PRELIM. REPORT - BASE FACILITIES
AT RCAF COLD LAKE - ARROW 2
DEVELOPMENT & DEMONSTRATION PROGRAM
ISSUE 2
REPORT NO. 72/GEQ/4-1

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AVRO AIRCRAFT

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A PRELIMINARY REPORT ON THE BASE FACILITIES REQUIRED AT RCAF COLD LAKE FOR THE ARROW 2 DEVELOPMENT & DEMONSTRATION PROGRAM.

Issue 2

Report No. 72/GEQ/4-1

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FORM 1749 A

CONTENTS

ILLUSTRATIONS

1. INTRODUCTION

This report summarizes the requirements of Arrow contractors for buildings to house equipment and personnel, in order to support Arrow programs at RCAF Station, Cold Lake. It has been prepared at short notice and must be regarded as being of a preliminary nature.

2. PROGRAMS AT COLD LAKE

The programs which have been considered in this report as being contractor supported are:

(a) The Canadair HTV program on aircraft 25211 and 25212

(b) Arrow Weapon System Demonstration on aircraft 25213 and 25214

(c) RCAF Phase 4 on aircraft 25216 and 25217

(d) RCAF Phase 5 on aircraft 25218 and 25219

(e) RCAF Phase 7 on aircraft 25226 and 25227

The phasing of these various programs is shown in Fig. 1.

3. ASSUMPTIONS

In order to prepare this report at short notice it has been necessary to make certain assumptions without first obtaining RCAF concurrence. These assumptions are:

(a) That on the completion of the Canadair HTV Program, aircraft 25211 and 25212 will be immediately allocated to RCAF Phase 7.

(b) That RCAF Phases 4, 5 and 7 must be productive from their commencement; in order to achieve this objective, where knowledge, experience and skills peculiar to components of the Arrow Weapon System are required, support for these programs must be supplied entirely by contractor personnel at the start. These personnel will be replaced by RCAF personnel on a progressive basis as trained RCAF personnel become available and are integrated into support teams. For the purposes of this report it is assumed that all but contractor service representatives can be phased out by September 1961.

3. ASSUMPTIONS (Continued)

(c) That the RCAF will provide the following personnel and facilities:

(i) For all Programs

(a) Refuelling services, consumable stores, utility transportation and unskilled labour as required.

(b) Secretarial assistance as required.

(c) Labour to transport missiles from the magazine to the missile preparation area.

(d) The full time services of twelve electronic mechanics to assist the electronic system contractor.

(e) Data reduction and processing facilities at least comparable to those already in existence at Cold Lake.

(ii) For RCAF Programs

Aircrews and flight planning personnel.

4. FIXED GROUND SUPPORT FACILITIES - ARROW FIRST LINE MAINTENANCE

The peak number of Arrow aircraft to be supported at Cold Lake is ten during the period September to December 1960. Eight of these aircraft will be equipped with complete Astra systems and working Sparrow 2 missile installations. To house these aircraft hangar space will be required. To develop and demonstrate the various states of readiness a readiness hangar will be required.

These aircraft could be accommodated in two RCAF standard "arch type" hangars (160 x 220 ft.) as shown in Fig. 2 or in one cantilever hangar (2 bays, each 148 x 300 ft.) as shown in Fig. 3. At each aircraft position the following services should be provided:

(a) Up to 40KVA of aircraft quality 115/200 volt, 400 c.p.s., 3 phase power

4. FIXED GROUND SUPPORT FACILITIES - ARROW FIRST LINE MAINTENANCE (Continued)

(b) A minimum of 150 lbs/min of cooling air at 4.5 psig and 55°F d.b.

(c) Electrical power outlets for:

(i) Main hydraulic rig

(ii) Auxiliary hydraulic rig

(iii) Nitrogen compressor

(iv) Electronic test equipment

If the cooling air is to be supplied from electrically driven rigs the total power requirements amount to approximately 300KVA/aircraft. It is suggested that six aircraft should be assumed to be using this quantity of power concurrently.

The hangar in which the various states of readiness will be demonstrated should have accommodation for one Arrow aircraft. To permit taxi in and out it should have access front and rear.

A complete aircraft run up muffler or pen will be required as part of the first line maintenance facilities. The optimum form of the run up facility is currently being studied. As a minimum, one pair of Durastack mufflers is required.

5. FIXED GROUND SUPPORT FACILITIES - SECOND LINE MAINTENANCE

The following fixed facilities for second line maintenance are required:

(a) Airframe

(i) Fuel System Component Shop: an area of approximately 500 sq. ft. (20 x 25 ft.), located remote from other buildings is required for function checking of fuel system components. This facility will house a fuel flow rig and a pressure/vacuum rig in addition to utility benches and office space. A 400 gallon capacity tank and pump with 100 gpm capacity at 75 psi are required.

5. FIXED GROUND SUPPORT FACILITIES - SECOND LINE MAINTENANCE (Continued)

(a) Airframe (Continued)

(ii) Air Conditioning Component Shop: an area of approximately 600 sq. ft. (20 x 30 ft.) is required for function checking of air conditioning system components. An air supply of 15 lbs/min at pressures up to 300 psi and temperatures up to 800°F will be required.

(iii) Electrical System Component Shop: an area of 400 sq. ft. is required for function checking of electrical system components. The facility will house an alternator test rig and a component test console in addition to work benches and office space. Electric power to drive the alternator rig and aircraft quality power to check components will be required in addition to cooling air.

(iv) Hydraulic Component Shop: an area of 600 sq. ft. is required for function checking of hydraulic components. This facility will house a pump test rig and hydraulic test consoles.

Approximately 100 KVA of electrical power will be required to drive the pump rig and a supply of 40 gpm hydraulic oil at 4000 psi will be necessary for component checking.

(v) Undercarriage Shop: an area of approximately 600 sq. ft. is estimated as being necessary for an undercarriage, wheels and brakes shop.

(vi) Armament pack facility: an area of approximately 2000 sq. ft. is required for servicing and re-arming weapon packs. This facility should be located adjacent to the missile preparation area and should be suitable for the short term storage of live missiles in packs.

5. FIXED GROUND SUPPORT FACILITIES - SECOND LINE MAINTENANCE (Continued)

(a) Airframe (Continued)

(vii) Other facilities: It is assumed that the RCAF will provide facilities for:

(i) Checking safety equipment

(ii) Parachute and Drag chute packing

(iii) Battery charging (NiCd)

(iv) Liquid Oxygen Facility

(v) Checking instruments

(vi) Supplying soft water

(b) Electronics (Astra System)

An area of 3600 sq. feet to house the equivalent of 1-1/2 Astra bench layouts and component test benches is considered necessary to support the various programs. Fig. 4 shows the proposed layout of the area. The facility should be located in an area which will permit an unrestricted field for radar transmissions of at least 1000 yds. and should be at least twelve feet above the ground to avoid physical injury by radiation to personnel who might pass by the facility and also to avoid ground interference.

The following services must be supplied to the facility:

(i)	Air conditioning	-	175 lbs/min of air at 70°F d.b. max and 6" water at entry to the equipment
(ii)	Electric Power	-	40 KVA of 115/200 volts, 400 cps, 3 phase, 20 KVA 115 volts, 60 cps 1 phase, 3 KW 28 volts
(iii)	Hydraulic Oil	-	17 gpm at 1000 psi
(iv)	Cooling Water	-	20 gpm at 50 psi
(v)	Compressed Air	-	Filtered air in small quantities at pressures up to 65 psig

5. FIXED GROUND SUPPORT FACILITIES - SECOND LINE MAINTENANCE
(Continued)

(c) Missile (Sparrow 2)

An area of 6200 sq. ft. is considered necessary to support the captive seeker missiles which will be used in the various programs and to provide up to 10 HTV missiles per month for test firings. This area will include a telemetry facility, necessary to support the Canadair HTV program. A proposed layout of the facility is shown in Fig. 5.

The entire facility requires the following power supplies to be available.

115V	60 cps Single phase	-	84 KVA
115/200V	400 cps Three phase	-	19 KVA
208V	400 cps Three phase	-	47.5 KVA

It is assumed that RCAF will provide storage space for:

20 missiles in crates @ 3 x 3 x 12 feet each

20 motors in crates @ 1 x 1 x 6 feet each

20 seeker units in crates @ 1 x 1 x 4 feet each

(d) Engine (Iroquois)

To support the various programs an engine assembly and run-up facility is required. A preliminary sketch of the facility is shown in Fig. 6. Orenda Engines Ltd., will be asked to specify its requirements for this facility in more detail.

(e) Associated Equipment

Support facilities for associated equipment and services will be required as follows:

(i) Ground Equipment Building: Approximately 800 sq. ft. of floor space is required in which to service ground support equipment.

5. FIXED GROUND SUPPORT FACILITIES - SECOND LINE MAINTENANCE (Continued)

(e) Associated Equipment (Continued)

(ii) Facilities for an air lift: Because of the early stage in the life of the Arrow Weapon System at which these programs are being carried out, it will be necessary to run an 'air lift' to support the operation. Hangarage, ground support equipment and personnel to support the air lift aircraft at Cold Lake are assumed to be provided by the RCAF in addition to the facilities detailed in this report.

(iii) Hangars and shops to support target aircraft, drones and towed targets are assumed to be provided by the RCAF.

(iv) Storage space and stores equipment personnel, for Arrow Weapon System components, are assumed to be provided by the RCAF.

6. FIXED FACILITIES - PERSONNEL

The total number of contractor personnel at Cold Lake will vary as shown in Fig. 7. Commencing with a small advance party early in 1960 the total strength will build up to 315 persons in September 1960. The decline shown during 1961 is in accordance with the assumptions outlined earlier in the report.

(a) Working Space

The requirements for office space etc. is based on the maximum number of contractor personnel at Cold Lake. It is assumed that as contractor personnel leave the base they will be replaced by RCAF personnel who will need similar accommodation.

In the missile facility Canadair will require separate offices for 2 people and office space for 25. A crew room with locker space for 10 persons is also required.

In the electronic facility, separate offices for 3 people and office space for 15 people will be required. Locker facilities for 30 people will also be necessary.

6. FIXED FACILITIES - PERSONNEL (Continued)

(a) Working Space (Continued)

In the engine facility separate offices for 2 people and office space for 4 people will be required. Locker facilities for 23 people will also be necessary.

In the first line maintenance hangar, separate offices will be required for 4 people and office space for 42 people. Also required will be an aircrew crew room for eight pilots and engineers and a ground crew crew room with accommodation for 156 people.

(b) Living Accommodation

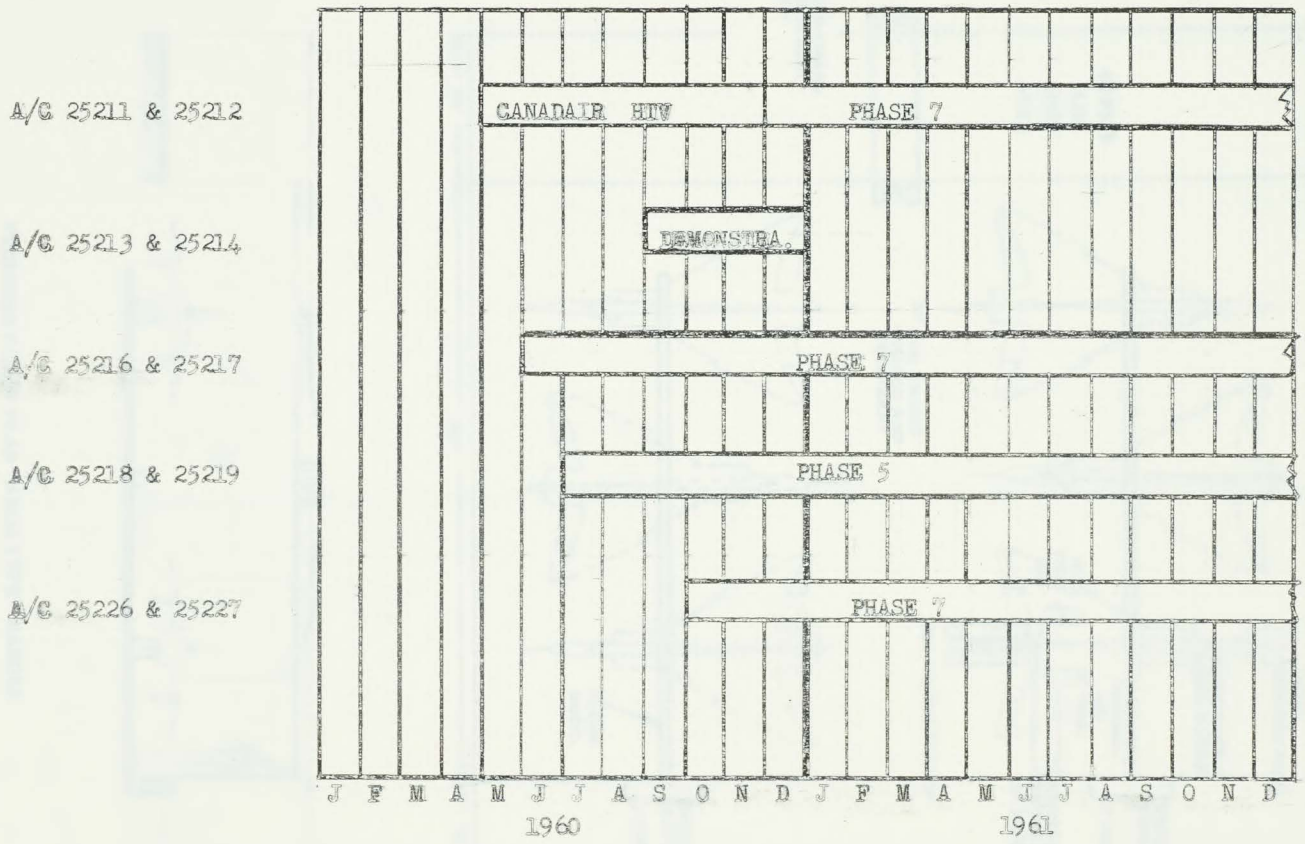
In addition to the personnel shown in Fig. 7 it is estimated that an average of 10 transient contractor personnel will be at Cold Lake for the duration of the program. These transients will require bachelor officer quarters and suitable messing.

It is assumed that contractor personnel required to be at Cold Lake for less than six months will leave their families at home and will require only bachelor accommodation. From Fig. 7 it will be seen that from August 1960 through February 1961 there will be up to 96 people who will be staying at Cold Lake less than six months. Of these 96 people, 24 will require bachelor officer accommodation and 72 will require sergeants quarters.

Of the 219 people who will be at Cold Lake for longer than six months, experience would indicate that ten percent will be single or will leave their families at home. Hence 22 of these people will require single accommodation; say 5 requiring officer accommodation and 17 sergeants quarters.

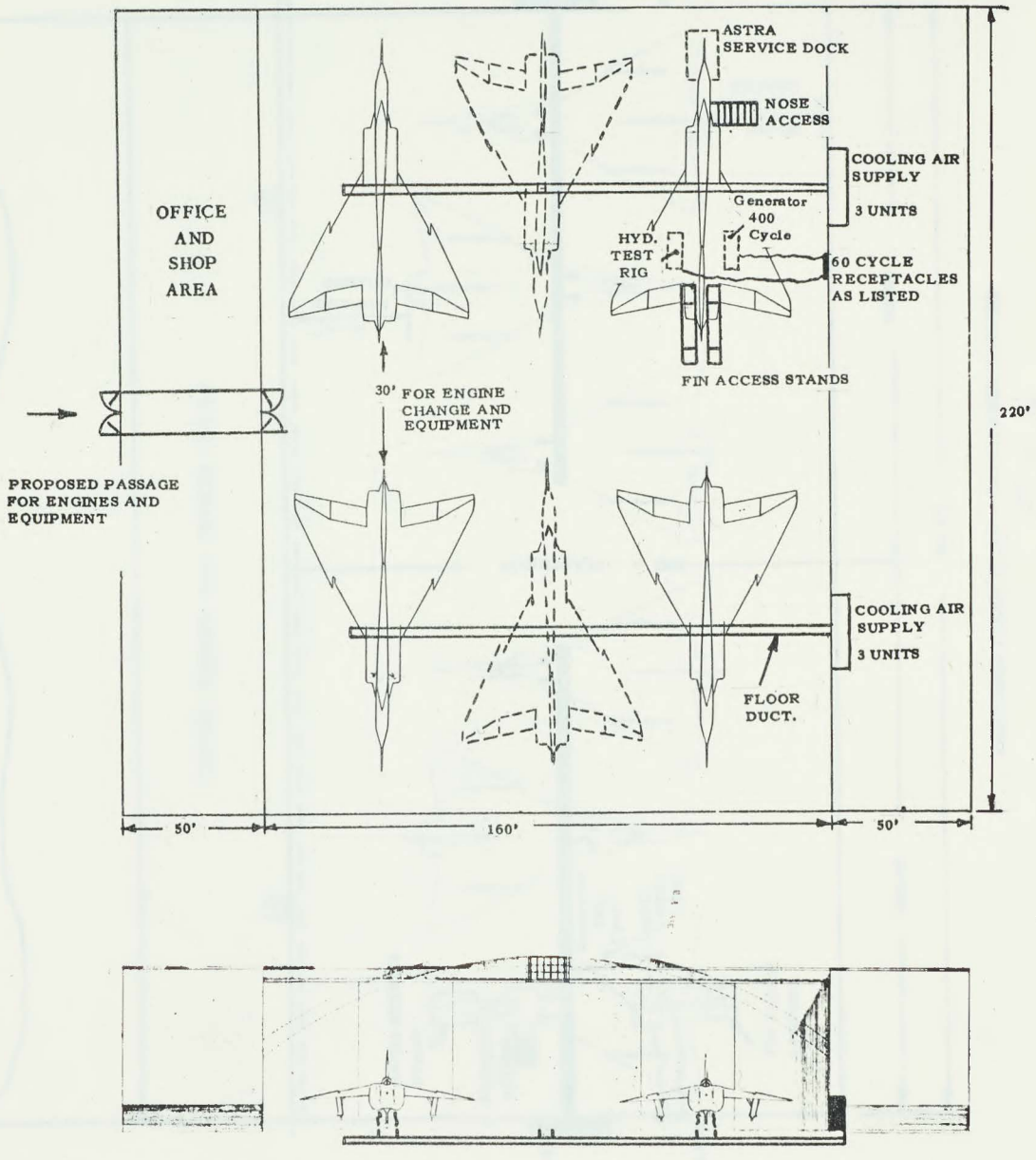
The remaining 197 people will require family accommodation. To summarize:

1. A peak of 39 people will require B.O.Q's.
2. A peak of 99 people will require sergeants quarters.
3. A total of 197 houses or apartments will be required for personnel who will be at Cold Lake longer than six months and who will bring their families with them.



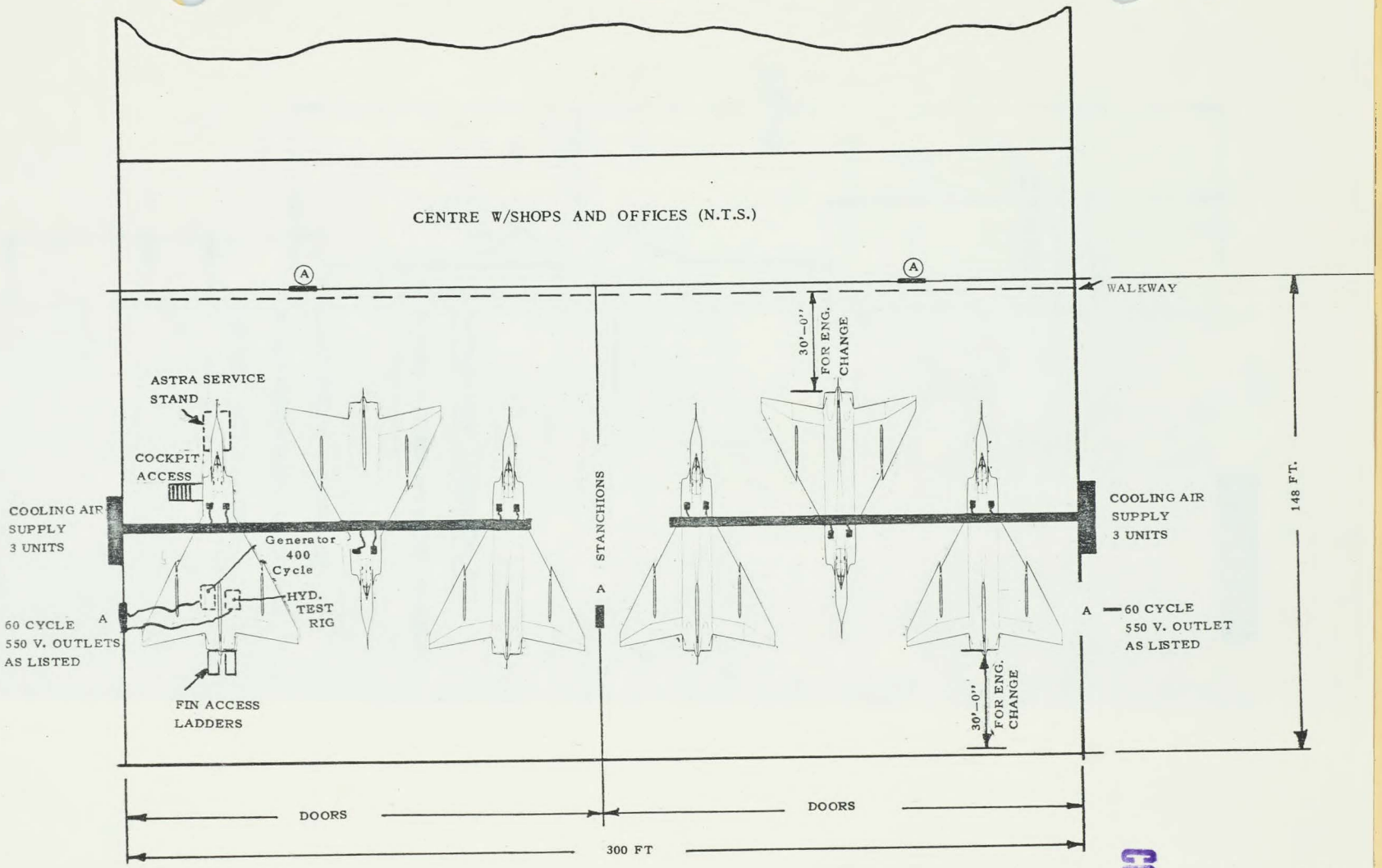
PHASING OF ARROW PROGRAMS AT COLD LAKE.

FIG. 1



PROPOSED FLOOR PLAN "ARCH TYPE" HANGER

FIG. 2



PROPOSED FLOOR PLAN – CANTILEVER HANGER

FIG. 3

SCALE: 1/500

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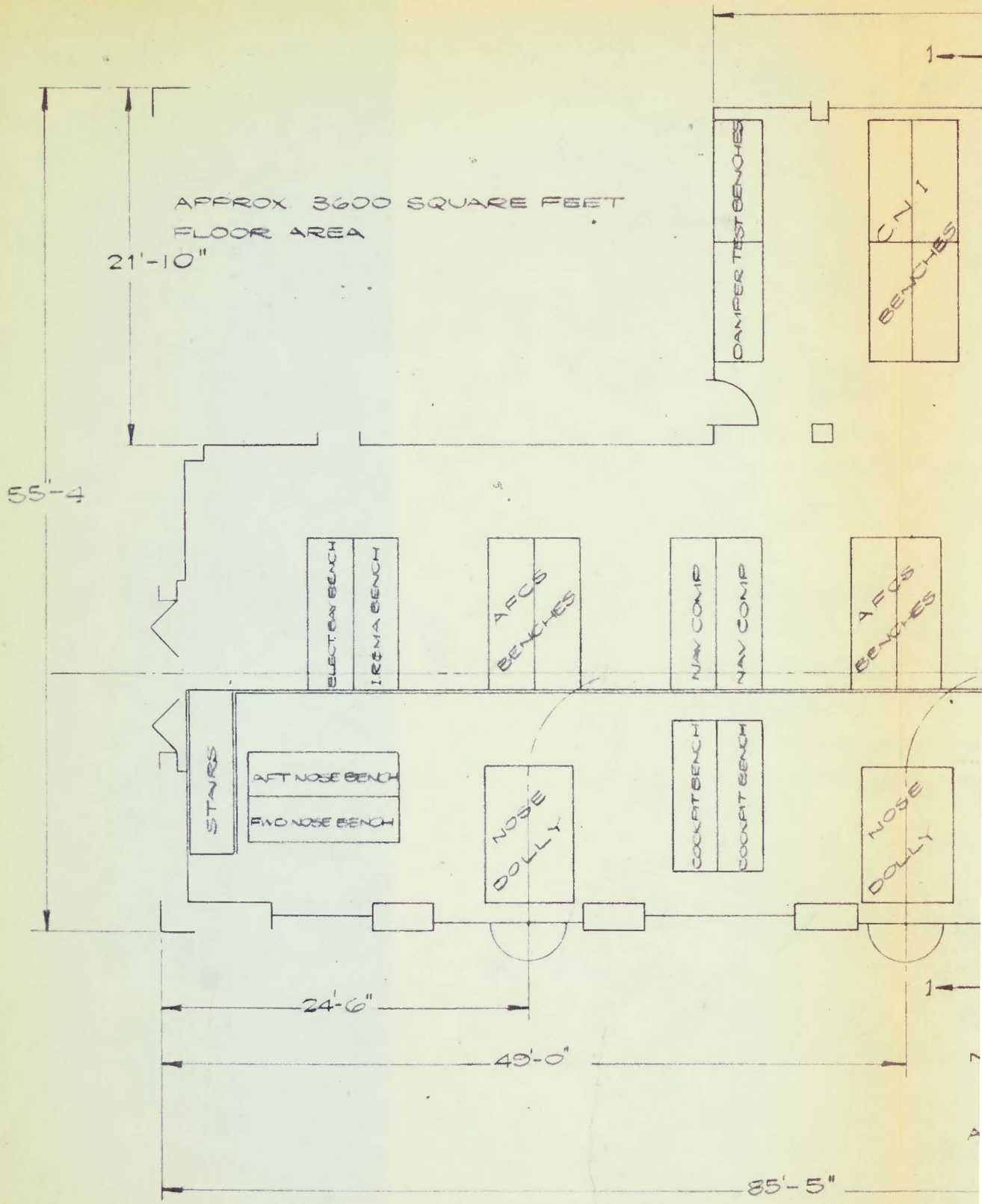

FIG. 4 ASTRA SHOP — BE

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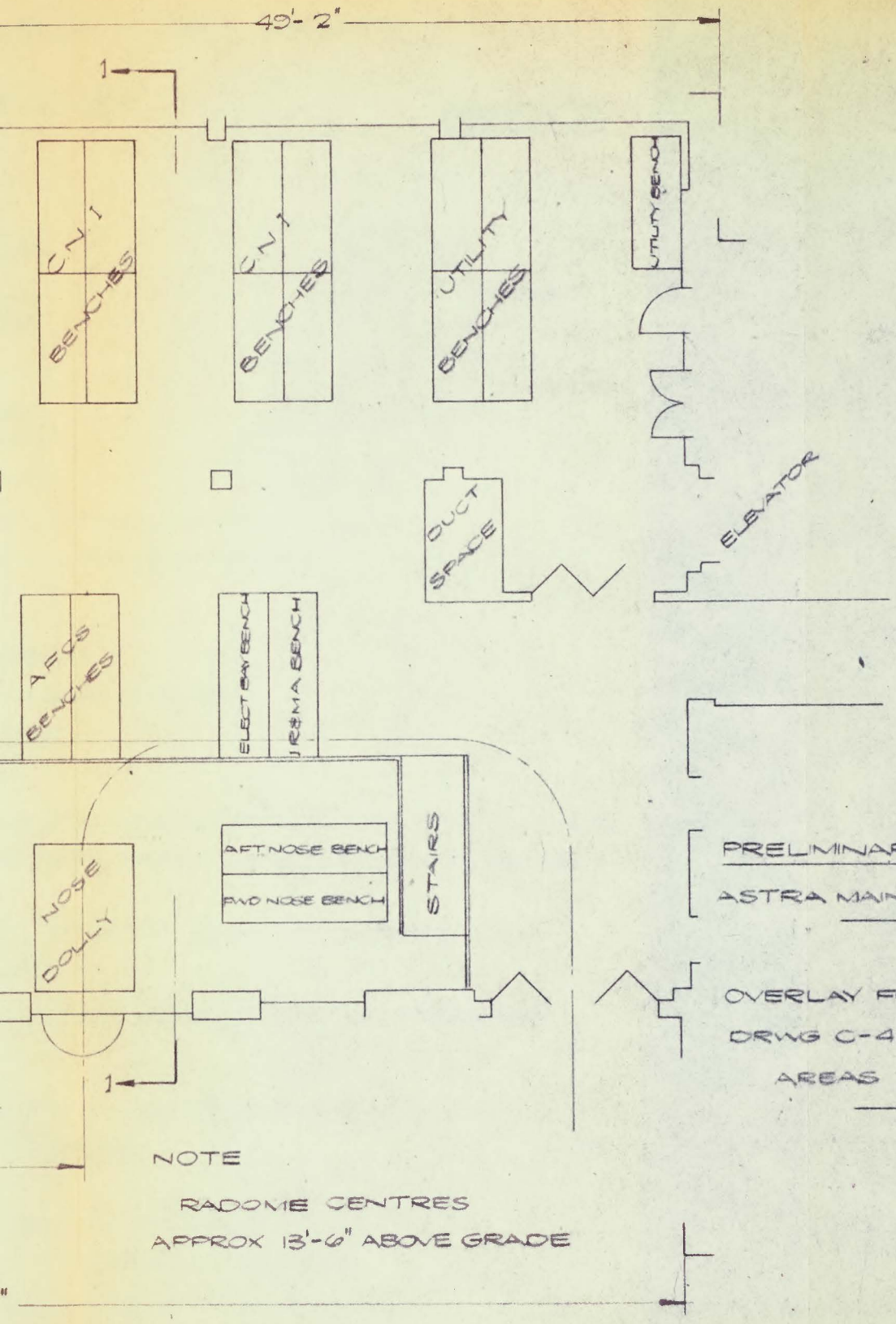

PRELIMINARY LAYOUT

ASTRA MAINTENANCE AREA

OVERLAY FOR AFH Q

DRWG C-49-20-1001-2

AREAS 10, 11, 20

NOTE

RADOME CENTRES

APPROX 13'-6" ABOVE GRADE

OP — BENCH LAYOUT

FIG 6 ENGINE BUILD & TEST FACILITY

PRELIMINARY

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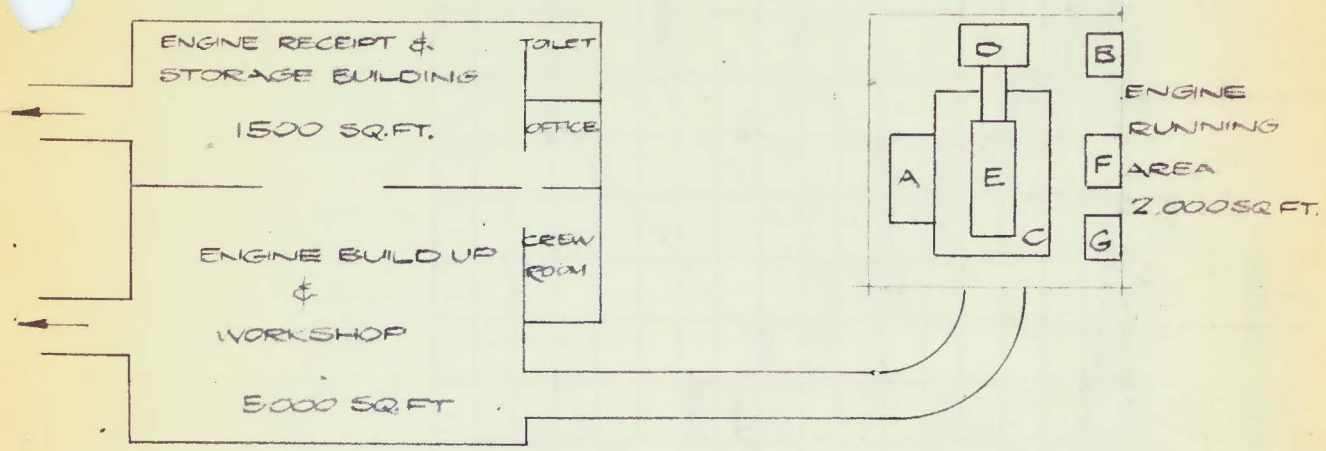


A — CONTROL ROOM

B — ENGINE RUNNING STAND

C — TEST HOUSE

D — SILENCER

E — WATER TANK 3600 GALLONS (FLOW UP TO 1200 G.P.M.)
— REQUIREMENT NOT FIRM DEPENDS ON TYPE OF
— SILENCER

F — FUEL TANK. 500 TO 1000 GALLONS (FLOW UP TO 200 G.P.M.)

G — ENGINE STARTER, MOBILE AIR COMPRESSOR

SERVICES;-

UNIVERSAL HOIST IN STORE & WORKSHOP 12000 LBS.

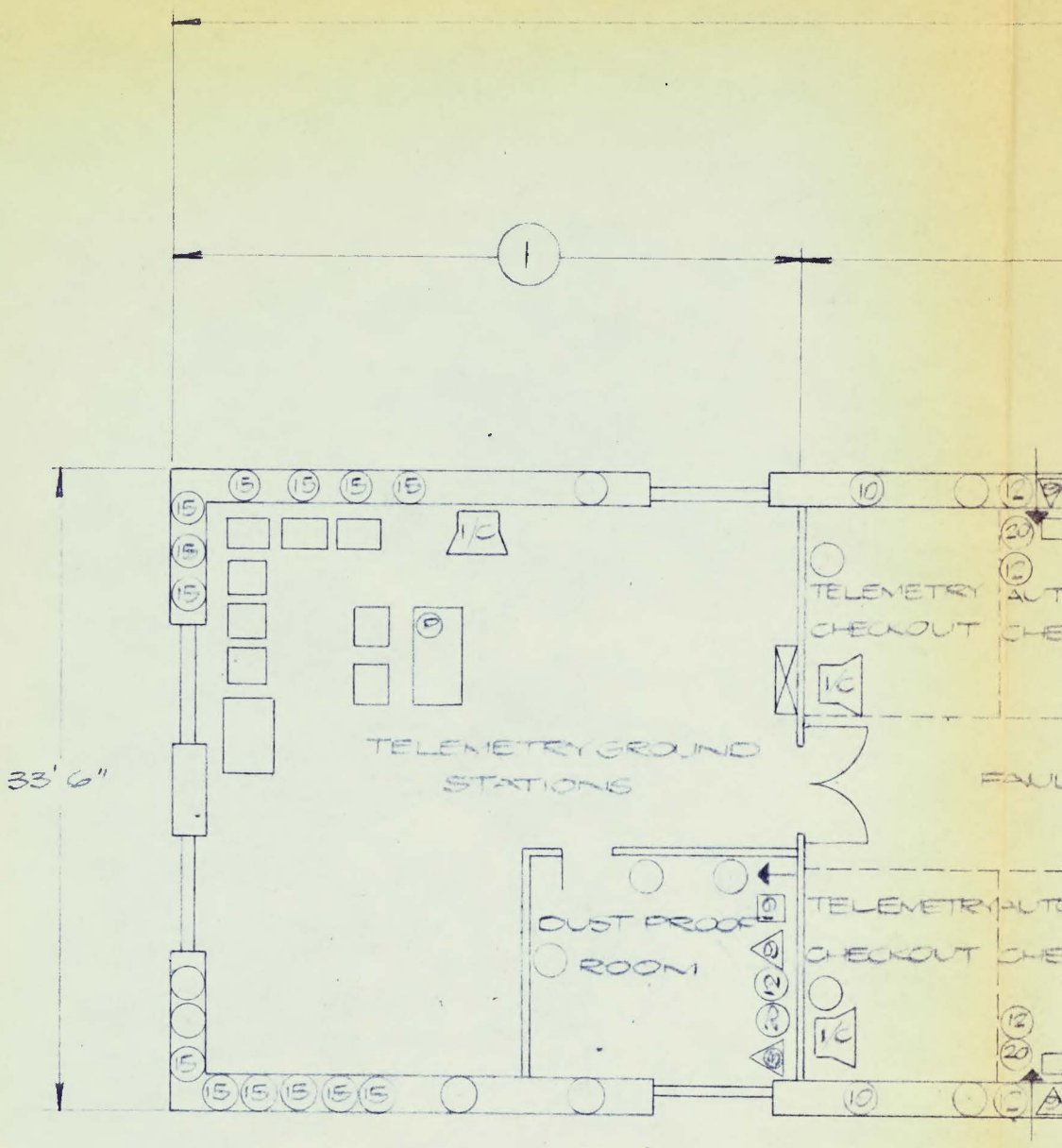
HEATING ALL AREAS

LIGHTING

110 V 60 CYCLES — TOOLS

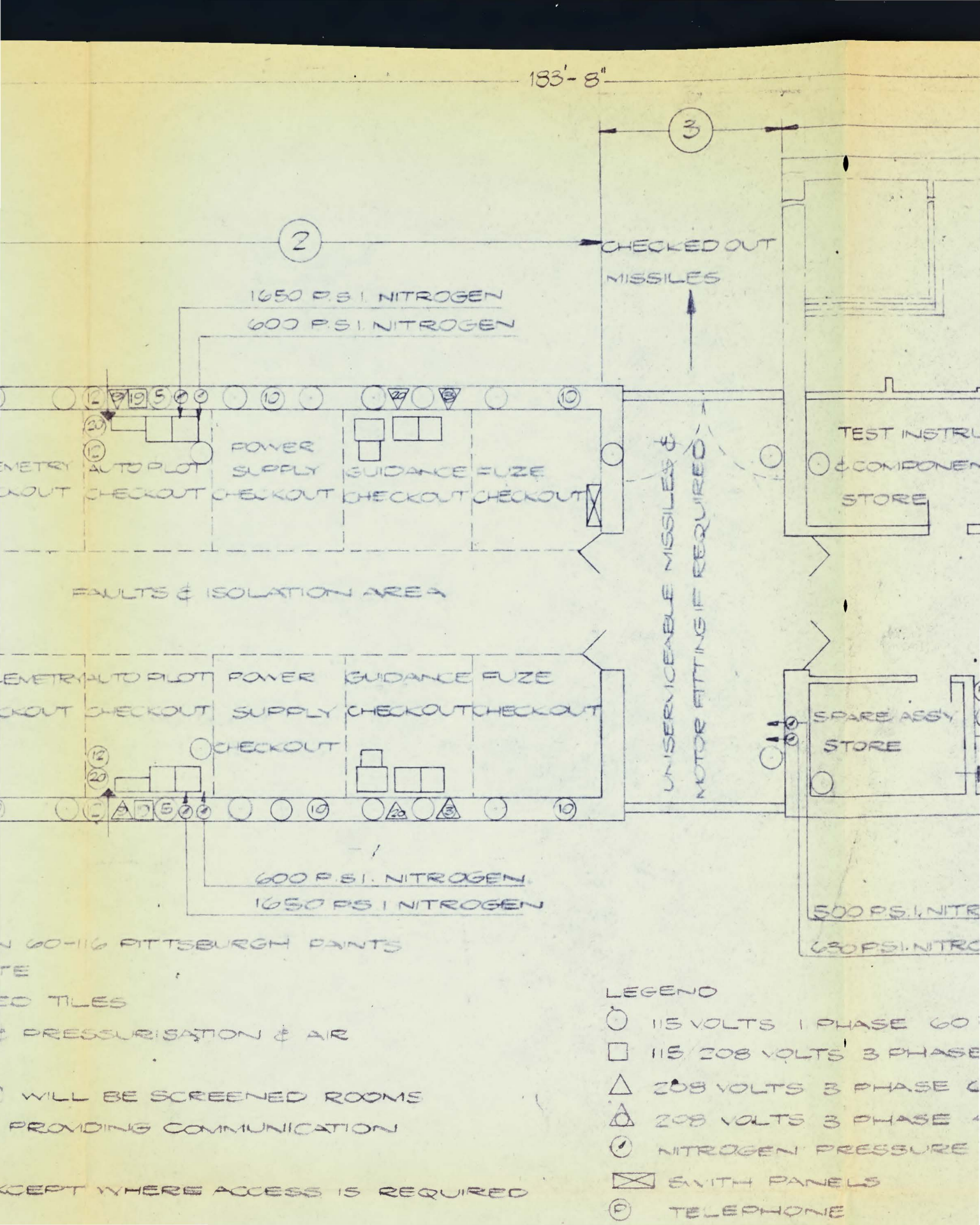
400 CYCLE — CONTROL ROOM

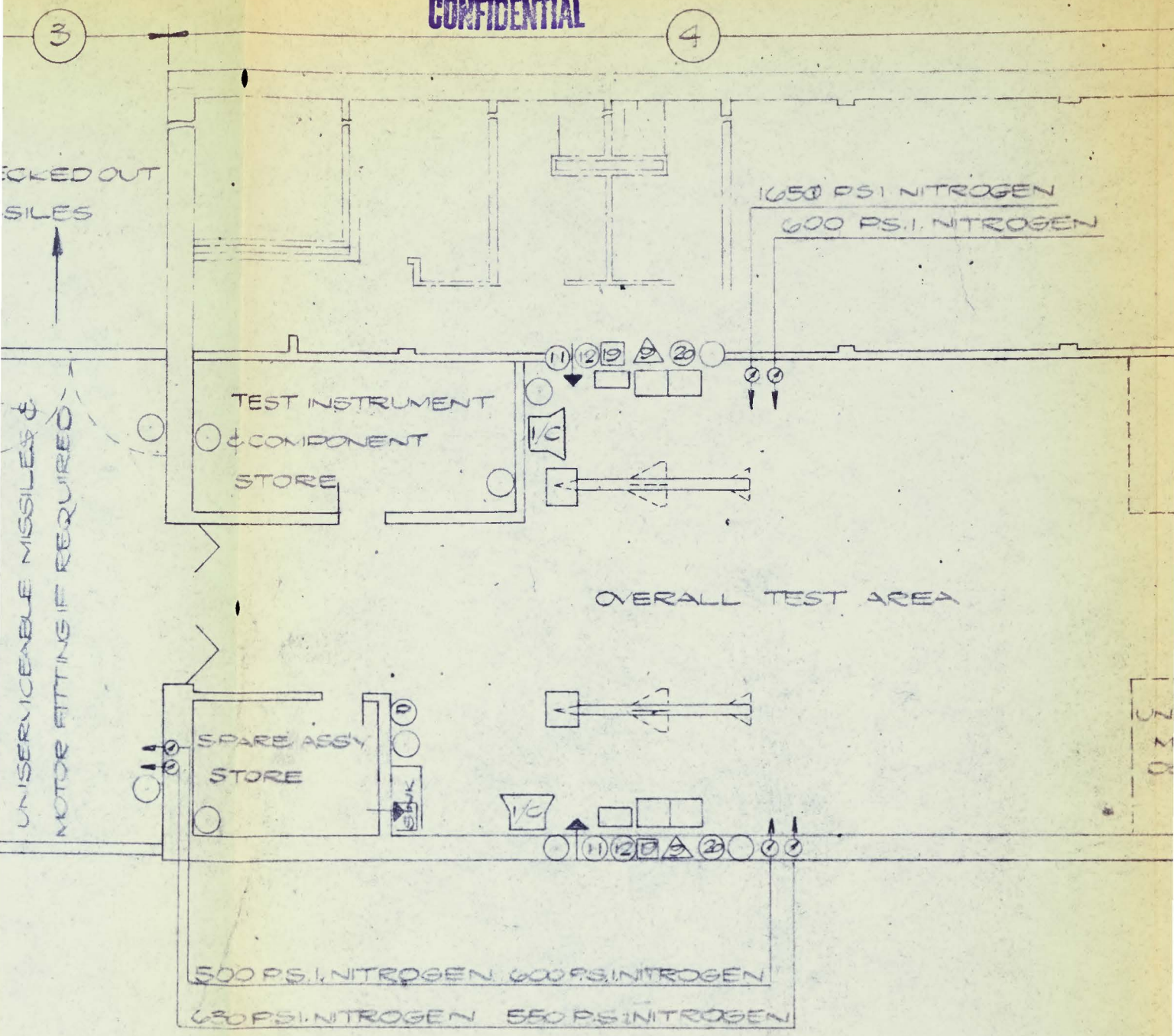
550 V. FOR BOOSTER PUMPS



GENERAL NOTES.

1. FINISH:- WALLS: PAINT SEAFOAM GREEN 60-116 F
CELING: PAINT ONE COAT WHITE
FLOOR: VINYL OR RUBBERIZED TILES
2. AIR CONDITIONING REQUIRED IN AREA ② & PRESSU
CONDITIONING IN DUST PROOF ROOM.
3. TELEMETRY CHECK OUT BAYS IN AREA ② WILL BE
4. INTERCOM SYSTEM TO BE CAPABLE OF PROVIDIN
BETWEEN ANY 2 POSITIONS
5. OUTSIDE DOORS TO BE SEALED OFF EXCEPT WH


183'-8"
3
2
CHECKED OUT
MISSILES
1650 P.S.I. NITROGEN
600 P.S.I. NITROGEN
AUTO PILOT CHECKOUT
POWER SUPPLY CHECKOUT
GUIDANCE CHECKOUT
FUZE CHECKOUT
TEST INSTRU
& COMPONEN
STORE
UNSERVICEABLE MISSILES &
MOTOR FITTING IF REQUIRED
FAULTS & ISOLATION AREA
AUTO PILOT CHECKOUT
POWER SUPPLY CHECKOUT
GUIDANCE CHECKOUT
FUZE CHECKOUT
SPARE ASSY
STORE
600 P.S.I. NITROGEN
1650 P.S.I. NITROGEN
500 P.S.I. NITR
630 P.S.I. NITRO
60-116 PITTSBURGH PAINTS
TILES
PRESSURISATION & AIR
WILL BE SCREENED ROOMS
PROVIDING COMMUNICATION
EXCEPT WHERE ACCESS IS REQUIRED
LEGEND
115 VOLTS 1 PHASE 60
115/208 VOLTS 3 PHASE
208 VOLTS 3 PHASE
208 VOLTS 3 PHASE
NITROGEN PRESSURE
EARTH PANELS
TELEPHONE



GEND

115 VOLTS 1 PHASE 60 CYCLES

115/208 VOLTS 3 PHASE 400 CYCLES

208 VOLTS 3 PHASE 60 CYCLES

208 VOLTS 3 PHASE 400 CYCLES

NITROGEN PRESSURE GAUGE

SWITH PANELS

TELEPHONE

FIG 5. MISSILE PREP