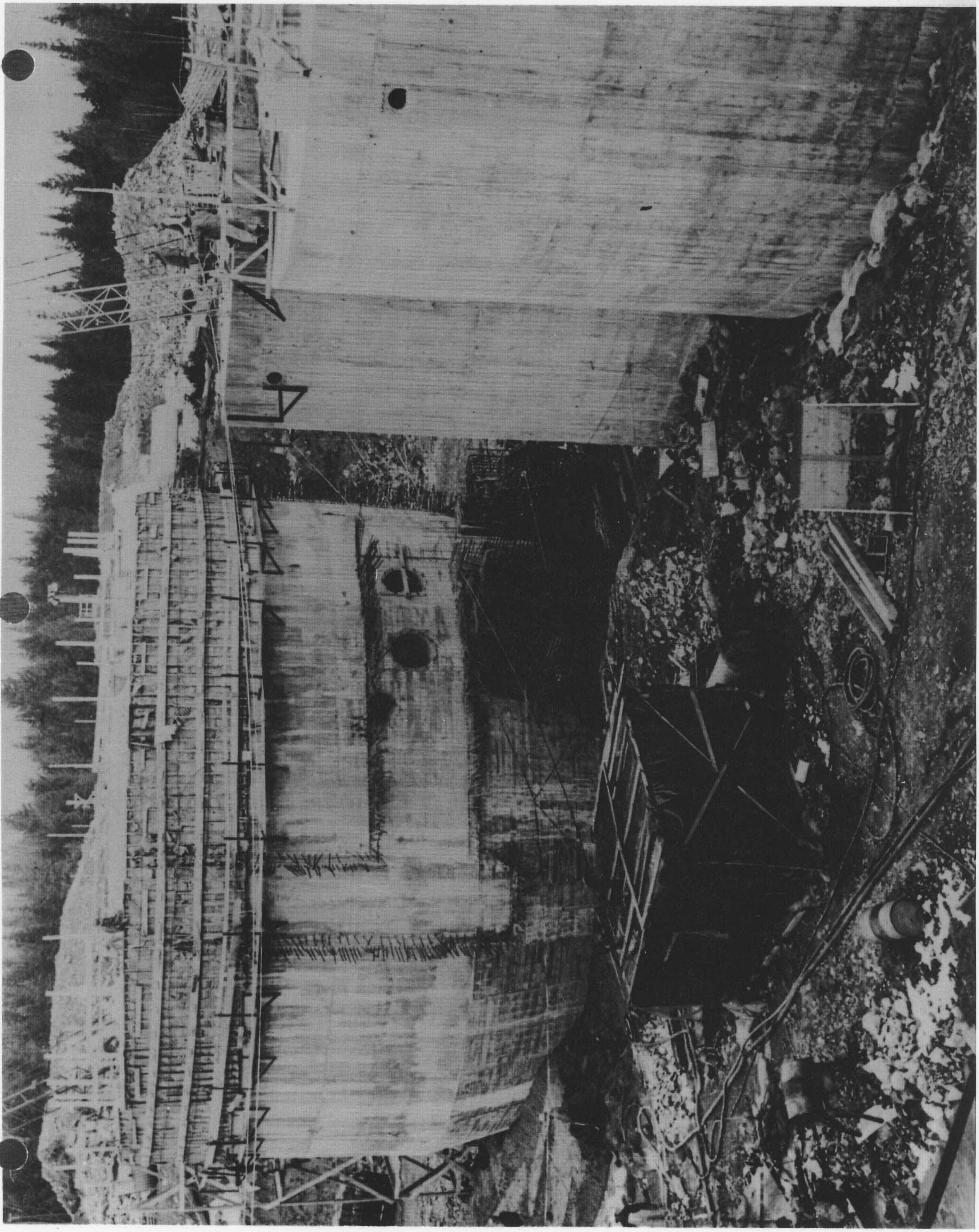
TYPICAL SILO CONSTRUCTION

Excavated areas indicate an open cut excavation to bottom of LCC level. Photo shows formation of the Haunch Section for silo.

Reinforcing being placed for tunnel entry to silo. Reinforcing dowels shown on face of haunch area for exhaust air duct shaft. Two openings above entry tunnel opening are for the exhaust ducts to exhaust duct shaft.

Form work for curtain wall at top of silo in place.

No. 12



SECTION VII

C. PHOTOGRAPHS

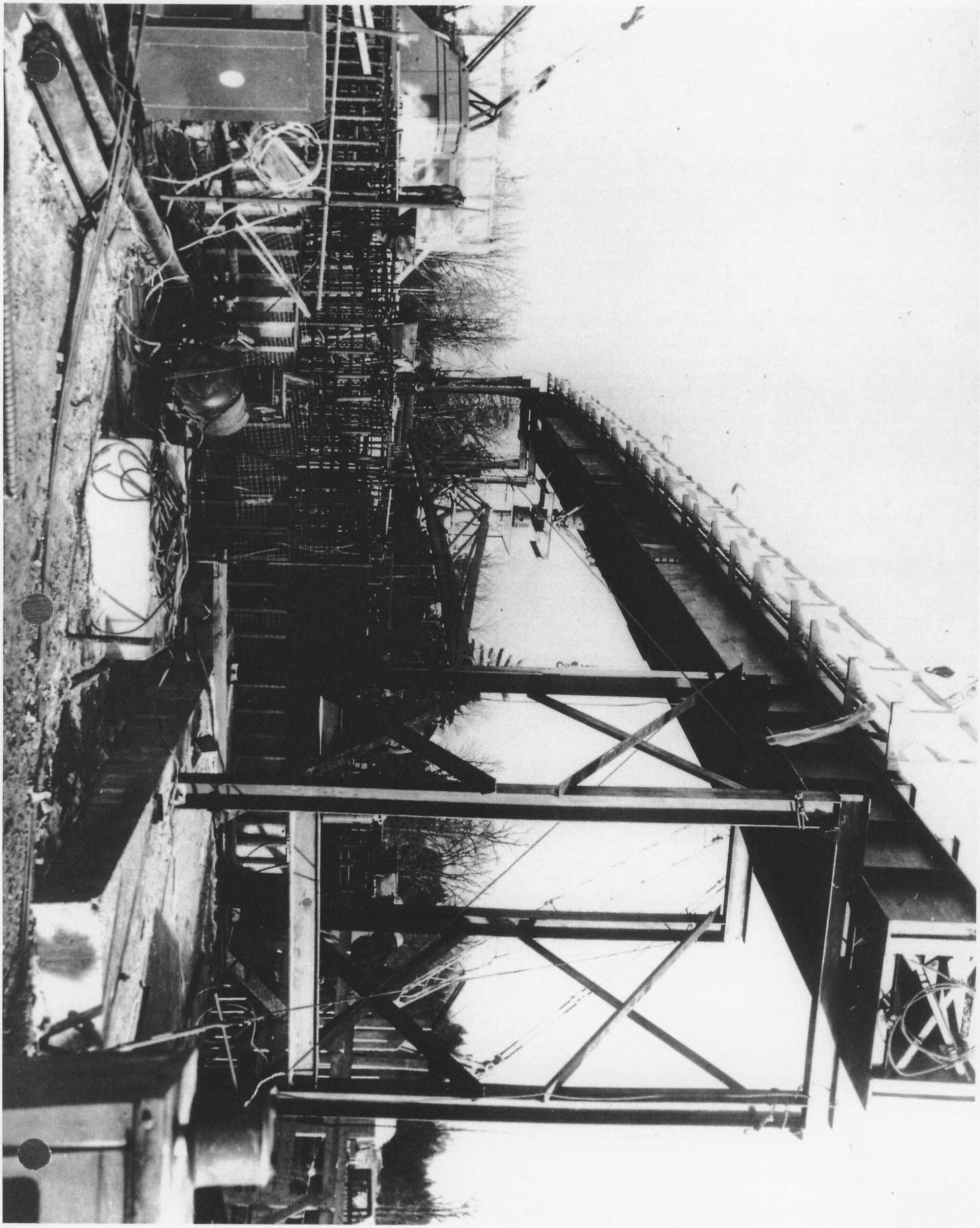
1. Construction

TYPICAL SILO CONSTRUCTION (SITE 1)

Steel Framework

Steel framework and bridging used for supporting pump-crete equipment for pouring concrete silo walls.

Reinforcing is shown in place for curtain wall. Forms are being placed for curtain wall in preparation for pouring concrete.



SECTION VII

C. PHOTOGRAPHS

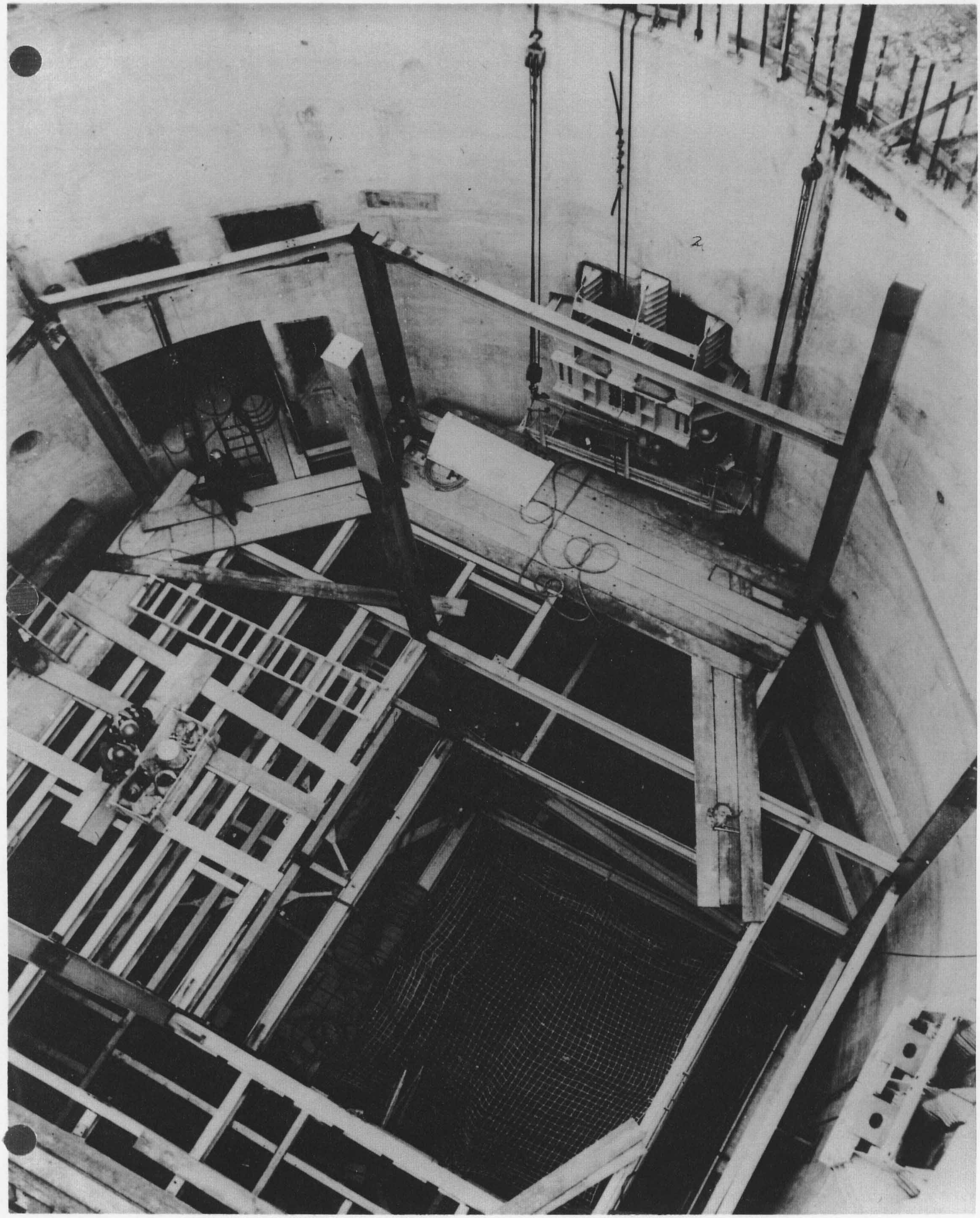
1. Construction

TYPICAL SILO CONSTRUCTION

Crib steel shown completed to Level 2 and stringers to Level 1. Note safety net in missile shaft area.

At upper right of photo shock hanger brackets being bolted to shock hanger insert plates.

At upper left opening to LCC Tunnel with openings for exhaust duct to exhaust shaft immediately above.



SECTION VII

C. PHOTOGRAPHS

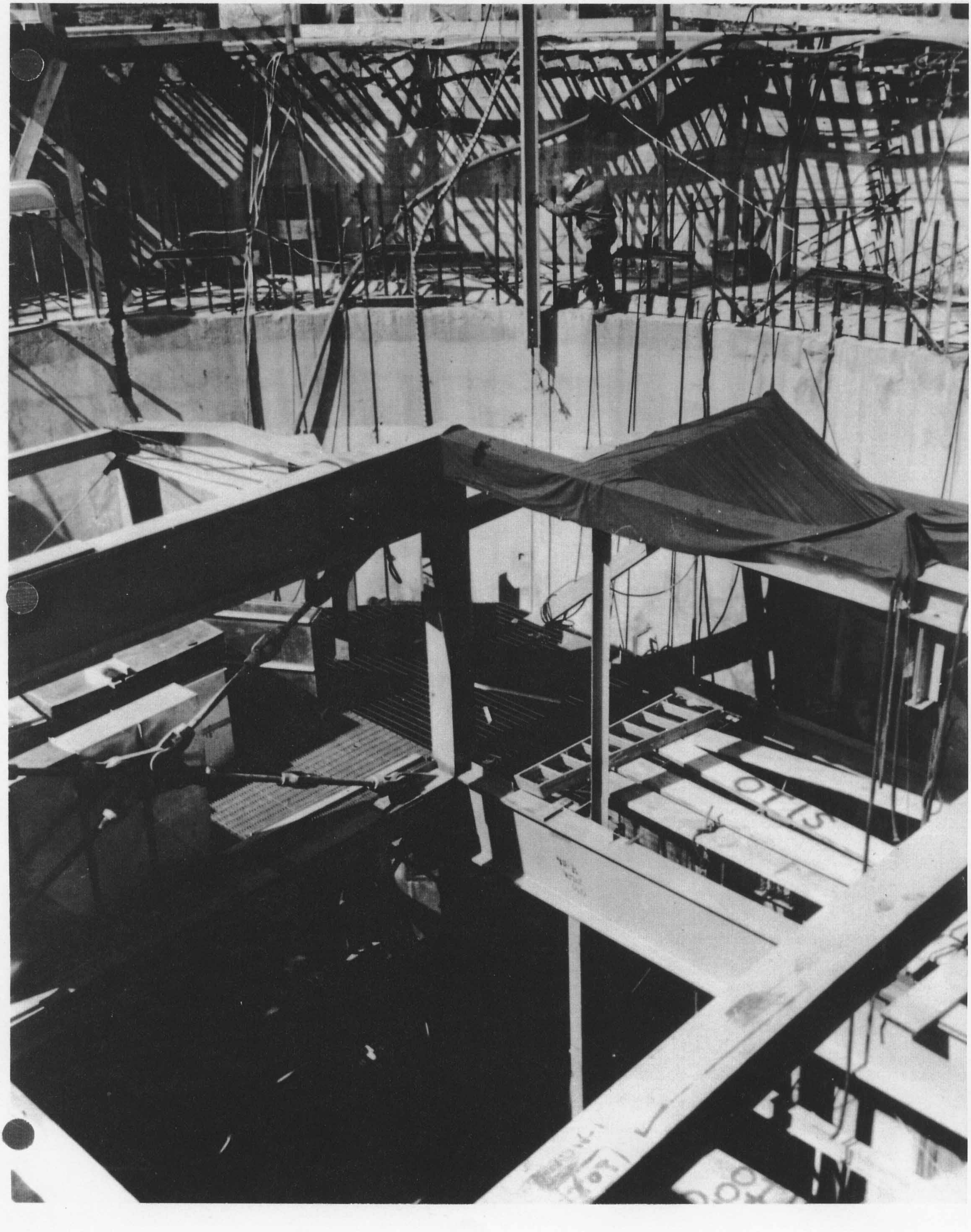
1. Construction

TYPICAL SILO INSTALLATION

Crib steel topped out at Level 1.

Recess with reinforcing bars protruding and wall at back is the curtain wall, the recess provides bearing for the concrete silo cap.

No. 15


OTIS

SECTION VII

C. PHOTOGRAPHS

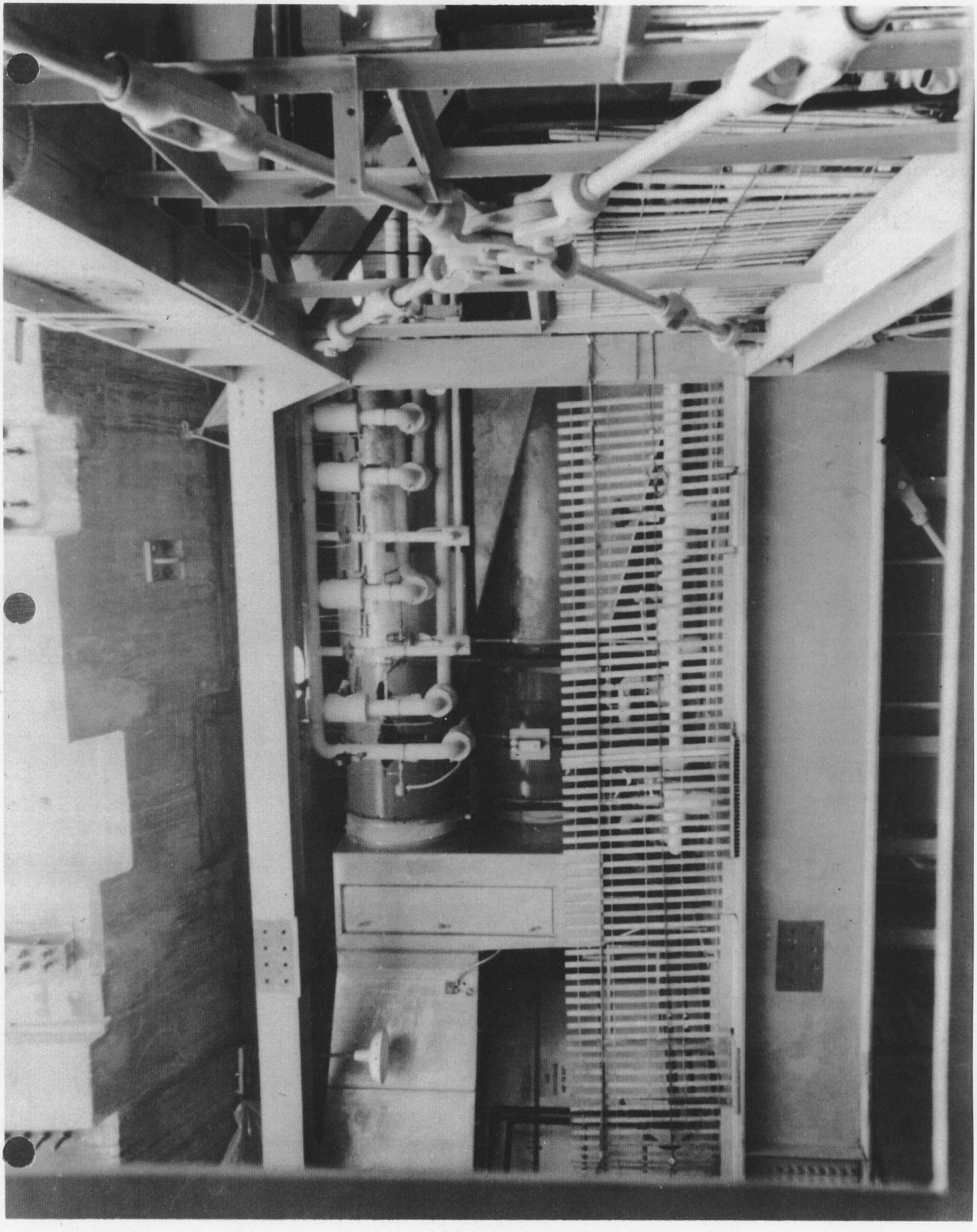
1. Construction

TYPICAL SILO INSTALLATION

Silo Interior

Crib steel at top level looking across missile opening, underside of silo concrete cap. Note heavy rod across bracing and turnbuckles at side of missile opening.

At background large piping is for dust collector and air washer system, smaller piping is water supply for spray nozzles in air washer system.



SECTION VII

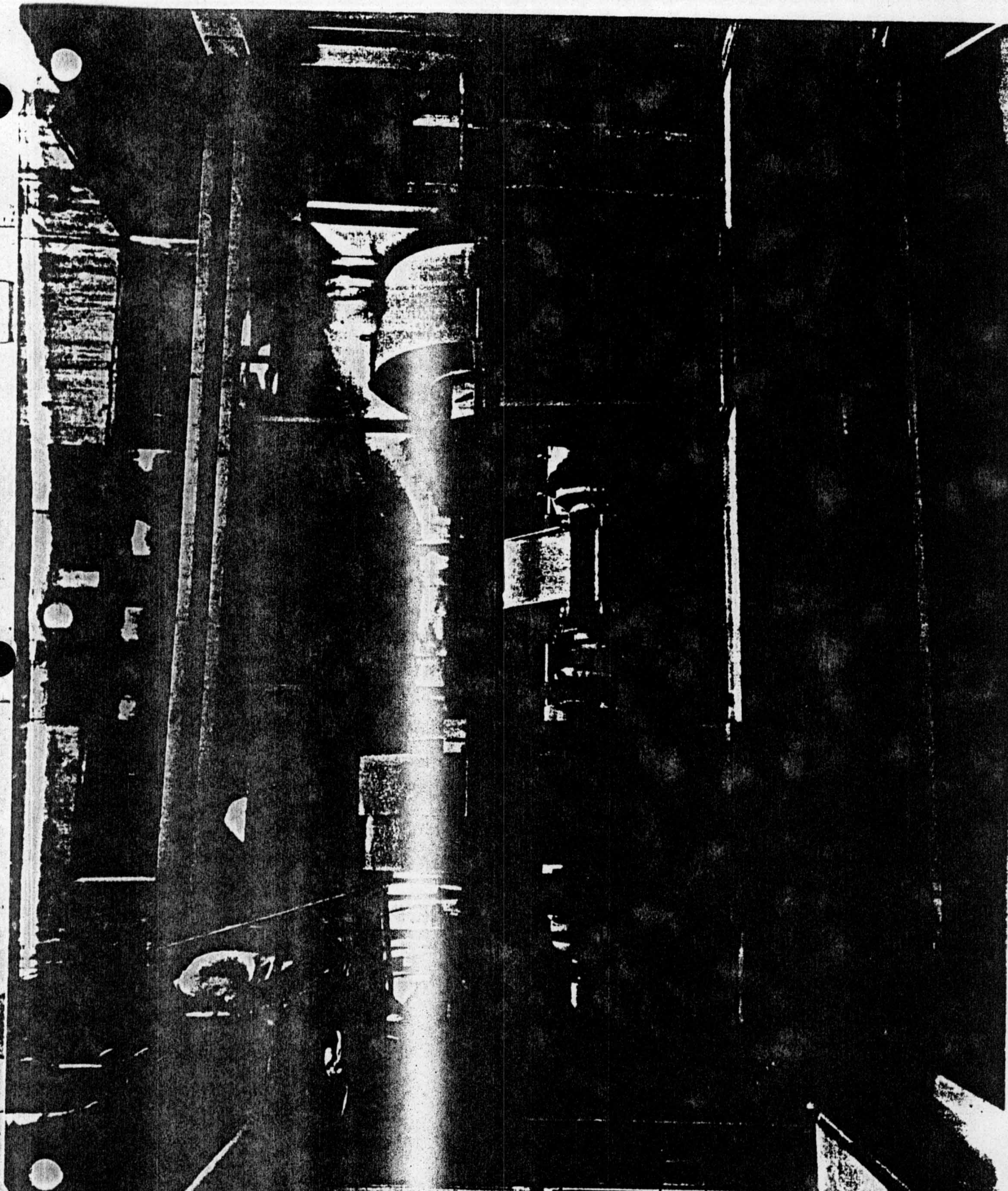
C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION
LEVEL 1

In foreground, Government furnished property, the Launch Platform Drive Mechanism. In the background, air supply duct system and flexible connection to concrete silo. Personnel elevator doors shown at left of picture.

No. 17



SECTION VII

G. PHOTOGRAPHS

1. Construction

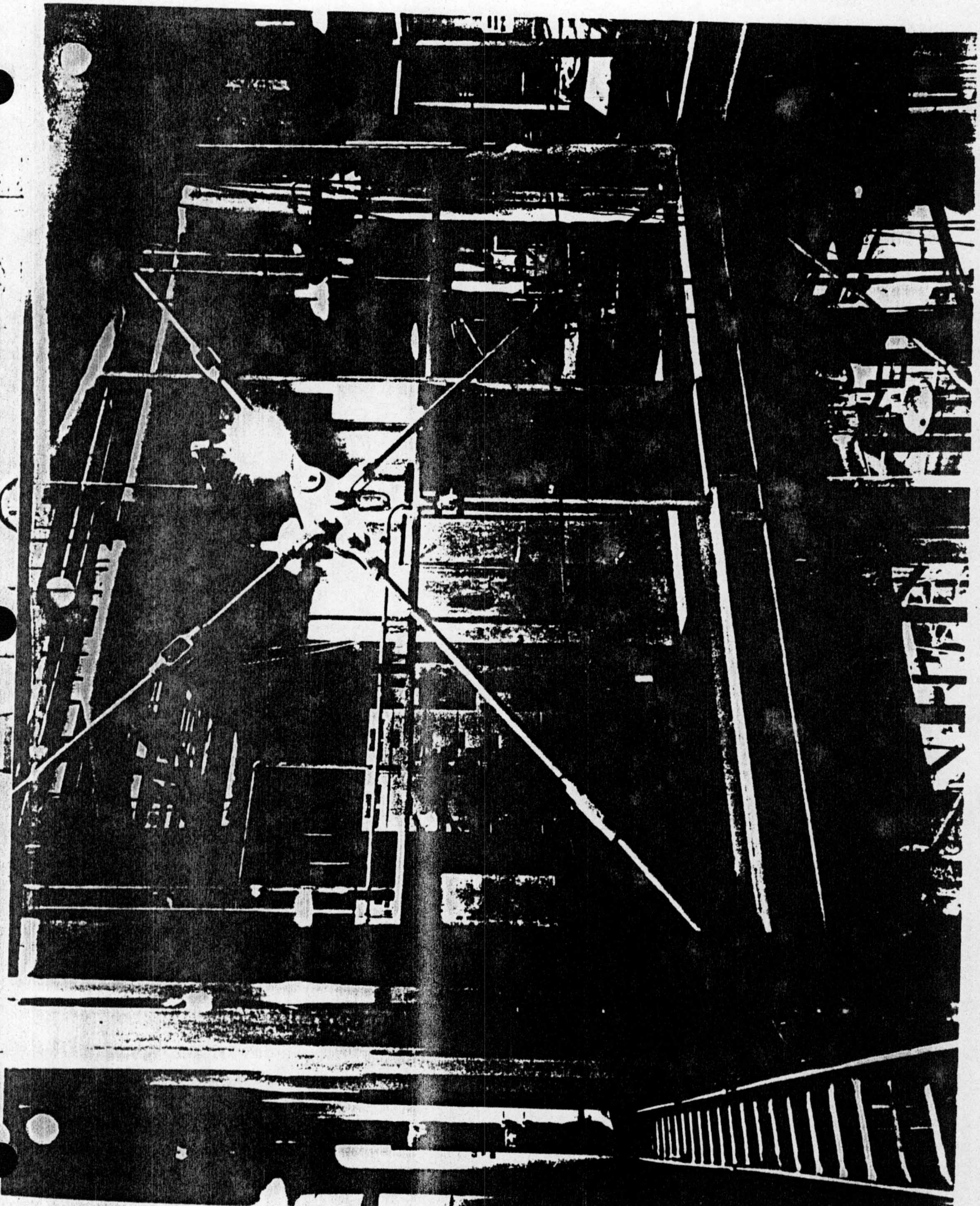
TYPICAL SILO INSTALLATION

Level 2, showing Motor Control Center. This panel is the Main Control of all motors throughout the silo.

At right of Motor Control Center is the Exhaust Air Plenum chamber for Ventilation System.

Mounted on Column "K" at right are the Emergency Lights and Public Address System.

Cable trays are shown at left of missile opening.



SECTION VII

C. PHOTOGRAPHS

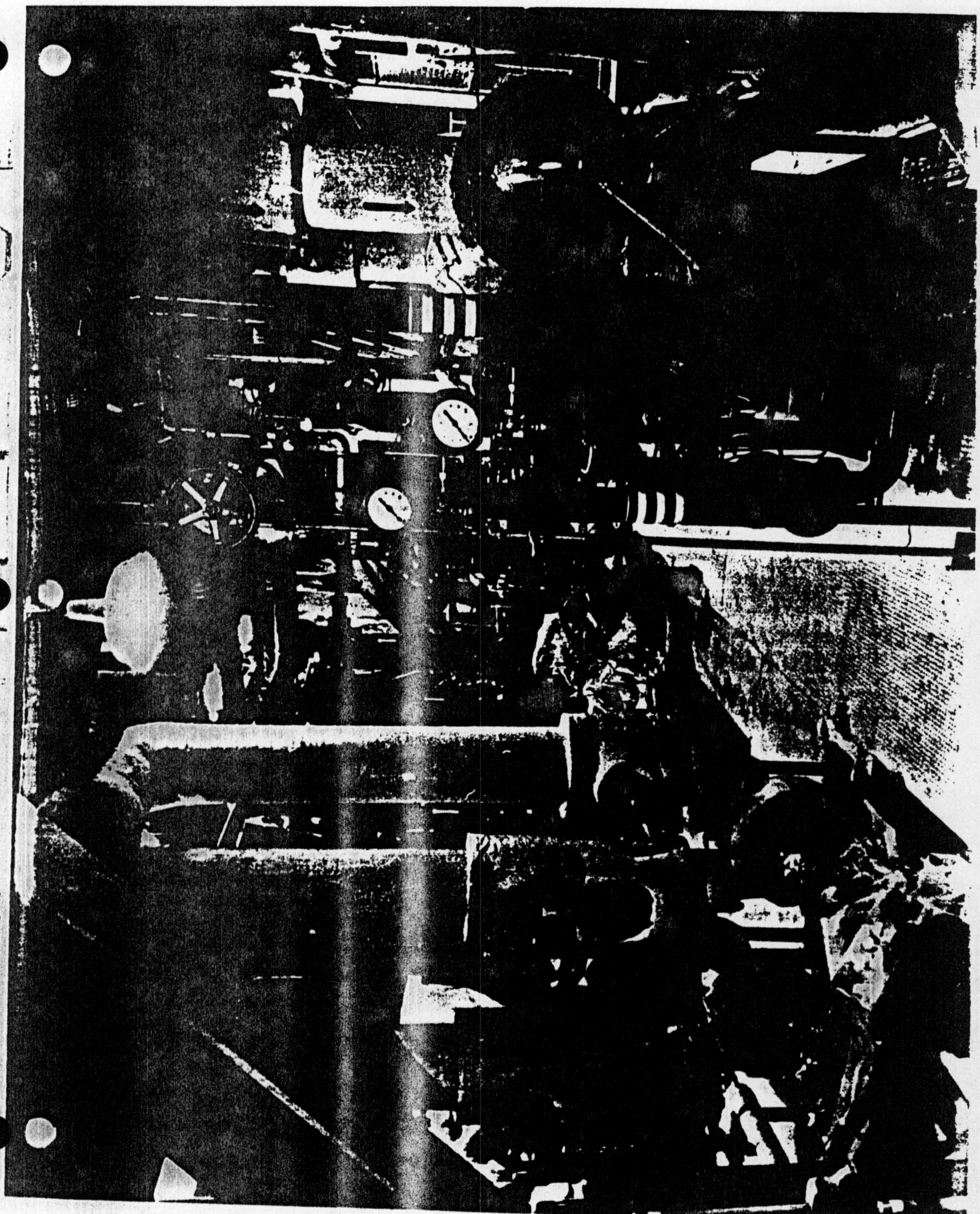
1. Construction

TYPICAL SILO INSTALLATION

Level 4 showing pumps, valves, and circulation pipes for water chiller.

The compact arrangement of motors, pumps, valves, controls, control panel, electrical conduit and lighting, and appurtenant work within the confined work area and narrow passageway indicated the difficulty of accomplishing the installation of the various items. Close coordination between the various trades was required, however, interference became inevitable between workmen involved in placement of electrical items, pipe fitting trades and controls.

A normal construction project as a rule allows easy access to the work area, and the areas usually contain adequate room to permit installation of the equipment, etc. In Atlas Missile construction access to the areas is limited and confined as indicated by this photograph and accompanying interior photographs.



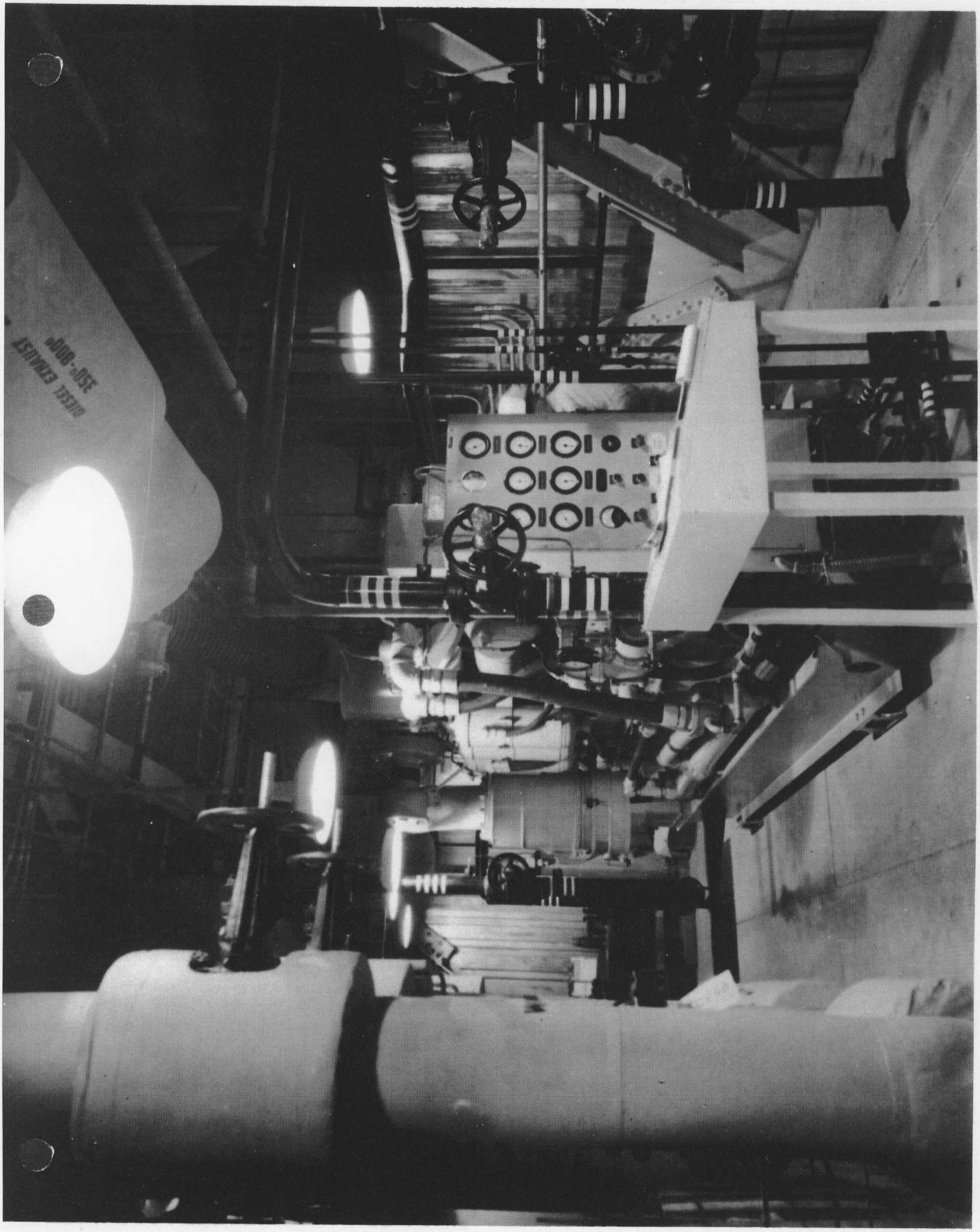
SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION

Level 5, showing Diesel Electric Generator and Control Panel. Note flexible connection for exhaust above generator and over control panel, the insulated exhaust heat exchanger. The two tanks above at left are oil supply tanks for diesel.


DIESEL EXHAUST
320°-800°

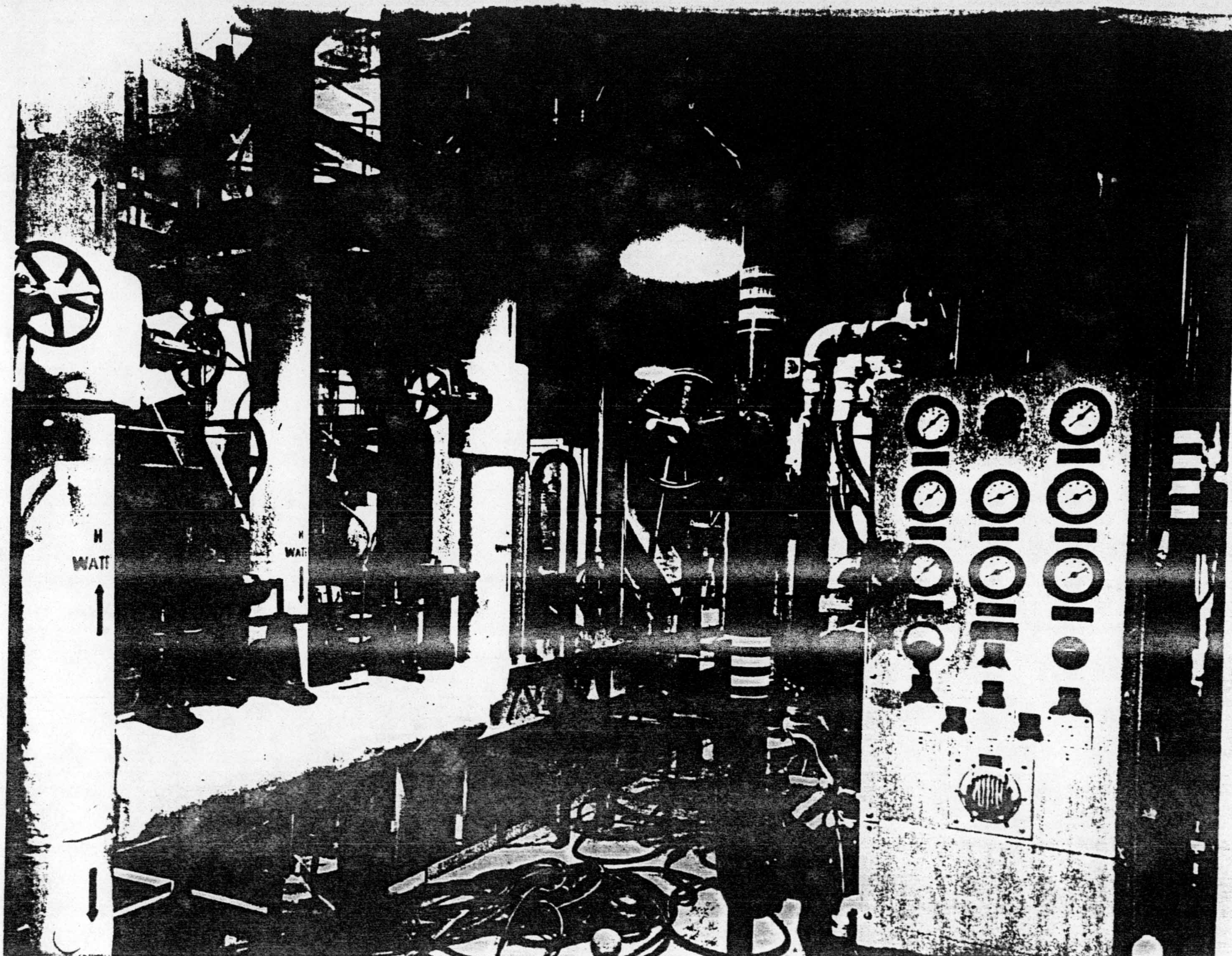
SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION
LEVEL 5

Close-up of Control Panel for Diesel Electric Generator Set. View of Insulated Hot Water Piping and Control Valves.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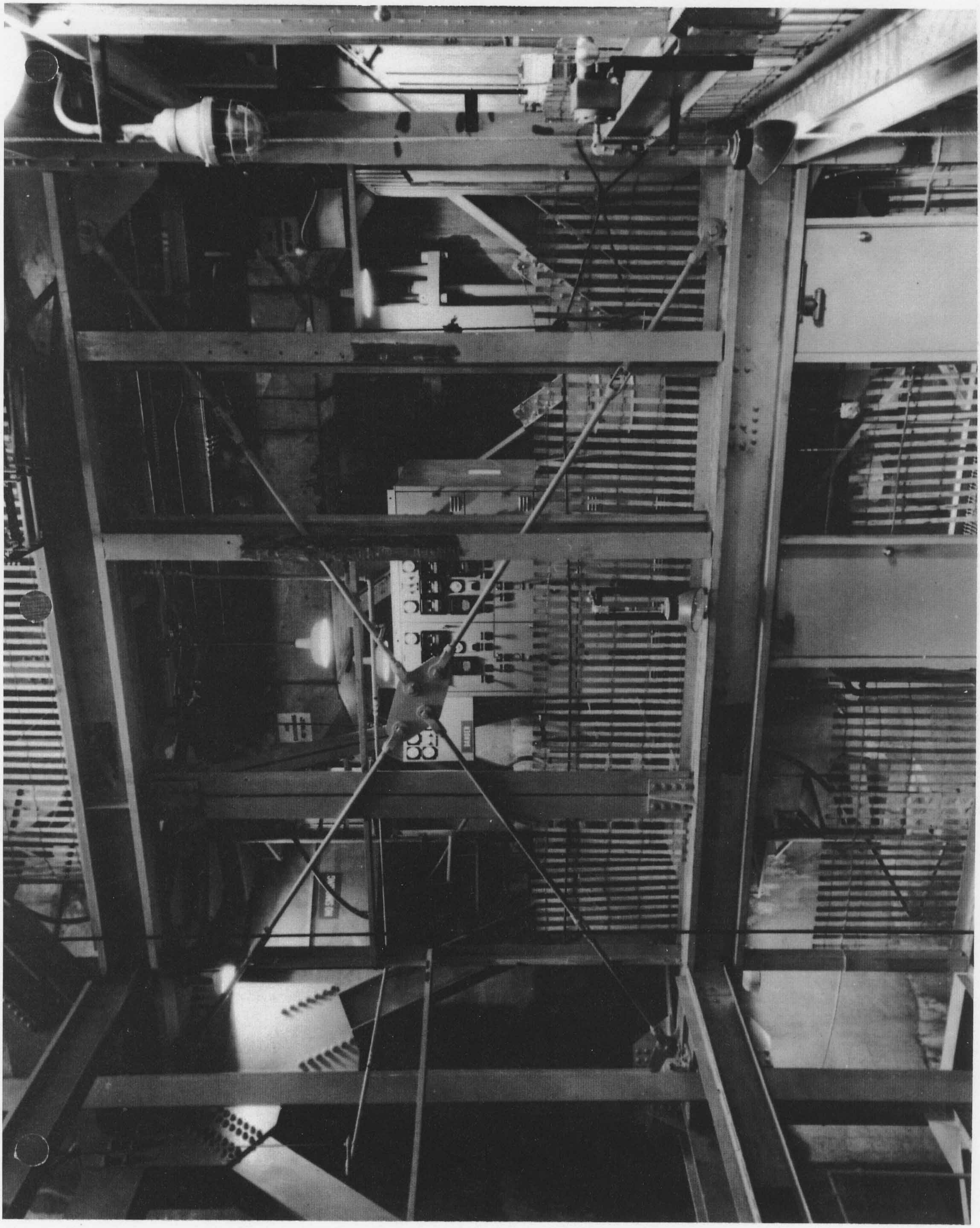
SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INTERIOR

Looking across opening for Missile, in background switch gear at Level 5, Government furnished equipment circular stairway at left of switch gear. In right background may be seen a portion of the shock hanger suspension system. Light fixtures are explosion proof.



SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION

Level 6

Across missile opening at top, showing Diesel Electric Generator Prefab.

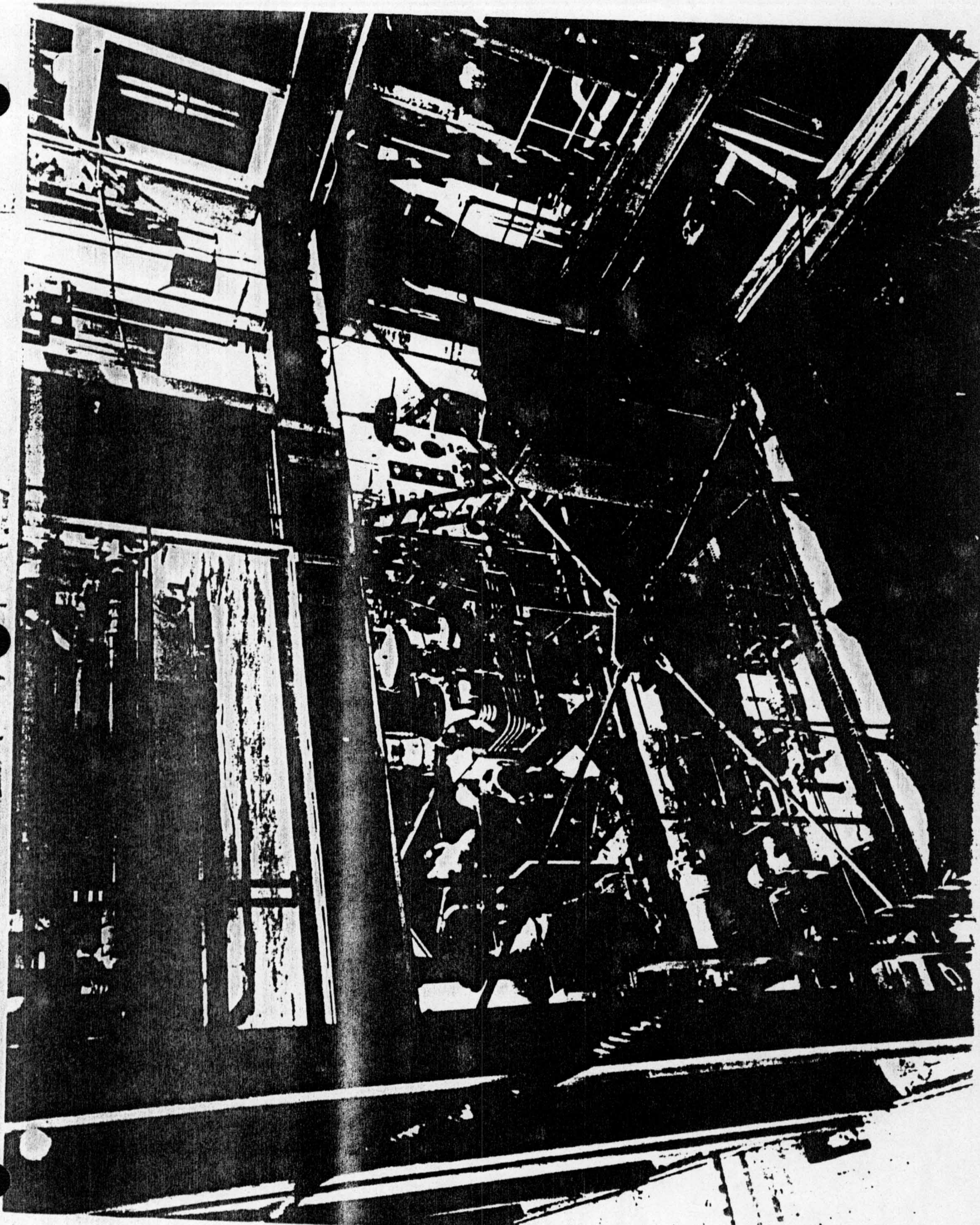
Level 7

At lower level, in foreground, the LOX Control Prefab, LOX Fill Prefab and Interconnecting Piping.

At right of opening a back view of Gas Detection Unit.

At left background a portion of Sphere Instrument Prefab, and to right the Pressurization Prefab Controls with Instrument Panel.

Note safety net in missile shaft.



SECTION VII

C. PHOTOGRAPHS

1. Construction

TYPICAL SILO INSTALLATION

LEVEL 7

In center of picture, Sphere Instrument Air Prefab, Government-furnished, in right foreground Pressurization Prefab Controls. In back of the sphere, the upright panel is the gas detector safety device.

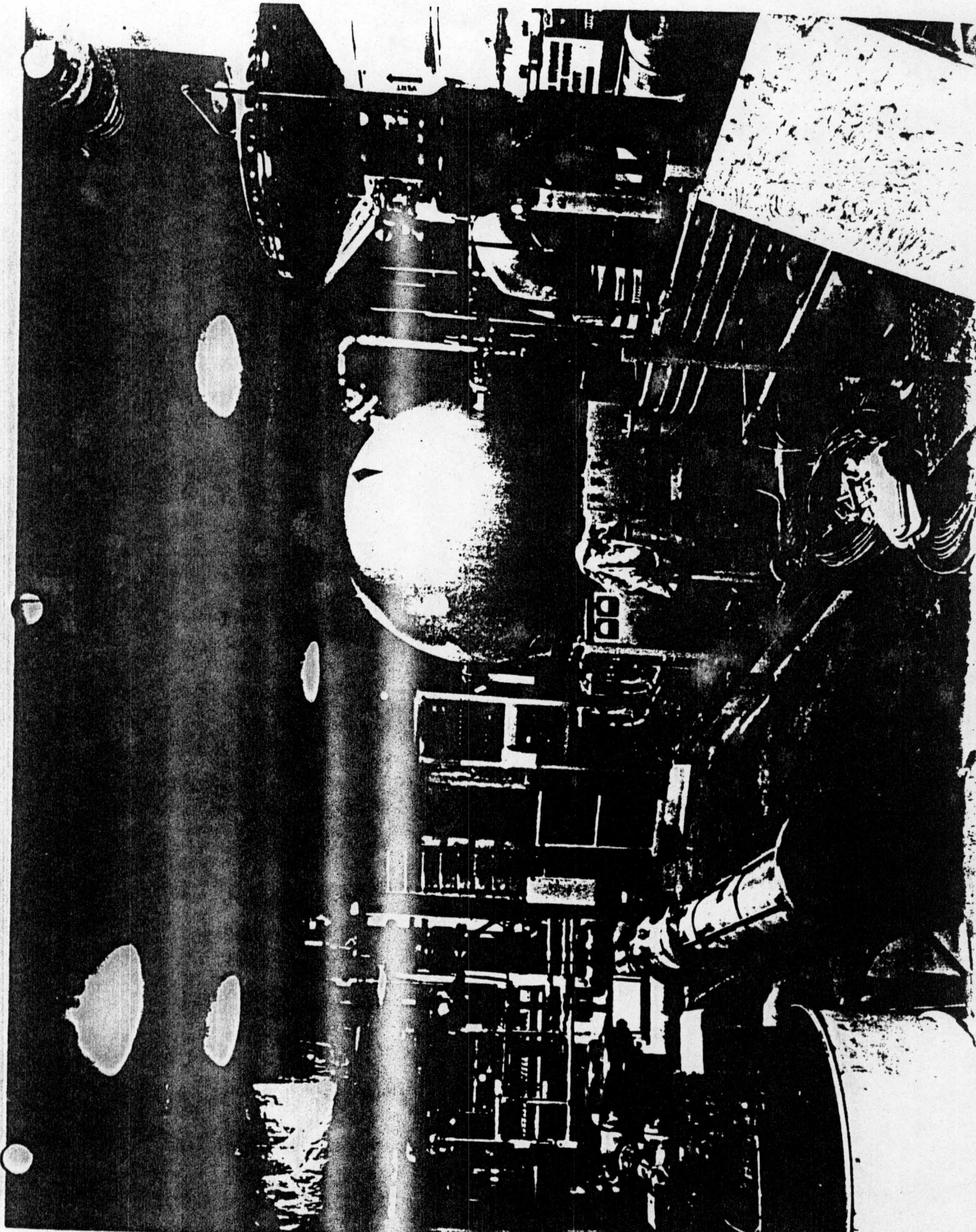
The piping and controls on the left background consist of the LOX Control Prefab, LOX Fill Prefab and Interconnecting Piping.

Also showing:

L-16, Unloading Valve

L-1, Fine Loading Valve

L-2, Main Missile Loading Valve



SECTION VII

C. PHOTOGRAPHS

1. Construction

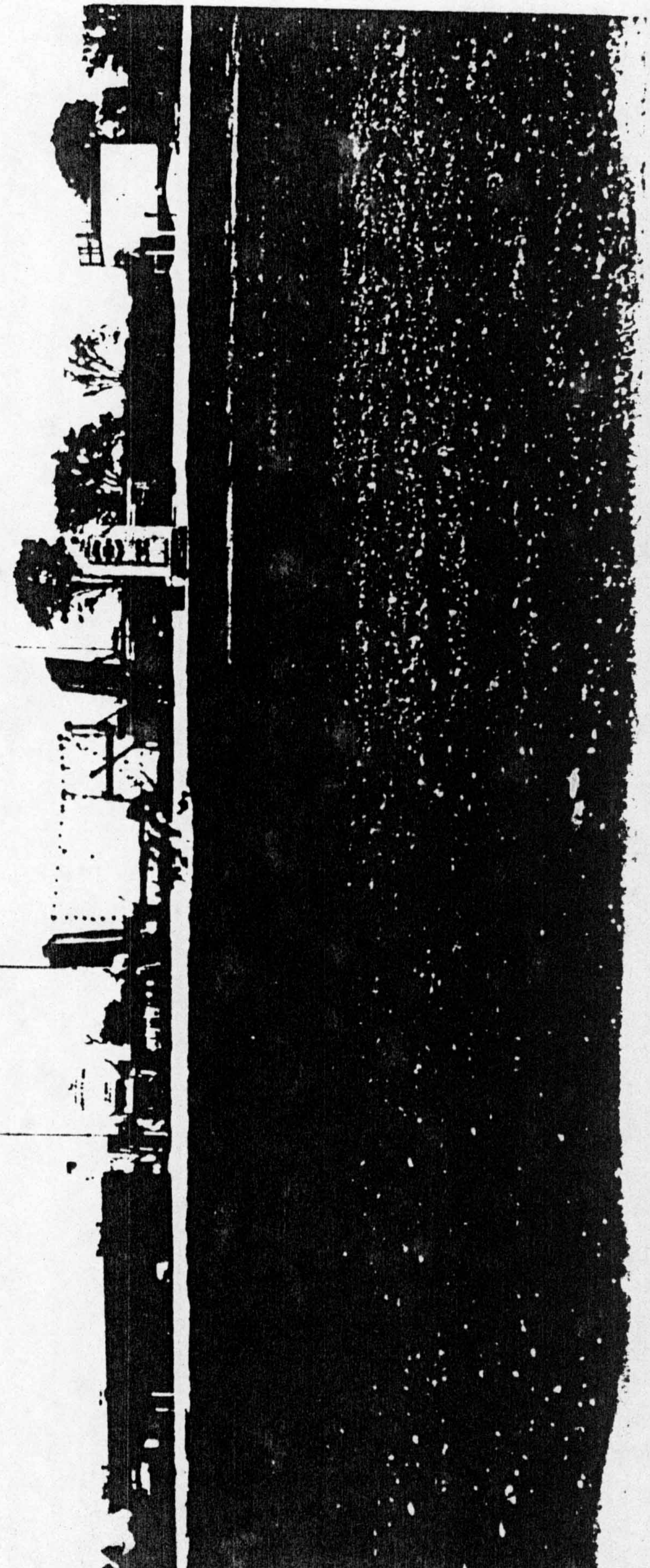
TYPICAL SITE INSTALLATION

In photo, at left, is Government-furnished Liquid Nitrogen trailer (side view).

Behind this trailer can be seen the back end of a Liquid Nitrogen Recharger (painted white), used for rapid vaporization of Liquid Nitrogen and pressurization. Both items of heavy equipment were used in testing the Propellant Loading System.

In center, the huge concrete double doors over missile area in open position, with covering over missile opening, to keep out rain, between the two concrete doors.

At right, water cooling tower structure.



SECTION VII

C. PHOTOGRAPHS

2. Visits - Inspections

Colonel W. W. Wilson, Atlas "F" Director and Contracting Officer for missile projects arriving at Plattsburgh Area on one of his many inspection tours.

In center Brig. General A. Gillem, Commanding Officer, 820th Air Division.

On right, Lt. Colonel Sidney Stern, Area Engineer.

SECTION VII

C. PHOTOGRAPHS

2. Visits - V.I.P. Photo

Lieutenant General E. C. Itschner, Chief of Engineers, U. S. Army discusses missile site progress with Lt. Colonel S. Stern, Area Engineer, at Site 2, during an inspection trip, 20 November 1960.

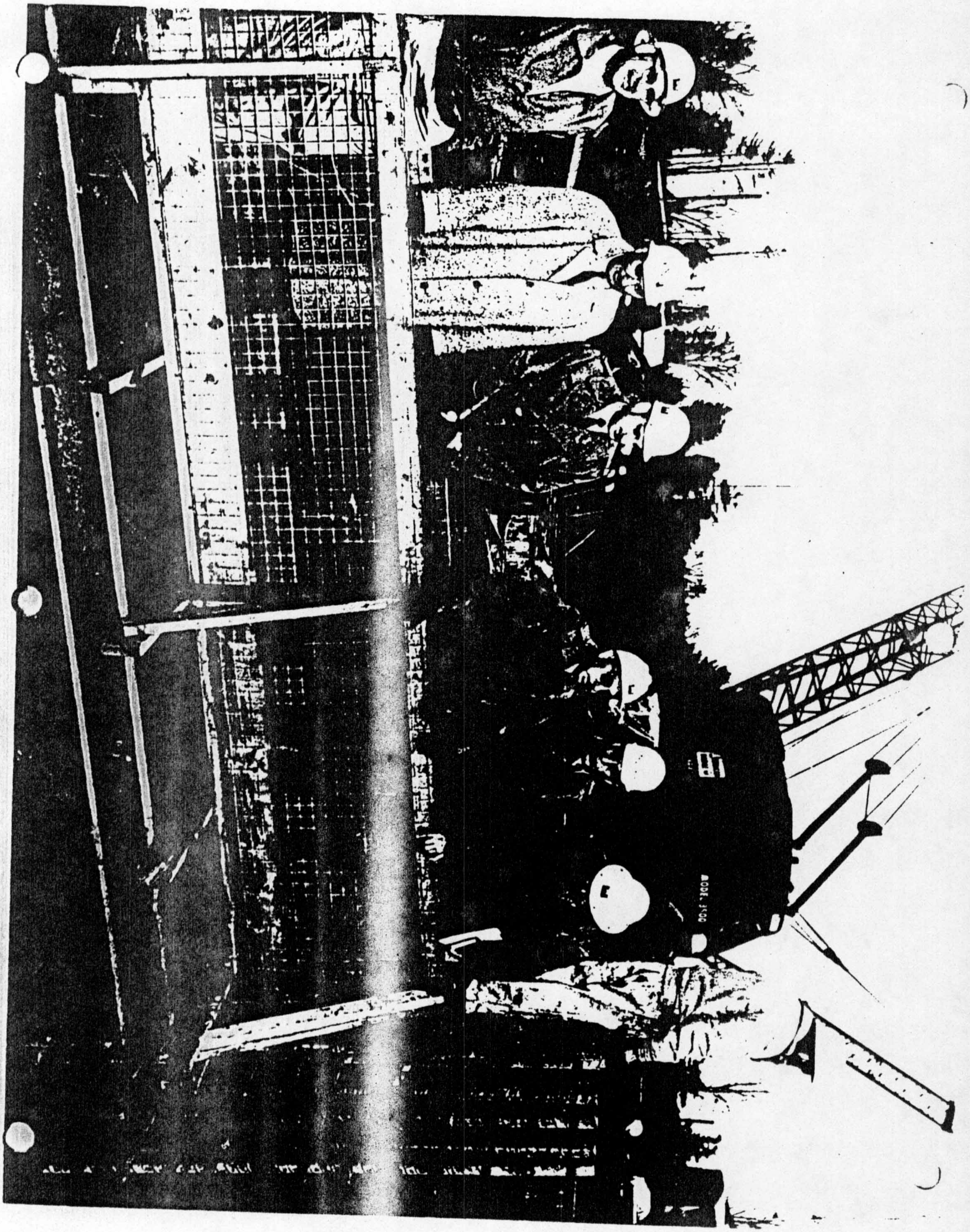
On the General's left is John Metz, Resident Engineer.

From left to right in the photo -

John Gomulka, Inspector, Corps of Engineers

Wm. Jennings, Chief, Construction Branch, Corps of Engineers, Plattsburgh Area, CEBMCO

The General's Aide.



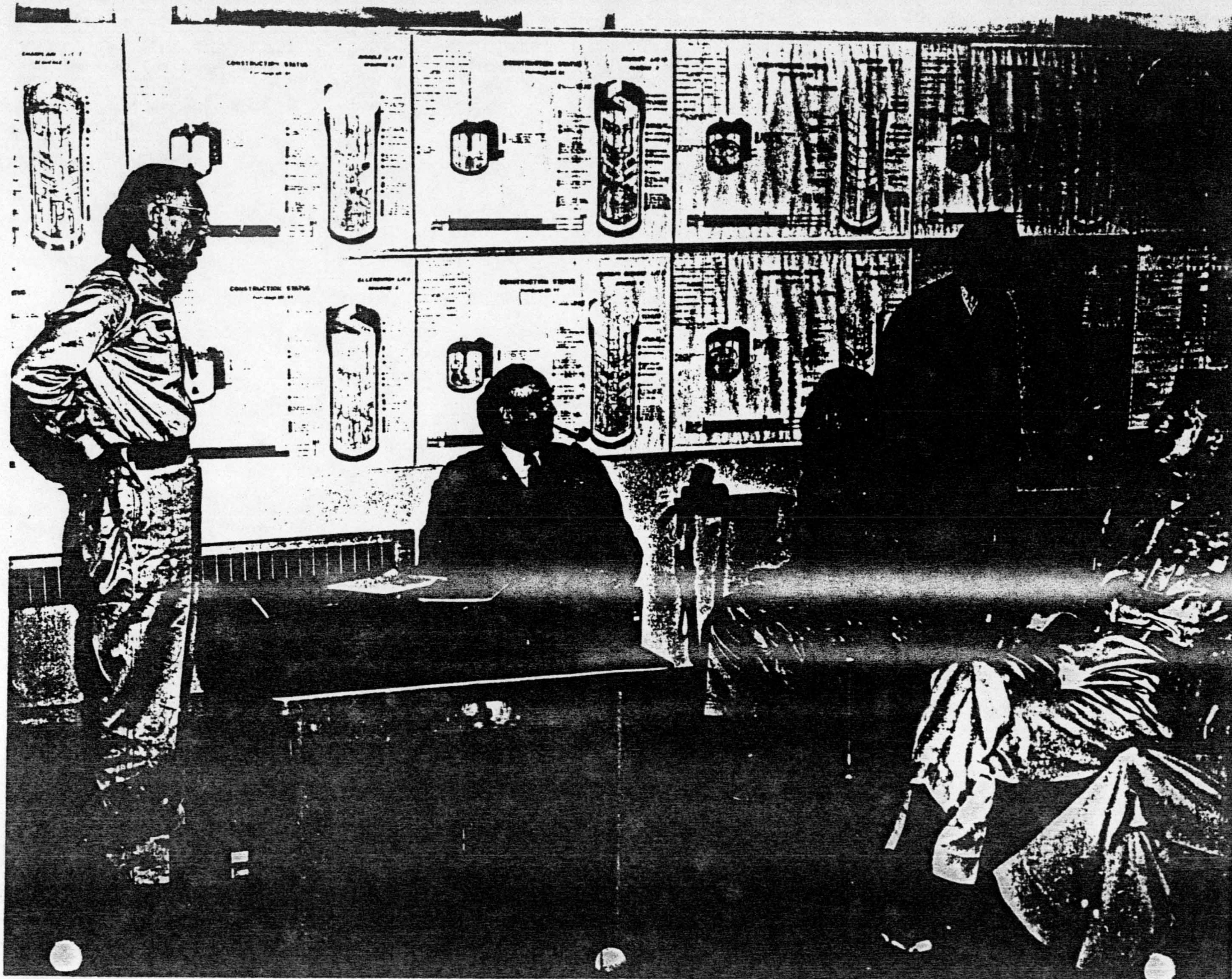
SECTION VII

C. PHOTOGRAPHS

2. V.I.P. Visits

Lt. General Walter K. Wilson, Chief of Engineers, Washington, D. C. (seated at table) and Colonel W. W. Wilson, Corps of Engineers (CEBMCO), Director of the Atlas "F" Program, receiving a briefing by Lt. Colonel L. E. Bremkamp, Area Engineer.

Inspection trip to Plattsburgh Area, 19 July 1961.


CONSTRUCTION STATUS
CONSTRUCTION STATUS
CONSTRUCTION STATUS
CONSTRUCTION STATUS

SECTION VII

C. PHOTOGRAPHS

2. V.I.P. Visits - Inspections

16 September 1960

French Army Engineers being briefed by Lt. Colonel S. Stern, Area Engineer, French Army Engineers, part of the Military Assistance Program Orientation Tour for France, Group V-61.

Seated at First Table:

Lt. General Rodolphe Le Grande, Inspector General, Corps of Engineers, French Army

Major General Robert M. Thuaire, Chief, French Army Engineers.

Second Table:

Lt. Colonel Pierre G. Martin, Engineers Section, French Army

Third Table (in rear):

Mr. J. Trolier, Assistant Area Engineer

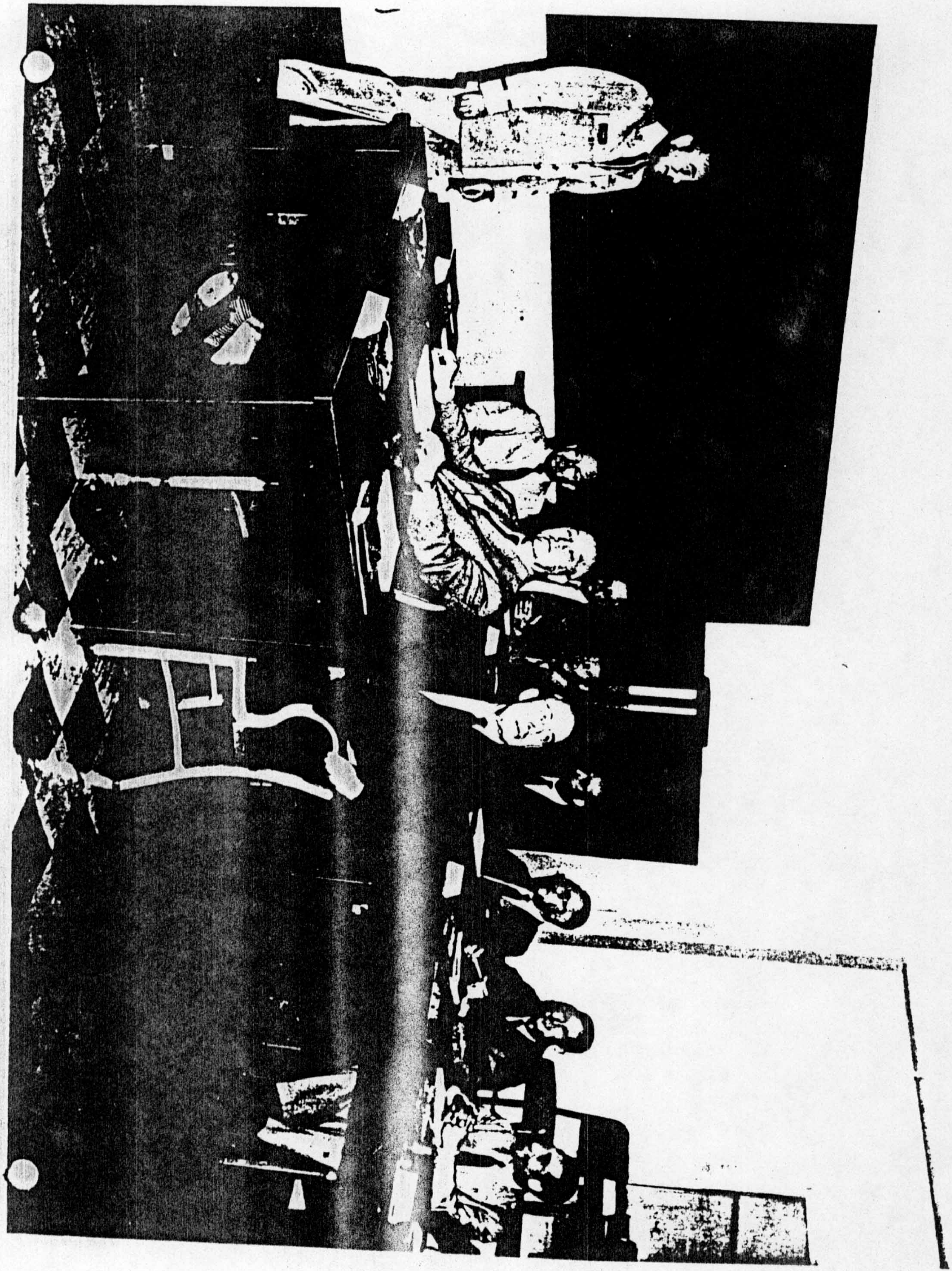
Colonel Pierre A. Dupont, Deputy Commander, Engineer School Angers, French Army

Mr. Leland Logan, Chief, Engineering and Technical Branch

Major Jean E. Lartigue, Chief of Section, Construction Office, French Army Engineers

Mr. E. Govern, Chief, Contract Administration Branch

Mr. H. Elliott, Chief, Administration Branch



SECTION VII

C. PHOTOGRAPHS

2. V.I.P. Visits

19 July 1961, Inspection Missile Facilities, Plattsburgh Area, Luncheon at the Officers Club Plattsburgh Air Force Base.

Left to right:

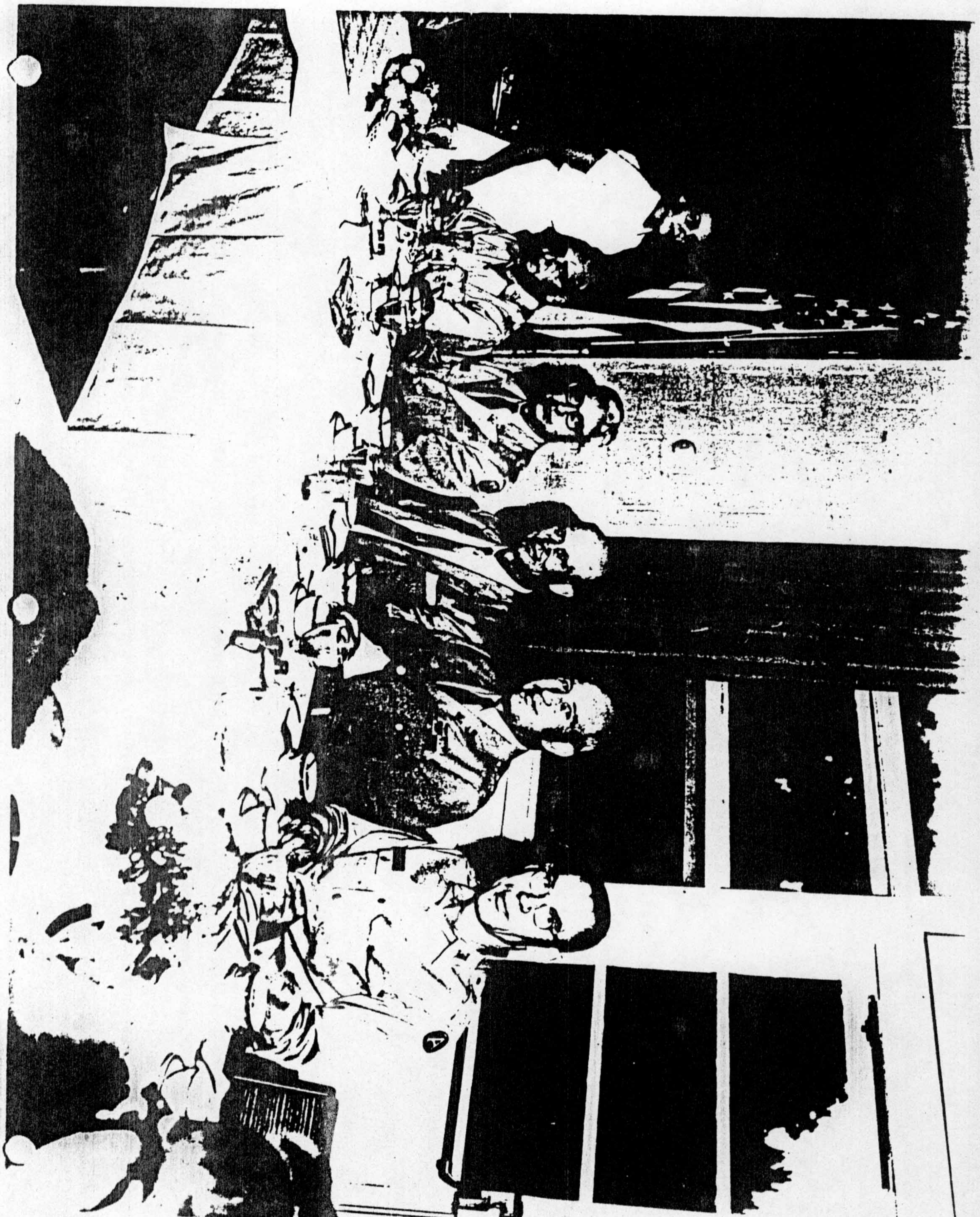
Col. F. Koisch, Military Construction, O.C.E.

Brig. Gen. T. Lipscomb, U. S. Army, C. E. Division Engineer, N.A.D.

Mr. H. C. Boschen, President, Raymond-Kaiser-Macco-Puget Sound

Lt. General W. K. Wilson, U. S. Army, C. E., Chief of Engineers

Lt. Col. L. E. Bremkamp, U. S. Army, C.E., Area Engineer, Plattsburgh Area



SECTION VII

C. PHOTOGRAPHS

2. Visits

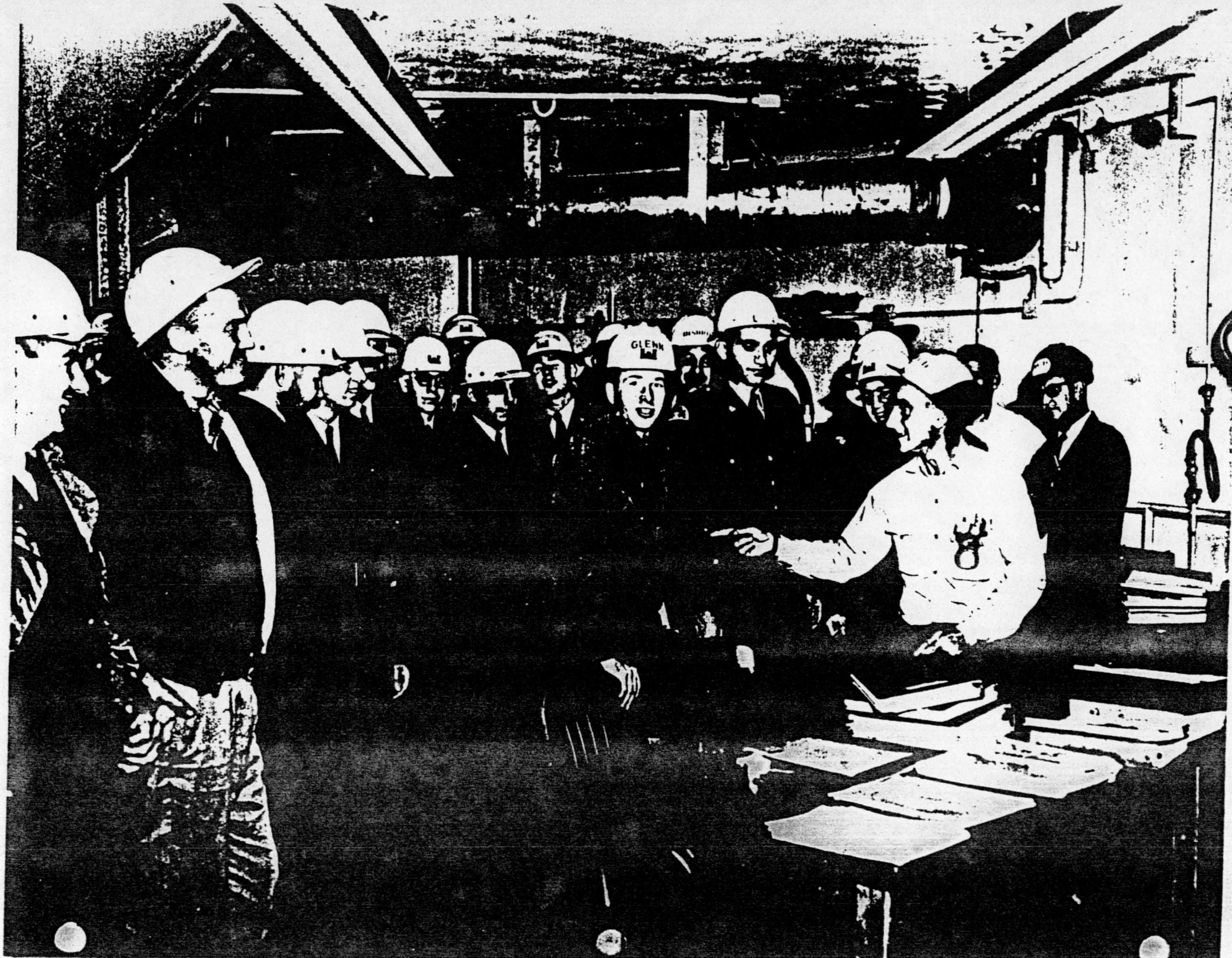
LCC SECOND FLOOR, SITE 5

Major R. A. Glenn, C.E. Military Assistant to the Area Engineer (center of photo) conducts a group of R.O.T.C. Cadets on a tour of the Missile Sites.

A representative of General Dynamics gives a briefing on optics.

The cadets are from Brooklyn Polytechnic Institute, New York. The tour occurred in October, 1961.

In the left foreground of the photo is Captain Vincent Cuneo, C.E., Senior Officer in Charge of the cadets from Brooklyn. Next is Robert Ramsdell, Resident Engineer, C.E. for Site No. 5.


GLENN

SECTION VII

C. PHOTOGRAPHS

3. Conferences.

Pre-Construction Conference Photo No. 3 - 1

Contract DA-30-075-eng-9522, Ballistic Missile Contract at Area Engineer's Office, Plattsburgh Air Force Base.

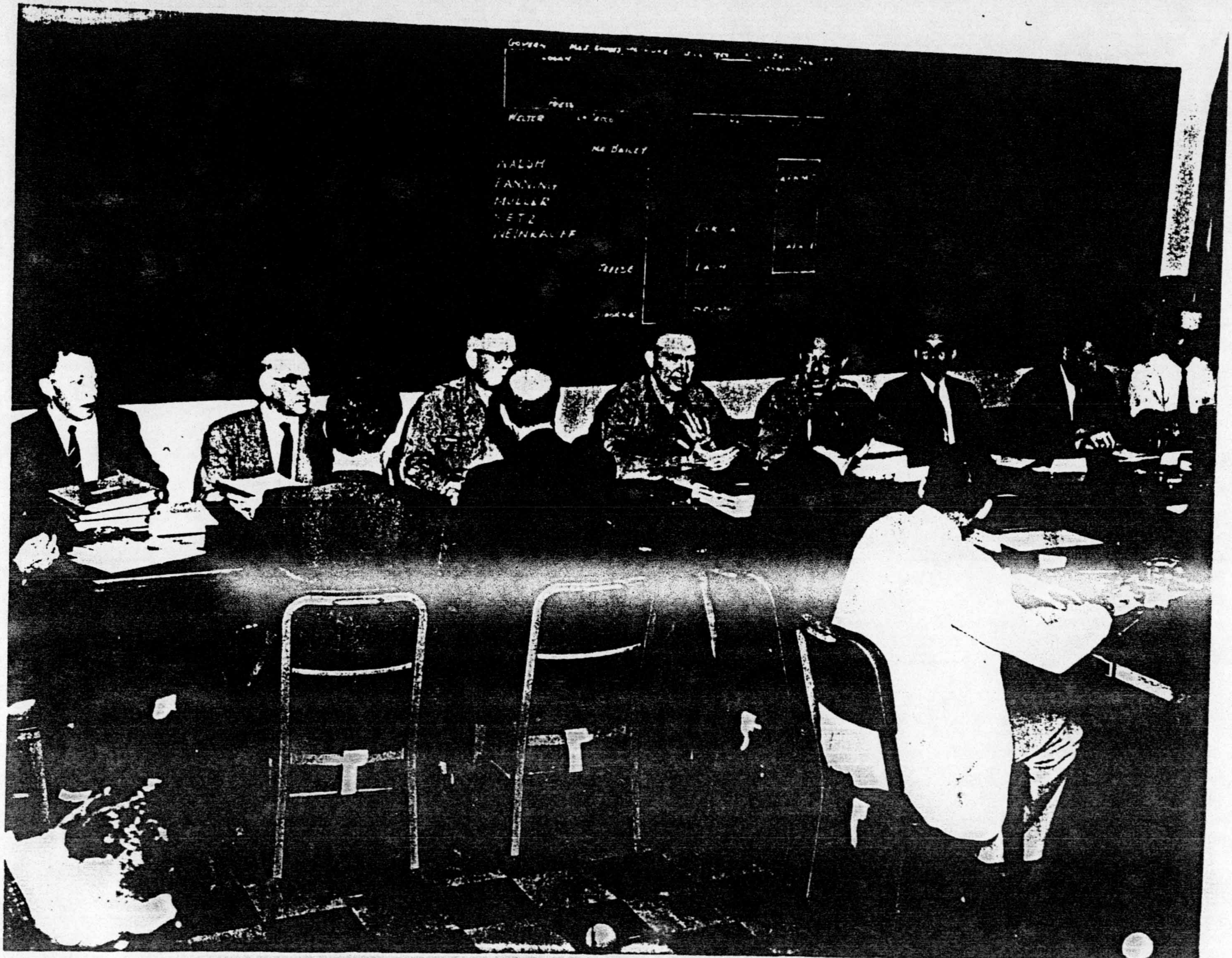
Pre-Construction Conference with representatives of Raymond-Kaiser-Macco-Puget Sound, 17 June 1960.

Colonel C. M. Duke, Corps of Engineers, New York District Engineer, Presiding.

Mr. G. W. Bailey, Vice President RKMP, Contractor's Representative.

Lt. Colonel S. Stern, Corps of Engineers and members of his staff.

New York District Representatives, Air Force, AFBMD Representatives.


WALSH
MULLER

SECTION VII

C. PHOTOGRAPHS

3. Conferences

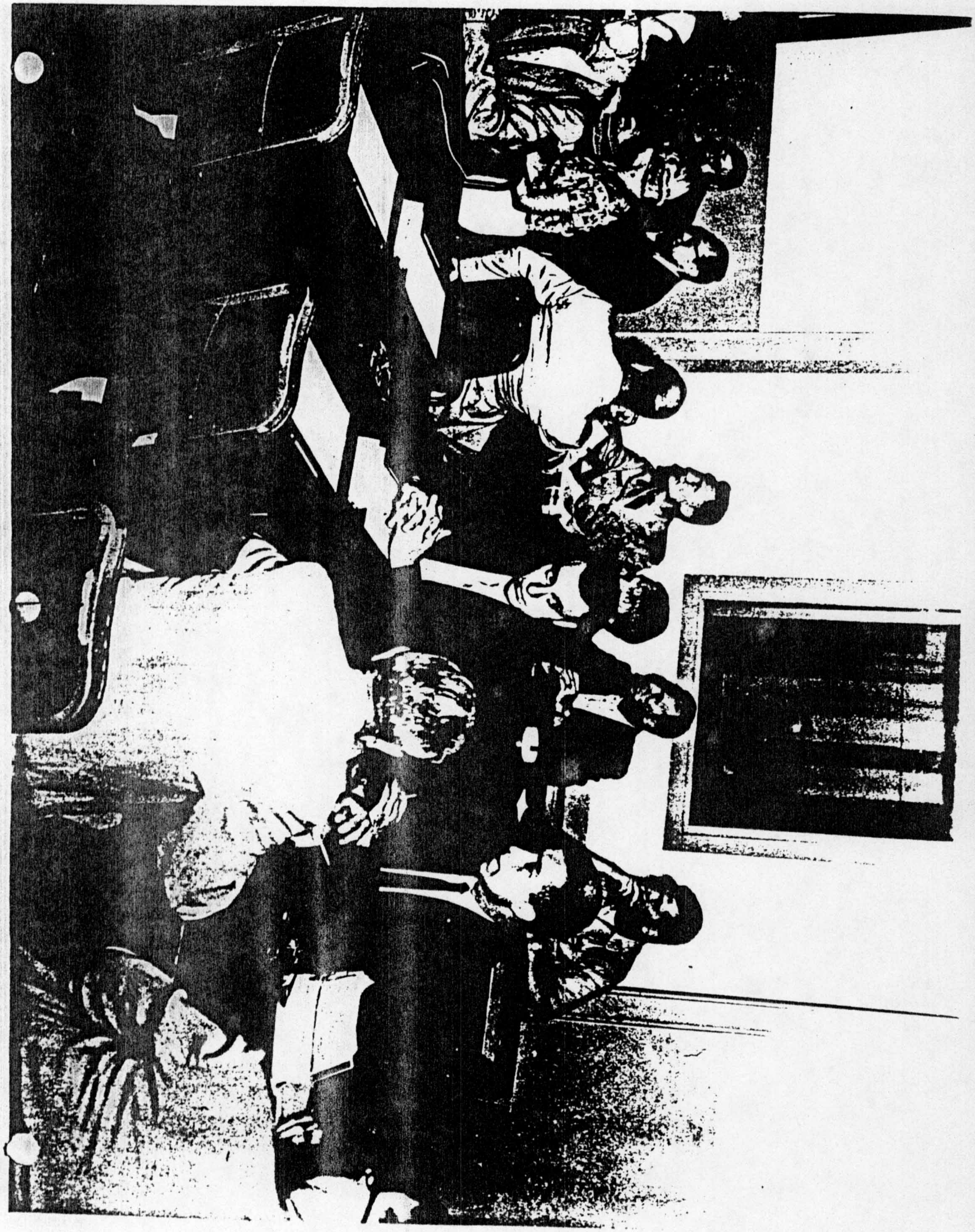
Pre-Construction Conference Photo - No. 3 -2

Contract No. DA-30-075-eng-9522

Pre-Construction Conference with Contractor, Raymond-Kaiser-Macco-Puget Sound.

At far table - Representative of Air Force, AFBMD Field Office, Plattsburgh, New York, Misitary and Civilian.

At near table - Mr. E. W. Simpson, Project Manager for the contractor, and representatives of New York District and Area Engineer, Plattsburgh.



SECTION VII

C. PHOTOGRAPHS

3. Conferences

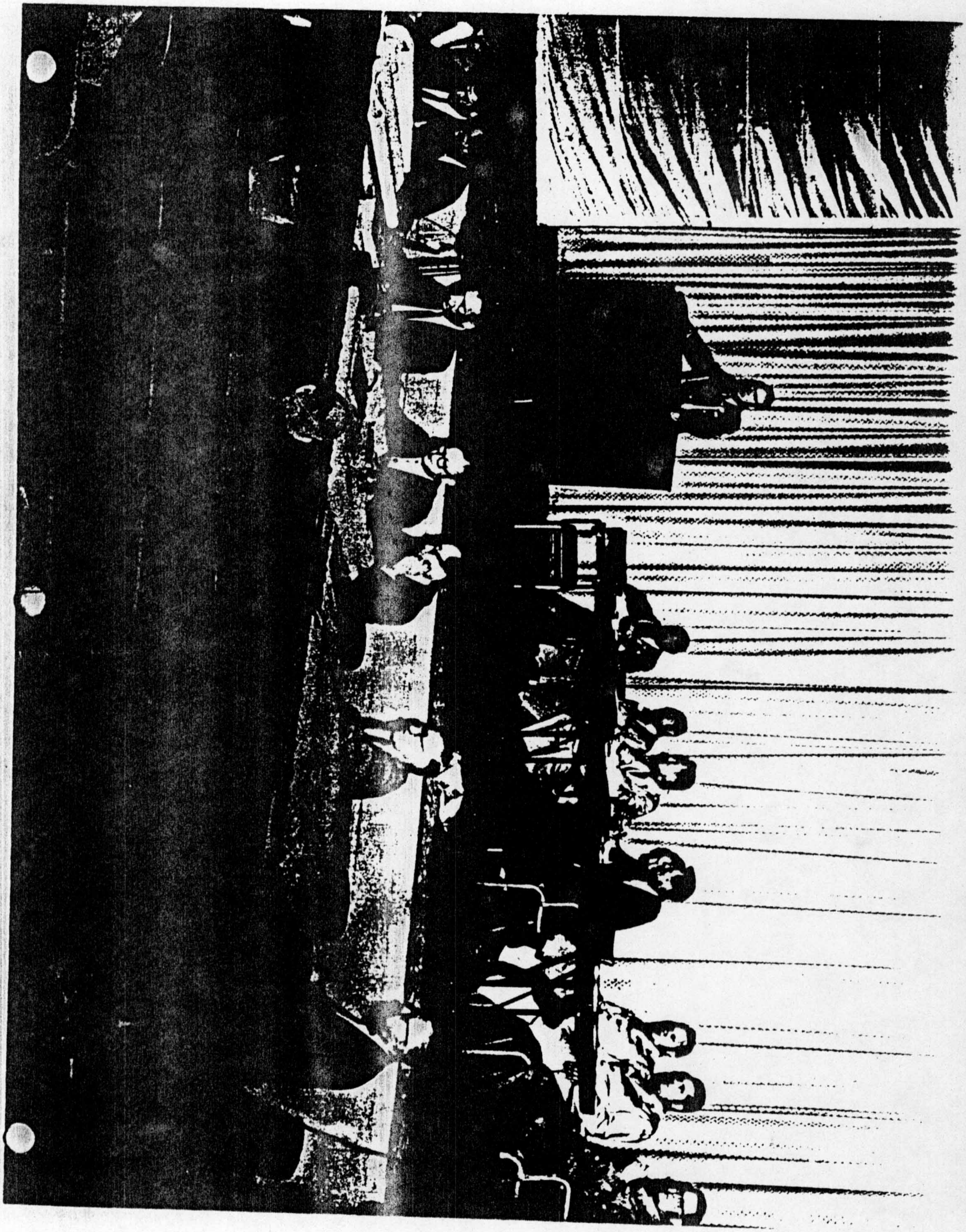
Pre-Bid Conference - Photo No. 3 -3

Contract DA-30-075-eng-9522, Pre-Construction Conferences held in the Base Theater Building at Plattsburgh Air Force Base, 0900 hours 24 May 1960 - See Section IV, Paragraph a-1, Pre-Construction History.

This conference was held to provide information to contractors and suppliers interested in bidding on the missile project.

On the stage, presiding over the meeting, is Colonel Charles M. Duke, Corps of Engineers, New York District Engineer. At the table representatives of the Corps of Engineers and U. S. Air Force, Ballistic Missiles Division of Inglewood, California and Plattsburgh Field Office. Lt. Col. S. Stern, Area Engineer, Corps of Engineers, is seated at the table, far left.

At the table below the stage, representatives of the Corps of Engineers, civilians, preparing answers from the plans and specifications in response to contractors questions. Mr. C. Panish, Chief of Engineering, New York District Office is seated at the table at right end, and next, Mr. L. Logan, Chief of Engineering and Technical Branch, Area Engineer's Office, Others are representatives of the New York District Office, experts in the field of Engineering, specifications and Contract Administration.



SECTION VII

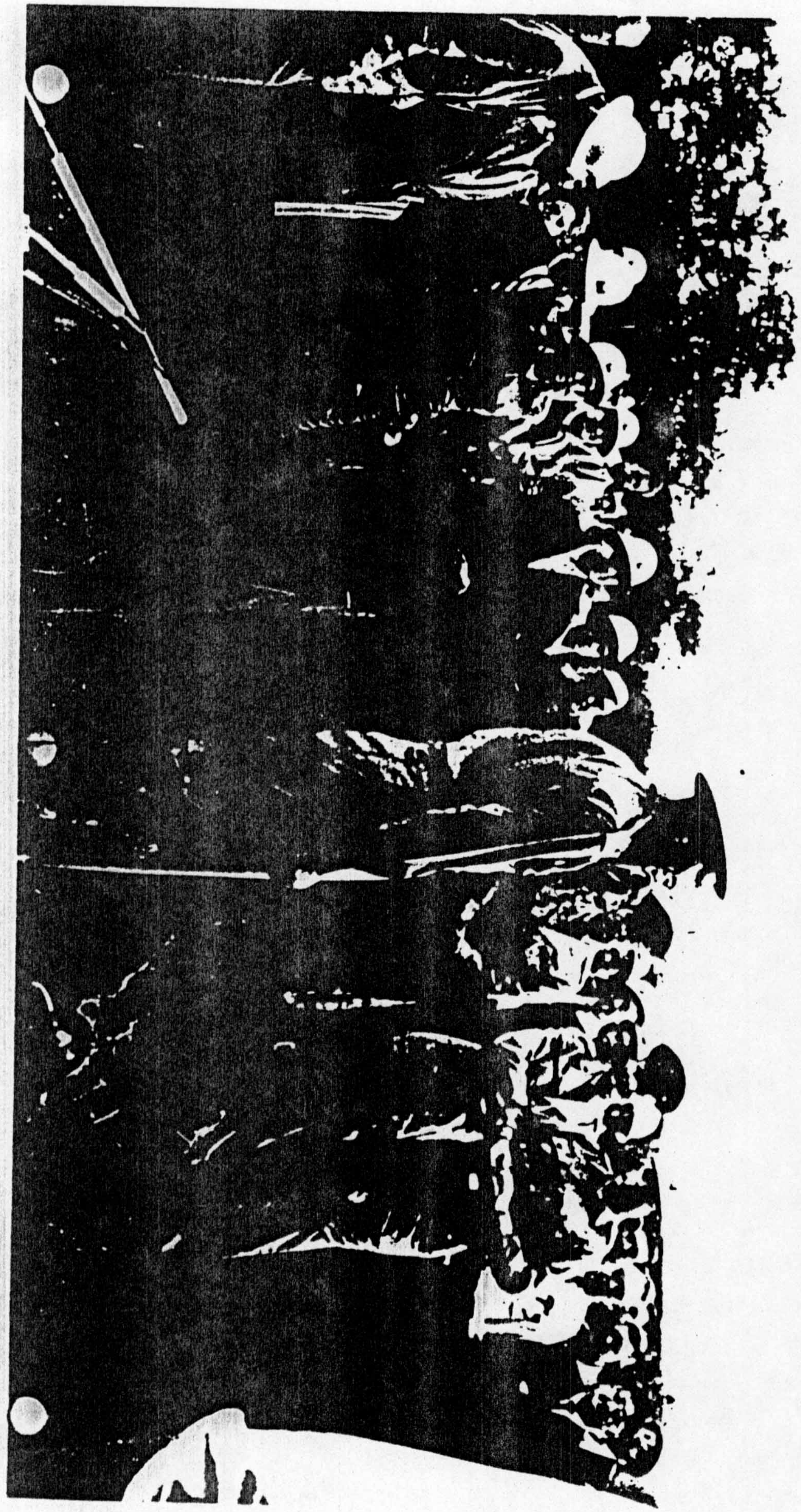
C. PHOTOGRAPHS

4. Ceremonies, Plattsburgh Area

Ground Breaking Ceremonies at Site No. 1, Champlain on 17 June 1960, beginning of the Plattsburgh Area Ballistic Missile project.

Colonel Charles M. Duke, Corps of Engineers District Engineer, New York District and Contracting Officer, addresses the group at the ceremonies.

In the group are representatives of the Air Force, Corps of Engineers, New York District and Plattsburgh Area, residents from nearby towns and Contractor representatives.



SECTION VII

C. PHOTOGRAPHS

4. Ceremonies

On 30 September 1960, Supervision of the Atlas Missile Site Construction, vicinity of Plattsburgh, transferred from U. S. Army Engineer District, New York, to the Corps of Engineers Ballistic Missile Construction Office (CEBMCO) in Los Angeles.

The Line-up

Lunch at Officers Club prior to ceremonies at Site No. 1, Champlain, 30 September 1960.

Reading from Left to Right:

In dark uniform - Colonel Calvin C. Fite, Jr. USAF Commander, SAFAF, Plattsburgh

Brig. General Joseph E. Gill, USAF, Headquarters BMC

Brig. General Alvin C. Welling, Corps of Engineers, Commander, CEBMCO

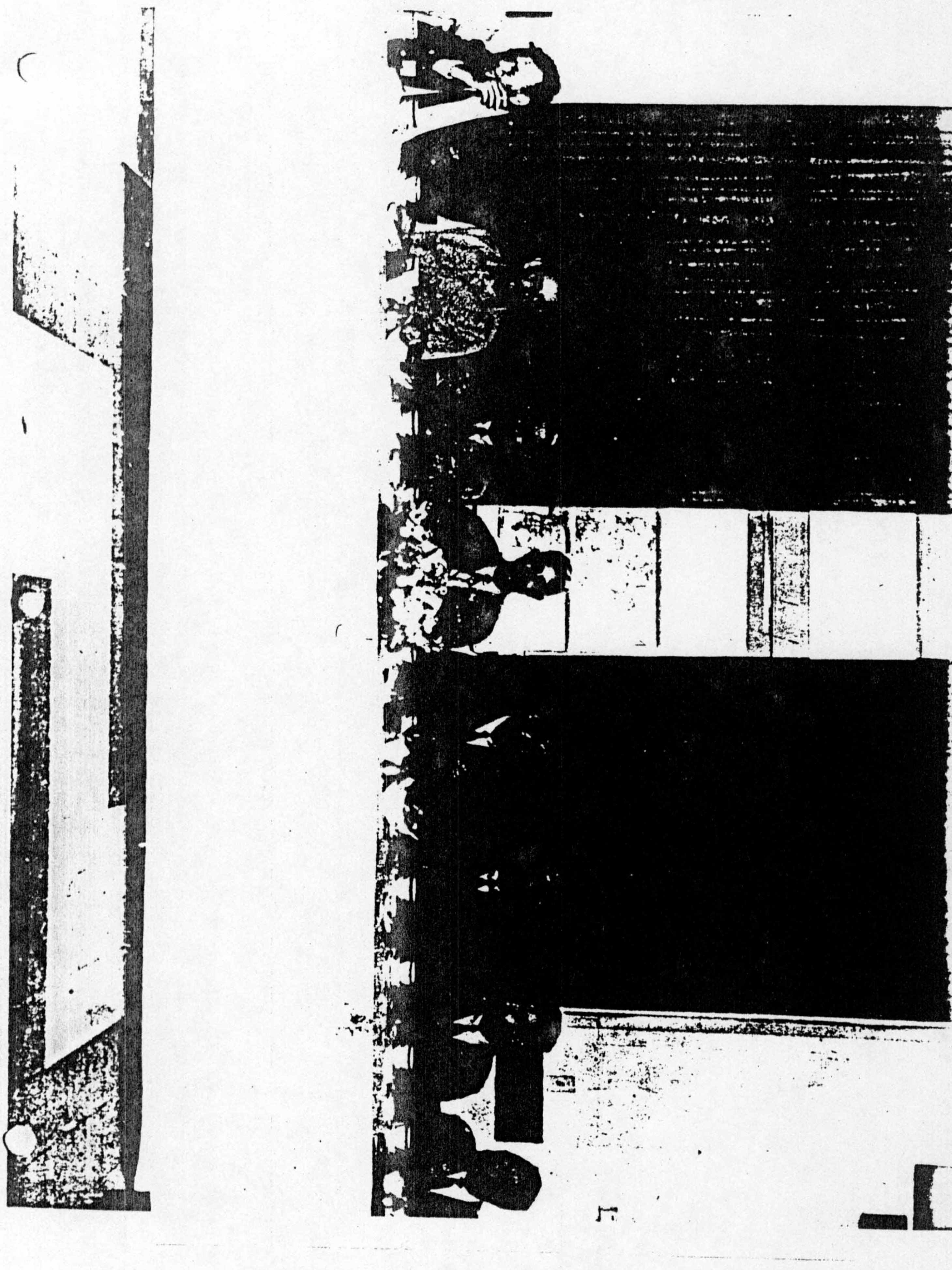
Brig. General Thomas Lipscomb, Corps of Engineers, Division Engineer, North Atlantic Division

Major General P. M. Hoisington, Headquarters USAF, Washington

Colonel Charles M. Duke, Corps of Engineers, District Engineer, New York District

Colonel W. W. Wilson, Corps of Engineers, Director of Atlas "F", CEBMCO

Lt. Col. Sidney Stern, Corps of Engineers, Area Engineer, Plattsburgh



SECTION VII

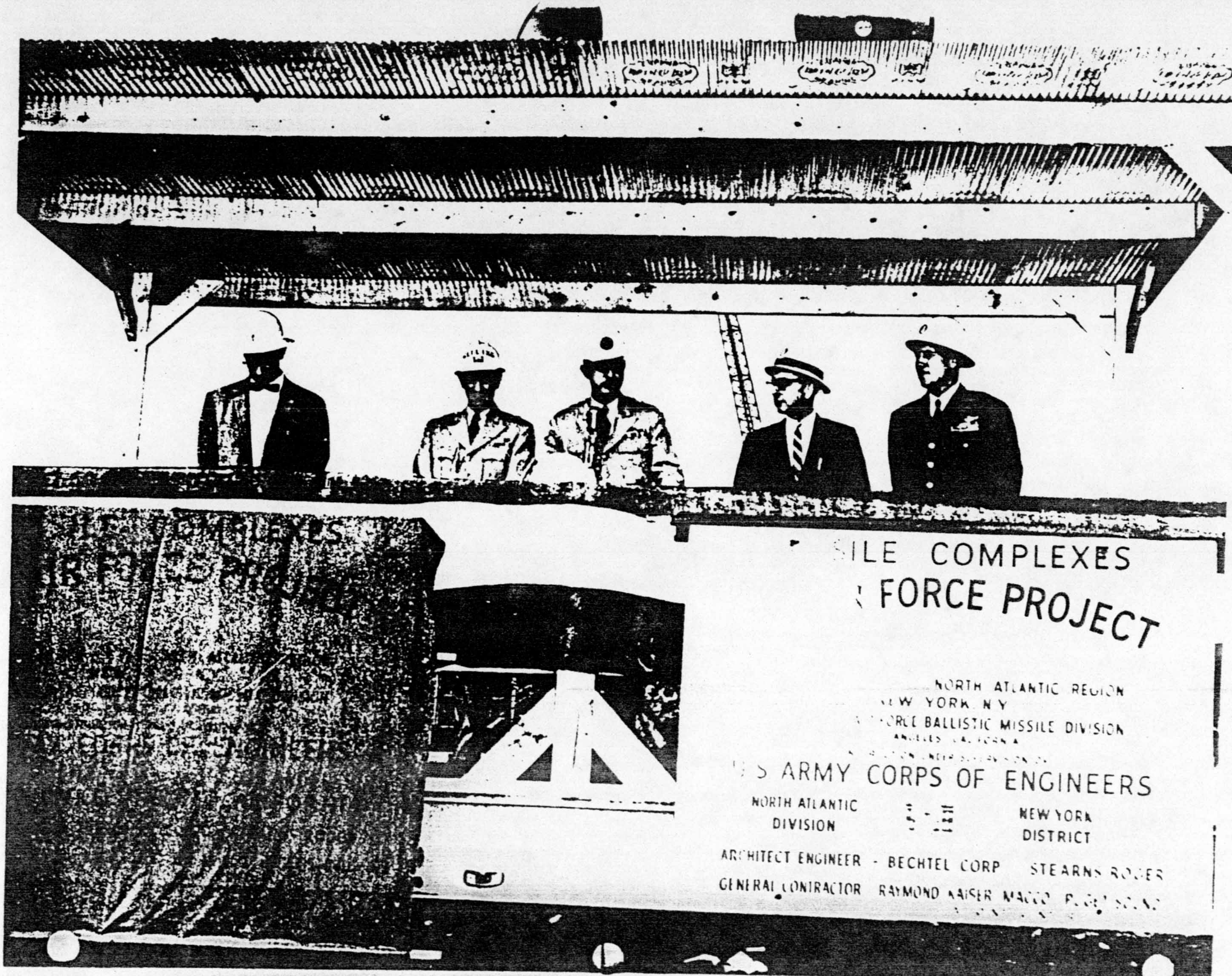
C. PHOTOGRAPHS

4. Ceremonies

On 30 September 1960 at 2400 hours the responsibility of the Plattsburgh Area Office for construction of the Atlas Ballistic Missile Office was transferred from New York District, North Atlantic Division to the Corps of Engineers, Ballistic Missile Construction Office (CEBMCO) Los Angeles, California.

Appropriate ceremonies were held at Site No. 1, Champlain, where Brig. General Lipscomb, U. S. Army, Corps of Engineers, Division Engineer, N.A.D. presided at ceremonies transferring responsibility to Brig. General Alvin C. Welling, U. S. Army Corps of Engineers, Commander of CEBMCO, Los Angeles, California (now Major General, Deputy for Site Activation, Ballistic Systems Division).

On the right in the speakers stand is Major General P. M. Hoisington, Hq. U.S.A.F., Washington, D. C. Next to General Hoisington is Mr. G. W. Bailey, Vice President of Raymond International. At opposite end of stand is Mr. E. W. Simpson, Project Manager of RNMP.


ILE COMPLEXES
FORCE PROJECT
NORTH ATLANTIC REGION
NEW YORK, N.Y.
BALLISTIC MISSILE DIVISION
U.S. ARMY CORPS OF ENGINEERS
NORTH ATLANTIC DIVISION
NEW YORK DISTRICT
ARCHITECT ENGINEER - BECHTEL CORP
STEARNS ROGER
GENERAL CONTRACTOR
RAYMOND KAISER MACCO

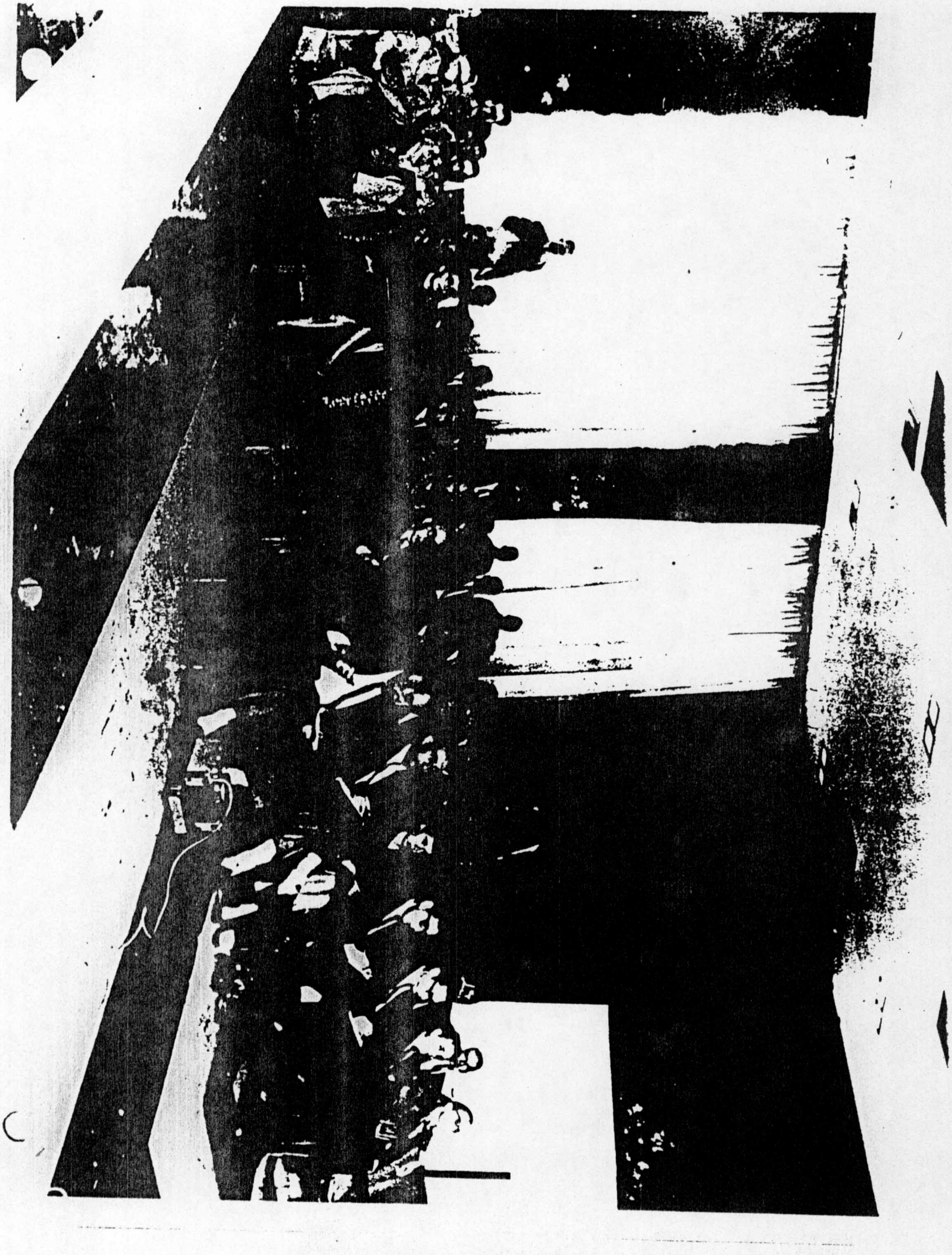
SECTION VII

C. PHOTOGRAPHS

4. Ceremonies

Responsibility of construction for Plattsburgh Area Missile Site Construction transferred from New York District to CEBMCO, Los Angeles, 30 September 1960.

Members of the Press receive a briefing concerning the transfer at the Plattsburgh Air Force Officers Club, Front Row.



SECTION VII

C. PHOTOGRAPHS

4. Ceremonies

Brigadier General A. C. Welling, Corps of Engineers, U. S. Army, Commanding General of CLEMCO at the time of the award, presents a Certificate of Achievement to Major John J. Kohler, Corps of Engineers. The certificate, dated 5 January 1961, is for service in the Cleveland Subsector Command, XX United States Army Corps.

Lt. Colonel Sidney Stern, Corps of Engineers, Area Engineer at time of the award stands by.

Major General Welling as of date of this preparation (1 March 1962) is Deputy for Site Activation, Ballistic Systems Division.


STERN
KOHLER

SECTION VII

C. PHOTOGRAPHS

4. Ceremonies - CEEMCO Plattsburgh Area

Miss Violet F. Herwerth received a Letter of Appreciation for her fine work with the Corps of Engineers from Lt. Colonel L. E. Bremkamp, Area Engineer, at ceremonies on 27 April 1961.

Miss Herwerth has had a long and useful career as a Civil Service employee, beginning her career in December 1927, with a total of all intervals of employment adding up to over 26 years.

Miss Herwerth has been employed by the Quartermaster Corps, Air Force, Navy and Corps of Engineers, joining the Corps under the New York District in Plattsburgh, New York, in September 1956.

Miss Herwerth is Stenographer and Secretary for the Chief of Contract Administration Branch.


COL L BREMKAMP

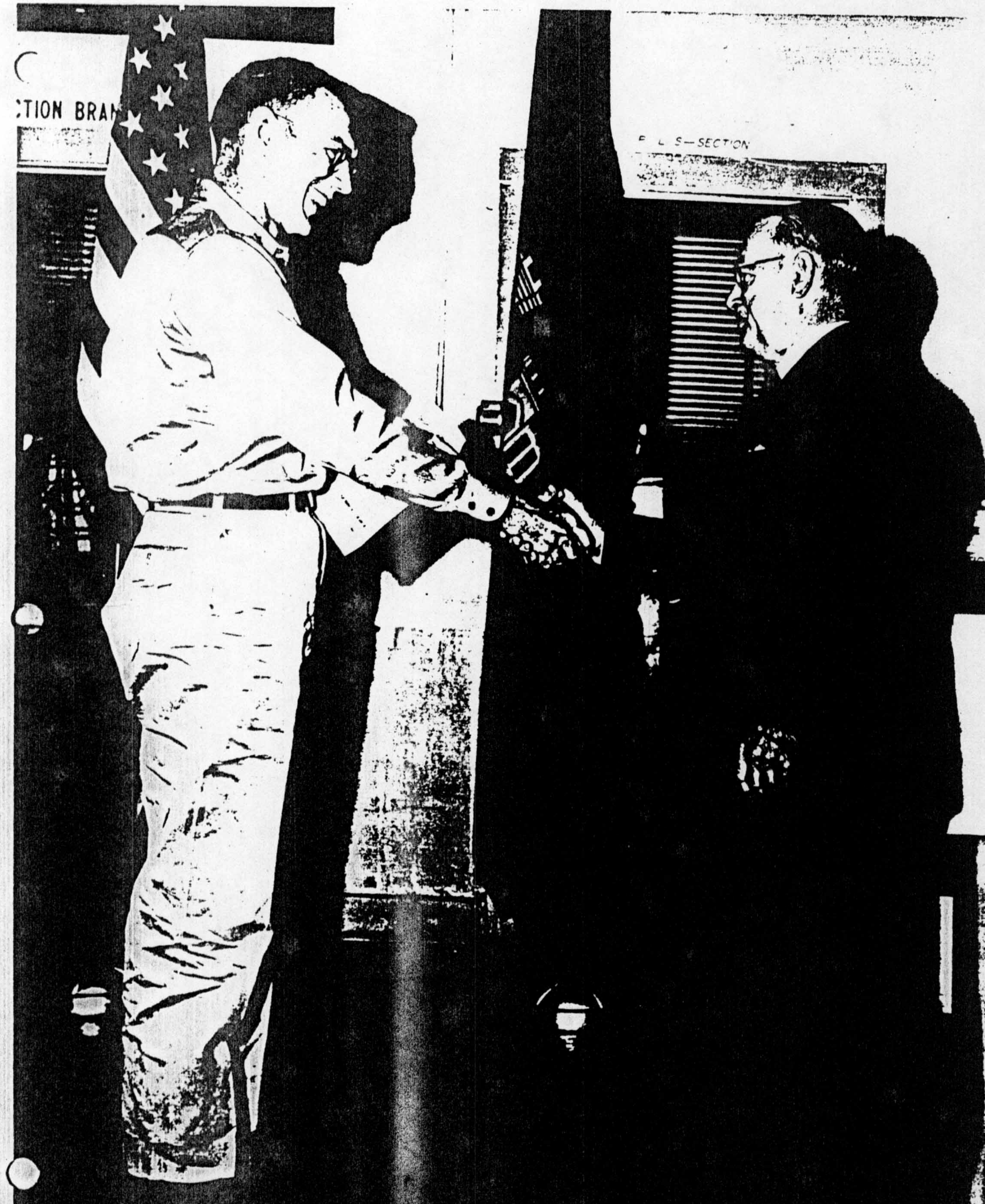
SECTION VII

C. PHOTOGRAPHS

4. Ceremonies - CEMCO, Plattsburgh Area

Mr. Leland Logan, Chief of Engineering and Technical Branch, June 1961, received a Certificate and a Service Pin from Lt. Colonel L. E. Bremkamp, Area Engineer, for having served 10 years with the Corps of Engineers.

Most of Mr. Logan's career has been with the New York District and transfer to Missile work was made at the beginning of the program at Plattsburgh in 1960.



SECTION VII

C. PHOTOGRAPHS

4. Ceremonies

Presentation of Superior Performance Award to Walter W. McCollough, Supervisory Administrative Assistant (Major A.U.S. Ret.), by Lt. Colonel L. E. Bremkamp, Area Engineer.

Attending the ceremony, Left to Right:

Mr. Howard Elliott, Chief Administration Branch

Mr. Leland Logan, Chief, Contract Administration Branch

Major Howard D. Rhodes, Deputy Area Engineer

Mr. Walter W. McCollough, Assistant Administration Branch

Mr. William Jennings, Chief, Operations Branch

Mr. Joseph Trolier, Assistant Area Engineer (Civilian)


LT COL L E
AREA ENGINEER

SECTION VII

C. PHOTOGRAPHS

4. Ceremonies

Presentation, Certificate to Major Rhodes, December 1961.

Major H. D. Rhodes, U. S. Army, Corps of Engineers, Deputy Area Engineer, Plattsburgh Area, received a Certificate of Service in Ballistic Missile Construction from Lt. Colonel Bremkamp, Area Engineer.

Major Rhodes was assigned to the Army Command School at Fort Leavenworth, Kansas.

From Left to Right:

E. D. Blakeney, Acting Chief, Engineer & Technical Branch on TDY from Salina, Kansas

B. Zimberg, Counsel

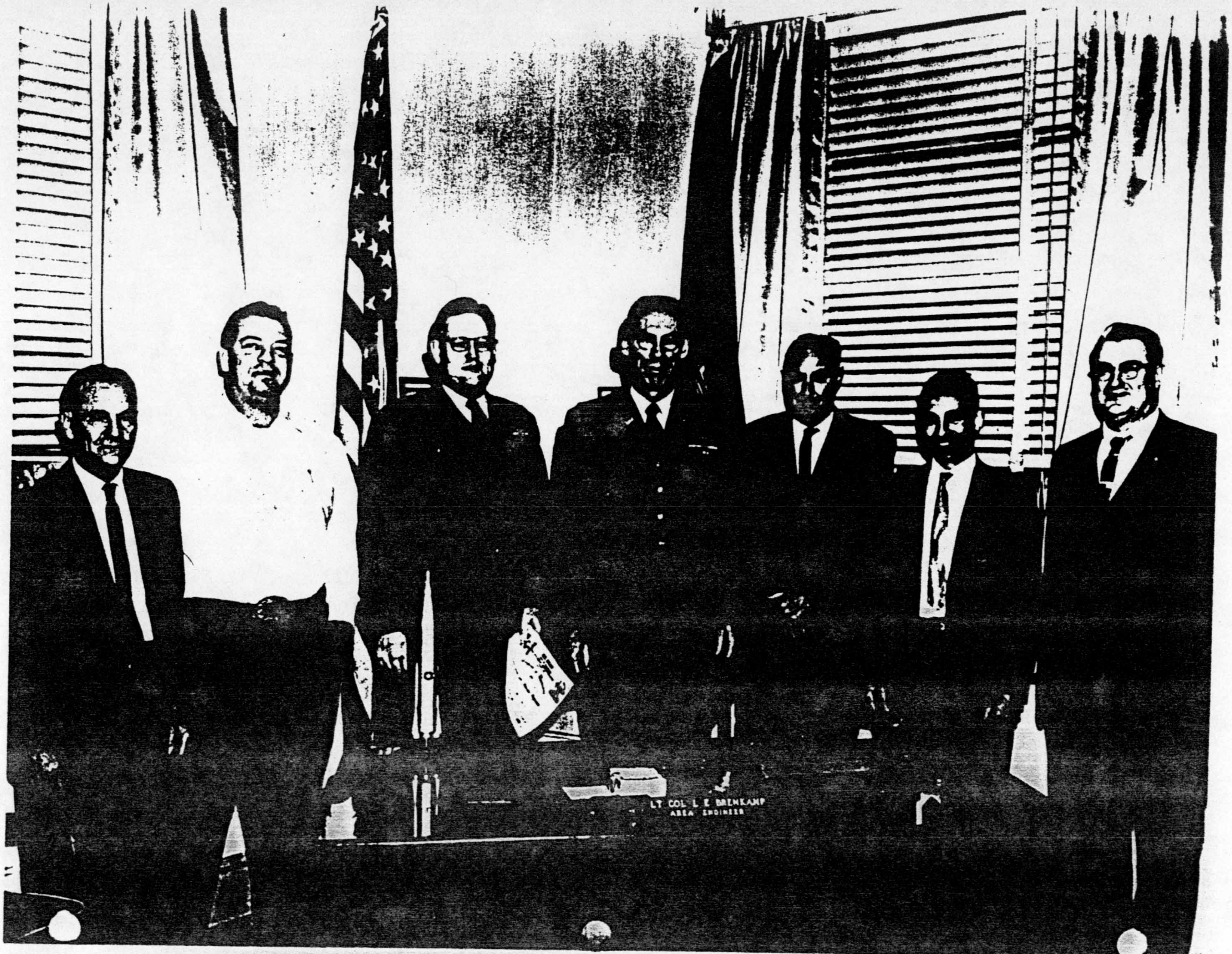
Major H. D. (Dusty) Rhodes

Lt. Colonel L. E. Bremkamp

Wm. Jennings, Chief Operations Branch

J. Trolier, Assistant Area Engineer (Civilian)

L. F. Osborne, Asst. Chief, Contract Administration Branch


LT COL L E BRINKAMP
AREA ENGINEER

C. PHOTOGRAPHS

4. Ceremonies, Plattsburgh Area

On 16 June 1961, Mr. Cyril B. Botten, Property and Supply Clerk of the Administrative Branch receiving from Lt. Colonel L. E. Bremkamp a service award and pin for having completed 30 years of service with the Government. His accumulated service has been with Post Quartermaster, U. S. Army, the U. S. Air Force and since 3 July 1950 with the Corps of Engineers. His home is in Plattsburgh, New York.


CHIEF CONSTRUCTION BR
P L S—SECTION

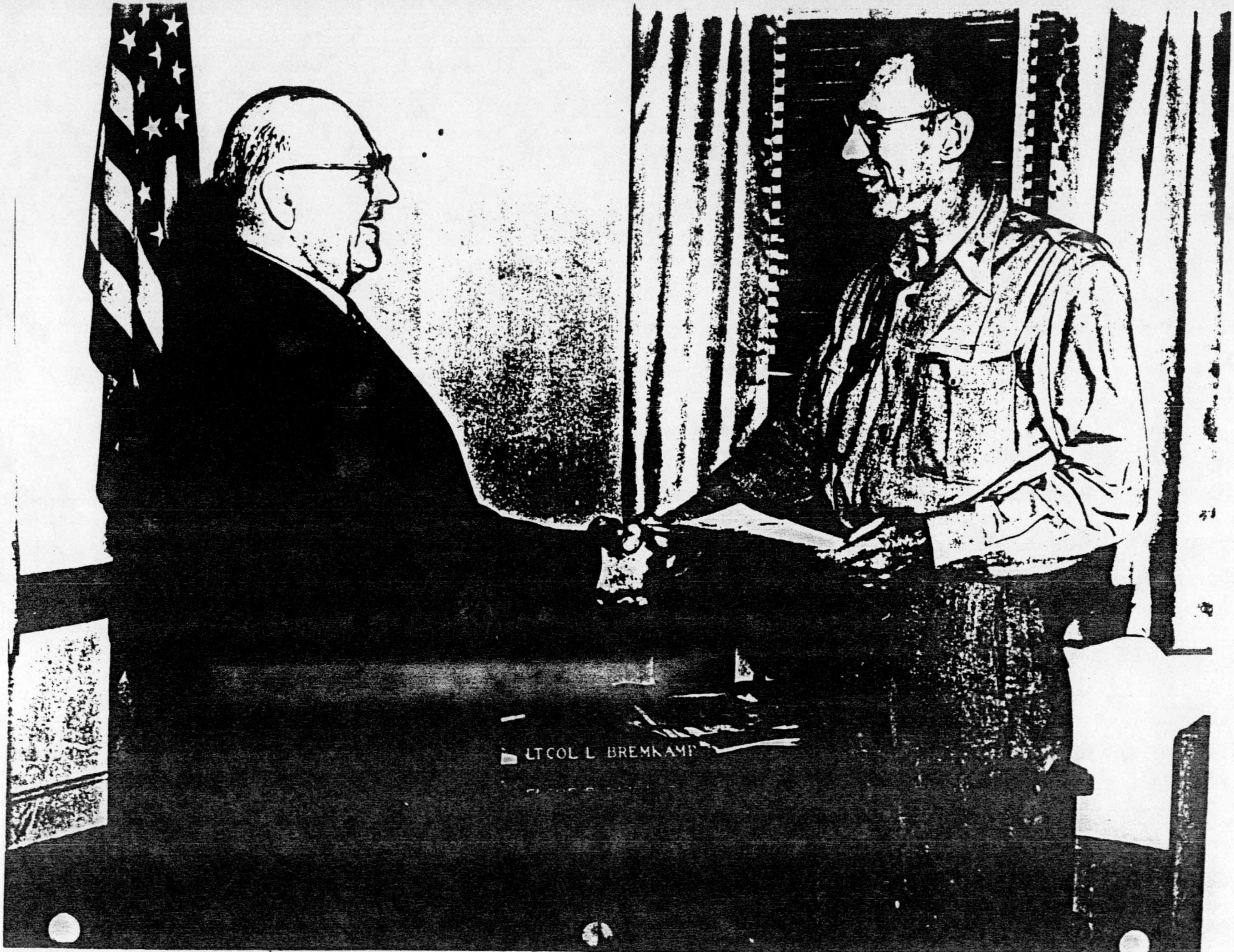
SECTION VII

C. PHOTOGRAPHS

4. Ceremonies, Plattsburgh Area

During award ceremonies on 19 June 1961 Mr. George Grass, Electrical Engineer in the Operations Branch, received a letter of commendation and congratulations from Lt. Col. L. E. Bremkamp, Area Engineer, for his excellent work at the Plattsburgh Missile Project.

Mr. Grass, now with CEBMCO, was formerly with the New York District and has served over 19 years with the Corps of Engineers, all of it in the Northern Area. He is looking forward to receiving his 20-year Service Pin Award in April 1963.


LTCOL L BREMKAMP

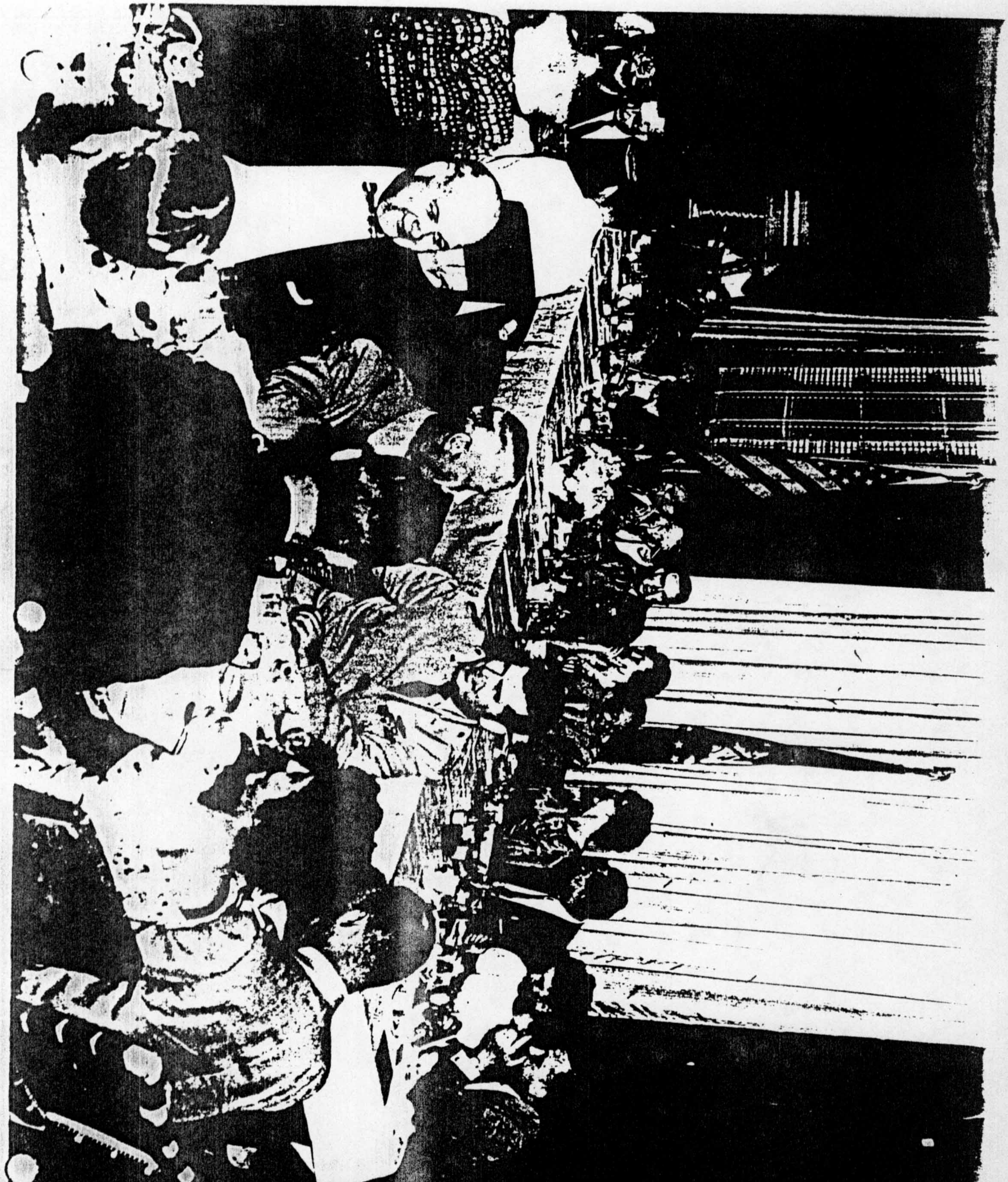
SECTION VII

C. PHOTOGRAPHS

5. Special Events

Photo showing Joint Meeting and Dinner between Society of American Military Engineers and National Society of Professional Engineers, at Officers Club, Plattsburgh Air Force Base.

Colonel Charles M. Duke, New York District Engineer addressed the meeting - 1960.



SECTION VII

G. PHOTOGRAPHS

5. Special Events.

Control Group Meeting and Dinner

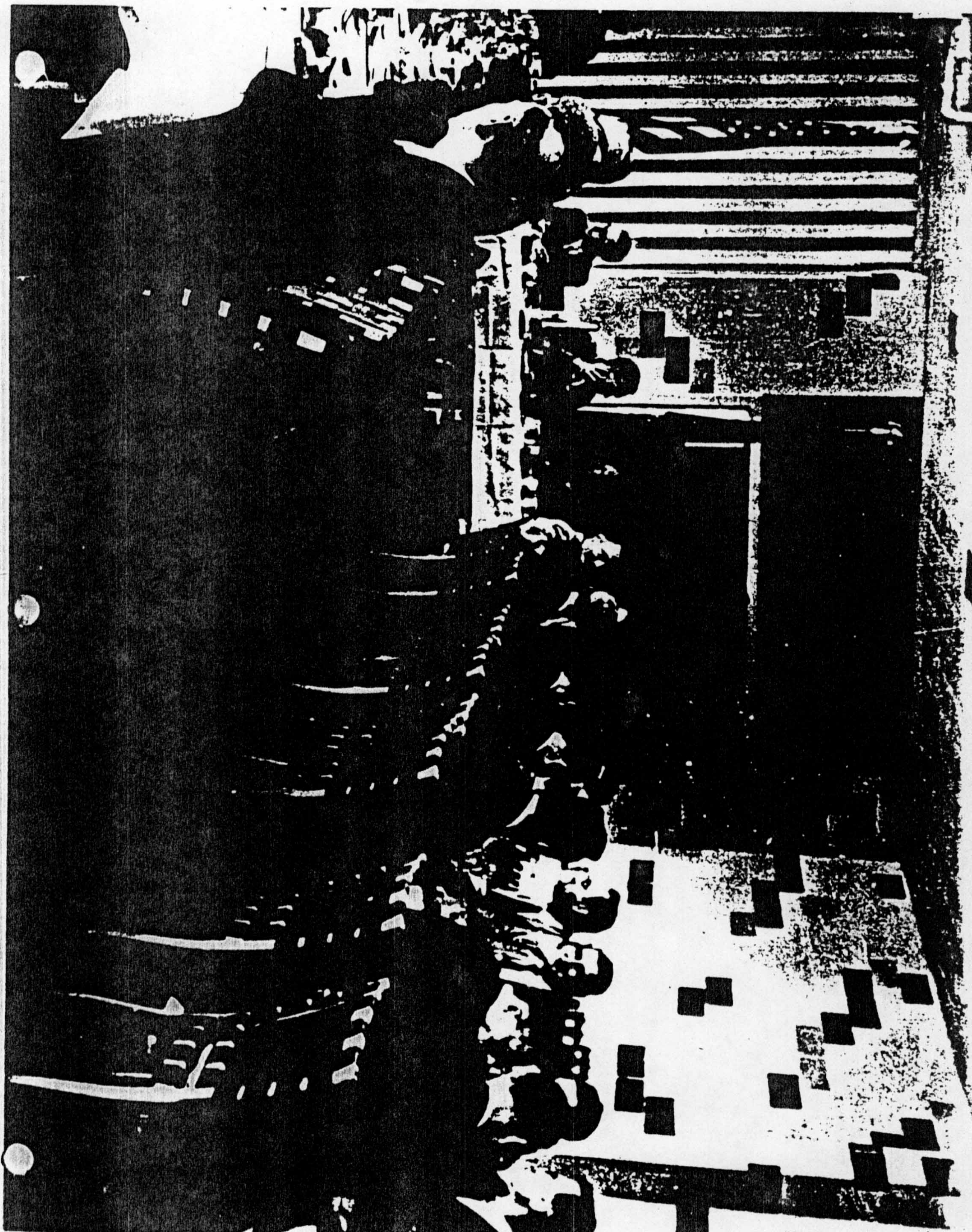
In lieu of the customary Control Group Meeting on Monday nights between representatives of the Corps of Engineers, Contractor and SATAF, a get acquainted meeting and dinner was held at the Officers Club at Plattsburgh Air Force Base late in the summer of 1960.

After the many group meetings that were at times "rough" it was felt that a meeting and dinner would engender a spirit of cooperativeness among all concerned. It did.

Colonel C. M. Duke, the New York District Engineer and Mr. G. W. Bailey, Vice President of RMBT attended the meeting from New York City and are seen at the speakers table with Lt. Col. S. Stern and Major H. D. Rhodes.

The meeting was attended by all Corps of Engineers Resident Engineers, Contractor Superintendents and Key Office Personnel, Sub-Contractor Key Personnel, the Assistant Area Engineer (Civilian), Chiefs and Assistant Chiefs of Construction, Engineering and Contract Administration Branches, Chiefs of Administration and Legal.

Also attending were Military and Civilian representatives of AFBMD field office.



SECTION VII

C. PHOTOGRAPHS

5. Special Events

Dinner Party - Retirement from Army Service by Lt. Colonel Sidney Stern, U. S. Army Corps of Engineers, Area Engineer for Plattsburgh Area.

Upon retirement of Lt. Colonel Stern, by Area Field Order No. 61-18 dated 7 June 1961, Lt. Colonel Louis E. Bremkamp assumed duties of Area Engineer, effective 6 June 1961.

At the Host Table:

Lt. Colonel R. Clendenin, USAF Deputy Commander, SATAF

Mrs. H. D. Rhodes

Lt. Colonel L. E. Bremkamp, Corps of Engineers, Area Engineer

Mrs. J. B. Holst, wife of Colonel John B. Holst, USAF, Commander 820th Combat Support Group

Col. Sidney Stern, Corps of Engineers, Retiring Area Engineer

Major H. D. Rhodes, Corps of Engineers, Executive Officer


LUCK
SID!!!

SECTION VII

C. PHOTOGRAPHS

5. Special Events

One of the Dinner Parties attended by CEBACO-SATAF personnel. Such parties assisted to maintain good relations between the two agencies.

On this occasion, retirement of Lt. Colonel S. Stern, Corps of Engineers, Area Engineer, from the Corps, August 1961.

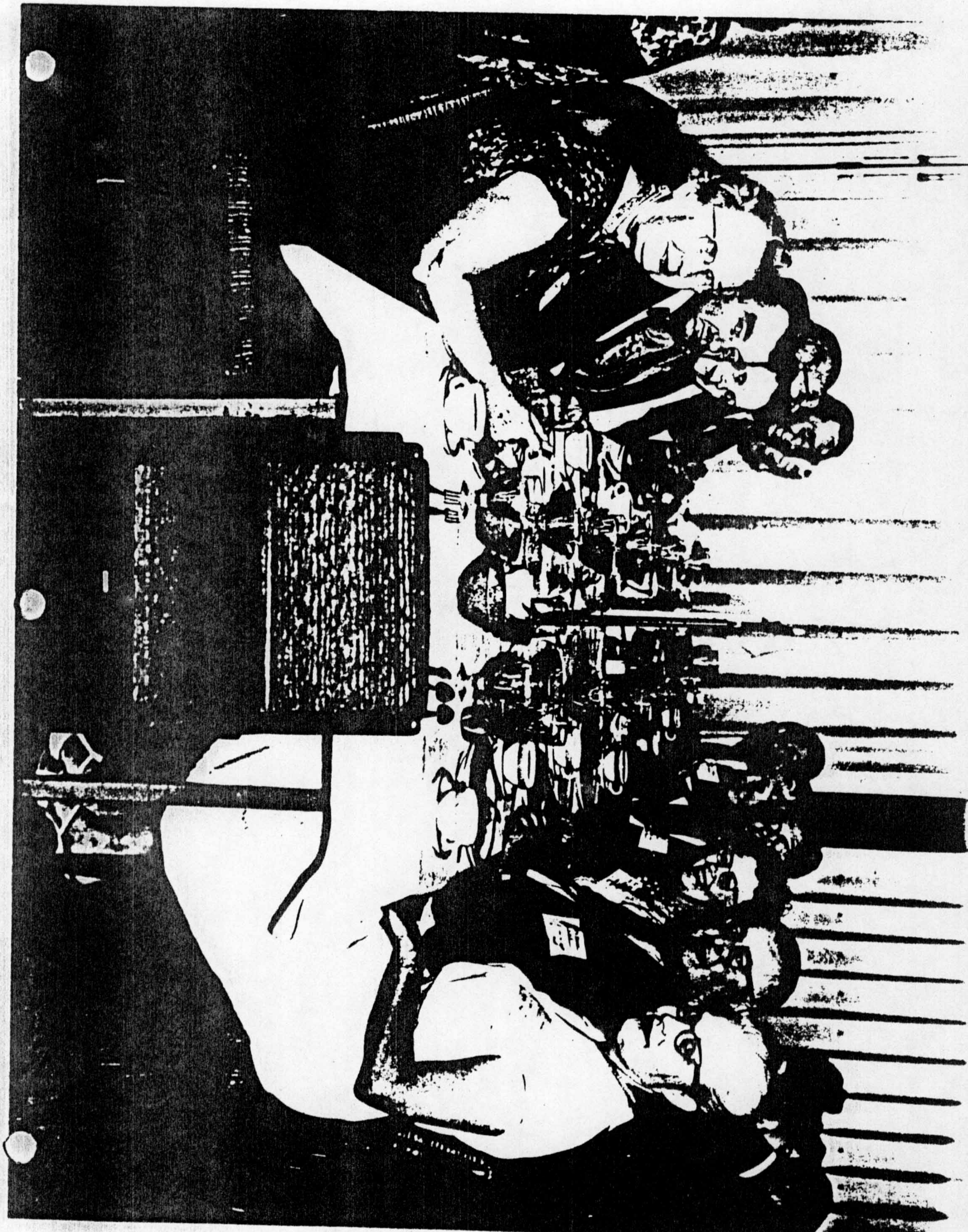
SECTION VII

C. PHOTOGRAPHS

5. Special Events

Dinner party by CEBMCO - SATAF personnel

Occasion - Retirement of Lt. Colonel Sidney Stern, Corps of Engineers, Area Engineer, August 1961.



SECTION VII

C. PHOTOGRAPHS

5. Special Events

Hungry Corps of Engineers personnel line up at the Buffet Table at the Officers Club, Plattsburgh Air Force Base.

At the table, Herbert Jefferies, Mechanical Engineer, gallantly assists the ladies fill their plates, while (right to left) Tom Neaves, R. Levasseur, J. O'Brien and I. Gleich, looking hungry, wait patiently and cheerfully for a helping.

In the background, at table, Charles Kestler looks up in time to have his picture taken.


GOOD LUCK SID!!!

SECTION VII

C. PHOTOGRAPHS

5. Special Events

Dinner Party December 1961 for Major H. D. Rhodes, Corps of Engineers, Deputy Area Engineer, on the occasion of his re-assignment to the Command School at Fort Leavenworth.

SATAF, Contractor and Corps of Engineers Personnel -

Col. Sidney Stern, C. of E. (Retired)

Captain Henry Pheil

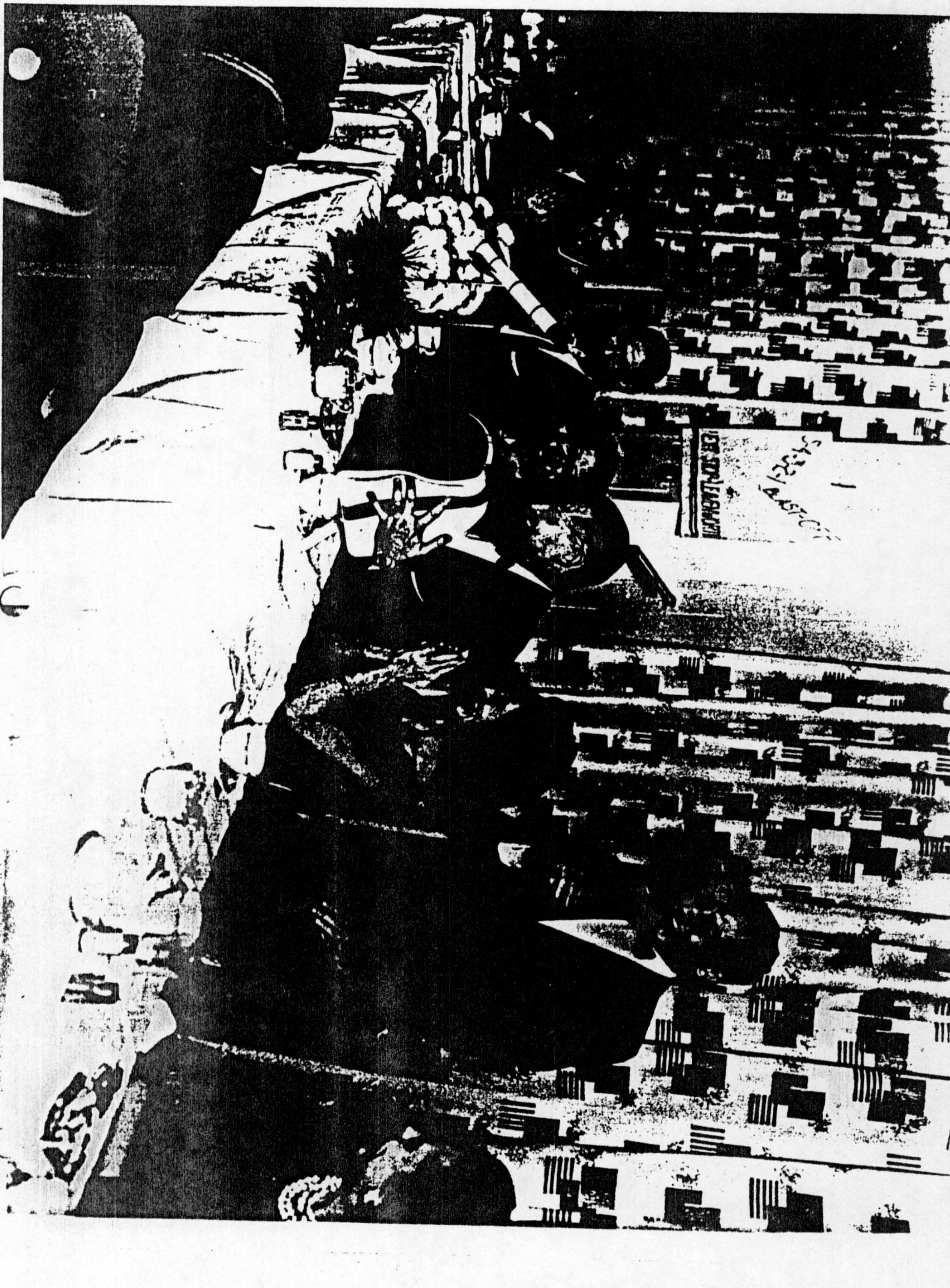
Mr. E. W. Simpson, Project Manager for RKMP

Mrs. L. E. Bremkamp and Lt. Col. L. E. Bremkamp

Mrs. H. D. Rhodes and Major H. D. Rhodes

Mrs. R. A. Glenn and Major R. A. Glenn (M.C.)

Mrs. C. W. Fite



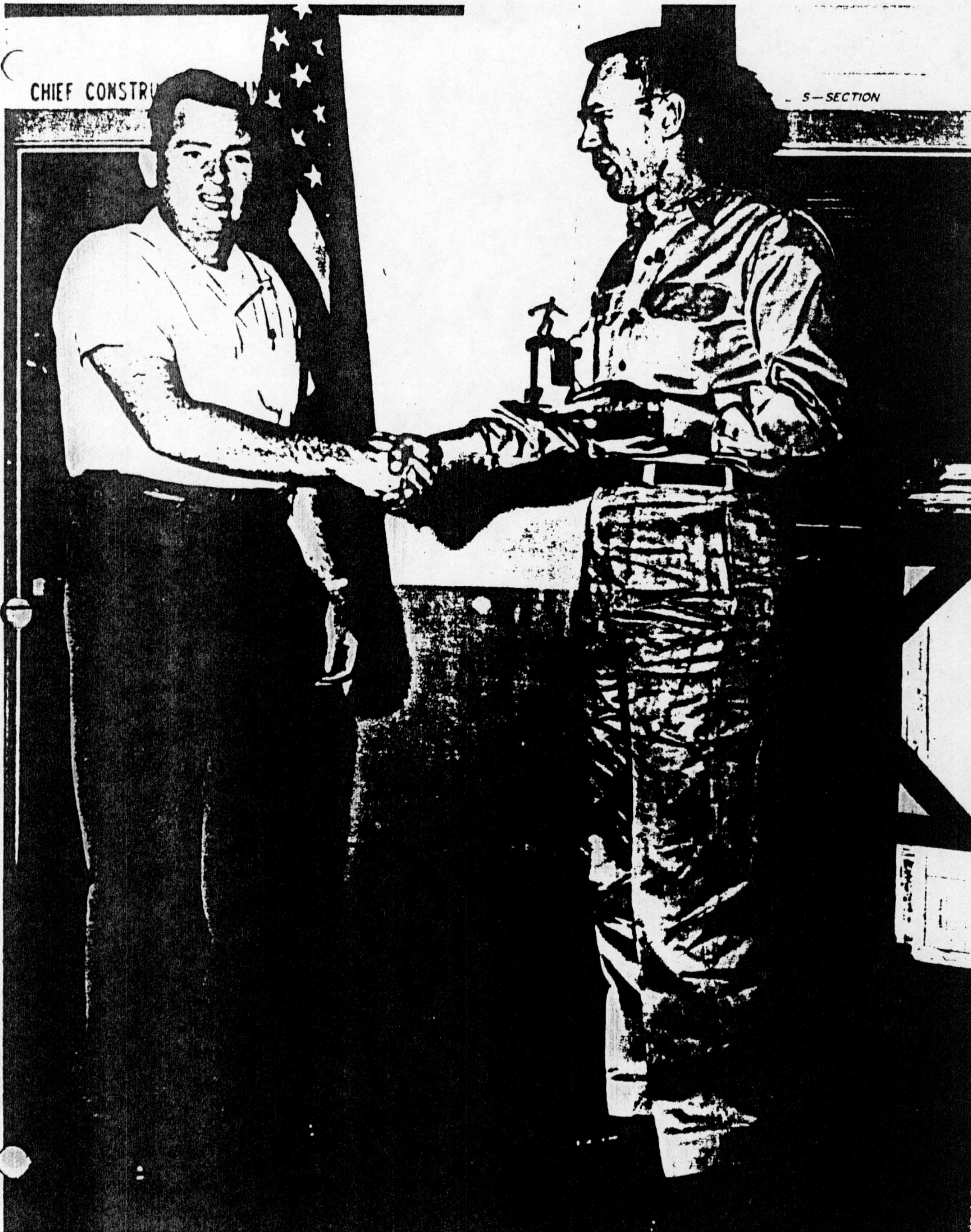
SECTION VII

C. PHOTOGRAPHS

5. Special Events

A CEBMCO Bowling League was established in the winter of 1960 consisting of six teams, four bowlers to a team. The teams were made up from branches within the Area Office (Contract Administration, Military Personnel, Construction, Engineering, Clerk-Typists and Estimates). The league is still operating as of 21 March 1962 and has successfully completed two full seasons. At the end of each season, trophies have been awarded to the first place team and individual trophies for high single game, high 3 game series, high average and most improved bowler. The trophies are presented at an annual bowling dinner which normally has about 75 people attending.

The attached photo shows Lt. Colonel L. E. Bremkamp, Area Engineer, presenting a trophy for high individual average to Mr. Robert P. Wood, Chief of Reports Section, Contract Administration Branch.


CHIEF CONSTRU
S—SECTION

SECTION VIII

REFERENCES, GLOSSARY FOOTNOTES

1. References and Inclosures for Section IV.

Reference: Section IV.

B. Major Operational Problems

1. Reference Rust and Corrosion Control, Section IV, Pages 11 - 12.

The following inclosures contain informative memoranda pertaining to action on this operational problem.

INCL. #1 - Memo. (undated) by M. M. Demetroulis, Chairman, Mechanical Sub-Team, Subject: Report of Mechanical Sub-Team.

INCL. #2 - Memo. (undated) by C. M. Calhoun, Chairman, Electrical Sub-Team, Subject: Report of Electrical Sub-Team.

INCL. #3 - Reference Section IV - I - 86, Paragraph 3, Reports. Inclosure Daily Narrative Report of Construction Accomplished.

SUBJECT: REPORT OF MECHANICAL SUB-TEAM

TO: MR. H. L. PFIZENMAYER, Chairman, Corrosion Survey Team

FROM: Mechanical Sub-Team

1. In accordance with the plan outlined in the 19 December 1961 Interim Report of Corrosion Inspection Team, Plattsburgh AFB and Modification 184 to Contract No. DA-30-075-ENG-9522 certain selected items of ASC equipment were disassembled, inspected for evidence of corrosion, and reassembled at Complex 8, Plattsburgh AFB, New York. The items listed were inspected 5-8 February 1962 by the Mechanical Sub-Team consisting of:

N. M. Demetroulis, OCE
R. O. Roig, BSSFB
P. A. Rosholt, ENGMA (A-F)
I. E. Wissner, (Present on 5-6 Feb 62)GD/A

The inspection was conducted in the presence of respective factory representatives after disassembly by Raymond, Kaiser, Macco, Puget Sound (RKMP) mechanics.

The items were as follows:

a. Launch platform exhaust fan EF-40.
b. Thrust section pressure fan PF-70.
c. Launch platform drive mechanism.
d. Launch platform sheave bearings.
e. Hot water pump P-61.
f. Condenser water pump P-31.
g. Chilled water pump P-51.
h. Emergency water pump P-32.
i. Fog system pump P-80.
j. Utility water pump P-81.
k. Temperature control valve TCV-51.

2. The following findings are reported for the mechanical items listed above:

a. Exhaust fan EF-40 was examined on 5 February 1962 below level 8. Internal inspection showed only minor surface corrosion of shaft, casing, fan blades and vanes. Bearings were sealed and showed no corrosion. It is the opinion of this group that this internal corrosion is of non-detrimental type. An examination of fan casing exterior showed the paint had peeled from the area directly above the motor and that some surface corrosion had taken place. It is believed that this corrosion may be expected to become progressively worse and shorten the life of the fan. It is recommended that all rust areas on the exterior of the fan casing be wire-brushed and painted at the next regular maintenance check and not later than six months from date of this report.

b. Power fan PF-70 was examined on 6 February 1962 in trailer. Internal and external inspection revealed only superficial corrosion on casing and shaft. It is the opinion of this group that the corrosion is of a non-detrimental nature.

c. Launch platform drive mechanism and sheave bearings: The caps were removed on 5 Febraury 1962 from fixed bearings at both ends of the non-rotating main shaft for the large gear and drum of the LP drive mechanism, level 1. There was a general superficial rust cover over about 50% of the shaft area thus exposed; however, since this a fixed shaft there is no detrimental effect to operation. In order to preclude progressive rusting, a rust inhibitant should be applied to the contact areas of the cap and shaft. The caps were also removed 5 February 1962 from the shaft of the sheave on level 8. This is also a fixed shaft and should be treated the same as that on level 1. While the caps were off, the shaft areas at the bearing caps were observed. There was no evidence that nay damage had occurred to bearings of either the LP drive mechanism or sheaves.

On 6 February, the inspection plate in the reduction gear box was removed and the gears and inside edge of roller bearings observed. Smudges were observed on the faces of 3 teeth. The smudges were classed as foreign matter with a possibility of oxidation but not detremental. The manufacturer's representative recommended a before-operation service to insure lubrication of gear teeth and bearings in the reduction gear box. This is concurred with by the team. Such service should be in accordance with recommendations of the manufacturer. It is recommended that LP drive mechanisms at all complexes be given this service at the earliest date.

d. All listed pumps were examined on 5 thru 8 February 1962 in the silo. These pumps all showed evidence of normal minor discoloration and superficial rusting of casing interior, shafts, impeller wheels, and bearing covers. In all cases, no corrosion of the bearings was evident. It is the opinion of the group that pump life in no case was affected by the corrosion noted. During inspection of pumps 81 & 80, a 1/8 inch thick deposit presumed to be carbonate was observed coating the interior of the impellar casing. Since these pumps handle utility water, it is recommended that the chemical analysis and treatment of the utility water be reviewed for adequacy.

e. Valve TCV-51 was examined on 7 February 1962 at level 4. The valve had the appearance of a new, unused valve with no evidence of corrosion or discoloration of parts.

3. It is the concensus of the mechanical sub-team that an extension of the corrosion survey is not warranted.

N. M. DEMETROULIS
Chairman, Mechanical Sub-Team

ENGMA-F-2 (SEC C)

SUBJECT: Report of Electrical Sub-Team

TO: H. L. Pfizenmayer, Chairman
Corrosion Survey Team

FROM: Electrical Sub-Team

1. In accordance with the plan outlined in the 19 December 1962 "Interim Report of Corrosion Inspection Team, Plattsburgh AFB", and Modification 184 to Contract No. DA-30-075-eng-9522, certain selected items of ASC were desassembled, inspected for evidence of corrosion, and reassembled at Complex 8, Plattsburgh AFB, New York. The electrical sub-team consisting of Messrs. C. M. Calhoun, Chairman (OCE), J. R. Brown (OCE), and F. E. Longan (BSSIB), on 5-8 February 1962 inspected the following items in the presence of factory representatives after disassembly by Raymond-Kaiser-Macco-Puget Sound (RKMP) mechanics:

a. Launch platform exhaust fan motor, LP-40
b. Thrust section pressure fan motor, PF-70
c. Hot water pump motor, P-61
d. Condenser water pump motor, P-31
e. Chilled water pump motor, P-51
f. Emergency water pump motor, P-32
g. 480-Volt switchgear
h. RPM generator on Launch platform motor

2. The following findings are reported for the elctric motors listed in paragraphs 1a to 1f, above:

a. Tests were made by RKMP personnel on 6 February 1961 in the presence of the electrical sub-team and the appropriate factory representatives and results obtained were within specified limits.

b. A visual inspection of the various components of each motor revealed corrosion of a non-detrimental nature, except for motor P-61. It is the concensus of the electrical sub-team that motors LP-40, PF-70, P-31, P-51, and P-32 are in a satisfactory conditions.

c. Corrosion was observed on the stator, rotor and end bells of motor P-61 with a clear line of demarkation between the corroded and non-corroded areas. From the corrosion pattern it was concluded that approximately the lower quarter of the equipment had been submerged in water.

Incl #2

3. On the day following the visual inspection, the electrical sub-team was informed that motor P-61 was cleaned by the joint effort of the Westinghouse Company factory representative and AKCMP personnel prior to reassembly. As a result of the corrective action taken, motor P-61 is now in a satisfactory condition. Corps of Engineers' records reveal that this motor was received at Complex 8 on 5 June 1961 and installed 12 Juno 1961, but a complete history of handling this motor is not available.

4. Three of the six overcurrent relays in the 480-volt switchgear were removed and examined. The condition of all three was practically identical. Except for certain non-essential hardware, (metal locking arms at the top and bottom of the relay frame, a manual visual reset device, and a small bracelet holding a set of contacts) no corrosion or visible damage was observed. The extent of corrosion was similar on each component and in each relay, but is believed by the electrical sub-team and the General Electric factory representative to be non-detrimental and of a nature which will not shorten the useful life of the equipment. There was no evidence, present or past, of fungus growth in the cabinet. The equipment is in satisfactory condition.

5. The RPM generator was found to be in excellent condition with no evidence of corrosion whatsoever.

6. The electrical components of the non-essential motor control center located on Level 2, was inspected for corrosion and found to have some rust on the laminated armature and pole pieces. The corrosion is considered to be of a minor nature and it is believed most of the rust will be removed by action of the armature against the pole pieces when the equipment is placed in normal use.

7. The electrical components of the facility elevator relay panel, located on level 1, was inspected for corrosion and found to be normal without any evidence of corrosion. Due to the location of the panel with respect to the launch silo overhead door, the relays on the panel are subjected to the weather. We are advised that action is now in progress to provide a cover for this panel. No further protection is considered necessary.

8. It is the concensus of the electrical sub-team that:

a. All equipment examined is in a satisfactory condition.

b. The inspection results indicate that an extension of the corrosion survey is not warranted.

c. It would be desirable to establish a record of "Megger" reading for each electric motor.

9. It is recommended that:

a. "Megger" readings of electric motors not yet connected and turned over to the Government by RKMP be made a part of the final acceptance inspection records; and that motors not meeting the appropriate standard for insulation resistance established by the American Institue of Electrical Engineers be disassembled and further inspected by Corps of Engineers personnel in a manner similar to the electrical inspection procedures contained in Modification 184 to Contract No. DA-20-075-eng-9522.

b. Similar inspections of all other electric motors not previously examined be made by GD/A personnel in connection with normal preventive maintenance performed during I & C.

C. M. CALHOUN
Chairman, Electrical Sub-Team