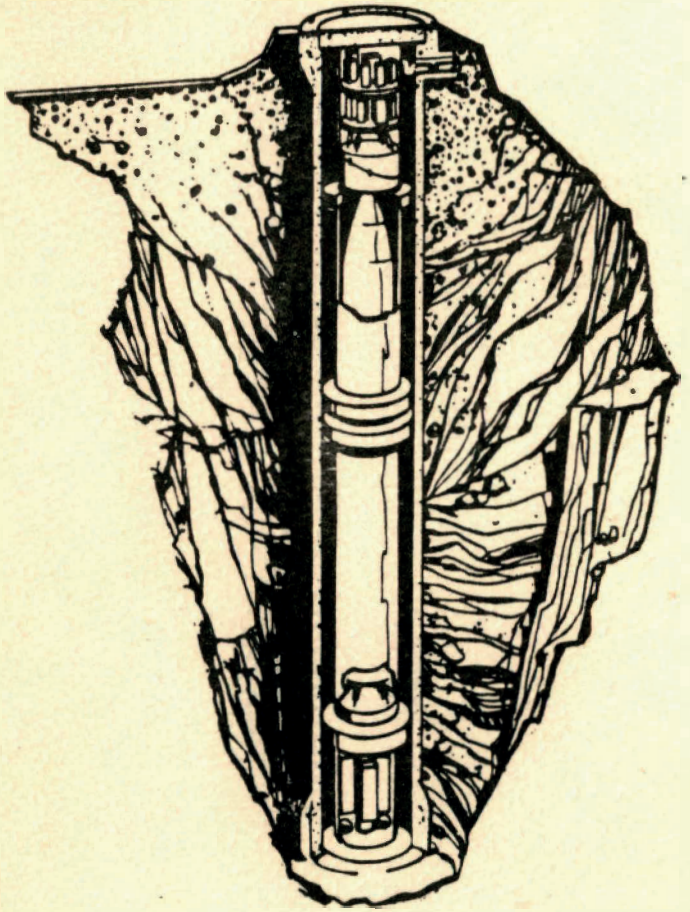
MX



Engineering Test Bed Program

July 1979

Boeing Aerospace Company

Boeing Co., Seattle, Wash.

MX

ENGINEERING TEST BED PROGRAM

Concept validation for the vertical shelter base mode is supported by an Engineering Test Bed program. Engineering tests on critical technical elements of the MX Multiple Protective Structure (MPS) concept will be conducted at a test site near Jackass Flats on the Nevada desert. The test site initially will consist of one vertical shelter and the necessary roadway to demonstrate the basic feasibility of the MX MPS system and to obtain engineering data to verify the preliminary design of the critical technical elements. The facility will not incorporate requirements for nuclear hardening.

Testing will begin in the summer of 1979 and will be completed in January 1980.

Additional engineering tests are proposed. For these, the Phase II road would be built, and may include additional vertical shelters, to obtain further engineering test data on vehicle roadability and manueverability. Another proposal would add a second roadway to the south similar to the Phase II roadway to test different roadway surface treatments.

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TEST BED LOCATION

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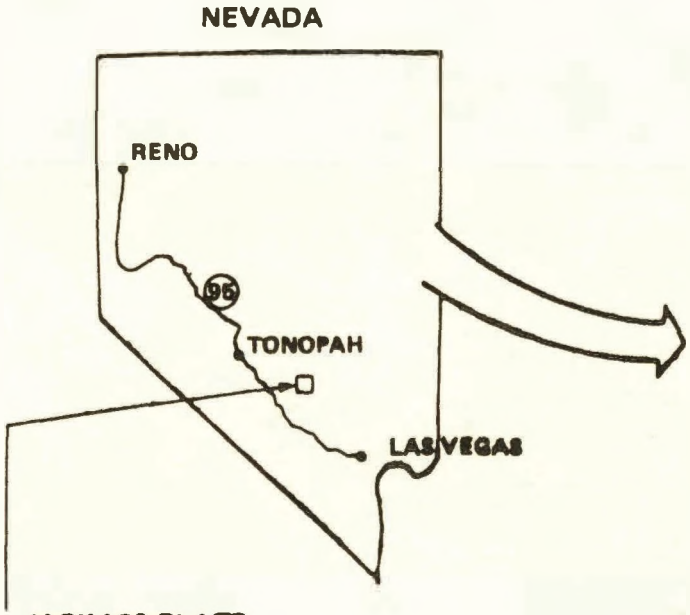

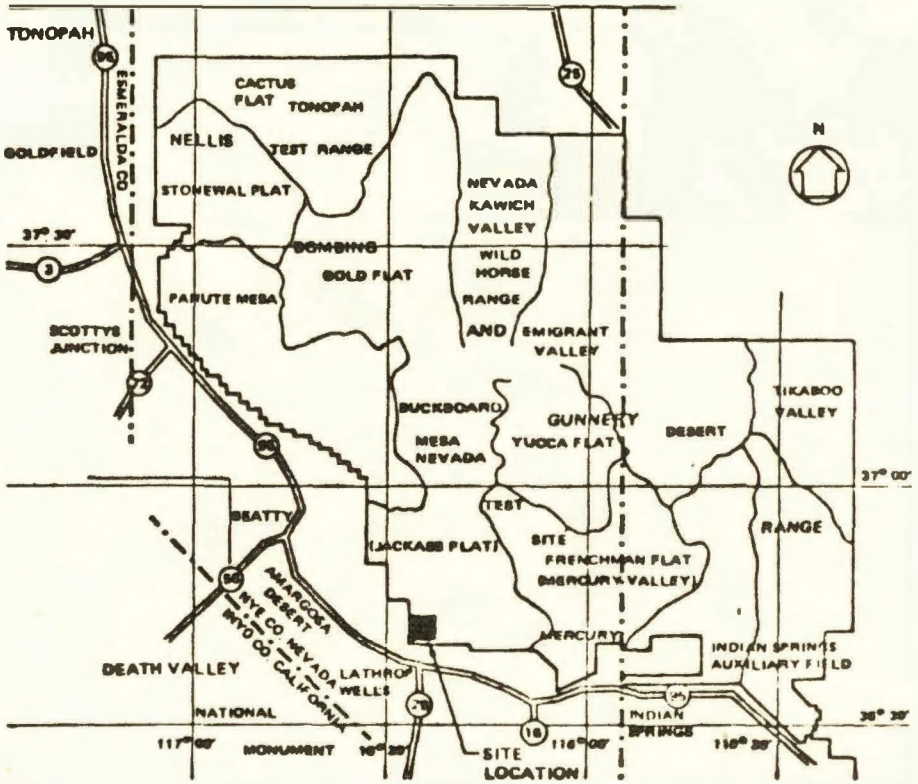

JACKASS FLATS

- **DEPARTMENT OF ENERGY NEVADA TEST SITE**
- **138 km TO LAS VEGAS**

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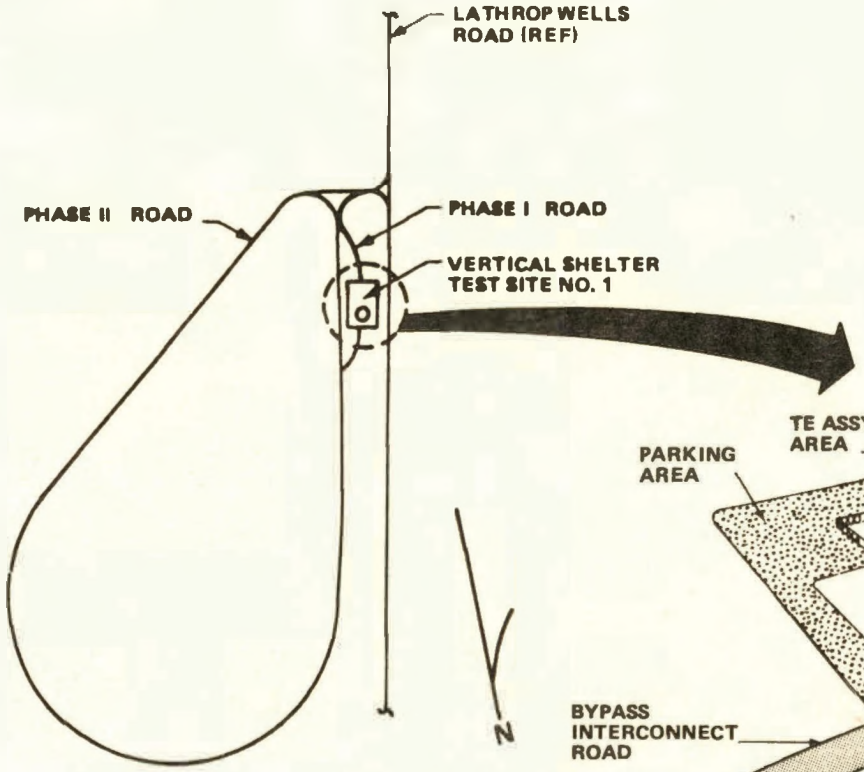
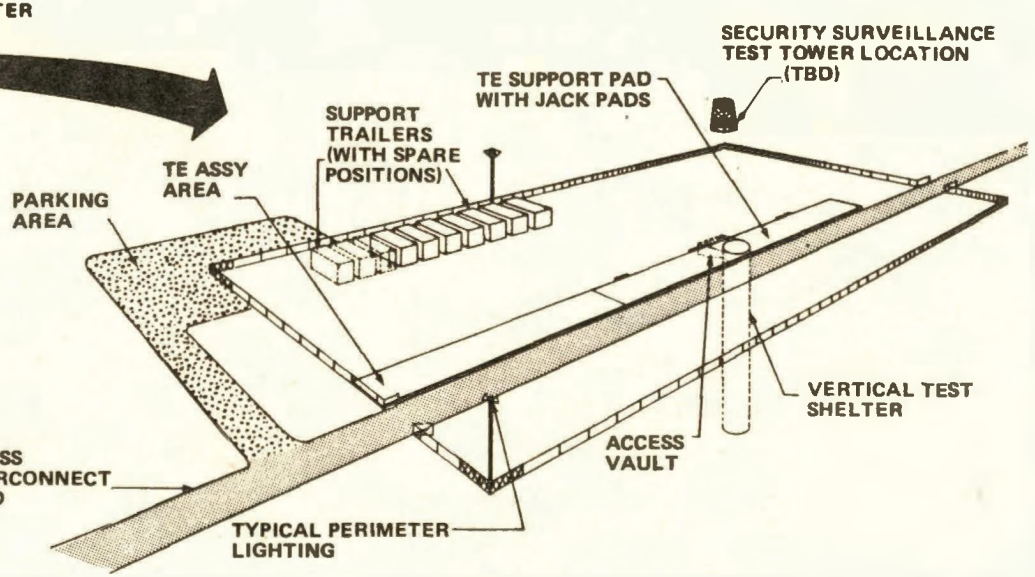
MX

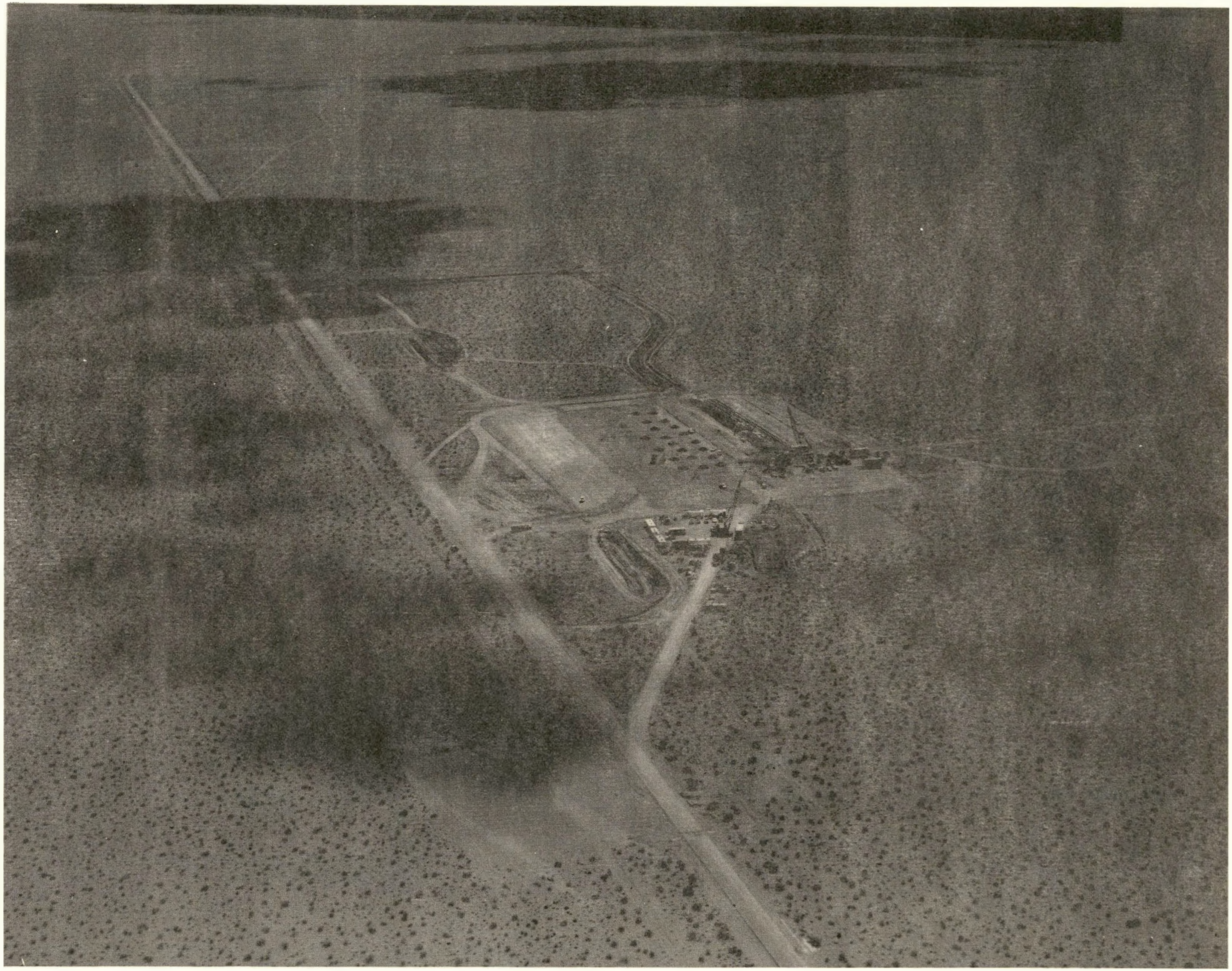
TEST SITE AND ROAD NETWORK



SITE PLAN



TEST SITE NO. 1 LAYOUT



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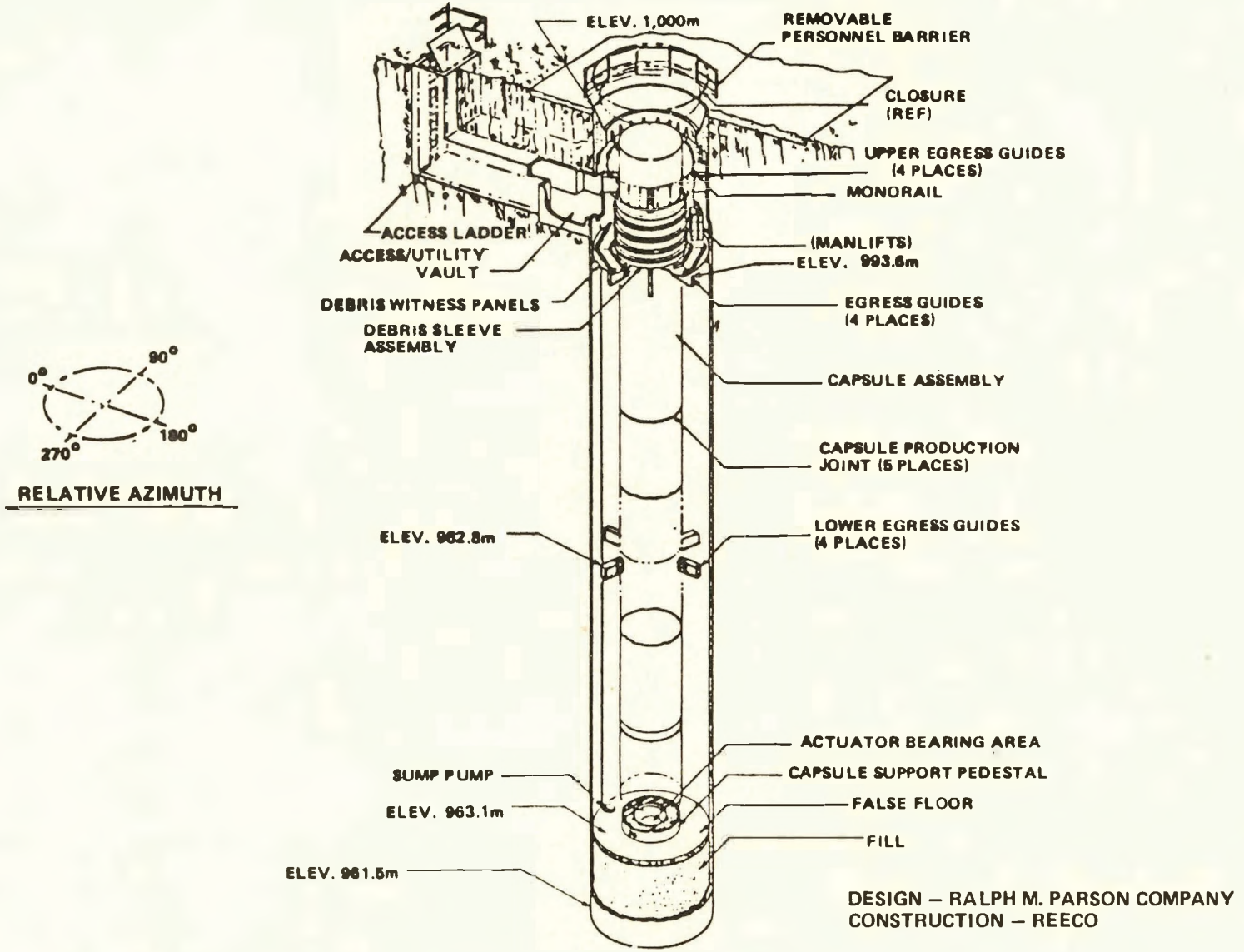
MX

VERTICAL SHELTER ARRANGEMENT



DESIGN – RALPH M. PARSON COMPANY
CONSTRUCTION – REECO

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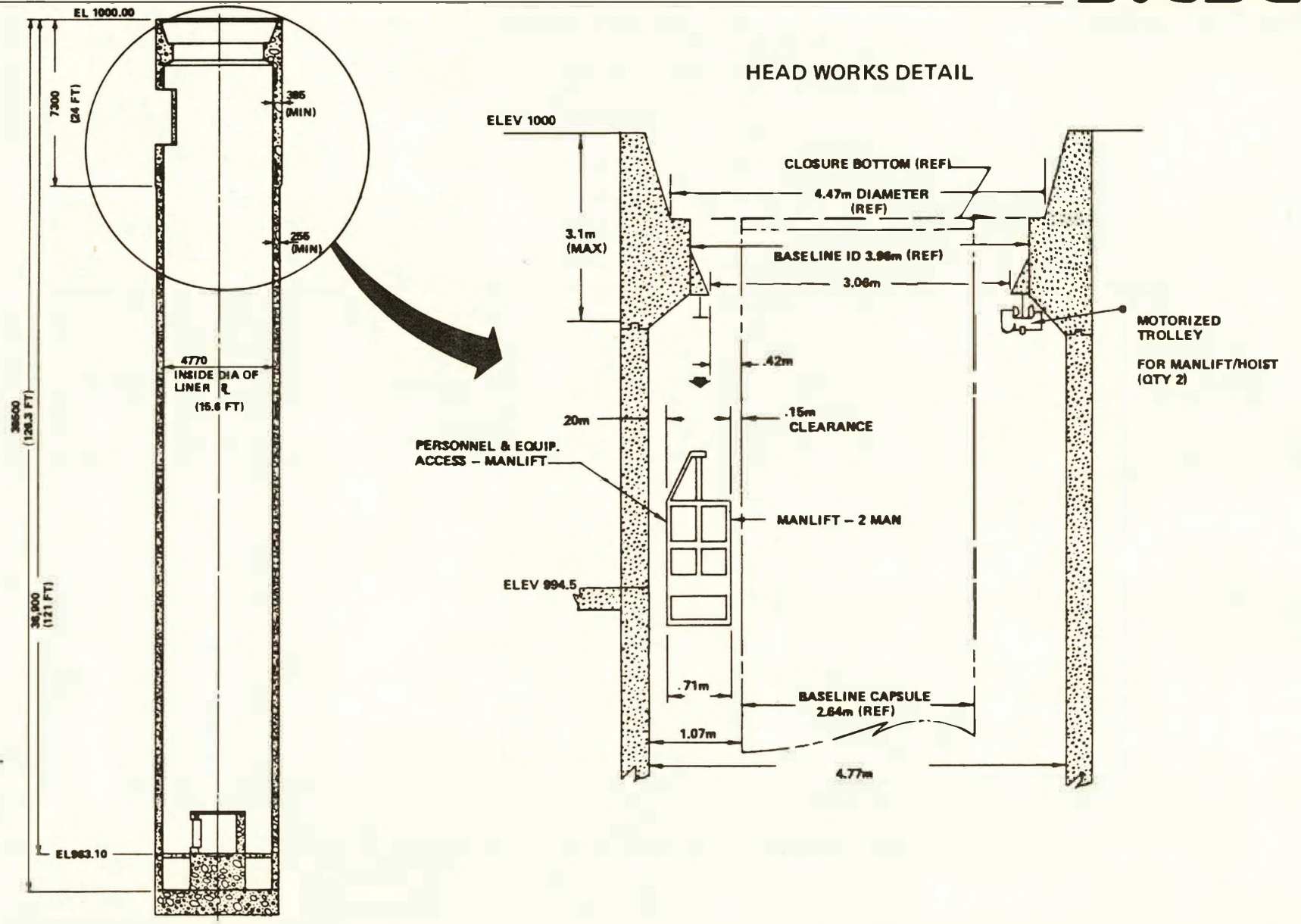
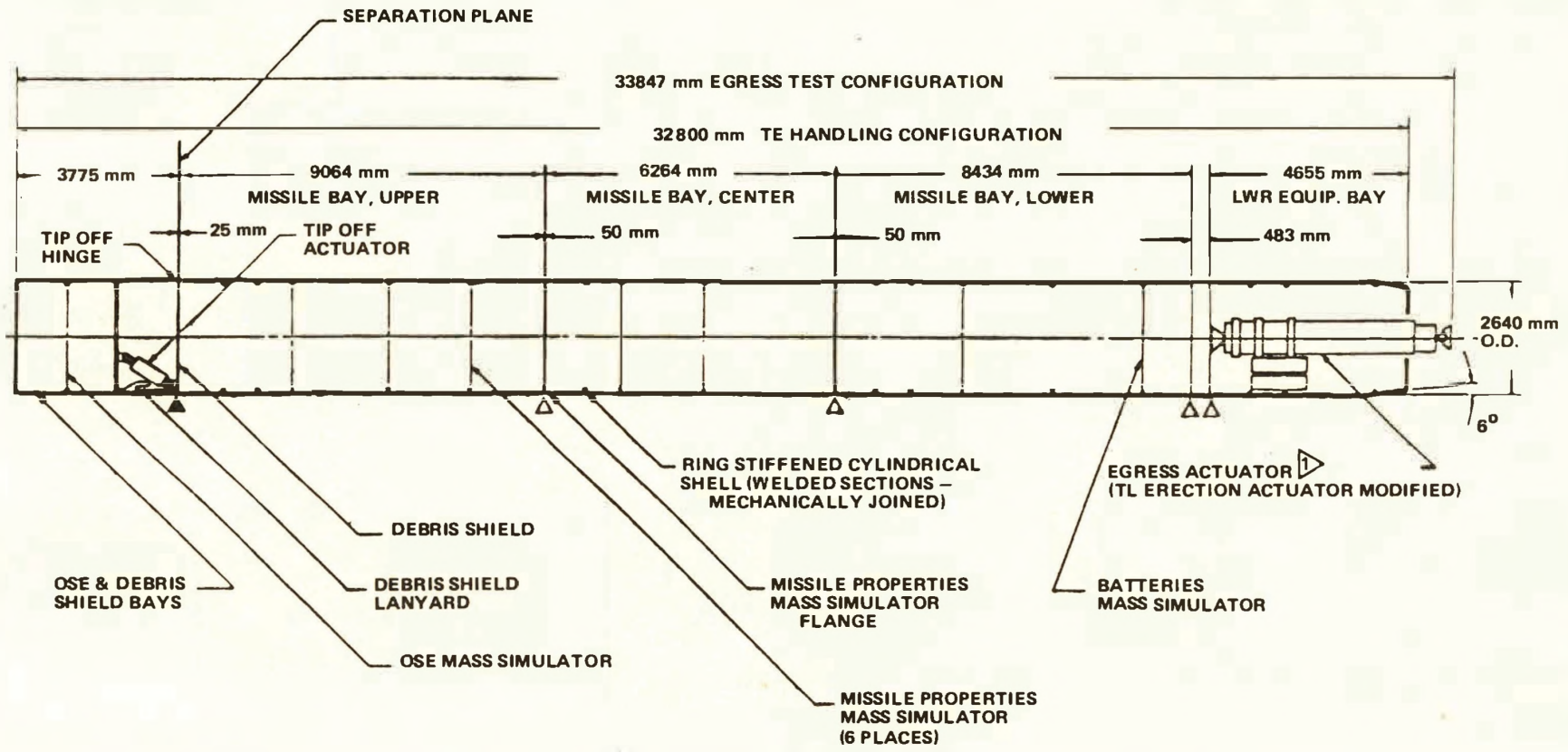
VERTICAL TEST SHELTER SITE NO. 1



MX

TEST CAPSULE CONFIGURATION



NOTES:

△ BOLTED ASSEMBLY JOINT

▲ BOLTED ASSEMBLY JOINT W/EXPLOSIVE NUTS FOR SEPARATION

1 FOR THE TE HANDLING CONFIGURATION THE EGRESS ACTUATOR IS REPLACED WITH A MASS SIMULATOR TO SIMULATE AN EGRESS ACTUATOR AND VERTICAL SHOCK ISOLATION SYSTEM

2 TOTAL CAPSULE WEIGHT = 157 850 kg (348 000 LBS) (DOES NOT INCLUDE LATERAL SIS)

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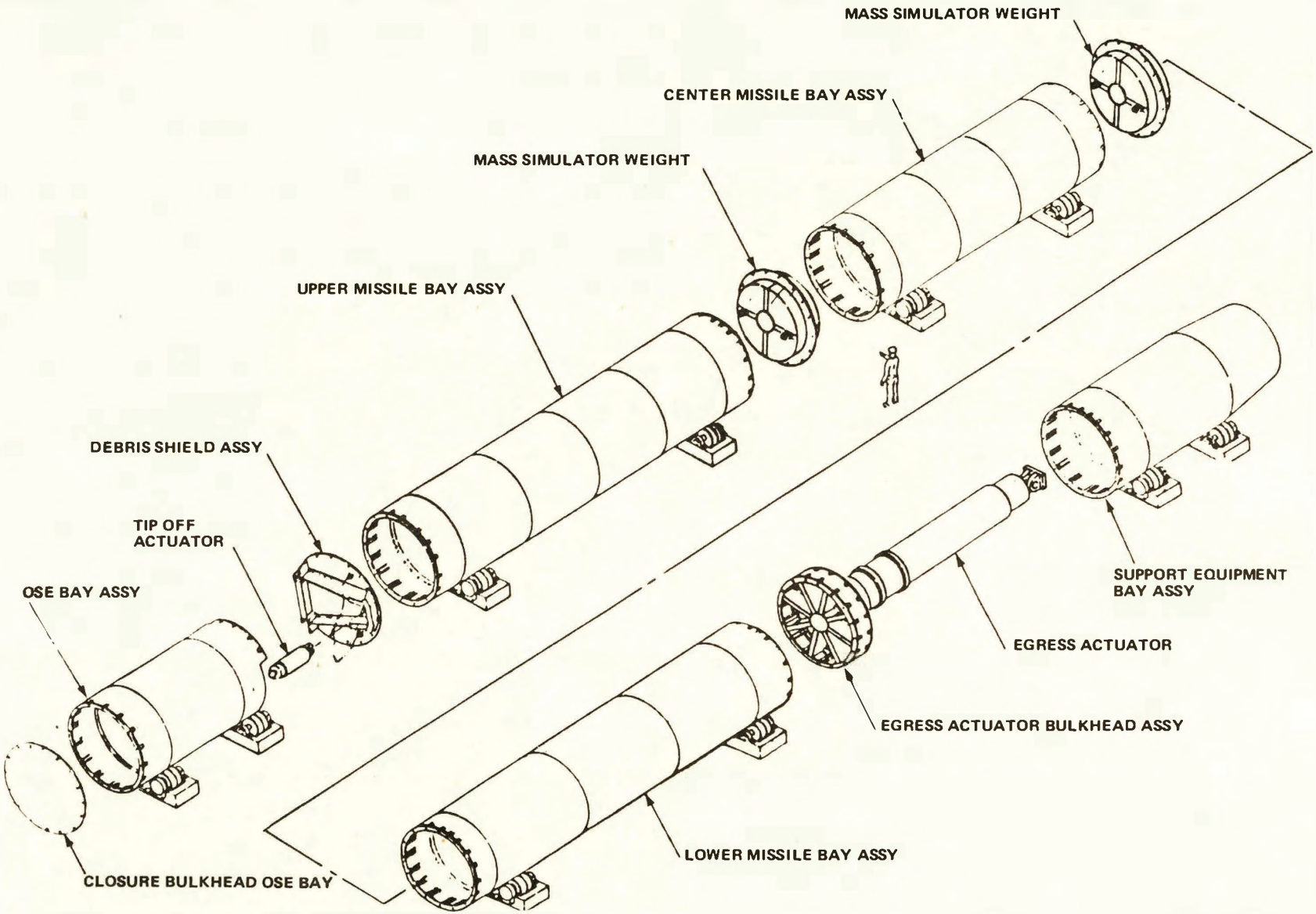
TEST CAPSULE ASSEMBLY



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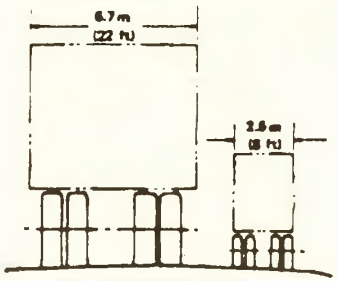
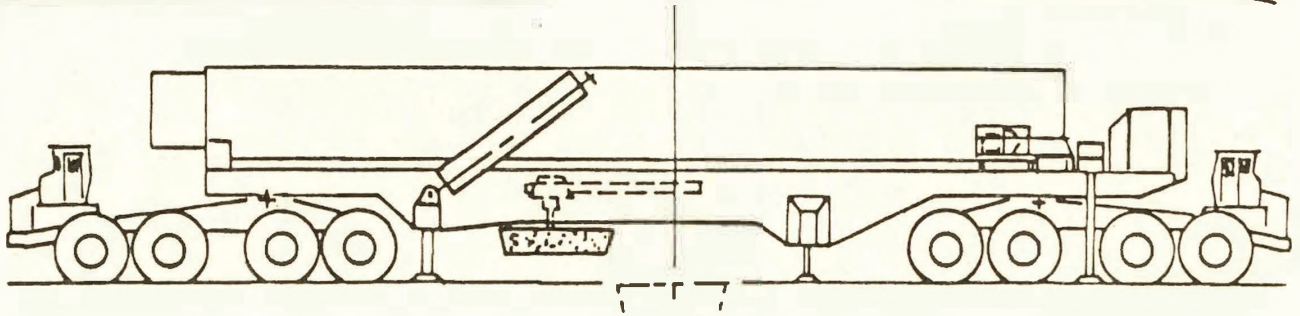
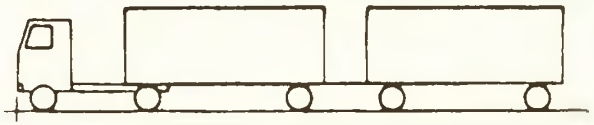
MX TRANSPORTER EMPLACER DOUBLE TRACTOR FEATURES

CHARACTERISTICS:

LENGTH	50,240mm (165 FT)
HEIGHT	8,180mm (27 FT)
WIDTH	6,700 mm (22 FT)
WEIGHT	565,000Kg (1,250,000 LBS)







COMMERCIAL TRACTOR/TRAILER
85,000 lb
(37,000 kg)

FEATURES:

- EQUAL OPERATION IN EITHER DIRECTION WITH SINGLE DRIVER CONTROL
- ERECTION AND PAYLOAD HOIST SYSTEMS ARE FAIL SAFE DESIGNS
- TIRE SELECTION AND ARRANGEMENT DESIGNED TO MINIMIZE ROAD COSTS
- AUTOMATED POSITIONING OVER PROTECTIVE STRUCTURE

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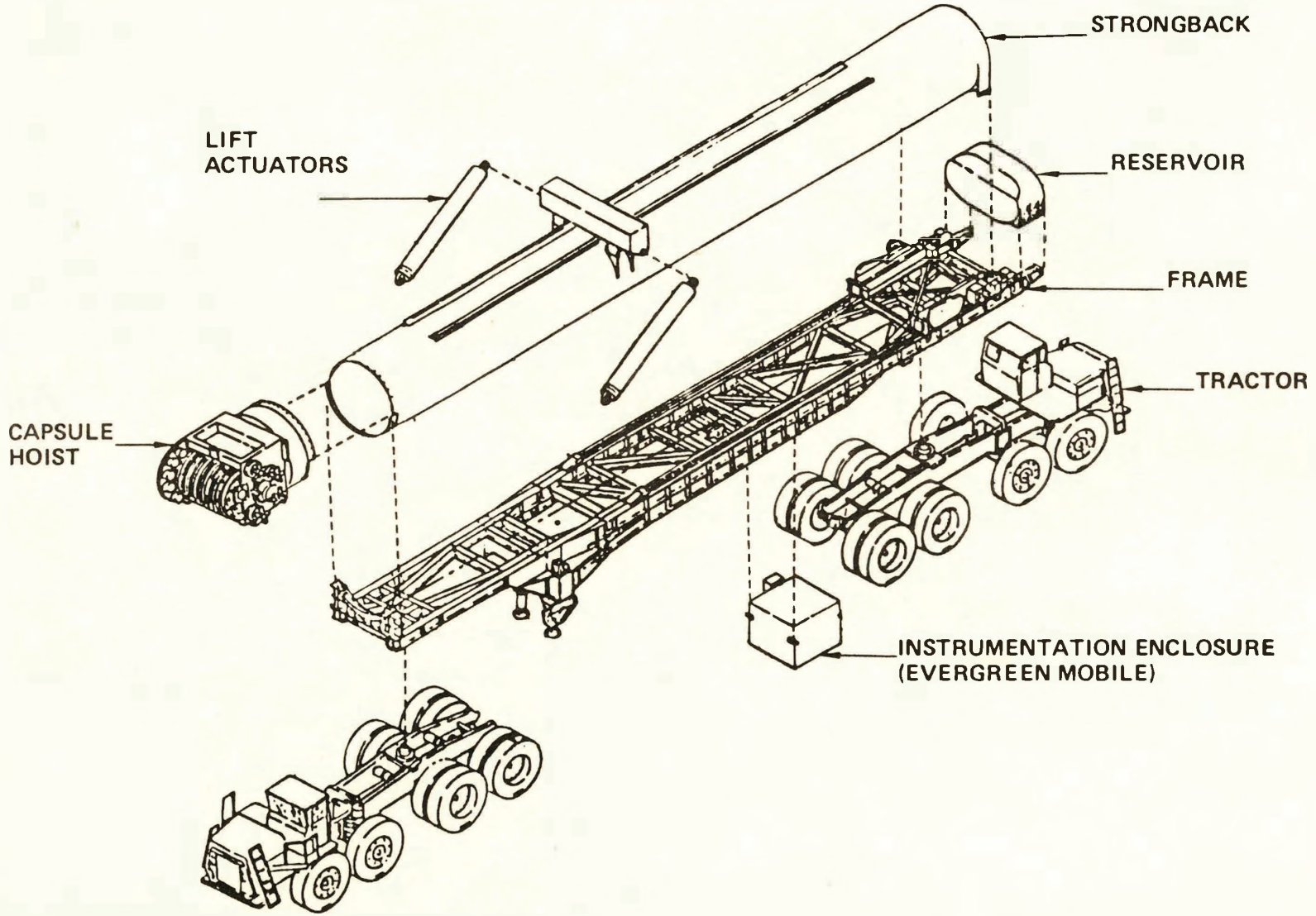
TRANSPORTER EMPLACER TEST VEHICLE

MX



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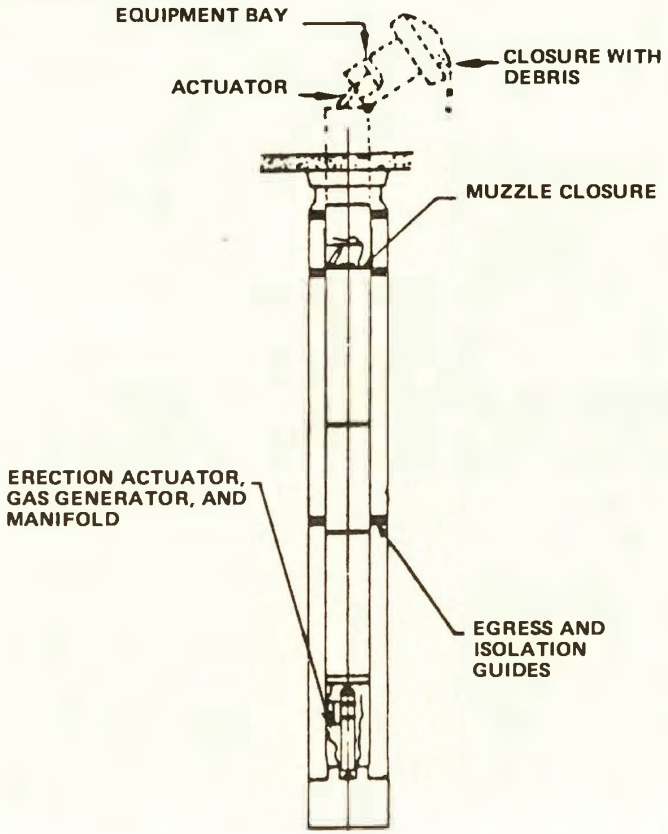
EGRESS TEST



TEST OBJECTIVES:

- EVALUATE:
  - INTERACTIONS DURING EGRESS
  - TIMELINES
  - EQUIPMENT BAY AND CLOSURE REMOVAL SYSTEMS
- VERIFY ANALYTICAL MODELS

The egress test evaluates the interactions, performance, and timelines for the egress of a full-scale launcher from the test shelter and for the removal of the upper electronics (OSE) bay by the tipoff actuator. The launcher will be raised 12 meters (39 feet) by the erection actuator. These data are used to verify analytical models and for final design of the operational equipment.

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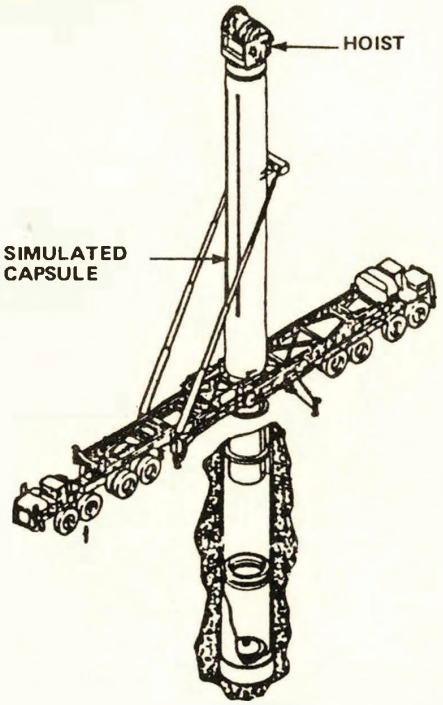
Transporter Emplacer

TRANSPORTER EMPLACEM ENT TESTS

MX

TRANSPORTER EMPLACER



TEST OBJECTIVES

- EVALUATE:
  - MISSILE CAPSULE EMPLACEMENT AND REMOVAL
  - TIMELINES FOR EMPLACEMENT AND REMOVAL OPERATIONS
  - ERECTION AND CAPSULE HOISTING FUNCTIONS
  - POTENTIAL HUMAN FACTOR LIMITATIONS
  - TRANSPORTER EMPLACER INDEXING OF MISSILE CAPSULE
  - OBSERVABLE SIGNATURES DURING EMPLACEMENT AND REMOVAL
  - SAFETY REQUIREMENTS
  - CLOSURE REMOVAL AND REPLACEMENT

This test evaluates the vehicle alignment accuracies over the vertical shelter and the emplacement and removal of a simulated launcher. Included in this test will be the time it takes to accomplish these movements and other observables related to launcher emplacement and removal.

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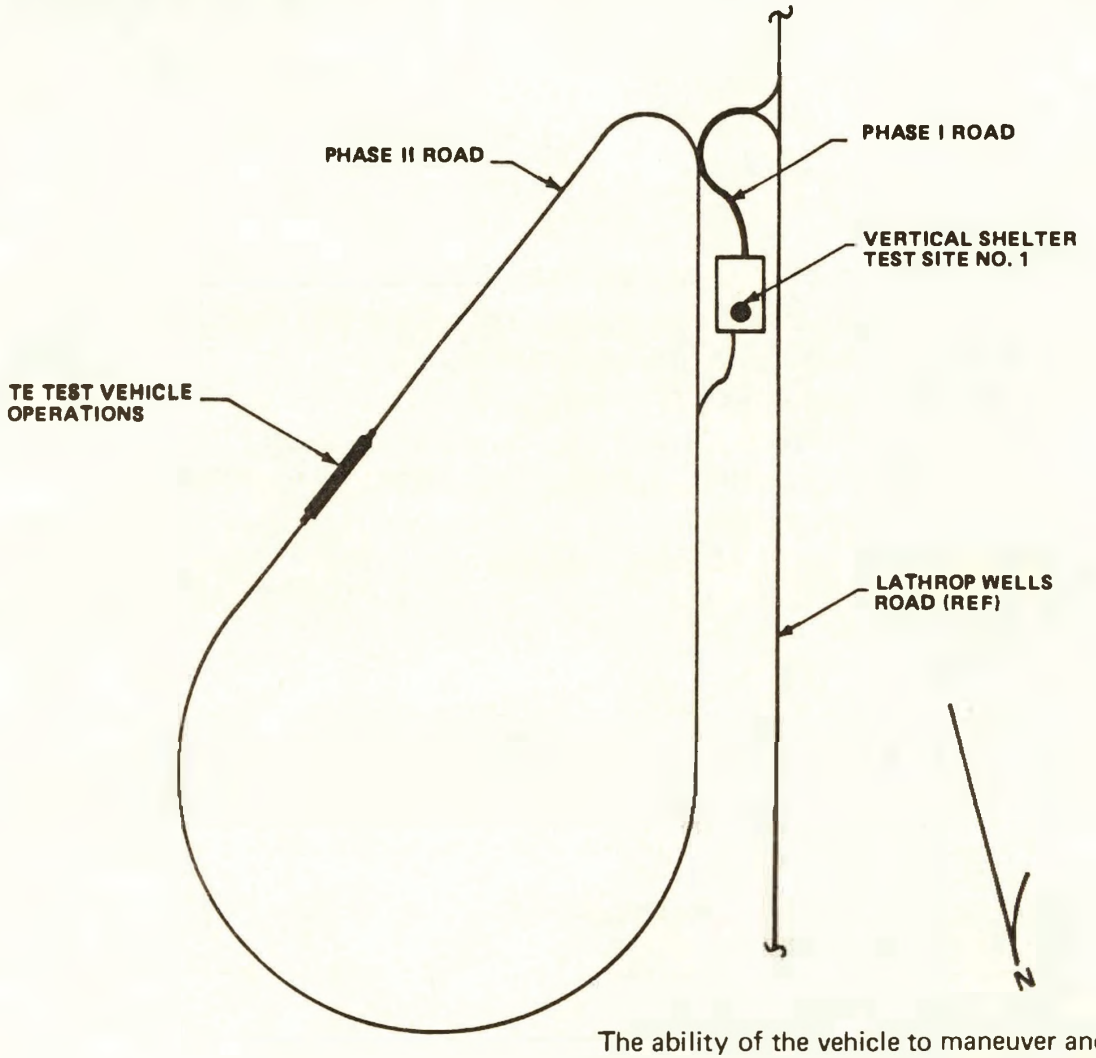
Transporter Emplacer

ROADABILITY/MANEUVERABILITY TESTS



TEST OBJECTIVE

- EVALUATE PERFORMANCE OF STEERING AND CONTROL SYSTEM UNDER VARYING CONDITIONS OF VELOCITY, TURNING, WEIGHT, START, STOP IN BOTH AUTOMATIC AND MANUAL MODE.
- VERIFY ANALYTICAL MODEL

The ability of the vehicle to maneuver and travel over gravel roads will be evaluated. Maneuver tests include the use of the automatic steering and control system to position the TE over the vertical shelter test site.

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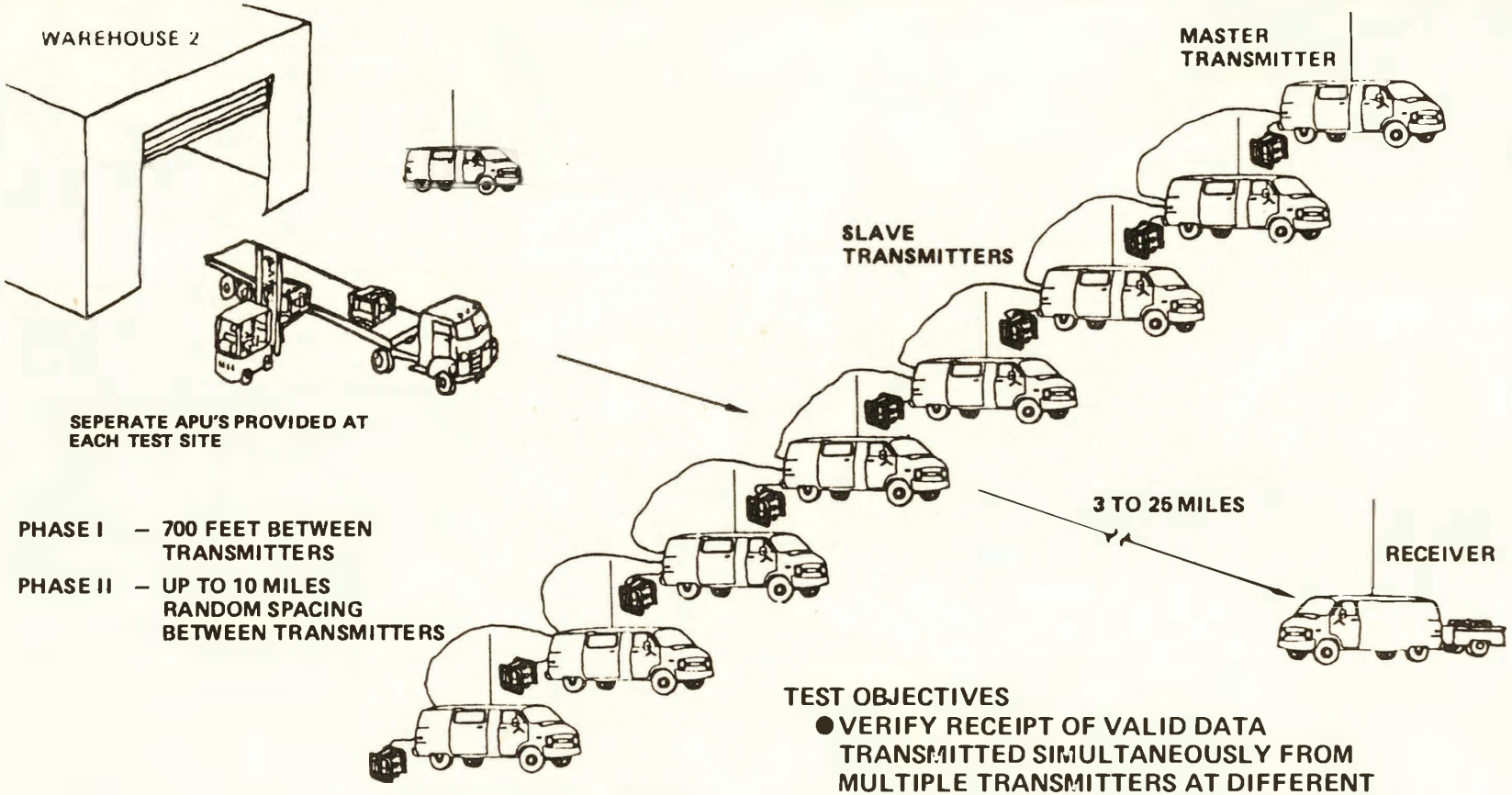
Communications

SIMULCAST TEST



PHASE I – 700 FEET BETWEEN TRANSMITTERS

PHASE II – UP TO 10 MILES RANDOM SPACING BETWEEN TRANSMITTERS

TEST OBJECTIVES

- VERIFY RECEIPT OF VALID DATA TRANSMITTED SIMULTANEOUSLY FROM MULTIPLE TRANSMITTERS AT DIFFERENT LOCATIONS, AND ENHANCEMENT OF SIGNAL STRENGTH

In this concept, a message sent to or from any one of the protective structures is received and retransmitted throughout all protective structures until the facility with the proper address receives the message.

Nine test stations in standard vehicles will be spaced up to 10 mi apart at remote Nevada locations to demonstrate this communications concept.

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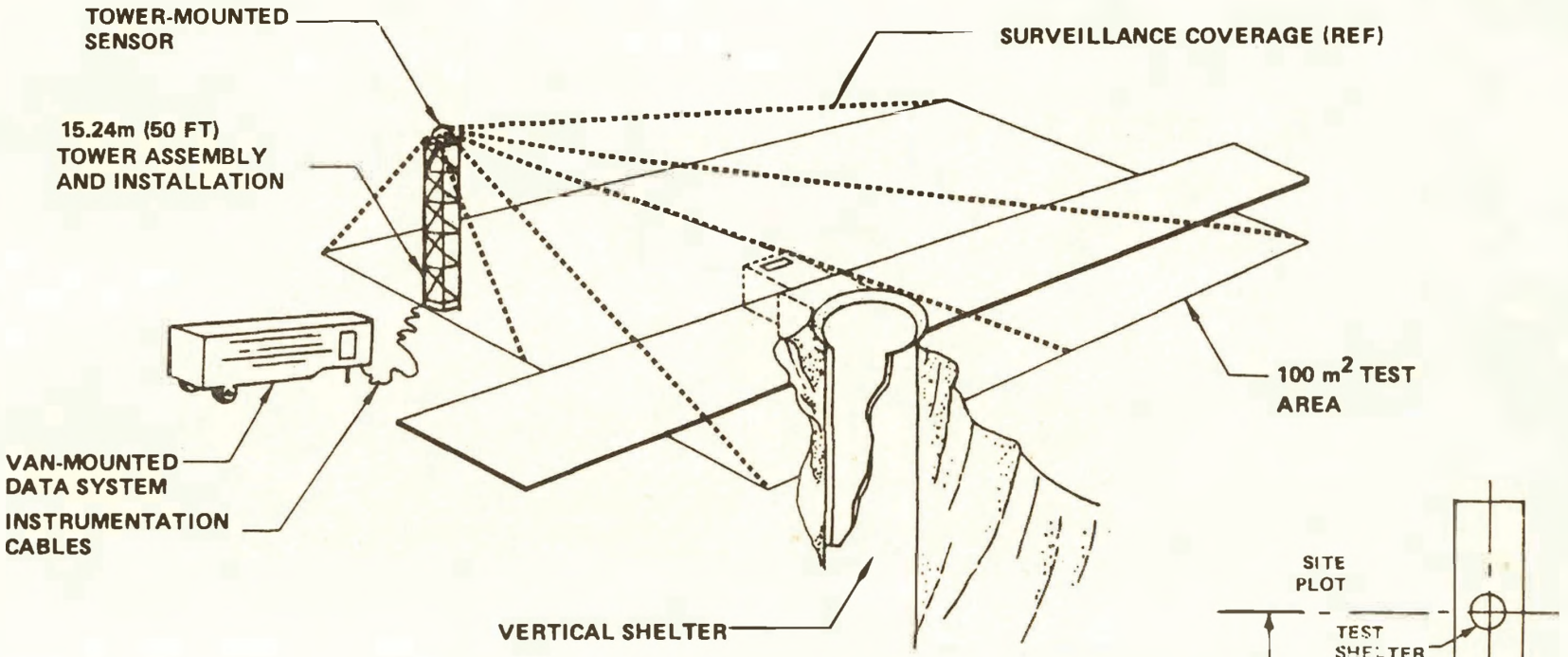
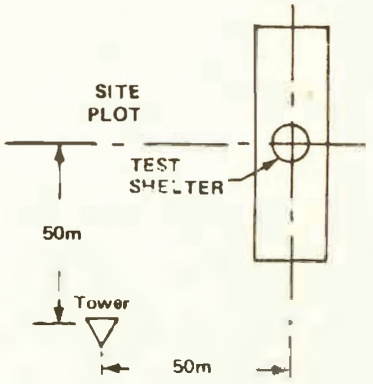
MX

Securi ty System

IR OPTICAL TEST

- TEST OBJECTIVES
  - EVALUATE SENSORS TO DETECT INTRUDERS
  - VERIFY DESIGN CONCEPT
  - TEST SITE NOISE AND NUISANCE TARGET ENVIRONMENTS





All protective structures will have sensors to detect site intrusion. Tests will evaluate the performance of IR optical sensors to detect above-ground intruders and to determine local noise and nuisance targets that might affect sensor performance at the test site.

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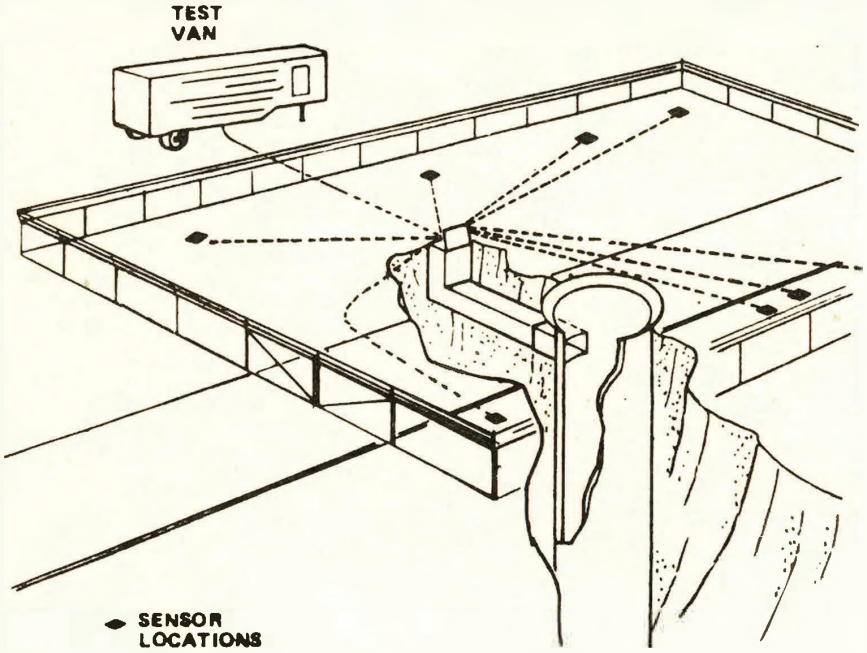
Security System

SEISMIC SENSOR TEST



TEST OBJECTIVES

- EVALUATE SENSORS TO DETECT INTRUDERS
- VERIFY DESIGN CONCEPT
- TEST SITE NOISE AND NUISANCE TARGET ENVIRONMENTS

Another class of detectors buried below the ground will be tested to evaluate their ability to detect seismic effects of intruders under a variety of conditions. Data will be obtained on seismic wave propagation, effects caused by site conditions and environments, and for assessment of operational performance predictions.

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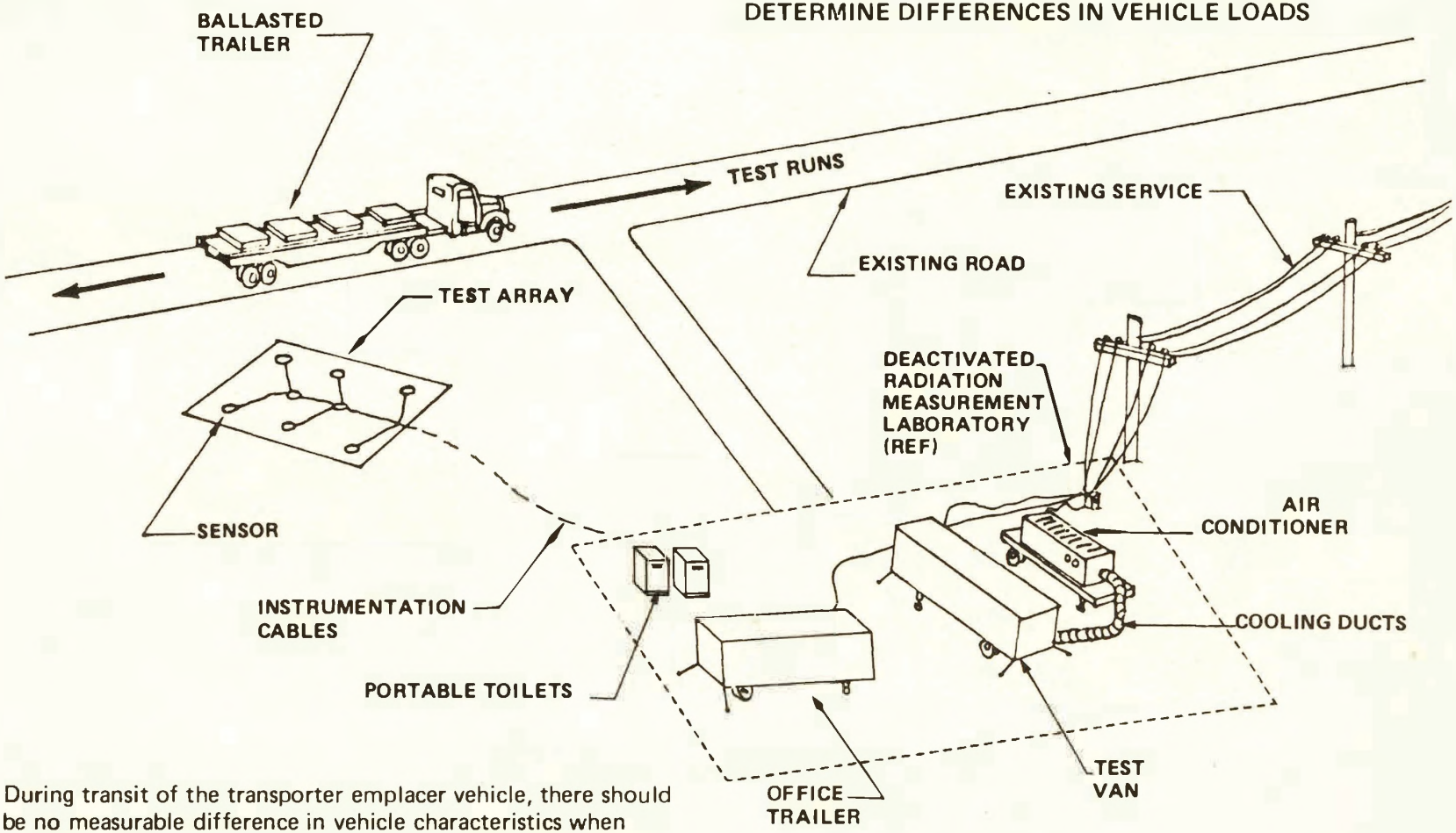
MX

VEHICLE SEISMIC SIGNATURE TEST

TEST OBJECTIVE

- EVALUATE ABILITY OF SEISMIC SENSORS TO DETERMINE DIFFERENCES IN VEHICLE LOADS



During transit of the transporter emplacer vehicle, there should be no measurable difference in vehicle characteristics when carrying a missile or carrying a simulator. The vehicle seismic signature test determines the extent that differences can be measured by seismic, tilt and accelerometer sensors of a truck/trailer driven past sensors at different speeds, carrying varied amounts and distribution of ballast.

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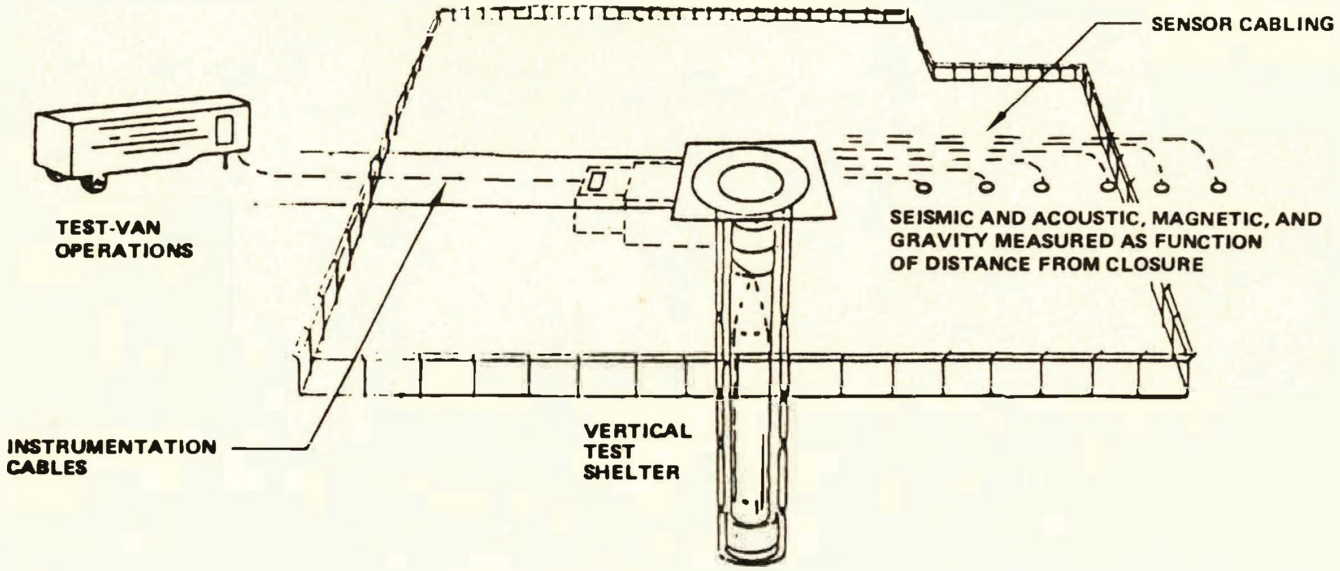
Preservation of Location Uncertainty

NEVADA BACKGROUND SIGNATURE TEST

MX



TEST OBJECTIVE

- DETERMINE BACKGROUND SIGNATURE NOISE LEVELS AT TEST SHELTER AND PROPOSED SHELTER LOCATIONS:
  - SEISMIC AND ACOUSTIC AND MAGNETIC

Measurements of a number of signatures inherent at the local test site and proposed MX protective structure locations will be recorded to develop profiles of expected background levels

MX

ENGINEERING TEST
BED PROGRAM

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