ATLAS MISSLE SITE TOUR

0900 — 1200

24 MARCH 1962

INFORMATION BULLETIN

ATTITN

HISTORY

The decision to build the Atlas Launching Facilities in this area was reached in early January 1960 at which time the Albuquerque District Office was requested to perform soils investigation to determine whether or not the geological conditions in this area would support the proposed installation. This investigation was accomplished by the Spencer J. Buchanan Company and by Gordon Herkenhoff & Associates with favorable results.

Design was initiated in early March after completion of the investigation, and the facility was advertised for bids on 16 May 1960, and bids were opened on 15 June 1960. The construction contract, in the amount of $22,115,828.00, was awarded to a Joint Venture consisting of Macco Corporation, Raymond International, Inc., The Kaiser Company, and Puget Sound Bridge & Drydock Company on 16 June 1960. Notice to Proceed was issued on 20 June 1960, and work was initiated on 23 June 1960.

The Roswell Area Office was activated on 15 May 1960 with a nucleus of people and has been expanded to a strength of 8 Officers and 165 Civilians.

CONSTRUCTION FEATURES

The Launching Facility consists of a launching silo which has a 26 ft. 1 in. inside radius and is 178 ft. deep, and a Launch Control Center which has a 40 ft. inside diameter and a 27 ft. clear height. The launching silo has 2 ft. - 6 in. thick concrete walls up to a point approximately 55 ft. below the top of the silo at which point the wall flares out to a total thickness of 9 ft. The LCC also has 2 ft. - 6 in. thick walls with 3 ft. - 6 in. floor and a 3 ft. - roof.

On the interior of the silo is a steel crib which is suspended from four shock mounts and supports all of the facilities inside the silo. The Launch Control Center has two suspended floors on which all equipment, etc. is mounted. The LCC and silo are connected by an underground tunnel.

There is a total of six Atlas "F" launching facilities being constructed nationwide, and a determination was made that all of these facilities would be identical insofar as practical. To accomplish this, and to assure delivery of critical material in sufficient time, the Government entered into contracts for fabrication of what is known as the standardized equipment. This equipment consists of the Propellant Loading System prefabs and interconnecting piping, the shock hangers, the door actuating mechanisms, the shock suspension systems, heating, ventilating, and air conditioning systems, and blast door closures.

These contracts have been assigned to the prime contractors, and they are responsible for the delivery and installation of these items of equipment.

One of the critical features of construction of these facilities is the cleanliness requirements for the Propellant Loading System. The systems are subject to temperature variations from a minus 308° F. to 120° F. and pressures exceeding 3500 lbs. per square inch. All portions of the Propellant Loading System and its component parts must be absolutely cleansed of all foreign particles and hydrocarbon larger than 150 microns as the presence of foreign substances, particularly hydrocarbons, can result in violent explosion and void the function of the facility.

The facility is a hardened facility designed to withstand nearby atomic detonations and still retain its effectiveness. It has a capability of sustaining operations for a period of up to ten days without outside support. This "button-up" period is principally for periods of inclement weather that would preclude normal delivery.

The construction is being accomplished under the philosophy of "concurrency", i.e., concurrent with the development of the weapons system.

SEQUENCE OF CONSTRUCTION

The construction of the Atlas Launching Facilities at Walker Air Force Base was accomplished under the supervision of the Area Engineer of the U. S. Army Corps of Engineers acting as the construction agent for the U. S. Air Force.

EXCAVATION: Open cut for mass excavation to a depth of approximately 38 feet was of the open pit type, large enough for silo and launch control center construction, work space, and a ramp leading down to this area. Solid material was broken up by dynamite placed in drilled holes and lighter material was ripped by bulldozer. Haulage to a waste area was by conventional powered scrapers. After this open mass excavation was completed, the silo shaft was excavated to a depth of 178' below original ground surface. The method employed was to drill blast holes to depths of 12', loading these holes with dynamite and break up about 10' to 15' of material at one time. This material was then removed by means of 45-55 ton cranes using a clam shell bucket on the first 35-40' and thereafter the contractor utilized a large muck bucket and dump trucks. It was necessary to lower and raise a front end loading tractor weighing about 22 tons into the shaft for each 15' of excavation. Concurrent with shafting was the placement of a series of steel ring beams spaced at 5' vertically. Containment of the silo wall surface area was by means of wire mesh and gunite concrete. Wood lagging was used on silos with heavy water seepage when considered necessary.

CONCRETE PLACEMENT: (Approximately 6,000 Cu Yds per Site). The major placement consisted of silo concrete which started on 6 September 1960 at Site #2 and was completed on 15 February 1961 at Site #7, with exception of the silo cap. The secondary concrete placement was for the Launch Control

Center and miscellaneous smaller pours continued until the completion date of 15 March 1962. The above 3 items were dovetailed together as the construction progressed. The last large pour was the silo cap which was actually completed after the silo crib steel was in place. Above ground surface pours were formed on both the inside and outside. Only a 1" plus or minus tolerance was allowable on the interior surface of the silo concrete. This tolerance applied to an 178' overall plumb height and a 52' 2" diameter. Concrete was placed by cranes using a 2 Cu Yd buckets. Tremies were used within the forms. Pneumatic vibrators were used to consolidate the type #V concrete. Heated water was required in the concrete batch in the winter and ice added in the hot summer months to control the temperature of the concrete at placement. The top 40' of construction was heavily re-inforced including $2\frac{1}{4}$" ribbed bars closely spaced in both horizontal and vertical planes.

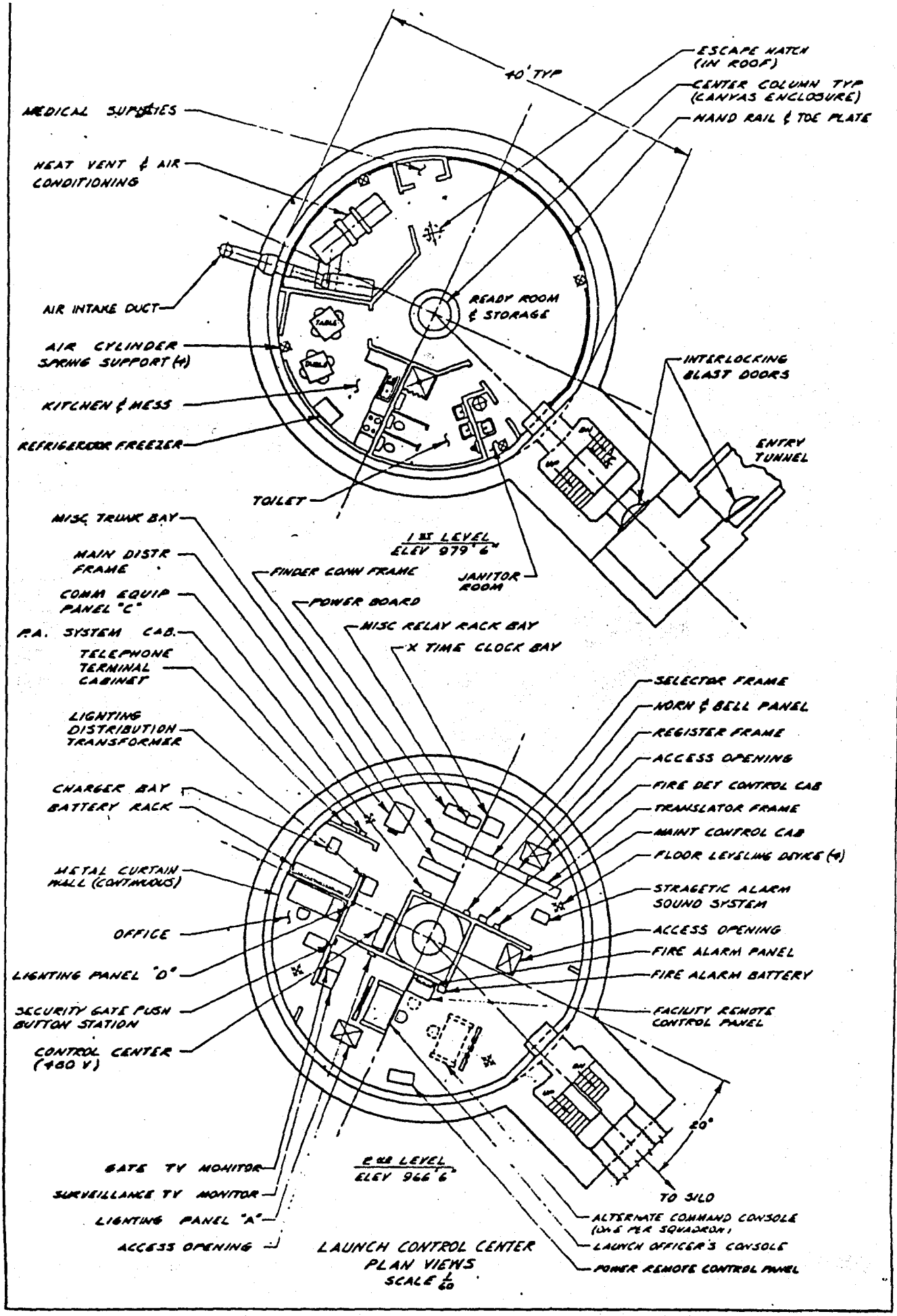
CRIB STEEL: Erection of structural crib steel was one of the major tasks under the direction of the Corps of Engineers. Macco Corporation erected all of the Launch Control Center cribs and 5 of the silo cribs. Owl Transportation and Trucking Company erected 7 of the silo cribs. Methods of erection was to pre-assemble the long columns into bents on the ground surface and then lower the complete unit into the silo. These units were connected by individual beams and braces as the work progressed. Installation of cryogenic, high pressure vessels and diesel generators proceeded con-currently with erection of Crib Steel. Delays in delivery of some of the above vessels caused extra work due to difficulty of drifting and placing these units after a major portion of the crib steel was in position. Grating, handrails and other miscellaneous iron were added per schedule. When the crib steel was erected through the 3rd level it was swung from its supports onto the shock strut hangers located at four points on the silo wall. Tolerances on the silo crib steel were extremely close. The tolerances required was 1/8" on alignment and 1/4" on elevations for each level. Backfill of the Mass Excavation proceeded con-currently with the erection of crib steel.

MECHANICAL AND ELECTRICAL: Installation of piping, pumps and related equipment proceeded after the initial erection of crib steel. Pre-assembled piping and units were connected together, controls added, the units pressure tested, and in the final stages these units were validated for operating efficiency. The Electrical installation for use on the support facilities was con-currently constructed with the mechanical units which included the air conditioning system. Very close co-ordination was required by all crafts and trades to construct the interior of the silo. Good cooperation was the normal attitude and only minor interferences were noted. Improvements were made in plans as the work progressed and these changes in turn needed to be incorporated into the finished product.

The propellant loading system (PLS) was constructed con-currently with the other systems. As previously noted this feature required meticulous care due to close tolerances and requirements of the contract.

In summation, and to lend some idea of the magnitude of the construction effort that is reflected in the construction of one Atlas "F" silo are the following: Approximately 48,000 cubic yards of material was excavated by open cut method. This was followed by approximately 24,000 cubic yards of material excavated by silo shafting. The sum total of those two, 72,000 cubic yards, was used during backfill operations. A total of approximately 6,000 cubic yards of portland cement concrete has been placed. The crib steel alone weighs approximately 600 tons, and when suspended and balanced on the eight suspension springs the weight of the crib steel, the various fueling vessels, motor generators, propellant loading skids, etc., the total weight accumulates to approximately 1,800,000 pounds. Using average job figures, the direct payroll paid to skilled and semi-skilled workmen employed at this site is in the magnitude of 3/4 million dollars. This does not include the salaries of the professional personnel, and workers at various fabricating factories. It reflects only the salaries of the workmen actually employed at Complex No. 4. The construction phase is complete and the site now passes to the second phase that of installation and checkout. Many more items of hardware will be placed within the silo and the Launch Control Center. Many more manhours of effort will be expended prior to the time when the missile is actually housed in the silo.

Any individual questions concerning the construction effort will be answered in detail during the morning tour of the site.



LAUNCH CONTROL CENTER
PLAN VIEWS
SCALE 1/60

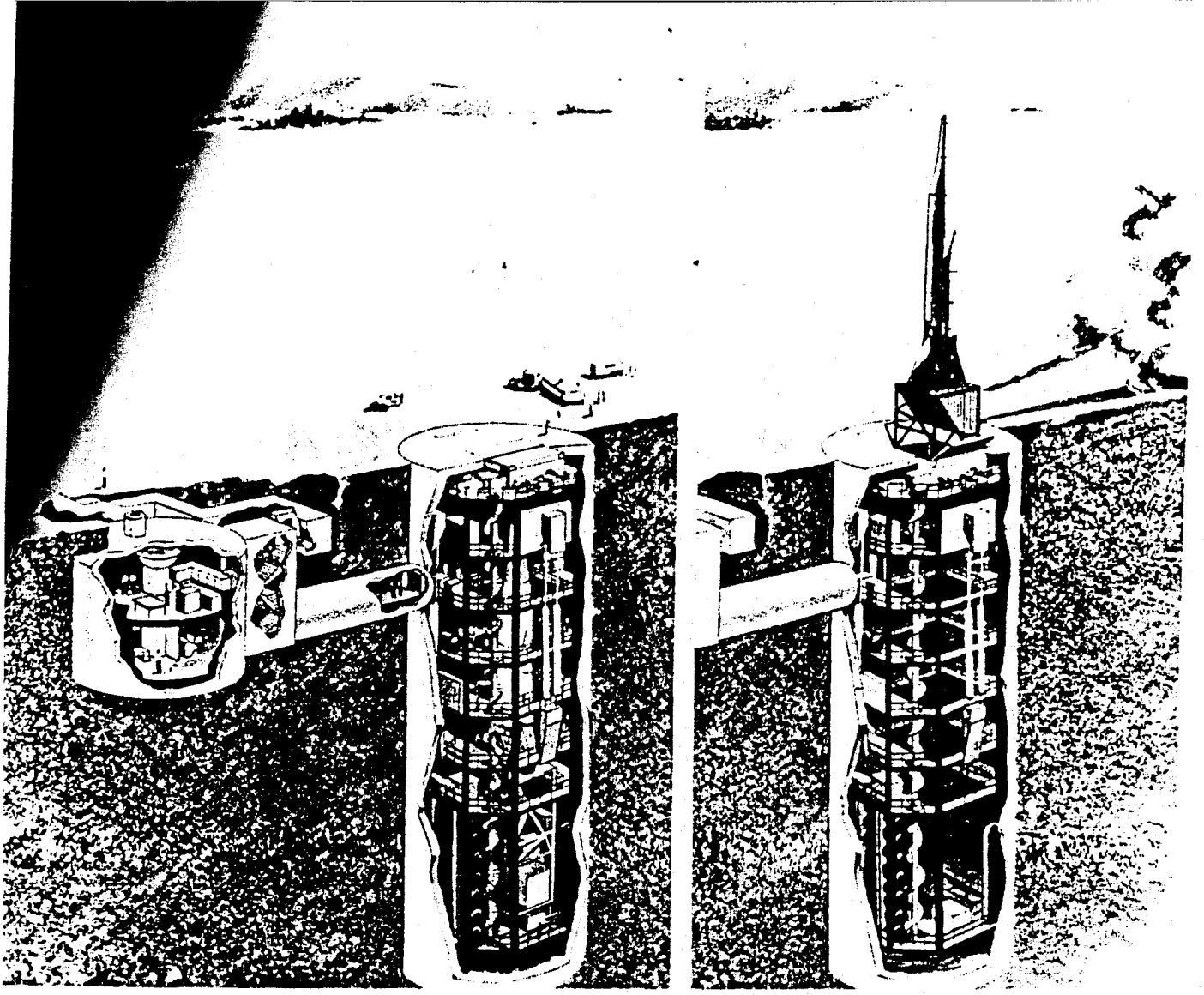
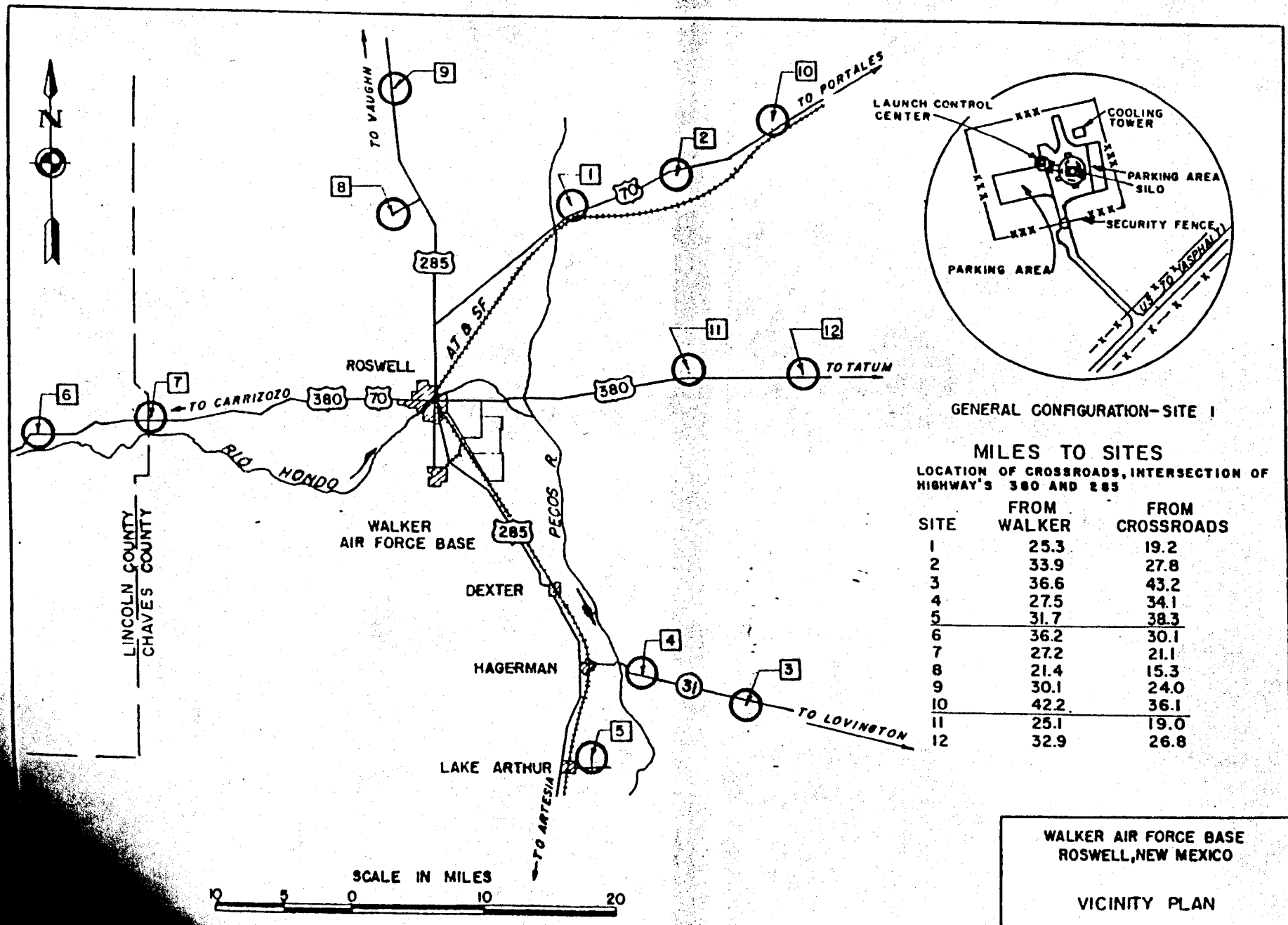


ILLUSTRATION OF AN ATLAS-F MISSILE COMPLEX.



GENERAL CONFIGURATION-SITE 1

MILES TO SITES

LOCATION OF CROSSROADS, INTERSECTION OF HIGHWAY'S 380 AND 285

SITE	FROM WALKER	FROM CROSSROADS
1	25.3	19.2
2	33.9	27.8
3	36.6	43.2
4	27.5	34.1
5	31.7	38.3
6	36.2	30.1
7	27.2	21.1
8	21.4	15.3
9	30.1	24.0
10	42.2	36.1
11	25.1	19.0
12	32.9	26.8

WALKER AIR FORCE BASE
ROSWELL, NEW MEXICO

VICINITY PLAN