

SAND AND GRAVEL RESOURCES OF THE
SPIRIT RIVER REGION
BOUNDED BY THE PEACE RIVER,
ALBERTA-B.C. BORDER,
SMOKY RIVER AND SOUTHERN BOUNDARIES
OF MAP SHEETS
83M/13-83M/16 AND 83N/13

W.A.D. Edwards
D.W. Scafe

March, 1990

OFR 1991-4

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ABSTRACT

A compilation and evaluation of existing sand and gravel resource information for the Spirit River area was completed by the Alberta Geological Survey for Alberta Forestry, Lands and Wildlife, Public Lands Division. Data were obtained from Alberta Transportation & Utilities (pit data), Alberta Environment (water well logs) and Alberta Research Council (geological) for the study.

The only economic source of gravel in the area is of alluvial origin and consists of terraces and bars primarily in the Peace River valley. Glacial and preglacial deposits occur in the region but are of no importance in the study area.

Further gravel exploration should focus on the river valleys. Since gravel is in short supply and exploration prospects are limited, it may be expedient to concentrate on alternative materials or more effective transportation plans rather than primary searches.

INTRODUCTION

This study is part of a program initiated in 1976 by the Alberta Research Council (ARC) and Alberta Forestry, Lands and Wildlife (AFLW) to provide information on the sand and gravel resources of Alberta. The area of study (figure 1), level of detail and roles of the participants were determined by representatives of the Public Lands Division of AFLW, Alberta Transportation and Utilities (AT&U) and the Alberta Geological Survey (AGS) a department of ARC at a meeting on September 13, 1989.

A reconnaissance level study (level 5 on figure 2) of the area bounded by the southern bank of the Peace River, Alberta-B.C. border, west bank of Smoky River and souther boundaries of NTS map sheets 83M/13-16 and 83N/13 was completed by AGS.

ACKNOWLEDGMENTS

Public Lands Division of AFLW provided the funds for the geological study. Alberta Transportation and Utilities provided testing and sampling data and Alberta Environment (AE) provided water well records.

METHODS

The study consists of compilation of existing information. Information available for the area includes water well logs from Alberta Environment, a surficial geology report by the ARC, information on sand and gravel pits from AT&U and an aggregate resource potential map by ARC for the northeast tip of the area and a bedrock topography map by ARC.

Deposits are grouped by their geological mode of formation. Their potential for containig gravel is assessed.

GEOLOGY

PHYSIOGRAPHY AND BEDROCK

The survey area lies primarily in the Peace River Lowland, a relatively flat region underlain by thick, fine grained, glaciolacustrine sediments over Cretaceous sandstones and shales. The Saddle Hills Upland and Wapiti Plain rise above the lowland and bring bedrock to the surface.

SURFICIAL GEOLOGY

Most surficial materials in the survey area are glaciolacustrine clay, silt and sand (light brown in figure 3). A thin mantle of eolian outwash

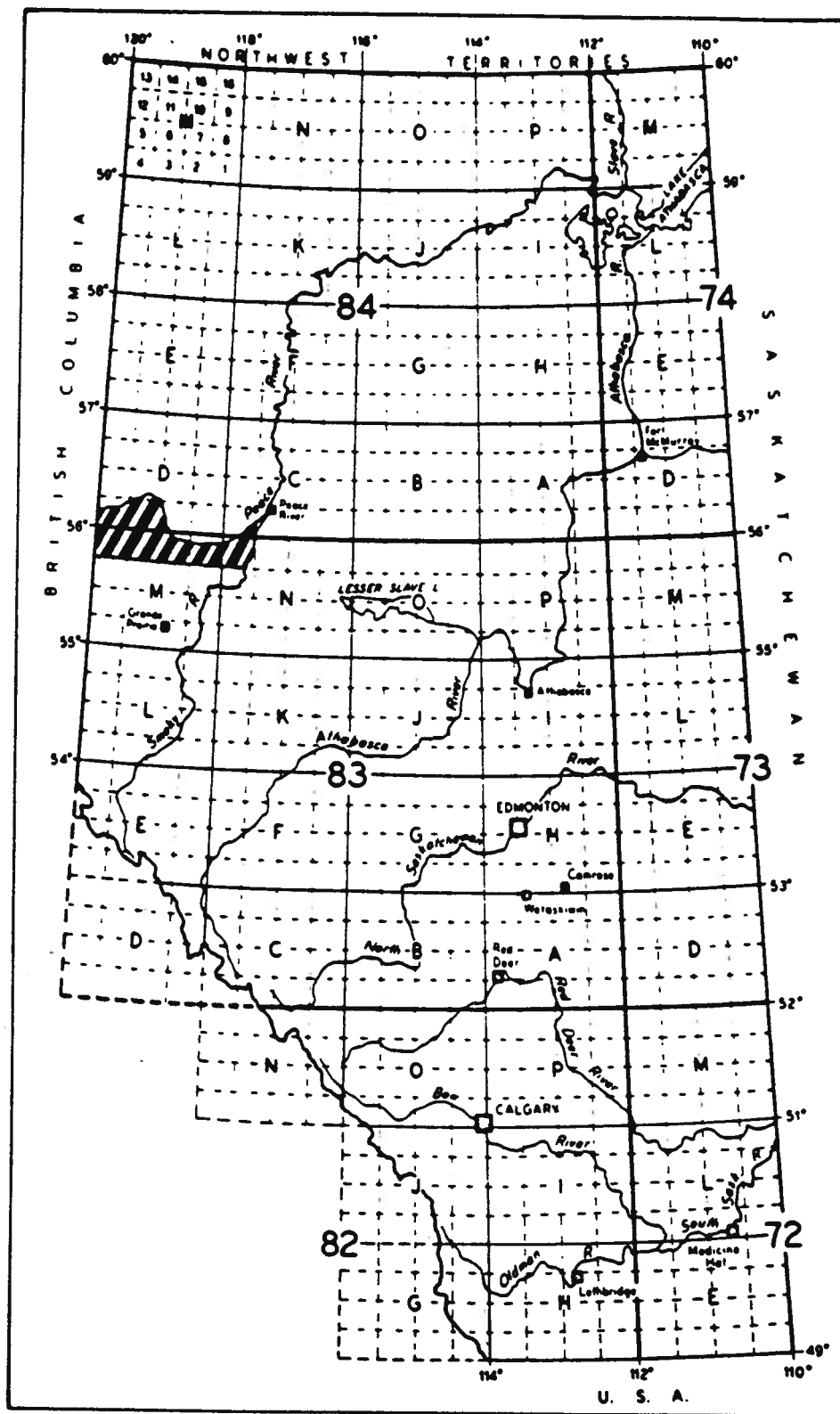
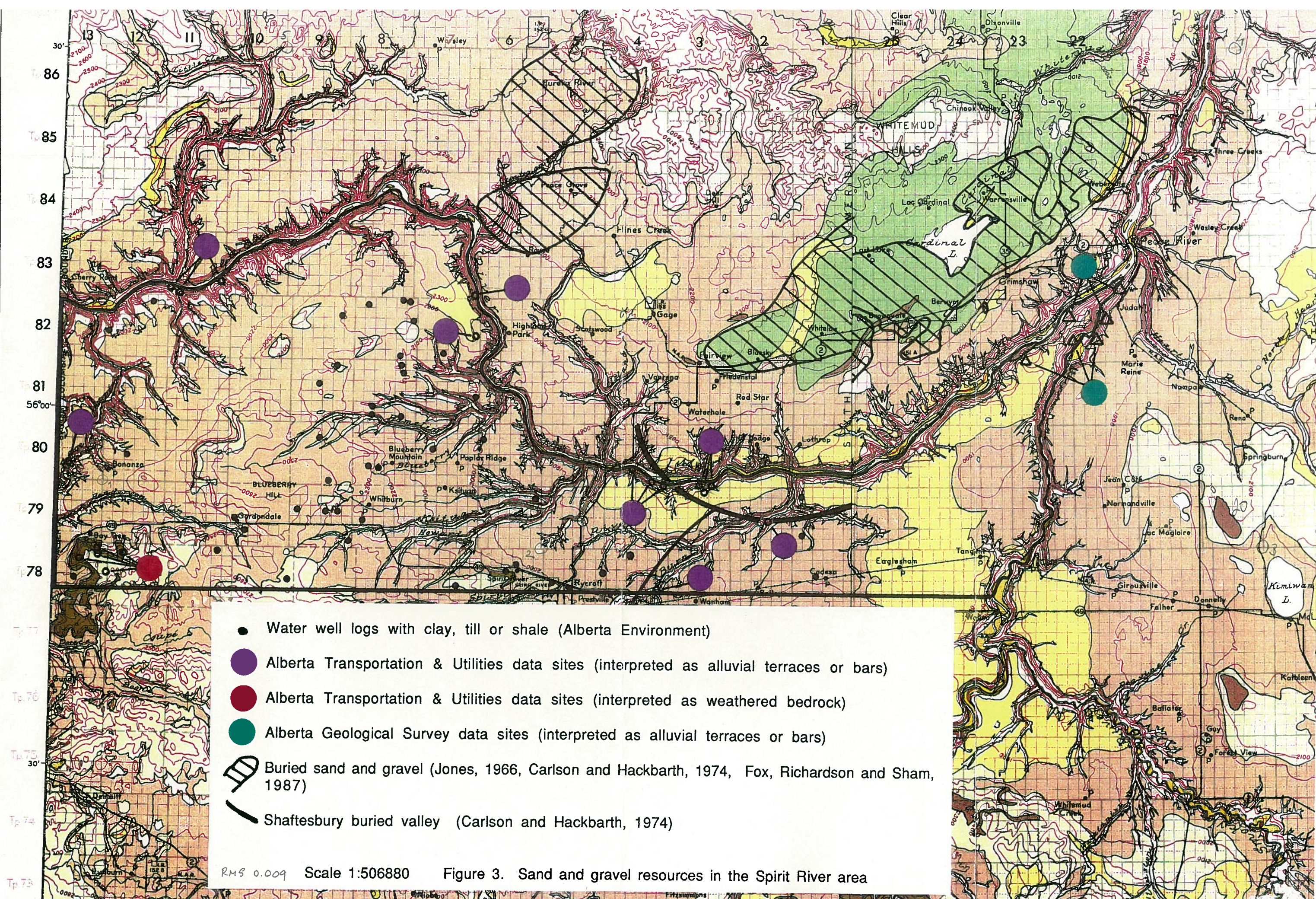


Figure 1. Study area

AGGREGATE INVENTORY MAPPING LEVELS

Format	Reconnaissance Study 5	Enhanced Reconnaissance Study 4	Regional Mapping 3	Detailed Mapping 2	Deposit Evaluation 1
Scale (Common)	1:250,000 (approx. 11x14 townships)	1:250,000 (approx. 11x14 townships)	1:50,000 (approx. 3x3 townships)	1:10,000	1:10,000 or larger
Mapping Methodology	Derived from existing surficial geology information. Aerial photograph interpretation.	Derived from existing surficial geology information. Aerial photograph interpretation. Some field traverses and site examination.	Aerial photograph interpretation Field traverses. Site examinations. Selected deposit testing. Laboratory testing.	Sedimentological studies. Site examination. Deposit testing. Laboratory testing.	Test pitting on an established grid. Hole logging. Materials analysis.
Uses	Broad scale planning. Preliminary aggregate exploration.	Broad scale planning. Preliminary aggregate exploration. Preliminary resource assessment.	Land use planning. Resource management. Resource estimates.	Land management. Reserve estimates. Deposit management.	Deposit evaluation. Development plan preparation.
Comments	Only potential areas suitable for finding deposits shown. Fairly quick and in- expensive to produce.	Potential areas suitable for finding deposits are shown. Some deposits are examined. A map will take 6 months to a year to produce.	Estimates deposit boundaries and gives quality and quantity estimations. A map may take 8 months to a year to produce.	Establishes deposit boundaries. Refines quantity/quality information. Fairly expensive survey.	Precise quality and quantity estimates. Deposit variations identified. Very expensive survey.
Output	2 map sheets per prof-year.	1 map sheet per prof-year.	2 to 3 map sheets per prof-year.	Special projects only.	Special projects only.

Figure 2. Study Levels



RMS 0.009 Scale 1:506880 Figure 3. Sand and gravel resources in the Spirit River area

or alluvial silts, sand or minor gravel (light yellow in figure 3) overlies the glaciolacustrine materials in a portion of the eastern part of the study area. A few, small patches of mainly clayey till are scattered throughout the western part of the study area (light green in figure 3). Surficial geology information is derived from the report by Jones (1966).

SAND AND GRAVEL RESOURCES

In the Peace River region sand and gravel can be assigned to one of four geological categories. These categories are alluvial, glacial, preglacial and weathered bedrock. The alluvial deposits are terraces, bars or beds of present rivers. The glacial deposits are of outwash or ice-contact (kame, esker) origin. The preglacial sources include upland deposits such as on the Peace Hills, Halverson Ridge or Swan Hills or buried valley deposits such as the Grimshaw Gravels located west of Peace River town near Cardinal Lake (figure 3). The sources that are derived from weathered bedrock are generally sandy and of limited occurrence (red dot on figure 3).

In the study area all four categories potentially are present. However, the terraces, bars or beds or rivers (primarily the Peace River) appear to be the only major economic source of gravel (purple and green dots on figure 3).

All information used in this study was obtained from the Alberta Research Council (Carlson and Hackbarth, 1974, Fox, Richardson and Sham, 1987 and Jones, 1966), Alberta Transportation and Utilities (data files, see Appendix A) or Alberta Environment (water well logs).

ALLUVIAL SOURCES

Table 1 lists current pits (AT&U), reservations (AT&U) and potential deposits (Fox et al 1987). Of the twenty one sites listed, twelve are in the Peace River valley, three along Smoky River, two on Burnt River and one on Pouce Coupe River. Thus, eighteen of the currently used (purple dots in figure 3) or potential sites (green dots in figure 3) are of alluvial origin (figure 3 and table 1). These terraces and bars are the principle sources of gravel for the study area.

Table 1. Sand and gravel resources currently identified in the study area.

Location	Probable Origin	Physiographic Locality	Material	Status
SE11, SW12-83-11-W6	bar	Peace River	?	pit
W1/2 5-83-11-W6	terrace	Peace River	?	?
NE6-83-11-W6	terrace	Peace River	gravel	pit
SW1-83-7-W6	terrace	Peace River	gravel	pit
SW13-82-7-W6	?	Peace River	?	pit
SE4-80-3-W6	terrace	Peace River	?	pit
SW3-80-3-W6	terrace	Peace River	gravel	pit
1.N1/2 2.N1/2 9-80-4-W6	bed bar	Peace River	?	reserved
NW34-79-3-W6	terrace	Peace River	?	depleted
(13,14)15-79-2-W6	terrace	Burnt River	gravel	pit
NE26-78-13-W6	weathered bedrock	Saddle Hills	sand	pit
SE28-78-13-W6	weathered bedrock	Saddle Hills	sand	pit?
SE24, (1)35-78-13-W6	weathered bedrock	Saddle Hills	?	pit
NE29-78-12-W6	weathered bedrock	Saddle Hills	?	pit
NE9-80-13-W6	bed bar	Pouce Coupe R.	?	reserved
NW11-78-4-W6	terrace	Burnt River	gravel	pit
SW, NE6, S1/2 8, W1/2 9-82-23W5	terrace	Peace River	gravel	mapped
SW, NE25-82-23-W5	terrace	Peace River	gravel	mapped
NW1, SW, NE12-83-22-W5	terrace	Peace River	gravel	mapped
NE7, SE18-82-22-W5	terrace	Smoky River	sand & gravel	mapped
NE17-82-22-W5	terrace	Smoky River	sand & gravel	mapped
E1/2 28-82-22-W5	bars	Smoky River	sand & gravel	mapped

GLACIAL SOURCES

Eolian and outwash sediments were mapped by Jones (1966). These are believed to be thin and sandy and to have little or no potential as a source of granular resources. Water wells (black dots in figure 3) in the study area indicate only clay or till. There is, therefore, no apparent potential indicated for material of a glacial source.

PREGLACIAL SOURCES

Jones (1966) and Fox et al (1987) mapped buried gravels north of the study area (Jones west of the sixth meridian, Fox et al east of the sixth meridian, figure 3). Carlson and Hackbarth (1979) also note areas of very deep drift (over 400 ft) in this area and map the thalweg of a buried valley (Shaftesbury Channel). This buried channel and a tributary valley along the Burnt River is shown on figure 3. The relative location and elevation of the Shaftesbury Channel and the Grimshaw Gravels suggest that the gravels may be a high level terrace in the preglacial valley. These types of gravel deposits can be excellent sources of aggregate with huge reserves and high percentage of coarse, hard rock. The possibility of preglacial terraces in the study area south of the Peace River must be considered.

The water wells in the central part of the study area (figure 3) indicate till and not buried sand or gravel. The Shaftesbury Channel is shown to trend northwestward (Carlson and Hackbarth, 1979). Buried gravels are shown by Jones (1966) north of the Peace River at Peace Grove and Eureka River (figure 3). This suggests that the preglacial terraces occur on the north side of the Peace River but not within the study area.

Preglacial sand and gravel outcrop near Watino (figure 3) in the Smoky River valley. Orientation of the gravel clasts and beds indicates a northeasterly flow (Liverman et al, 1989). The Smoky River may trace the course of a small buried valley north from Watino. If this is the case, other gravel beds may be present along the Smoky River in the eastern part of the study area. The gravel exposed near Watino is thin and deeply covered, however, and the economic value of such gravels is low.

WEATHERED BEDROCK

Jones (1966) maps residual materials (weathered bedrock) in the northwestern part of the study area. AT&U data show a number of pits, probably in sand, in the vicinity. If these deposits are formed from

weathered bedrock they do not contain gravel. If weathering has been of a preglacial cap of gravel on bedrock, some gravel will be present in the lag. In general, weathered bedrock is not a usual or productive source of gravel or sand in Alberta.

SUMMARY

The western half of the study area does not seem to have significant potential for new deposits other than in the river valleys. The eolian and outwash material in the eastern half of the study area probably has little value but may be covering other outwash or even preglacial deposits. This possibility is remote but is not discounted as water well information is not available to check the suggestion.

RECOMMENDATIONS

The search for gravel should be concentrated in the major river valleys in the study area. An alternate source of course aggregate is manufactured aggregate that can be produced by burning, in a rotary kiln, the abundant glaciolacustrine clays present in the area. Gravels hauled from outside the study area also should be considered. Crushed stone from within the area probably is not a likely source for aggregate because of the soft nature of the local sandstone but rail or barge transport of competent material from B.C. could be considered. The economics of long gravel haul distances should be weighed against the costs of further exploration in the area, manufactured aggregate or crushed stone. Haul distances from the buried deposits north of the Peace River possibly could be shortened if south-shore stockpiling was performed during the winter months using ice bridges as the mode of access.

REFERENCES

Carlson, V.A. and D.A. Hackbarth (1974) Bedrock topography of the Grand Prairie area, NTS 83M, Alberta: Alberta Research Council map

Fox, J., R.J.H. Richardson and P.C. Sham (1987) Aggregate resource potential by geological ranking and reserve estimate, Peace River-High Level area, Alberta: Alberta Research Council map.

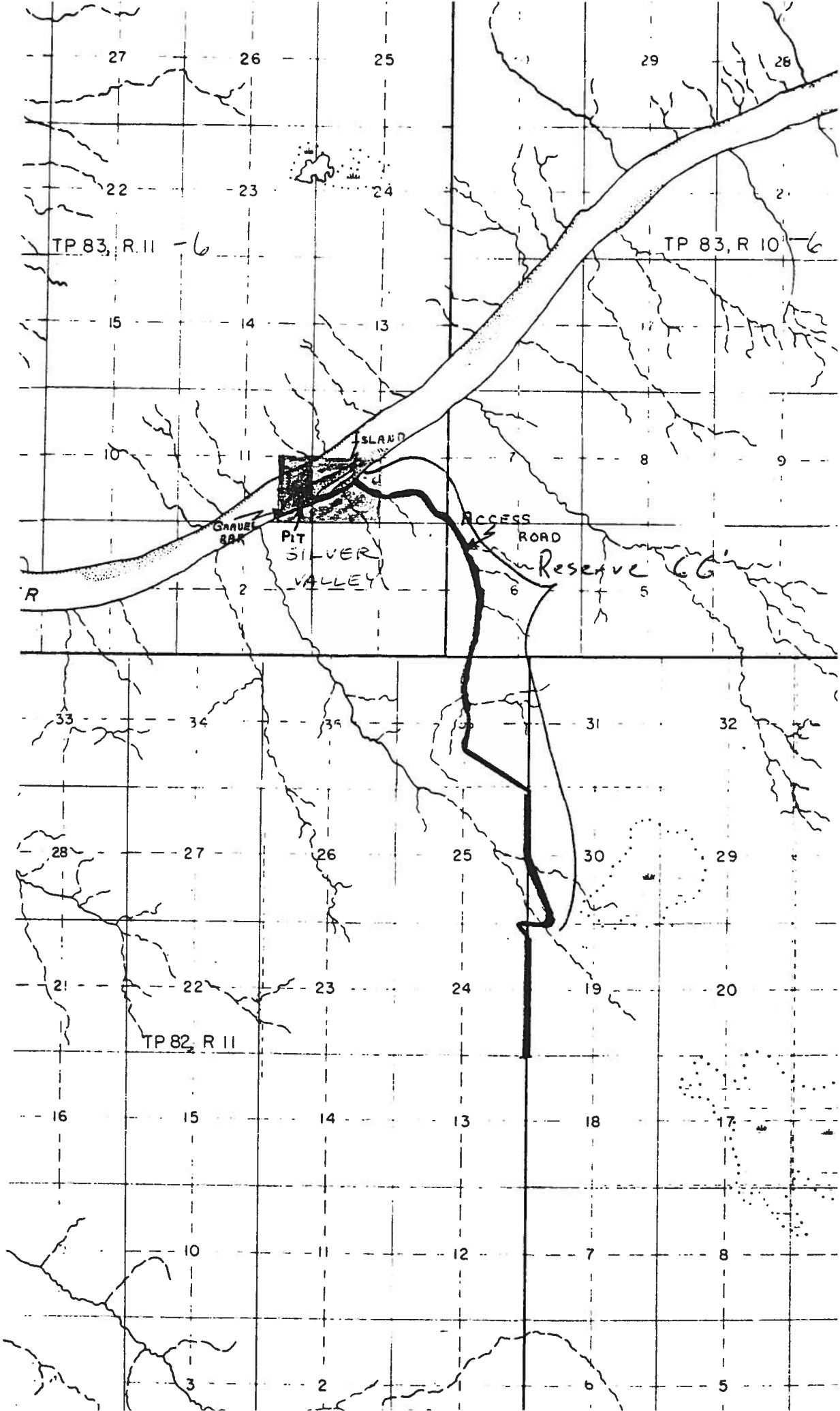
Jones, J.F. (1966) Geology and groundwater resources of the Peace River district, northwestern Alberta: Alberta Research Council Bulletin 16.

Liverman, D.G.E., N.R. Cotts and N.W. Rutter (1989) Laurentide glaciation in west-central Alberta: a single (late Wisconsinan) event: Canadian Journal Earth Science, vol. 26, no. 2, p. 266-274.

APPENDIX 1

Sand and gravel information provided by Alberta Transportation & Utilities

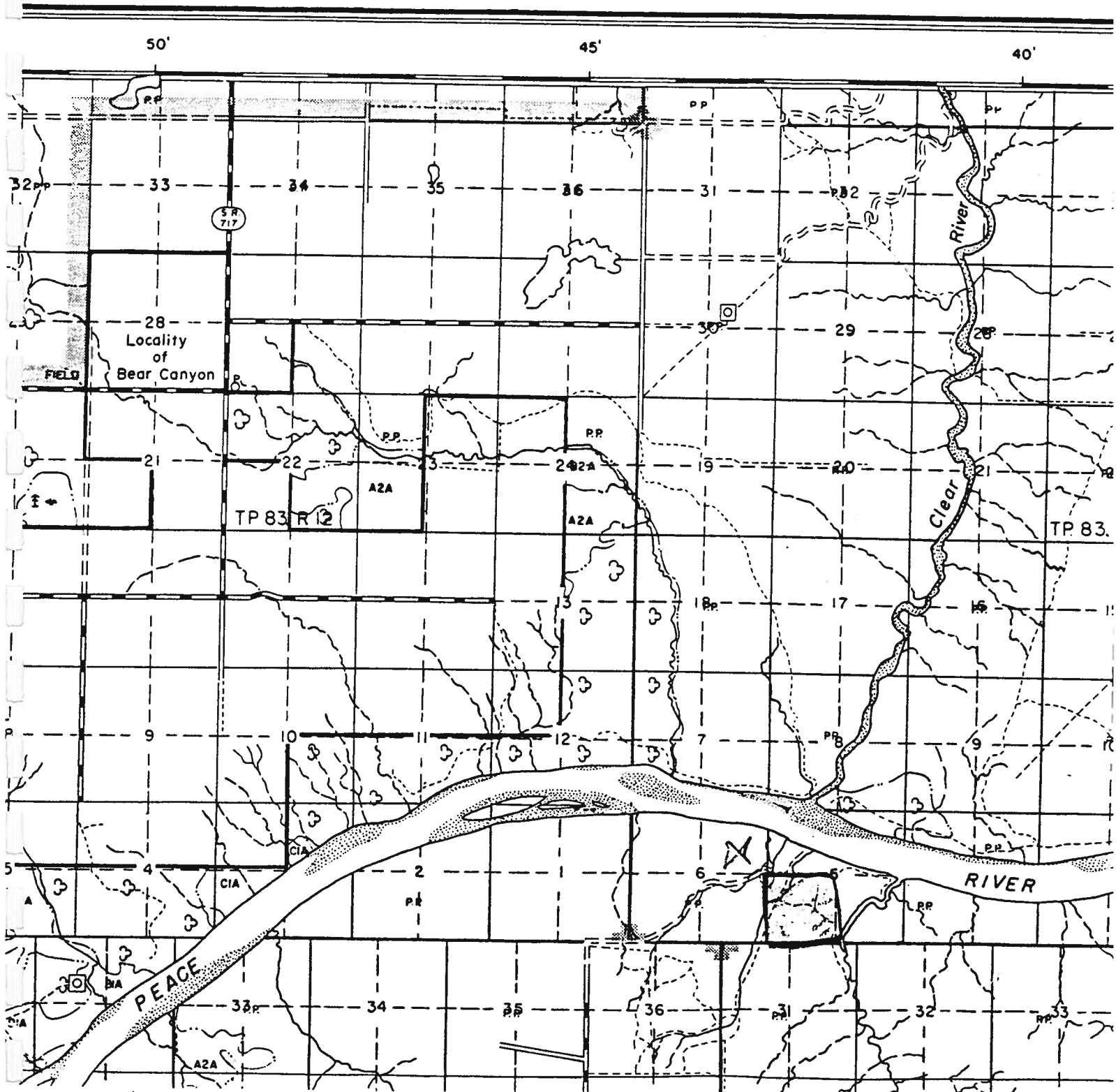
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W/2
~~SR~~ 5-83-11-W6

including
bed of basin
of river

(2)

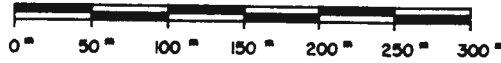


PIT PLAN

REQUIRED PROCEDURE FOR OPERATIONS IN THE SILVER VALLEY No.2

3
PIT

NE 1/4 SEC. 6 TP. 83 RGE. II W. 6 M.

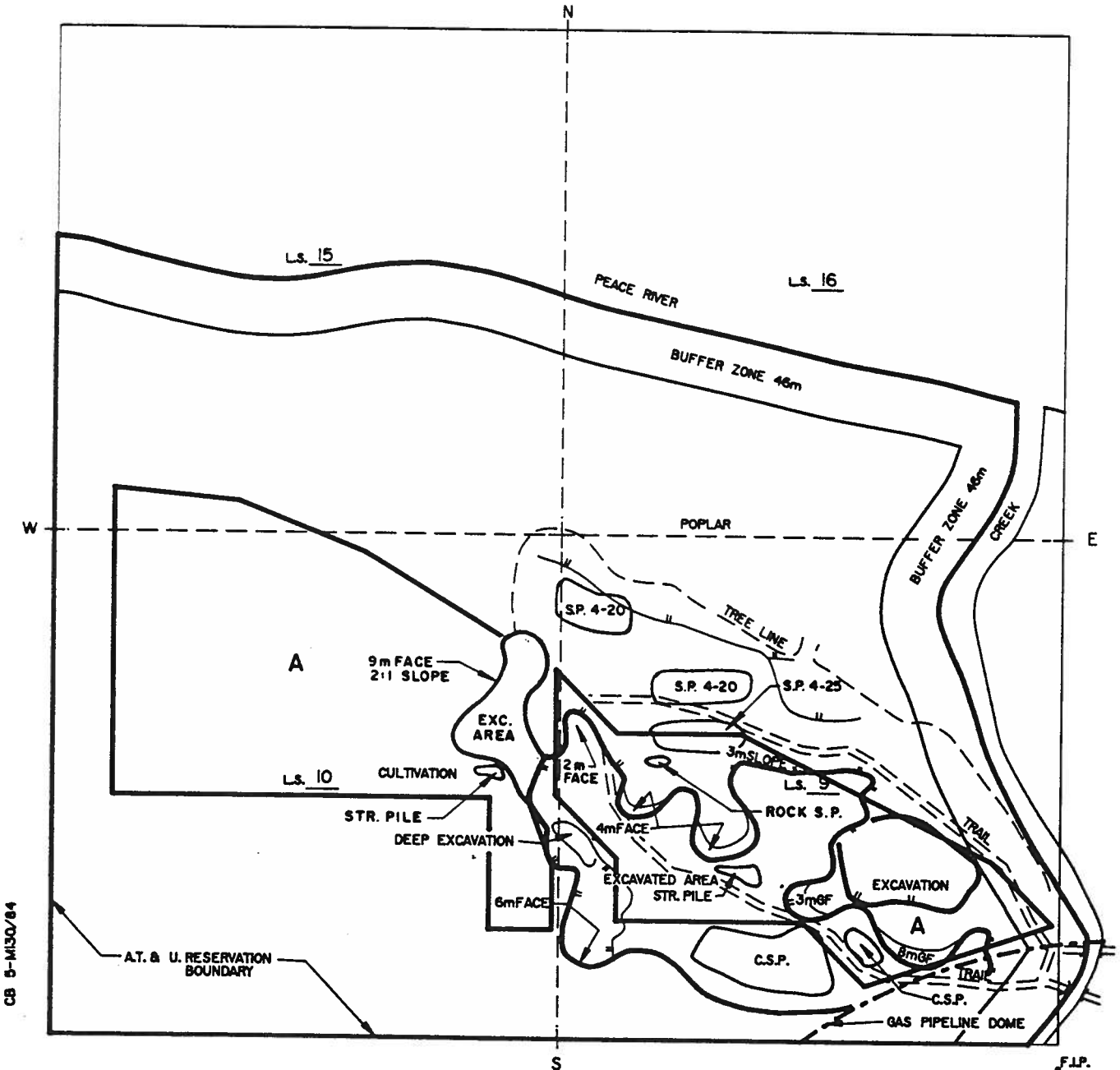


NOTE:

- BEGIN AGGREGATE EXCAVATION IN AREA "B" OUTLINED WITH A DASHED LINE
- BEGIN AGGREGATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "P" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

- | | | | |
|------|----------------|------------------|------------------------------|
| OP | OPEN PIT | SP. | STOCKPILE |
| A | AGGREGATE AREA | C.S.P. | CRUSH STOCKPILE |
| D | DEPLETED AREA | A.T. RESV. B.DY. | BOUNDARY OF RESERVATION AREA |
| STR. | STRIPPING | A.T. AGR. B.DY. | BOUNDARY OF AGREEMENT AREA |
| T | TOPSOIL | H.W.Y. R.A.W. | HIGHWAY RIGHT OF WAY |
| GF | GRAVEL FACE | - X - | FENCE LINE |
| SF | SAND FACE | MS | MUSKIE |



CB 5-M130/84

DATE Jan 30 19 89

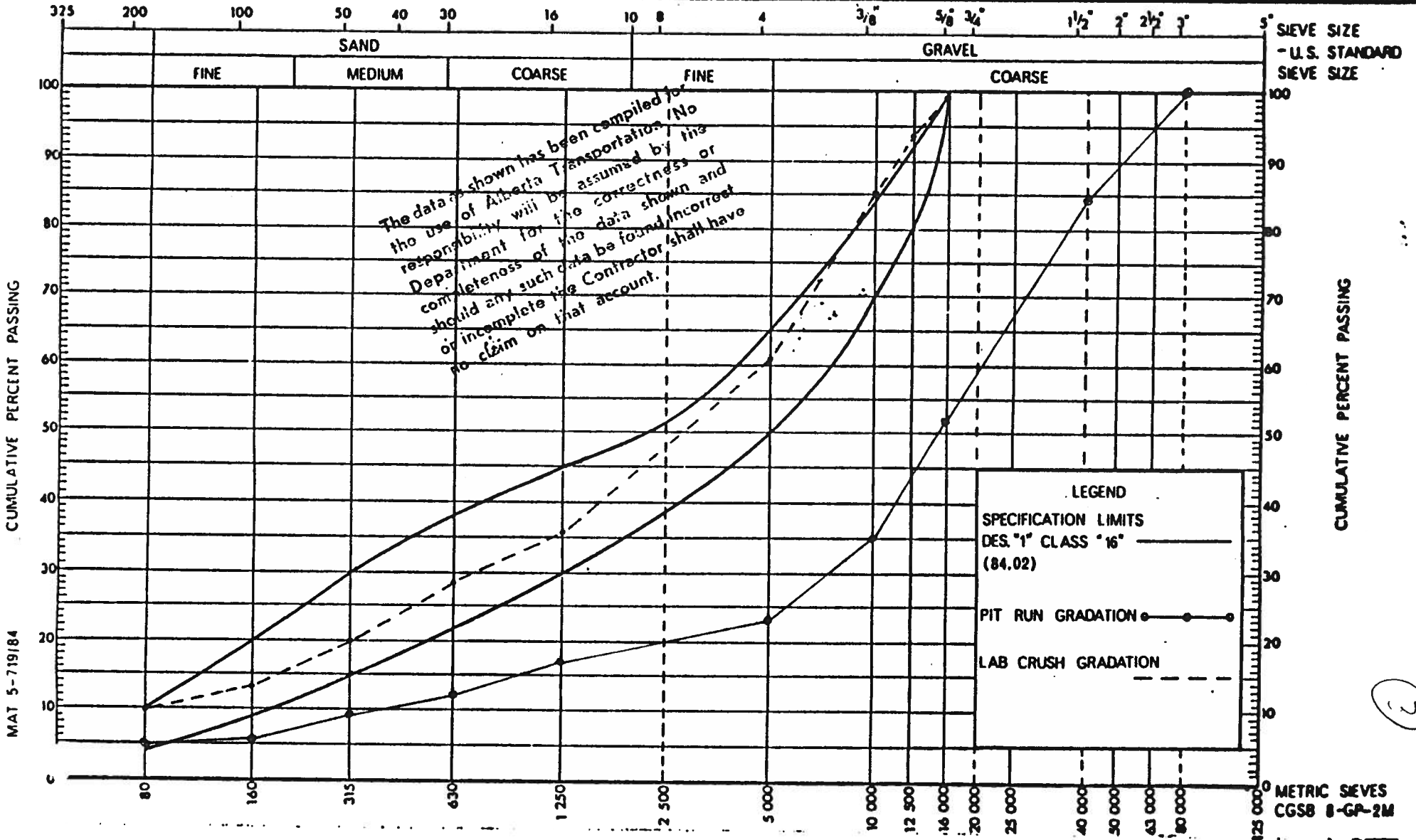
R. P. Mack
FOR MATERIALS ENGINEERING BRANCH

SUMMARY OF AGGREGATE PROSPECT
AGGREGATE GRADATION CHART

DATE REPORTED _____

SHEET 3 OF 5

TO S. Kushneryk PROJECT [REDACTED] PIT NAME SILVER VALLEY #2
 CC _____ FROM _____ PIT LOCATION NE 6-83-11-6
 TO _____ LAB SAMPLE NO. 404822 - 832



MAT 5-719/84

REMARKS _____

10 pt 11.

PIT PLAN

REQUIRED PROCEDURE FOR OPERATIONS IN THE NORTH FOURTH CREEK

SW 1 1 83 7 6

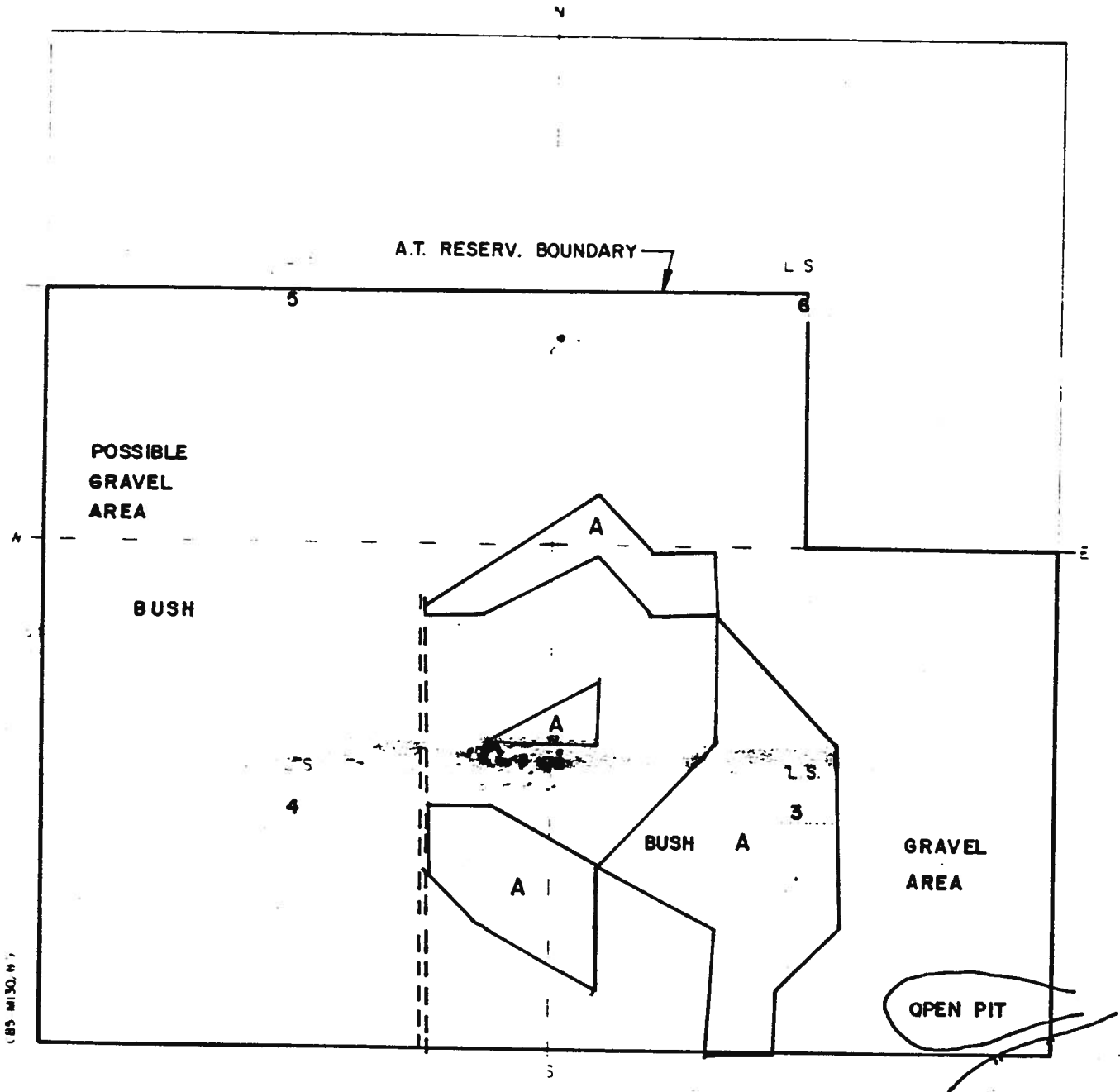


NOTE

- BEGIN AGGREGATE EXCAVATION IN AREA 'B' OUTLINED WITH A DASHED LINE
- BEGIN AGGREGATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA 'P' OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND

- OPEN PIT
- A AGGREGATE AREA
- DEPLETED AREA
- OVERBURDEN AREA
- TS: TOPSOIL



(85 m/30.0 ft)

PIT PLAN

REQUIRED PROCEDURE FOR OPERATIONS IN THE ... FOURTH CREEK ... PIT
 .SW. 1/4 SEC. 13.. TP. 82.. RGE. 7... W. 6... M

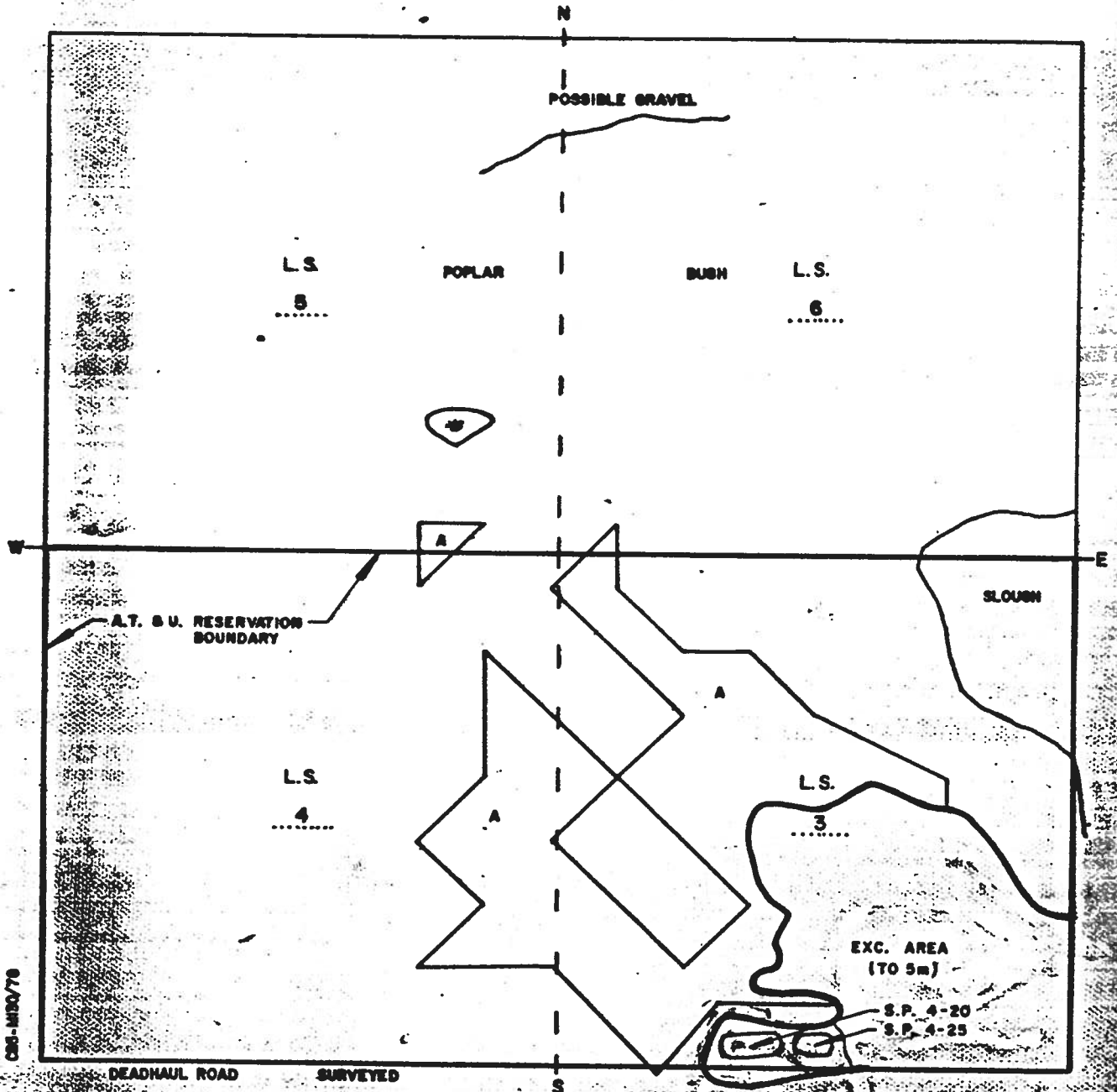


NOTE:

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- BEGIN AGGREGATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "P" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

- OP = OPEN PIT
- A = AGGREGATE AREA
- D = DEPLETED AREA
- O = OVERBURDEN AREA
- TS = TOPSOIL



C88-11820/78

DATE May 16 1989

[Signature]
 FOR MATERIALS ENGINEERING BRANCH

RESERVATION APPLICATION

o/r ✓

6

Application No. **CNT 650022**
 Date of Request **Dec 10/198**

Requesting Agency **TRANSPORTATION** Telephone **427-3101** Agency File No. **LOCATION**

Reservation for immediate use
 Comments, etc. **OLD SURFACE MATERIALS RESERVATION REQUIRING FIELD**

Reservation for future use (holding)
INVESTIGATION PRIOR TO CANCELLATION OR APPLICATION

Land use restriction
FOR A 'D' - RESERVATION Term **FIVE YEARS**

LAND LOCATION

Twp	Rge	Mer.	¼ Section
80	13	6	Bed and Bars of the river, PT. of LSD 9 East of the river all in sect NE 9, NW 9 (Bed of river), SE 9 (Bed of river).

ENERGY AND NATURAL RESOURCES USE ONLY

Land Standing

Zone

cc
 -diary
 -Transportation
 -Spirit River West - Field Off.
 -Reg. mgr - Spirit River East

NEW CODE
ENT.0541.1
E & NR CONTROL No.
E & NR FILE No. CNT 650022
PLANNING ONLY GR 80-13-W6
EFFECTIVE DATE TRA-AS
EXPIRY DATE 16-11-65
APPROVAL 30-11-90
 NTP INTO R. ORD /LSAS

The above reservation/restriction is requested on the above land.
R. W. JUREL, P. Eng.
 Manager As Engineer
 for Requesting Agency

File Records Land Appraisal Entered in Records

Referred to:
 AFS F&W PARKS TRANS. ENVIRONMENT Other

RECORDS, Note
 Please remove written reservations dated 16-11-65.

Remarks and comments
LSAS OPERATION
 INPUT ID. 1501
 TX ID. 190012-88
 VERIFIED *[Signature]* DATE 13-4-84

To be entered in the records of the Department

Permissive use Reservation Approved
 This reservation expires on
 for Asst. Deputy Minister

PIT PLAN

6A

REQUIRED PROCEDURE FOR OPERATIONS IN THE LASSITER PIT

SE 1/4 SEC. 4 TP. 80 RGE. 3 W. 6 M.

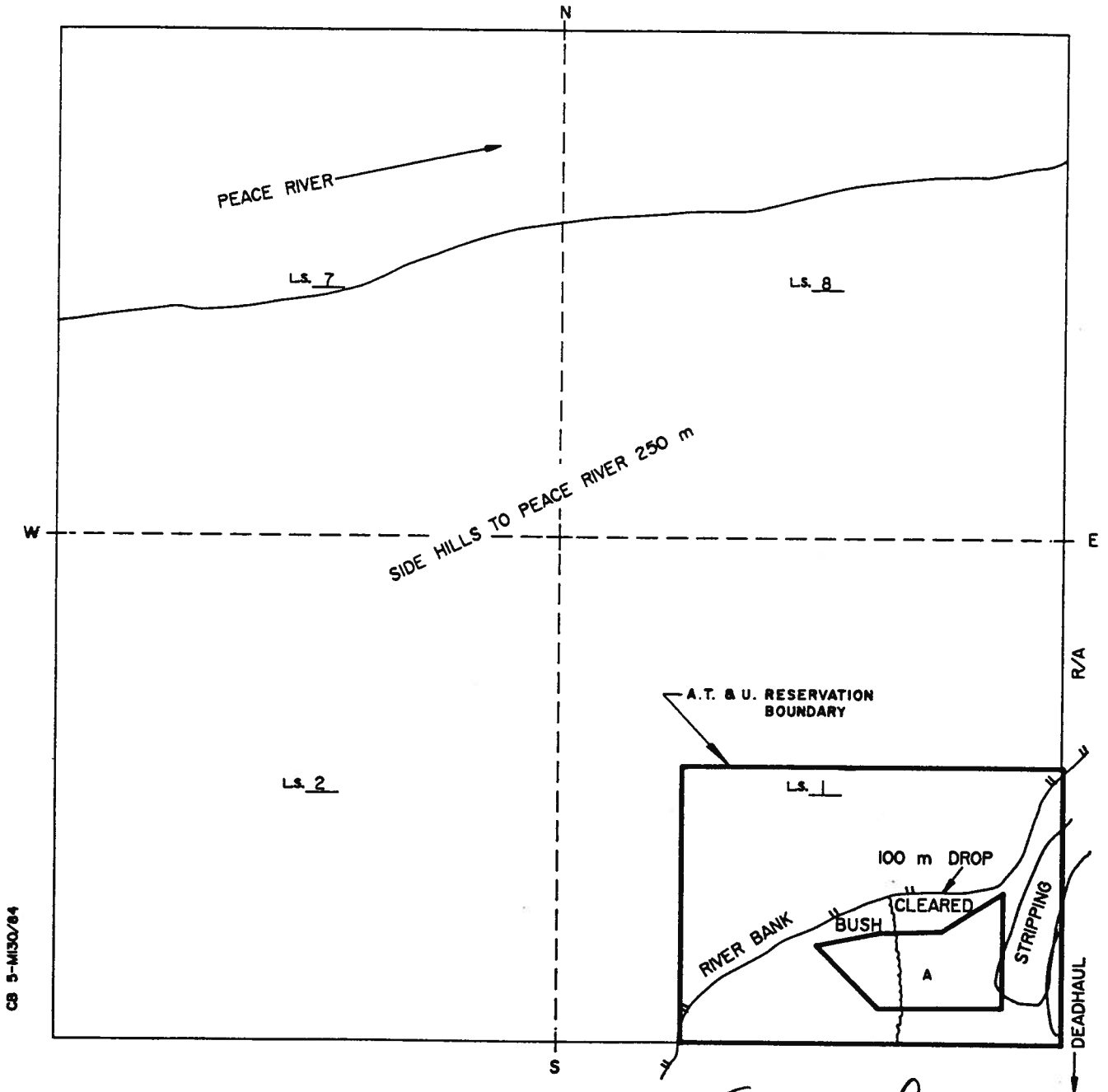


NOTE:

- BEGIN AGGREGATE EXCAVATION IN AREA "B" OUTLINED WITH A DASHED LINE
- BEGIN AGGREGATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "C" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

OP	OPEN PIT	SP.	STOCKPILE
A	AGGREGATE AREA	C.S.P.	CRUSH STOCKPILE
D	DEPLETED AREA	A.T. RESV. BDR.	BOUNDARY OF RESERVATION AREA
STR.	STRIPPING	A.T. AGR. BDR.	BOUNDARY OF AGREEMENT AREA
T	TOPSOIL	Hwy. R/W.	HIGHWAY RIGHT OF WAY
GF	GRAVEL FACE	- X -	FENCE LINE
SF	SAND FACE	≡≡	MUSKIE



CB 5-M30/84

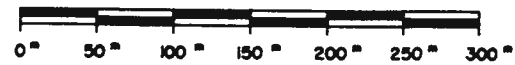
DATE Dec. 16 19 88

R. P. [Signature]
 FOR MATERIALS ENGINEERING BRANCH

7

REQUIRED PROCEDURE FOR OPERATIONS IN THE LASSITER PIT

SW 1/4 SEC. 3 TP. 80 RGE. 3 W. 6 M.

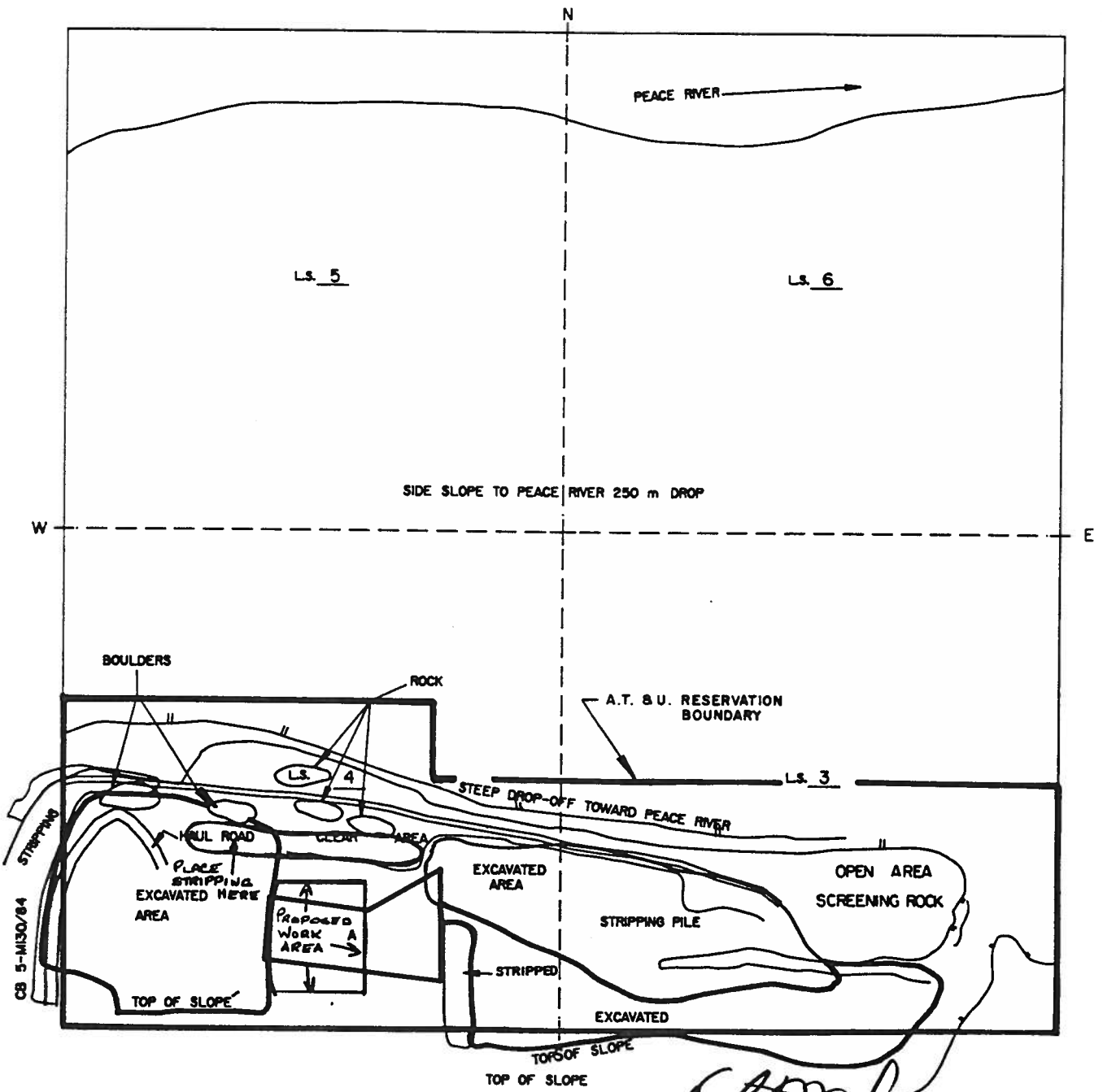


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- BEGIN APPROPRIATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "C" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

OP	OPEN PIT	SP.	STOCKPILE
A	AGGREGATE AREA	C.S.P.	CRUSH STOCKPILE
D	DEPLETED AREA	A.T. RESV. BDY.	BOUNDARY OF RESERVATION AREA
STR.	STRIPPING	A.T. AGR. BDY.	BOUNDARY OF AGREEMENT AREA
T	TOPSOIL	HWY. R.L.W.	HIGHWAY RIGHT OF WAY
GF	GRAVEL FACE	- X -	FENCE LINE
SF	SAND FACE	MS	MUSKIE



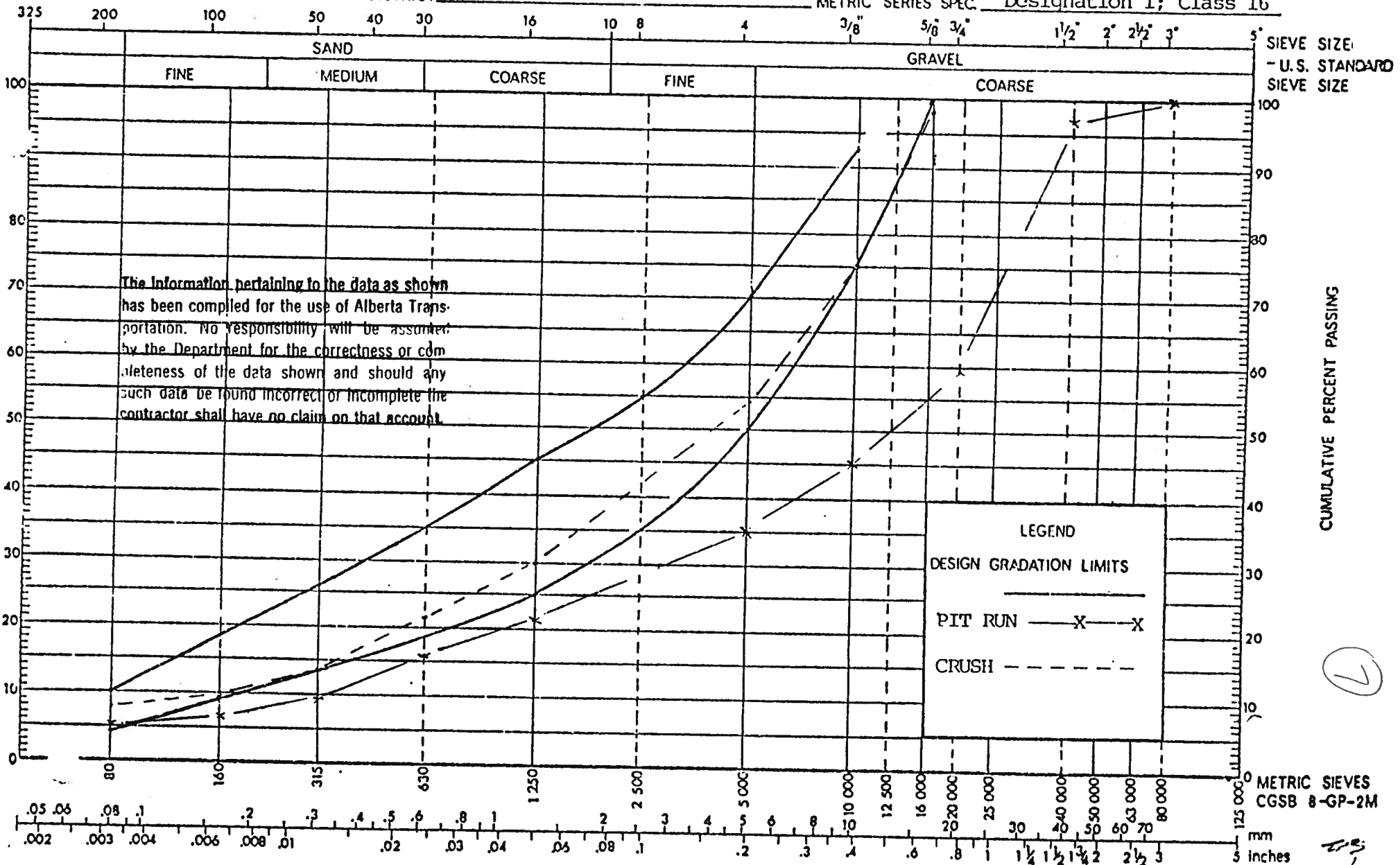
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DATE Dec. 16 1988

[Signature]
 FOR MATERIALS ENGINEERING BRANCH



PROJECT _____ FROM _____
 JOB NO. _____ TO _____
 PIT NAME LASSITER WEEK ENDING _____
 PIT LOCATION S# 3-80-3-6 TYPE OF WORK _____
 Lab Sample #'s 301495 - 502 SAMPLE SOURCE _____
 REGION _____
 DISTRICT _____ METRIC SERIES SPEC. Designation 1; Class 16



The information pertaining to the data as shown has been compiled for the use of Alberta Transportation. No responsibility will be assumed by the Department for the correctness or completeness of the data shown and should any such data be found incorrect or incomplete the contractor shall have no claim on that account.

LEGEND

DESIGN GRADATION LIMITS ———

PIT RUN ——— X ——— X

CRUSH - - - - -

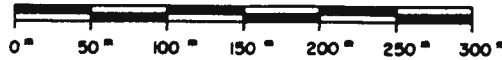
CUMULATIVE PERCENT PASSING

①

METRIC SIEVES CGSB 8-GP-2M
mm inches

NW 1/4 SEC. 34 TP. 79 RGE. 3 W. 6 M.

9

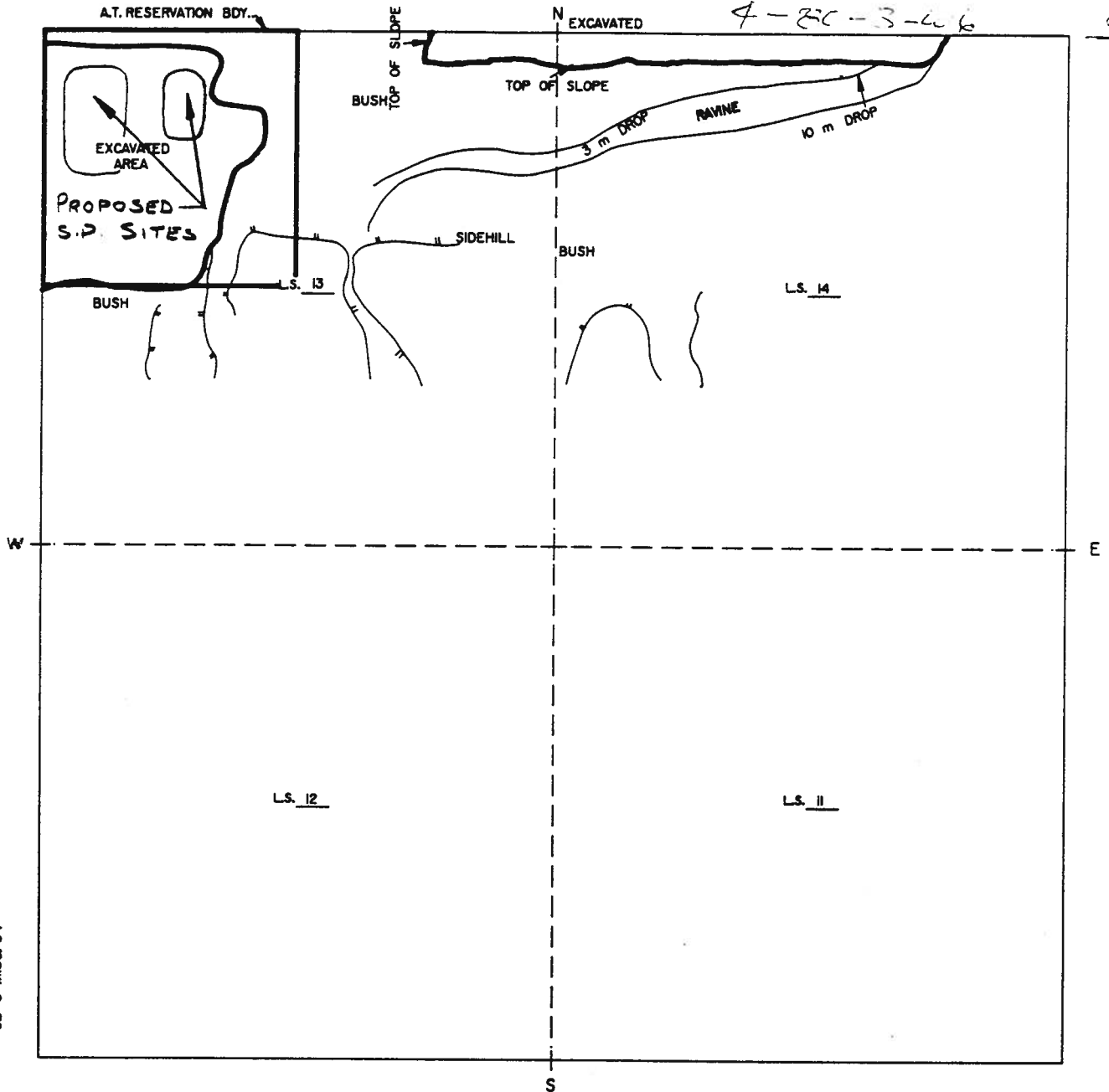


NOTE:

- BEGIN AGGREGATE EXCAVATION IN AREA "B" OUTLINED WITH A DASHED LINE
- BEGIN AGGREGATE EXCAVATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "T" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

- | | | | |
|-----|----------------|---------------|------------------------------|
| OP | OPEN PIT | SP | STOCKPILE |
| A | AGGREGATE AREA | C.S.P. | CRUSH STOCKPILE |
| D | DEPLETED AREA | A.T.RESV.BDY. | BOUNDARY OF RESERVATION AREA |
| STR | STRIPPING | A.T.AGR.BDY. | BOUNDARY OF AGREEMENT AREA |
| T | TOPSOIL | Hwy. R.W. | HIGHWAY RIGHT OF WAY |
| GF | GRAVEL FACE | - X - | FENCE LINE |
| SF | SAND FACE | ⊞ | MUSKEG |



CB 5-M130/84

DATE Jan. 11 1989

P. DeLuca

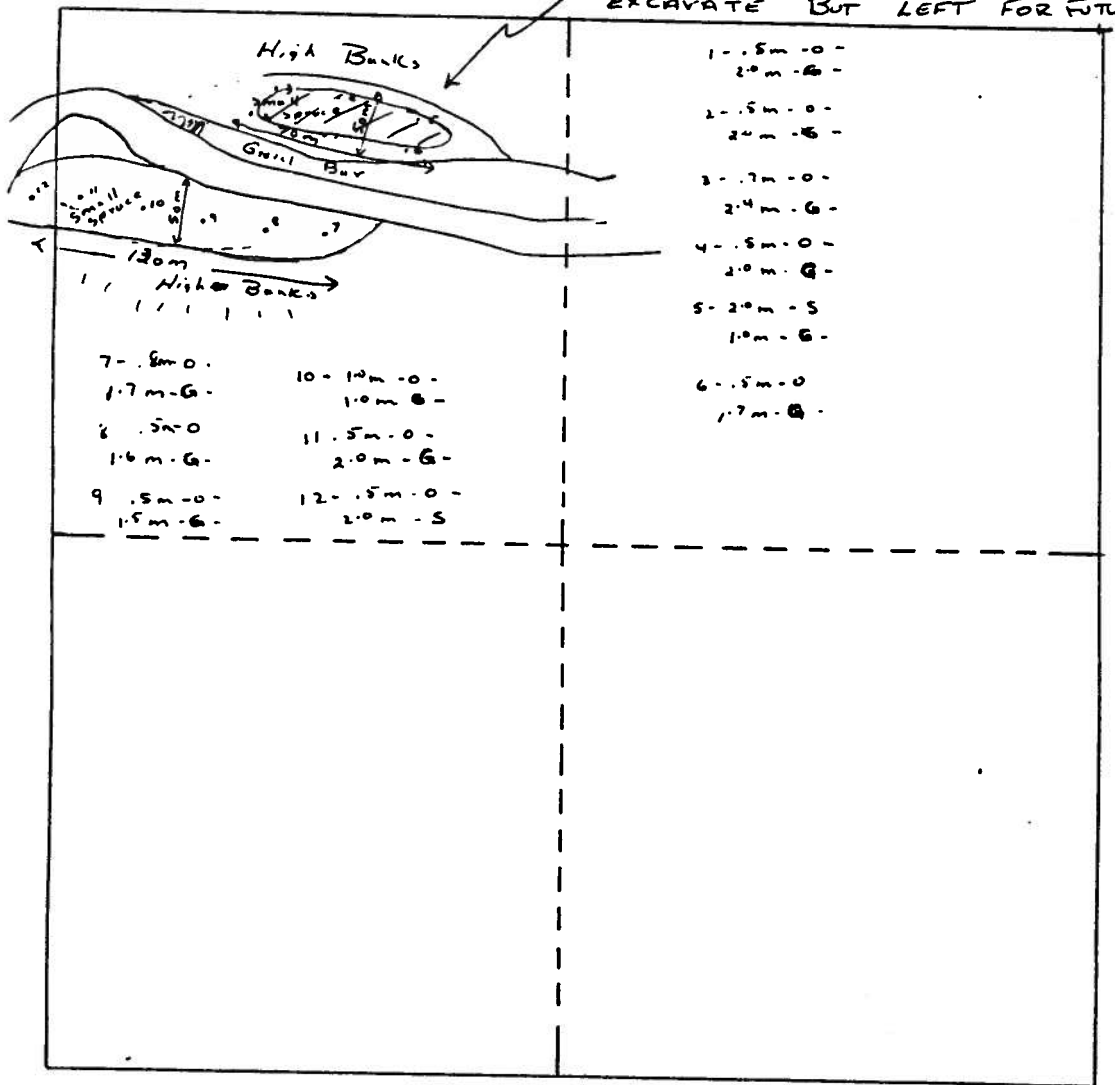
FOR MATERIALS ENGINEERING BRANCH

the gravel in this pit was recommended for base course only & I think it now is depleted & used only as a stockpile area

LOCATION: LSD 13 & 14 Section 15 Township 79 Range 2 W. 6 Mer

O - overburden
 G - Gravel
 S - Sand.

RECEIVED PERMISSION TO EXCAVATE BUT LEFT FOR FUTURE



7056
 1/15/56

ADDRESS OF ISSUING OFFICE
PUBLIC LANDS DIVISION
 Box 579, Spirit River, Ab. T0H 3G0 864-3574
 TAKEN BY: _____ TELEPHONE NO. _____

PUBLIC PIT LICENCE NUMBER
PPL 006028
 L.S.A.S. CLIENT I.D. NUMBER

OPERATOR'S NAME
EMMANUEL BYLER
 ADDRESS
BOULDER AB
 POSTAL CODE *T0H 1K0* TELEPHONE NUMBER *353-2198*
 LAND DESCRIPTION: USE KEY FILE NO. SHOWN IN PUBLIC PIT BOOK
 LS *72* QTR *26* SECT *75* TWP *13* RGE *6*

PUBLIC PIT RESERVATION HELD BY
 ALBERTA TRANSPORTATION AND UTILITIES ALBERTA FOREST SERVICE PUBLIC LANDS

Pursuant to the Public Lands Act and Regulations thereunder the above named operator is hereby authorized to remove only 100 cubic yards or _____ cubic meters of PIT RUN Silice/Graue L from the above lands.

This licence does not entitle the operator to remove stockpiled surface materials unless placed there by the operator. Removal of surface materials in excess of the amount approved by this licence is illegal and is subject to a penalty. If more surface materials are required, please contact the OFFICE FROM WHERE THIS LICENCE WAS OBTAINED. This authority is granted to the operator complying with the attached schedule of conditions. Upon completion of operations or upon expiration of this surface materials licence, whichever date occurs first, you must complete the attached SURFACE MATERIALS RETURN and forward it to the OFFICE FROM WHERE THIS LICENCE WAS OBTAINED within 30 days. Further dispositions may be withheld until this is received. This licence does not grant the operator a right of exclusive possession to the land described in the licence nor does it grant to the operator the right, to the exclusion of others, to remove and take away from the land, the surface materials within and under the land.

EFFECTIVE DATE OF LICENCE *August 31 1988* EXPIRY DATE *October 31 1988*
 SIGNATURE OF APPLICANT OR AGENT *Emmanuel Byler* SIGNATURE OF ISSUING OFFICER *Joe Velders*

COPIES TO
 ALBERTA TRANSPORTATION AND UTILITIES DISTRICT NUMBER *11 13*
 ALBERTA TRANSPORTATION AND UTILITIES AGGREGATES ENGINEER 4TH FLOOR TWIN ATINA BLDG. 6888 - 86TH AVENUE EDMONTON, ALBERTA T6B 2K3
 P.L. FIELD SERVICES FOREST

Application Fee	\$	<i>20.00</i>
<i>75</i> Royalty	\$	<i>100.00</i>
<i>10</i> Surcharge	\$	<i>20.00</i>
TOTAL	\$	<i>140.00</i>
CASH REFERENCE ACCTS. USE ONLY		

FOR SPECIAL LAND DISPOSITIONS SECTION USE ONLY
 LICENCE CANCELLED IN L.S.A.S. BY S.M. UNIT
 DATE _____ APPROVED BY _____
 LSAS OPERATIONS
 RECORDING OF ISSUED LICENCE RECORDING OF CANCELLED LICENCE
 SURFACE FILE ROOM
 RECORDING OF ISSUED LICENCE RECORDING OF CANCELLED LICENCE
 DATE INITIALS DATE INITIALS

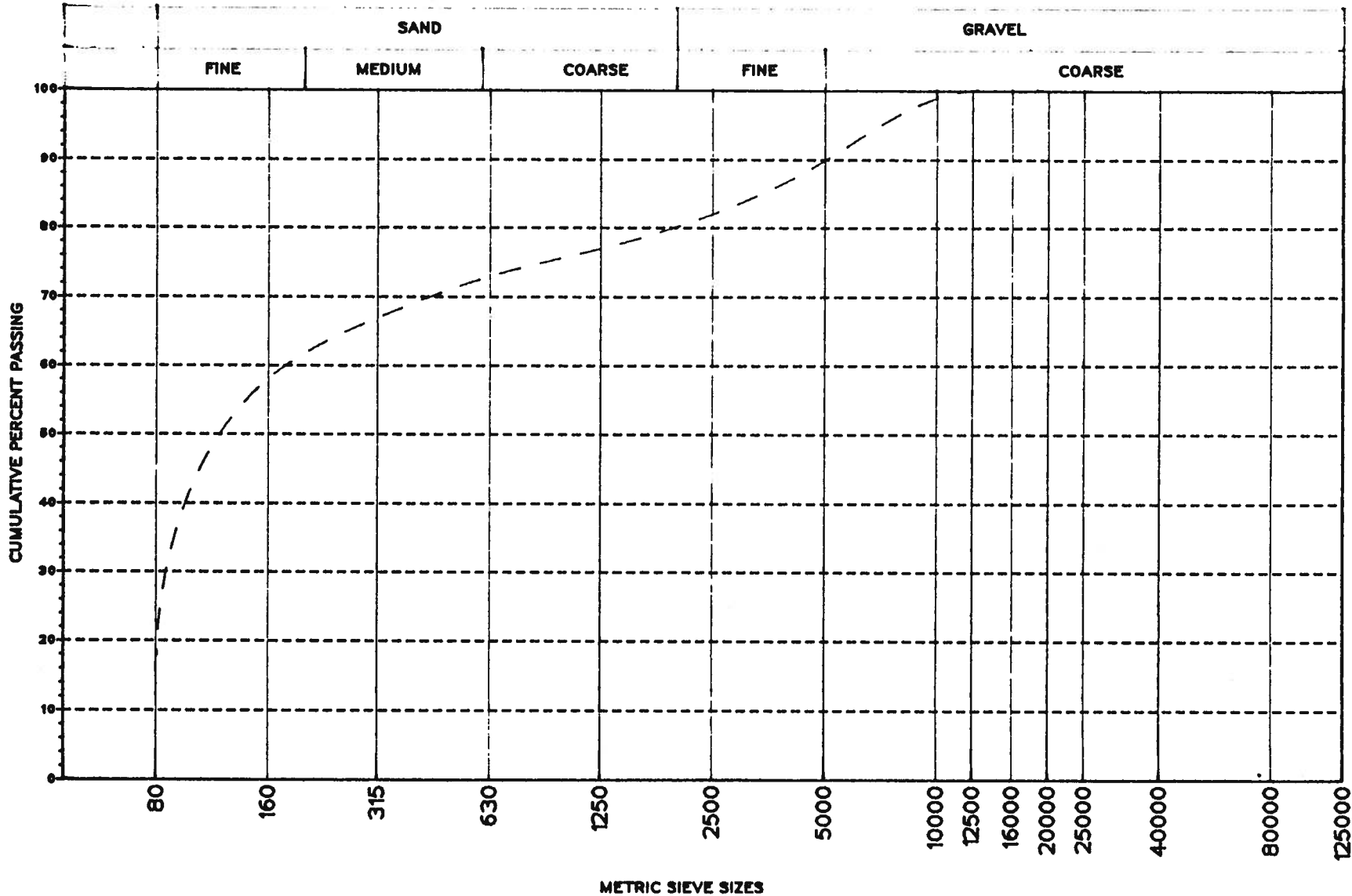
CONTROL REGISTER NO. _____
 WHITE Operator GOLDENROD Special Land Dispositions PINK Accounts CANARY Retain In Issuing GREEN Regional Headquarters

AGGREGATE GRADATION CHART

MST BLEND SAND

PROJECT : HW49 :02&04

DESIGNATION AND CLASS : SAND
PIT NAME: WEST BAY TREE
LOCATION: SE-28-078-13-06
DATE SAMPLED: 88/07/21
FIRST SAMPLE: 426674 LAST SAMPLE: 426674



(12)



ENERGY AND NATURAL RESOURCES

RESERVATION/NOTATION AMENDM

122752 (13)

Agency (Dept./Branch) ALBERTA TRANSPORTATION & Utilities (Materials Engineering Br) E & NR Control N CNT 6800

Client I.D. No. 8000020 - 001 Telephone 427-3101 Date of Request Feb. 5/88 Agency File No. SE 24 > 78-13-6 E & NR File No. 67 78-13-

Purpose of the Amendment
 Add Land Delete Land Amend Expiry Date Amend Code Amend Other (see explanation)

Explanation for Amendment Change: _____ Amended Agency Comments: Please amend for a 5 year term Agency Contact Person: P. DeLuca
 (Please Print & Initial)

ADD LANDS						DELETE LANDS						LANDS NOW REQUIRED					
Name of Subdivision						Name of Subdivision						Name of Subdivision					
Subdivision Plan No.		Block	Lot	Parcel		Subdivision Plan No.		Block	Lot	Parcel		Subdivision Plan No.		Block	Lot		
Qtr./LS	Sec.	Twp.	Rge.	Mer.	Ac.	Qtr./LS	Sec.	Twp.	Rge.	Mer.	Ac.	Qtr./LS	Sec.	Twp.	Rge.	Mer.	
												SE	24	78	13	6	1
												SE	35	78	13	6	4
												LS D 1					

RECEIVED
 APR 15 1988
 MATERIAL ENGINEERING
 BRANCH

SRPU Conflicts Yes No see attached

Reservation/Notation	Current Code	Amended Code
Type	<u>CNT</u>	<u>CNT</u>
Purpose	<u>0541</u>	<u>0541</u>
Restriction	<u>1</u>	<u>1</u>
Exception(s)		

Energy & Natural Resources Use Only

Comments: _____

Amendment Date: (Y M D) 88-04-02
 Expiry Date: (Y M D) 92-10-3

[Signature]
 for ADM, Public Lands

Action by	(Date & Initial)	Referral Dates	(Sent/Received)
Doc/SRPU (App)		Land Mg't	
Admin. Support		AFS	
Land Mg't		F & W	
Doc/SRPU (Disp)		Envir.	
File Records		Transp.	
		Minerals	
		Other	

LSAS Note: _____

Copies for:
FIELD - GEORGE A
AM (SARIT RIV)
FORA
GR. AC FORCE)

LSAS ID: LSASI 07
1880411
63
 APR 13 88

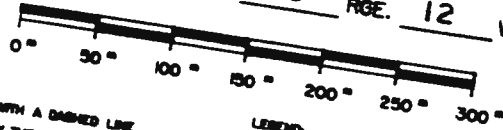
PIT PLAN



(14)

REQUIRED PROCEDURE FOR OPERATIONS IN THE BONANZA CORNER

NE 1/4 SEC. 29 TP. 78 RGE. 12 W. 6 M. PIT

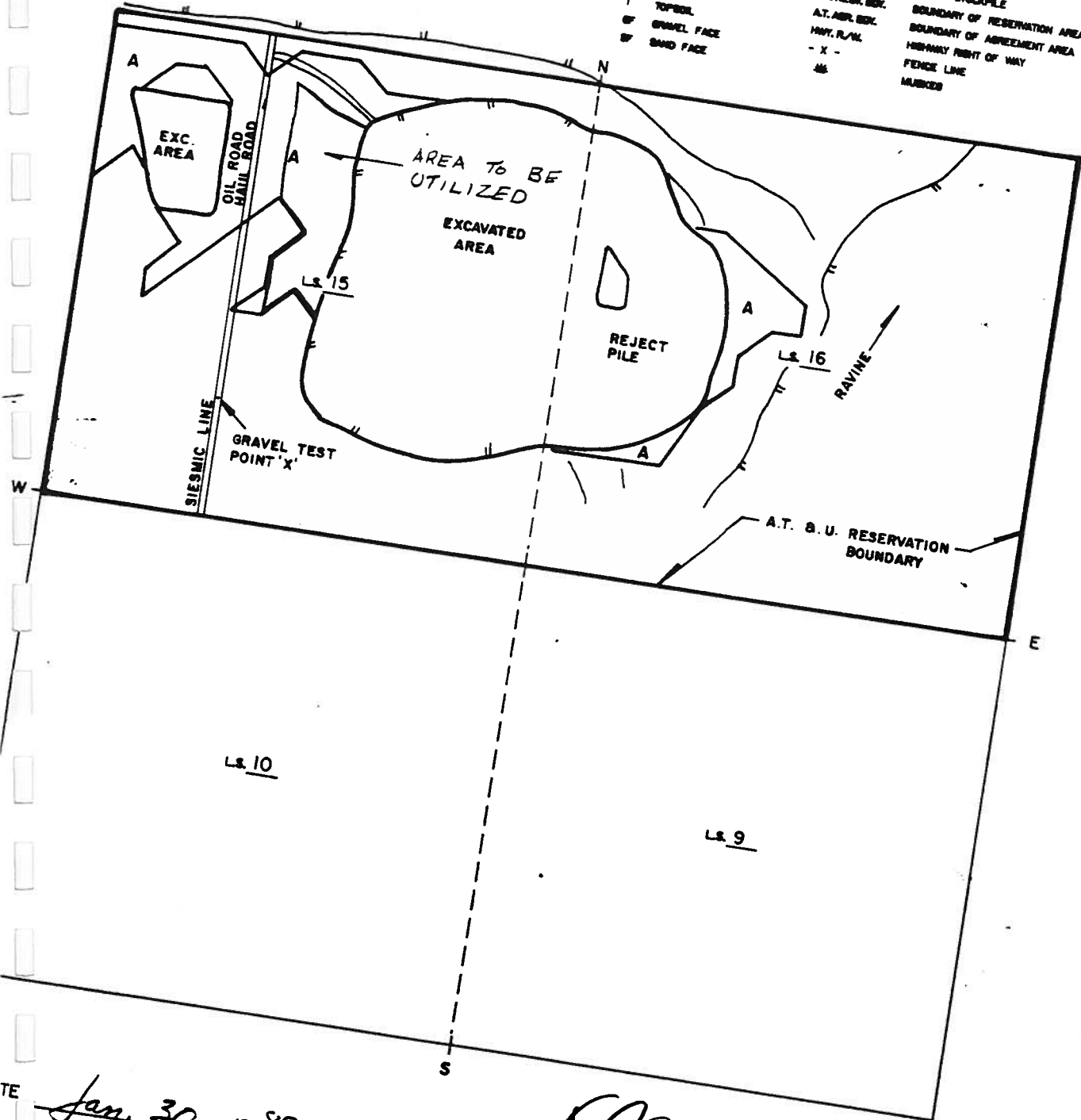


NOTE:

- SOIL APPROPRIATE EXAMINATION IN AREA "B" OUTLINED WITH A DASHED LINE
- SOIL APPROPRIATE EXAMINATION IN AREA DESIGNATED BY THE ENGINEER
- PLACE OVERBURDEN IN AREA "A" OUTLINED WITH A DASHED LINE
- PLACE OVERBURDEN IN AREA DESIGNATED BY THE ENGINEER

LEGEND:

- | | | | |
|------|------------------|----------------|------------------------------|
| OP | OPEN PIT | SP. | SPUDPILE |
| A | APPROPRIATE AREA | C.S.P. | CRUSH STOCKPILE |
| D | DEPLETED AREA | A.T. RES. BDR. | BOUNDARY OF RESERVATION AREA |
| STR. | STRIPPING | A.T. AGR. BDR. | BOUNDARY OF AGREEMENT AREA |
| T | TOPSOIL | Hwy. R/W | HIGHWAY RIGHT OF WAY |
| GF | GRANUL FACE | - X - | FENCE LINE |
| BF | SAND FACE | MB | MARKER |



TE Jan. 30 19 89

R.P. Mah
FOR MATERIALS ENGINEERING BRANCH

15

GRAVEL PIT REPORT

Name of Pit *Gravel*

Owner *Govt. of Alta*

Location *At 11-25-4-1*

Dead Haul Routes *4 miles east of stockpile down old Burnt
river hill onto river flat*

Condition of Deadhaul *Good gravel except through pit area
along river banks*

Condition of Pit

Depth of Overburden *6-8* Ft. Depth of Gravel *2-5* Ft.

Water Level From Surface *variable* Ft.

Type of Gravel (Coarse, Fine, Clean, etc.) *medium coarse with
fine sand, fairly clean*

Surface Area of Pit Left *unknown, deposits pretty well untested*

Estimated Yardage Still Available *unknown* Cu. Yds.

Gravel Removed (All quantities less Asphalt)

Description of Work	Tons	Cu. Yds.
Pit-Run Granular		<i>16,327</i>
Pit-Run Sand		
Designation Class		
Designation Class		
Designation Class		
Granular Supply for Culverts		
Material for Dead Haul		
Total Removed		<i>16,327</i>

Prospects of More Gravel

Adjoining Pit *126126-4126411*

Near Pit

In The District 1/4 Sec. Twp. Rge. W.

Remarks *gravel lies in small benches and gravel
banks along Burnt river*

Date *Nov 64* Engineer *R. P. ...*

Note
Make sketch showing deadhaul routes with distances on reverse side. This form to be sent to Edmonton upon completion of using pit. One form for each pit used.
Show mileage of common haul point, deadhaul distance in miles, location of pit relative to section and project. Also enlarged sketch of pit showing excavated portion relative to test holes.