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PRELIMINARY AIRPHOTO STUDIES  
FOR SELECTION OF AN AIRPORT SITE NEAR  
PINE POINT NORTH WEST TERRITORIES

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Prepared for:

Department of Transport  
1046 Federal Building  
Edmonton, Alberta.

Attention: V. R. Currie, P. Eng.,  
Regional Construction Engineer.

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# PRELIMINARY AIRPHOTO STUDIES FOR SELECTION OF AN AIRPORT SITE NEAR PINE POINT NORTH WEST TERRITORIES

## INTRODUCTION

Purpose of this airphoto study was to locate potential airport sites near the proposed mining development at Pine Point N.W.T.

The Department of Transport provided airphoto coverage of a large area surrounding Pine Point. Average scale of airphotos was approximately one inch equals 5000 feet. Location plan-profiles of the proposed highway between Buffalo River and Pine Point townsite were also provided. Geological references were obtained from our own library.

## PROCEDURE

Airphotos and reference material were studied to obtain an overall appreciation of the problem. Granular material prospects, sinkholes, sand dunes and areas of reasonably well-drained ground were noted on the photos at this stage. An area of maximum interest was blocked out. An uncontrolled airphoto mosaic was assembled covering the selected area. Terrain details, existing man-made features, approximate position of planned railway and highway and potential airport sites were traced from the airphotos on to the plan that accompanies this report. Detailed outlining of terrain was carried out only in the vicinity of the most promising-looking airport sites. In other areas, muskeg was outlined broadly and intervening areas were described with brief notes.

## GEOLOGY

Most of the area studied in airphotos is underlain by bedrock of Middle Devonian age. Cominco G-1 well drilled near Pine Point townsite shows 1171 feet of sedimentary rock overlying Precambrian rock. The section includes dolomite, limestone, shale, and gypsum. No glacial materials are shown on top of bedrock at this point.

The following quotations are from G.S.C. Paper 58-11 by R.J.W. Douglas:

"Map-unit 10 which lies in stratigraphic position between map-units 9 and 14, consists mainly of massive, white, crystalline and banded gypsum with some thinly bedded, finely laminated, finely crystalline limestone."

According to the geologic map, our sites "H" and "I" are located on "map-unit 10." A large number of well-developed sinkholes were identified in airphotos around these two sites.

A further quotation from paper 58-11 describes the bedrock in the vicinity of Pine Point as follows:

"On the south shore of Great Slave Lake, the Pine Point formation is divided into two map-units -- 11a and 11b. Map-unit 11a includes the beds outcropping at Pine Point, and consists of dark grey to black, finely crystalline, bituminous and petroliferous limestone, in part nodular argillaceous and fossiliferous; interbedded with light grey, laminated, finely crystalline limestone, and rarely thinly bedded to fissile black bituminous shale; overlain by thinly bedded, medium to dark brown, finely crystalline to cryptocrystalline, fossiliferous limestone."

"Map-unit 11b contains thin-bedded to massive, light to medium brown, fine-grained to granular, vuggy dolomite, weathering light brownish grey and in part petroliferous."

The report describes the bedrock in the proposed mine area as follows:

"Southwest of Pine Point, exposures in the Presqu'île formation are massive, coarsely recrystallized, vuggy dolomites, mottled light medium purplish brown, are light grey and white, with veinlets and vugs containing galena, sphalerite and large dolomite crystals."

Summary Report 1921, Part B of the GSC contains a paper by A.E. Cameron (Hay and Buffalo Rivers, Great Slave Lake, and Adjacent Country). The following quotation taken from page 35B of this paper describes the terrain in the vicinity of the mine area:

"About 10 miles south of Pine Point and about 250 feet above the lake a flat-lying, crystalline dolomite outcrops in places over an area of several square miles. The dolomite is grey, weathered white, and quite coarsely crystalline. Fresh fracture shows a porous structure and many cavities in which typical curved rhombondral crystals of dolomite occur. The general lithological character of the rock is identical with that of the Presqu'île dolomites on Nintsi point, but bituminous matter and sulphur springs are here absent and no fossils were obtained by which correlation could be confirmed. Large sink-holes 10 to 20 feet deep and as much as 200 feet in length are numerous."

And from page 36B:

"The origin of the ores was not evident. The ore-body appears to be a replacement of the dolomite by mineralized solutions which entered along fissures. At one point situated a few hundred feet southeast of the crest at the fold, a thin fissure was traced for a few feet and then

lost under the surface till."

Bedrock outcrops and sinkholes in the proposed mine area could not be located in the small-scale photos. Presence of sinkholes in this area will affect at least one of the potential sites selected.

Varying depths of glacial till are believed to rest on bedrock over the entire study-area. Till, of course, will be absent where bedrock is exposed at ground surface. Greatest depth of till is expected in morainal ridges toward the south and west side of the study-area.

Beach ridges of sand or gravel occur throughout the study-area. The highest of these beaches occurs along the 900-foot contour about 30 miles south of the shore of Great Slave Lake.

Beach deposits in the vicinity of site "G", along the proposed highway and in the mining site-area, appear to be good prospects for gravel. Lake-bed sands appear to cover the glacial till on most areas of high ground. In some areas the sand is so abundant that large dunes have developed.

Large tracts of low wet ground and muskeg occur in the study-area. Permafrost is believed to be of sporadic nature with islands of permafrost occurring at random.

#### PROSPECTIVE SITES

Site "A" and "B" are about equal from a terrain standpoint. Fairly well-drained sands with probably some fine gravel cover both site-areas. Both sites could probably be developed to accommodate float-equipped aircraft. Site "A" has the best potential dock site. Construction materials could be taken to the site by barge. Access to the townsite of Pine Point would be relatively easy -- routes following terrain class 1 are recommended. Ground surface is quite flat. One should check the depth of sand and the location of water table in the sand at both sites. Bedrock will not likely be encountered in normal construction cuts.

Site "C". Terrain conditions at site "C" are expected to be relatively good. Beach-deposited granular materials (predominantly sand) cover the site-area. Rolling topography along the northwest-southeast runway may dictate deep cuts to meet acceptable runway grades. Testholes should be drilled to determine if bedrock will be encountered in these cuts. Dawson Landing could be developed as a dock site and float-plane anchorage in

conjunction with this site. Access to Pine Point townsite could be developed over terrain class 1. Several prospective gravel deposits are located nearby.

- Site "D". Terrain conditions at site "D" appear to be favorable except for some local wet ground in lows and potentially rough ridge topography. Granular borrow material for construction of runways will likely be in abundant supply. Soil conditions under proposed runways have a good chance of being gravelly. Granular beach ridges are numerous in the area.
- Site "E" is not considered to be a promising site. Bedrock outcrop and sinkholes likely occur in the vicinity of this site (see section on geology). The area will likely be required for mining development.
- Site "F" is not considered to be a promising site. Terrain is reasonably flat. Surficial soils appear to be sandy. The area available for development is limited. Access to proposed highway is long and would have to cross long stretches of muskeg. There are no nearby gravel prospects. Suggest we abandon consideration of this site.
- Site "G" is located about 18 miles from the townsite of PinePoint. A four-mile access road over reasonably good terrain would be required to reach the proposed highway. Surficial soils look like fairly well drained sand. Good-looking prospective gravel deposits are located nearby. Topography is expected to be well within allowable limits. Several large deep sinkholes were noticed in airphotos. We suspect that many more sinkholes of smaller size would be seen in large-scale photos if they were available. If this site is seriously considered as an airport site, the potential hazard of underlying soluble rock formations should be the first thing investigated.
- Site "H" is not considered to be a promising site. Our first impression of this site is that there are far too many sinkholes adjacent to proposed runways. We expect thick beds of gypsum bedrock at shallow depth below ground surface. The site-area appears to be covered by fairly well-drained sand. About 10 miles of new construction would be required for access to the townsite of Pine Point. Nearby granular material prospects are classed as "fair."

Site "I" is about seven miles farther from Pine Point than site "H" and has terrain conditions comparable to site "H". Since we consider site "H" as unfavorable, we suggest site "I" should be abandoned from further consideration.

#### PREFERRED SITES

Following is a list of potential sites in order of preference with reasons for the choice:

- 1) Site "D" Closest feasible site.  
Terrain and drainage is favorable.  
No sinkholes observed.  
Potential gravel and borrow is good.
- 2) Site "A" Access good; about 15 miles.  
Terrain and drainage is favorable.  
No sinkholes observed.  
Potential dock and float-plane anchorage.  
Potential gravel and borrow is fair.
- 3) Site "B" Located closer than Site "A"; but potential dock site is not as favorable.
- 4) Site "C" Access good; about 13 miles.  
Terrain and drainage is generally favorable with reservations about topography and possible bedrock in deep cuts.  
No sinkholes observed.  
Potential dock and float-plane anchorage.  
Potential gravel and borrow is fair to good.
- 5) Site "G" Access good; about 18 miles.  
Terrain and drainage is generally favorable with reservations about sinkhole hazard.  
Potential gravel and borrow is good.
- 6) Site "E" Presence of rock outcrop, sinkholes, and plans for future mine development will likely rule out this site.
- 7) Site "F" Remote.  
Access is poor and costly.  
Developable area is limited.  
Borrow and gravel prospects is poor.  
Suggest abandon site from further consideration.

- 8) Site "H" Large number of sinkholes.  
Access is fair only.
- 9) Site "I" Terrain conditions are similar to site "H" but  
located seven miles farther from Pine Point.  
Suggest abandon site from further consideration.

The following items are considered to be of prime importance in field investigation of these potential sites:

1) Either examine low-altitude airphotos or make low-altitude passes with helicopter over sites being investigated. Note any sign of ground subsidence that may indicate that the site is underlain by soluble bedrock.

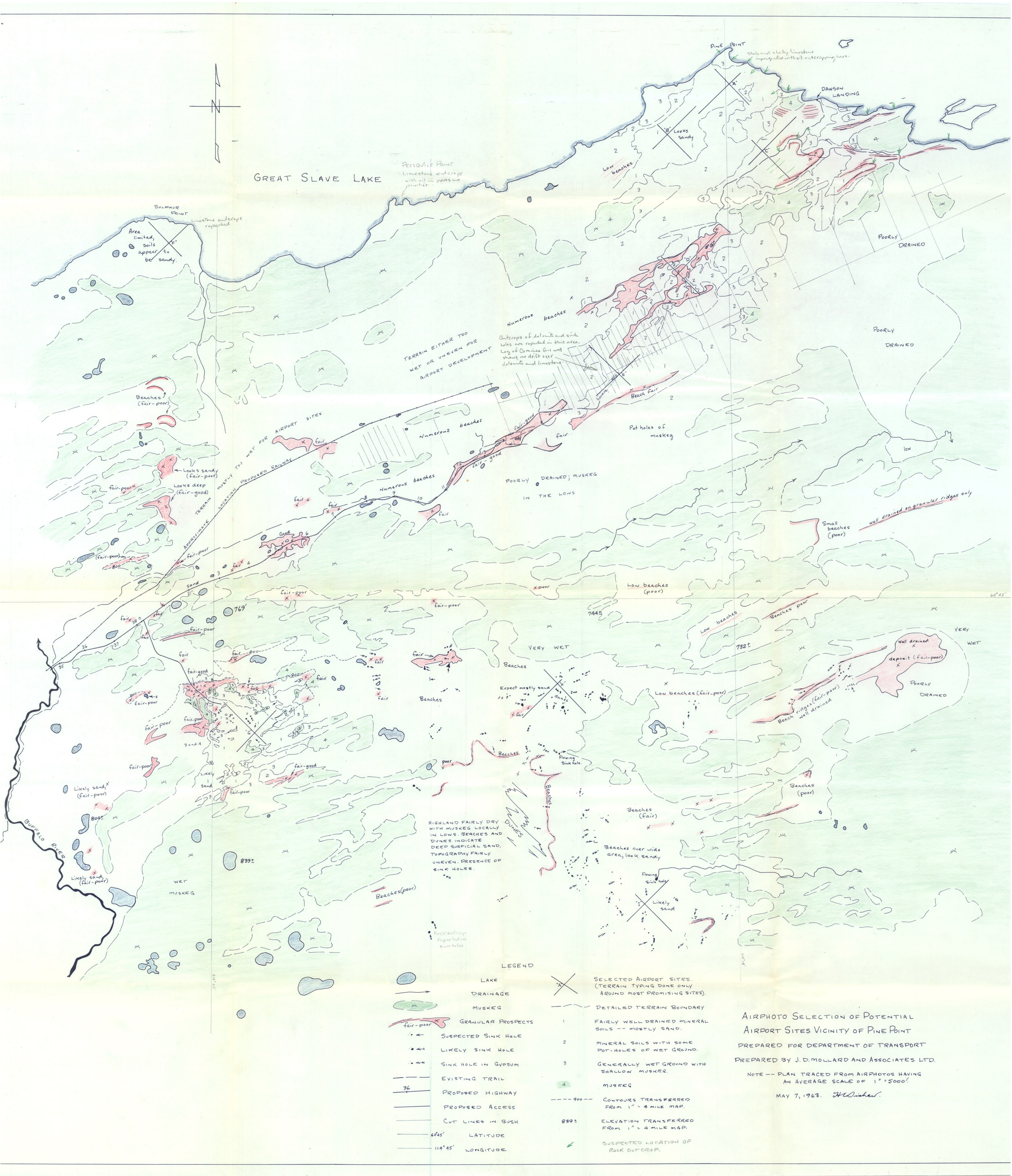
2) Drill test holes to examine surficial soils and determine position of ground-water table. Note whether permafrost is present.

3) Note position and elevation of any bedrock outcrop near site being investigated. By examination of topography and testhole information, determine if construction cuts will encounter rock.

4) Examine potential sources of borrow and gravel.

#### WATER SUPPLY FOR SITES

Sites "A", "B" and "C" would likely obtain water from Great Slave Lake. Ground-water sources should be investigated for sites located farther inland. Shallow aquifers would likely be contaminated with organic water and would be subject to freezing if very shallow. Bedrock aquifers would likely contain highly mineralized water. (Note white tone on muskegs located east of sites "H" and "I".) Also note flowing sinkholes in the vicinity of sites "H" and "I". This water is almost certainly coming from gypsum bedrock and will be saturated with sulphates.



GREAT SLAVE LAKE

Presquile Point  
Limestone outcrops  
with oil in pores and  
cracks.

Sulphur Point  
Limestone outcrops  
reported.  
Area limited,  
soils  
appear to  
be sandy.

Pine Point  
Shale and silty limestone  
impregnated with oil outcropping here.

Dawson Landing

Poorly  
Drained

Poorly  
Drained

TERRAIN EITHER TOO  
WET OR UNEVEN FOR  
AIRPORT DEVELOPMENT

Numerous beaches  
Outcrops of dolomite and side  
holes are reported in this area.  
Long of Caribou Gut well  
shows no drift over  
dolomite and limestone.

Pot holes of  
muskeg

POORLY DRAINED; MUSKEG  
IN THE LOWS

Small beaches  
(poor)  
well drained on granular ridges only

Low beaches  
(poor)

Beaches poor

Well drained  
deposit (fair-poor)

Poorly  
Drained

VERY WET

Expect mostly sand  
and dunes

Low beaches (fair-poor)

Beach well drained

Beaches (poor)

Beaches (fair)

Beaches over wide  
area, look sandy

Flowing  
sink hole

Likely  
sand

HIGHLAND FAIRLY DRY  
WITH MUSKEG LOCALLY  
IN LOWS. BEACHES AND  
DUNES INDICATE  
DEEP SURFICIAL SAND.  
TOPOGRAPHY FAIRLY  
UNEVEN, PRESENCE OF  
SINK HOLES.

Beaches (poor)

Rock outcrop  
reported in  
sink holes

LEGEND

- LAKE
- DRAINAGE
- MUSKEG
- GRANULAR PROSPECTS
- SUSPECTED SINK HOLE
- LIKELY SINK HOLE
- SINK HOLE IN GYPSUM
- EXISTING TRAIL
- PROPOSED HIGHWAY
- PROPOSED ACCESS
- CUT LINES IN BUSH
- 60°45' LATITUDE
- 114°45' LONGITUDE

- SELECTED AIRPORT SITES.  
(TERRAIN TYPING DONE ONLY  
AROUND MOST PROMISING SITES).
- DETAILED TERRAIN BOUNDARY
- FAIRLY WELL DRAINED MINERAL  
SOILS -- MOSTLY SAND.
- MINERAL SOILS WITH SOME  
POT-HOLES OF WET GROUND.
- GENERALLY WET GROUND WITH  
SHALLOW MUSKEG.
- MUSKEG
- CONTOURS TRANSFERRED  
FROM 1" = 4 MILE MAP.
- ELEVATION TRANSFERRED  
FROM 1" = 4 MILE MAP.
- SUSPECTED LOCATION OF  
ROCK OUTCROP.

AIRPHOTO SELECTION OF POTENTIAL  
AIRPORT SITES VICINITY OF PINE POINT  
PREPARED FOR DEPARTMENT OF TRANSPORT  
PREPARED BY J.D. MOLLARD AND ASSOCIATES LTD.  
NOTE -- PLAN TRACED FROM AIRPHOTOS HAVING  
AN AVERAGE SCALE OF 1" = 5000'  
MAY 7, 1963. H.D. Mollard.

END OF REPORT