Public Works Canada

Western Region

for

Department of Indian Affairs and Northern Development

Travaux publics Canada

Région de l'Ouest

pour

Ministère des Affaires indiennes et du Nord canadien

Specification

PROJECT No. 085816

MAY 1979

CLEARING, GRADING AND DRAINAGE
kilometre 138.28 to kilometre 164.00
LIARD HIGHWAY, N.W.T.

LIARD HIGHWAY, N.W.T.

km 138.28 to km 164.00

DESIGN REPORT

June 19, 1979

LIARD HIGHWAY, N.W.T.

km 138.28 to km 164.00

DESIGN REPORT

These comments are in addition to those contained in the Final Design Submission and Tender Package kilometre 138.28 to kilometre 164.00 dated October 30, 1978 and the Final Design Submission kilometre 138.28 to kilometre 164.00 dated November 1978.

Alignment

The proposed final alignment for this section of the Liard Highway is as outlined in the Liard Highway alignment Report N.W.T. mile 0.00 to mile 156.70 including the Fort Liard Access Road mile 0.00 to mile 7.50 January 1975 with the alternate alignment for mile 80.5 to 83 being selected as the first alignment in the vicinity of the Netla River.

All horizontal alignment meets the standard design criteria of a DCV100 design which states that the minimum radius of curve allowed is 380 metres. There are a total of 13 curves with the radius varying from 582.14 metres to 3492.76 metres. Clearing limits are to be 30.5 metres or the required construction limit plus 5 metres.

All vertical alignment meets DCV100 design of a maximum gradient of 5% and a stopping site distance of 200 metres with the exception of the vertical alignment in the vicinity of km 155.8 (155.2 to 156.5). Here the vertical alignment meets a DCV85 with grades of -7.49% and +7.61% and designed for comfort control on the sag curve. (This design would meet a DCV41 based on the old imperial design criteria.) When comparing this design with the standard DCV100 criteria there is a reduction in the excavation quantity of 66,000 m^3 (most of this material having to be wasted) and the embankment quantity of 21,000 m^3. This reduction is the design criteria results in a considerable cost saving.

Geotechnical Investigation

In addition to the Report on Geotechnical Investigation Kilometre 107 to Kilometer 208 Fort Liard Highway Volume I; on which the Final Design Submission was based further geotech was done and a report completed in May 1979 (the following is a summary of the major cuts and borrow pits presently proposed incorporating the changes that resulted from further geotechnical investigation).

km	Area	Total Depth	Material	S.F.	Waste	Useable
(1) 138.4	R/W cut	-	Silty Clay	1.4	4000m^3	10,000m^3
138.6	R/W cut	-	Silty Sand	1.4	-	13,000m^3
140.2	1.2 ha.	5.5m	Sandy Siet	1.4	800m^3	28,000m^3
140.6	R/W cut	-	Silty Clay	1.4		22,000m^3
143.4	R/W cut		Silty Clay	1.4		12,000m^3
143.5	1.7 ha.	2.4m	Clayey Silt	1.4	1500m^3	27,000m^3
145.5	2.25 ha.	4.3m	Silty Clay	1.4	1900m^3	50,000m^3
147.5	R/W cut		Silty Clay	1.4		19,000m^3
149.9	2.65ha.	2.1m	Silty Sand	1.4	2300m^3	28,000m^3
150.4	0.9 ha.	5.8m	Silty Sand	1.4	300m^3	18,500m^3
150.8	1.6 ha.	5.2m	Silty Sand	1.4	1000m^3	33,500m^3
152.6 & 152.4	R/W cut	-	Silty Clay	1.4	2800m^3	28,000m^3
154.8	1.0 ha.	4.0m	Silty Clay	1.4	500m^3	50,000m^3
155.6 & 156.1	R/W cut	-	Silty Clay	1.4	2800m^3	84,000m^3
157.9	2.1 ha.	4.0m	Silty Clay	1.4	1700m^3	40,000m^3
159.7	3.7 ha.	2.7m	Silty Clay	1.4	3400 m^3	60,000 m^3
(2) 163.2	2.9 ha.	6.5m	Sand-Gravel Clay	1.25	2500m^3	95,500m^3

(1) 4000m^3 of frozen materials to be placed in the bottom of the higher ~~fields~~ fills nearby.

(2) 116,000m^2 of useable includes 14,500m^3 of pit run gravel.

Environmental Assessment

Environmental Data Sheets were prepared and submitted with the Final Design Submission. All information shown on these data sheets was taken from Synergy's Report dated May 1975. Subsequent to the submission of these environmental sheets some pits have been deleted and other pits added. All pits and waste disposal areas are shown on the attached treatment sheets.

Hydrology

All culvert installations larger than 1400 mm in diameter were designed in-house using the method outlined in the Public Works Canada hydrology report (Culvert/Bridge Hydrology was applied by P.W.C. July 1978). The latest criteria for the design of large culverts where fish are to be considered allows for the use of the stream simulation approach and the Fish Migration discharge can be taken as the annual flood. There was only one stream in the section requiring a fish design. The 4250 mm diameter SPCSP has been designed using a stream simulation approach. A copy of the revised hydrology summary is attached.

Design Comments

There are several areas that should be restricted to the winter months.

1. R/W cut at 138.4 requires subcutting the full width of the cut and backfilling with granular meterials. The frozen material is to be placed in the core of the fill at km 138.9.

2. An access road to the gravel source at km 138.4 has been proposed to be built during the winter in order to obtain Pit Run materials as required. This would be the least expensive approach. An alternate solution would be to stockpile sufficient Pit Run material along the R/W during the winter thus eliminating an all weather access road. The stockpile could be in the vicinity of km 138.6 and would consists of approximately 5600 m^3.

3. The material from the borrow sources at km 145.4 and 149.9 have moisture content at or above the plastic limits. It is suggested that the material from these two pits be placed during the winter. Prior to the placement of Pit Run gravel this section will have to be dried. An extra lift of gravel has been allowed for this section.

4. S.P.C.S.P. Installation at km 155.8

The fill over this installation is at the maximum allowable according to the Design Guidelines for Northern Roads. This is the section where the DCV100 criteria is not met for vertical alignments. To meet the DCV100 design the fill and/or depth of adjacent cuts would have to be increased. To increase the fill, the height of cover allowed using the design guide lines would be exceeded. While this could be quite acceptable with excellent back fill materials it is not recommended due to the quality of back fill available. (In addition to the select granular back-fill approximately 34000 tonnes of gravel is to be used to back-fill the culvert installation to supplement ~~to~~ the material from the adjacent cuts.) Flatening the grade at the location would

deepen the cut resulting in an increase in the waste excavation, because the adjacent cuts are in excess of the plastic limit. The adjacent cuts should be stepped as shown on the plans and the grade built with this material shall be dried prior to placing the capping materials. The backslopes of the cuts should be left to stabilize before final trimming is attempted.

5. The material from the Borrow source at kilometre 159.6 has moisture contents exceeding the plastic limit and material should be placed during the winter.

Capping Section - km 155.0 to km 161.6

The grade built from materials from the R/W cuts at kilometer 155.6 and 156.1 and the borrow source at kilometer 159.6 will be built 300 mm below grade and a surge load of granular capping material shall be placed over this sections during summer conditions. Sections of the grade built from the borrow source at kilometer 157.9 could also require capping.

Settlements

Settlements requiring from 0.1 to 0.4 metres were allowed for in this design. Additional embankment material has been added for the following areas that are expected to settle.

km 146.3 to 150.9	0.1m average settlement
km 150.9 to 153.1	0.2m average settlement
km 155.7 to 155.9	0.4m average settlement
km 157.6 to 158.9	0.1m average settlement
km 158.9 to 162.4	0.2m average settlement
km 162.4 to 163.6	0.3m average settlement
km 163.6 to 164.0	0.2m average settlement

Waste

The waste excavation at km 155.6 and 156.1 is to be placed in a berm as shown on the plans and disposed of in a waste pile adjacent km 155.3. The waste material from the Borrow sources is to be used to construct haul roads and on trimming of the resultant Borrow pit. For all other unsuitable material from culvert excavation or portions of R/W cut it is anticipated that it can be place approximately in the core or the high fill sections.

Special Ditch Treatment

Special ditch treatment is required at the following locations based on the P.W.C. report Special Ditch Treatment amended June 1974 for the Mackenzie Highway.

km 138.3 to 138.4	gravel lining
km 138.5 to 138.7	ditch checks
km 140.5 to 140.6	ditch checks
km 152.5 to 153.0	ditch checks
km 155.4 to 156.3	gravel lining

Gravel Sources

Pit run gravel is required for several different uses for this section of the Liard Highway. Only one of the proposed sources was shown on the environmental sheets as a proposed source. Treatment sheets are attached for the following granular sources.

km 138.4	Netla Source
km 155.0	Gravel Bar in Liard River
km 163.2	Bottom Portion of Proposed Borrow

Prepared by

Ken Barnett
Senior Design Engineer
Western Region

REVISED 78/12/06

LIARD HIGHWAY HYDROLOGY SUMMARY
KILOMETER 138.38 TO KILOMETER 164
(Water Planning and Management Guidelines, 1975 have been used herein for culvert designs)

KILOMETER	AREA (km^2)	Q_D (m^3/s)	T.W.Elev. at Q_D (m)	F_D (m)	V_O (m/s)	Q_F (m^3/s)	T.W. Elev. at Q_F (m)	F_F (m)	V_M (m/s)	COMMENTS
152 + 781	2.27	4.92	143.10	0.58	1.53	NA				Total area = 5.44 km^2 (100% swamp or muskeg). Recommended 1-2150 mm S.P.C.S.P.
154 + 000	3.40	5.58	150.38	0.51	2.91	NA				Total area 6.5 km^2 (100% swamp or muskeg). Recommedded 1-2150 mm S.P.C.S.P.
155 + 808	30.04 60.09	21.58	128.73	-0.04	2.94	10.0	128.35	0.67	1.75	Total area = 60.09 km^2 (100% swamp or muskeg). "Effective" area is used in the computation of QD ... "Total" area is used in the computation of QF. Recommended 1-4250 mm S.P.C.S.P. set 1.07 m below stream bed and rip-rapped to that depth throughout the culvert. Stream simulation design.

Q_D - 50 year design discharge

Q_F - Fish migration discharge (based on mean annaul discharge)

V_O - Mean velocity of the outlet

V_M - Maximum mean velocity in the culvert at fish migration discharge.

F_D - Freeboard at 50 year design discharge.

F_F - Freeboard at fish migration discharge.

LENGTH 80m
WIDTH 50m
DEPTH 2m
QUANTITY 5 600 m^3

AIR PHOTO NO.: A24871 - 62,63

Public Works Canada / Travaux publics Canada

Drawing title: Titre du dessin: NETLA RIVER GRAVEL SOURCE

scale: échelle 1:10000 km 138.4

date: revisions

designed by: conçu par — date

drawn by: dessiné par

reviewed by: examiné par

approved by: approuvé par

project no.: no. du projet: 085816

dwg. no.: dessin no.: 1 of 11

DPW 700A

CLEARED LENGTH	130m
CLEARED WIDTH	90m
DEPTH	5.5m
QUANTITY	28 000 m^3

AIR PHOTO NO. A24871-60,61

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 140-14B BORROW SOURCE

scale / échelle: 1:10 000

date / revisions

designed by / conçu par — date

drawn by / dessiné par

reviewed by / examiné par

approved by / approuvé par

project no / no du projet: 085816

dwg. no / dessin no: 2of 11

DPW 700A

CLEARED LENGTH	130 m
CLEARED WIDTH	130 m
DEPTH	2.4 m
QUANTITY	27 000 m^3

AIR PHOTO NO. A24871-48,49

Public Works Canada / Travaux publics Canada

Drawing title: Titre du dessin: **143-64B BORROW SOURCE**

scale: échelle: 1:10 000

date / revisions

designed by: conçu par — date

drawn by: dessiné par

reviewed by: examiné par:

approved by: approuvé par:

project no: no. du projet: 085816

dwg no: dessin no: 3 of 11

DPW 700A

CLEARED LENGTH	170 m
CLEARED WIDTH	130 m
DEPTH	4.3 m
QUANTITY	50 000 m^3

AIR PHOTO NO.: A 24871-47,48

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 145-9B
BORROW SOURCE

scale / échelle: 1:10 000

date: revisions

designed by / conçu par: date

drawn by / dessiné par:

reviewed by / examiné par:

approved by / approuvé par:

project no. / no. du projet: 085816

dwg. no / dessin no.: 4 of 11

DPW 700A

CLEARED LENGTH	200 m
CLEARED WIDTH	130 m
DEPTH	2.1 m
QUANTITY	28 000 m^3

AIR PHOTO NO. : A24871-35,36

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 150 - 718 BORROW SOURCE

scale / échelle: 1:10 000

date: revisions:

designed by / conçu par: date:

drawn by / dessiné par:

reviewed by / examiné par:

approved by / approuvé par:

project no. / no. du projet: 085816

dwg no. / dessin no.: 5 of 11

DPW 700A

CLEARED LENGTH	110 m
CLEARED WIDTH	80 m
DEPTH	5.8 m
QUANTITY	18 500 m^3

AIR PHOTO NO. : A24871 - 35,36

Public Works Canada / Travaux publics Canada

Drawing title: Titre du dessin: 150 - 10B
BORROW SOURCE

scale: échelle: 1 : 10 000

date: revisions

designed by: conçu par: date

drawn by: dessiné par:

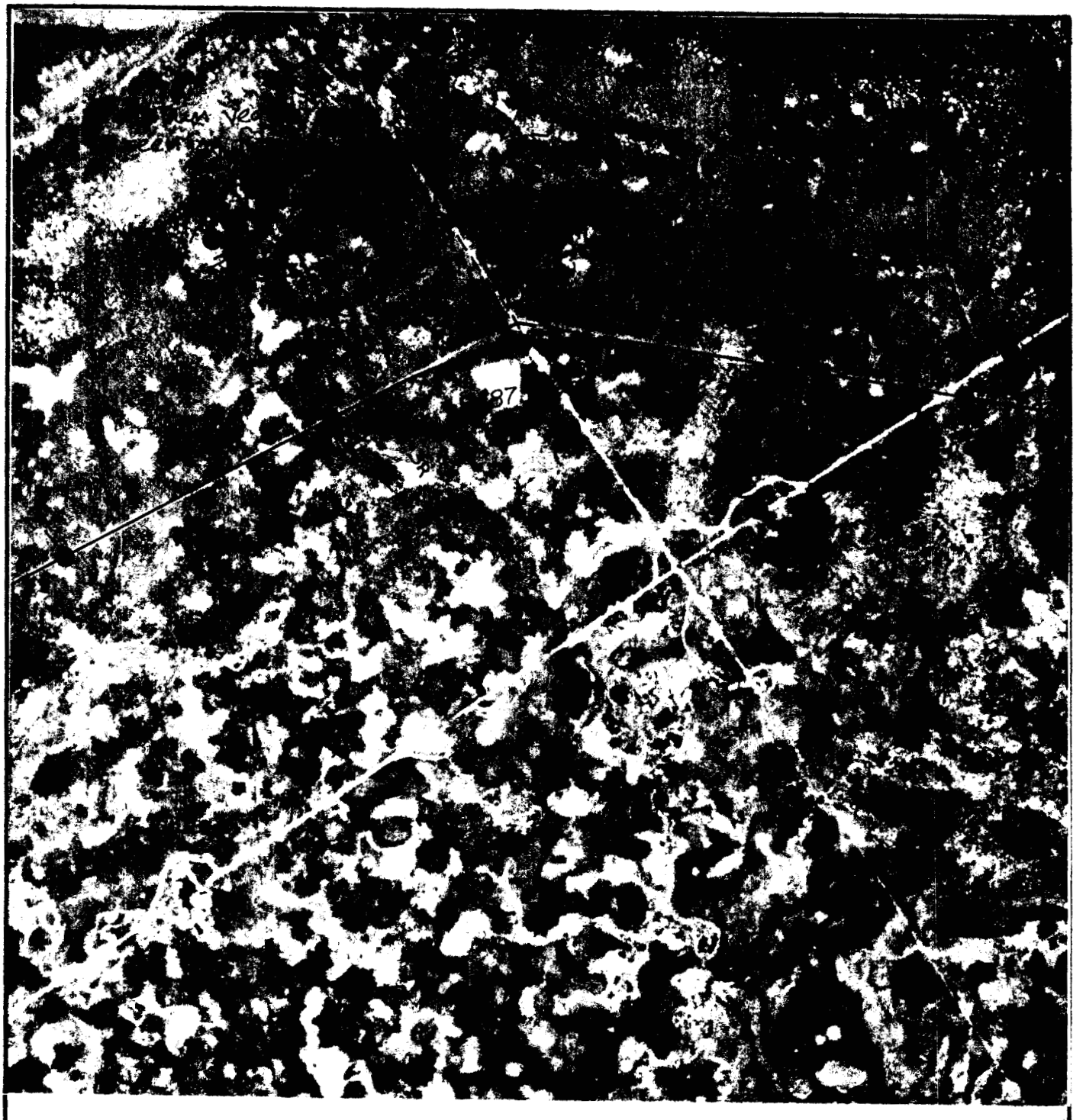
reviewed by: examiné par:

approved by: approuvé par:

project no.: no. du projet: 085816

dwg. no. dessin no. 6 of 11

DPW 700A



CLEARED LENGTH	260m
CLEARED WIDTH	60m
DEPTH	5.2 m
QUANTITY	33 500 m^3

AIR PHOTO NO : A24871 - 35,36

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 150-8B
BORROW SOURCE

scale / échelle: 1:10 000

date: revisions:

designed by / conçu par: date:

drawn by / dessiné par:

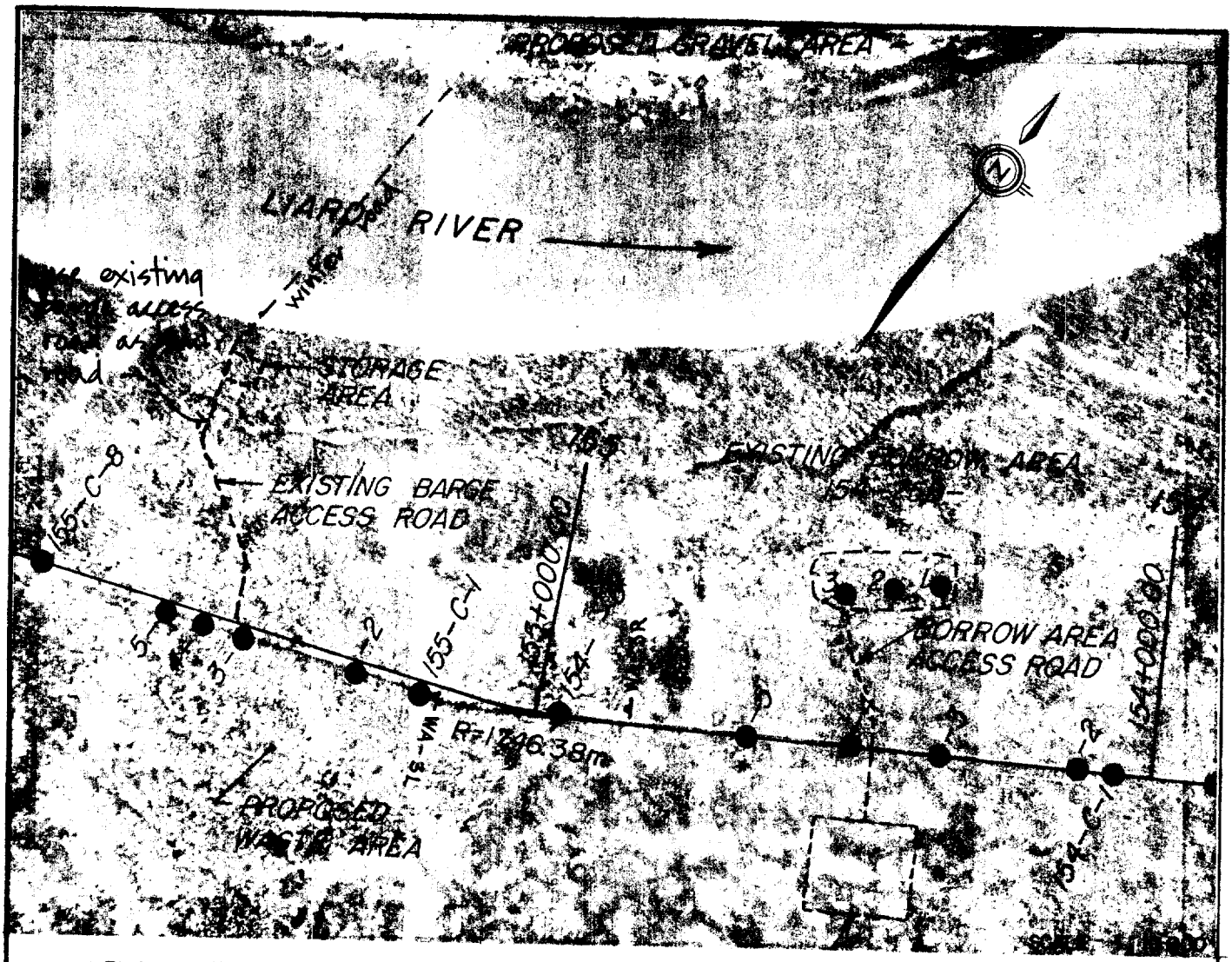
reviewed by / examiné par:

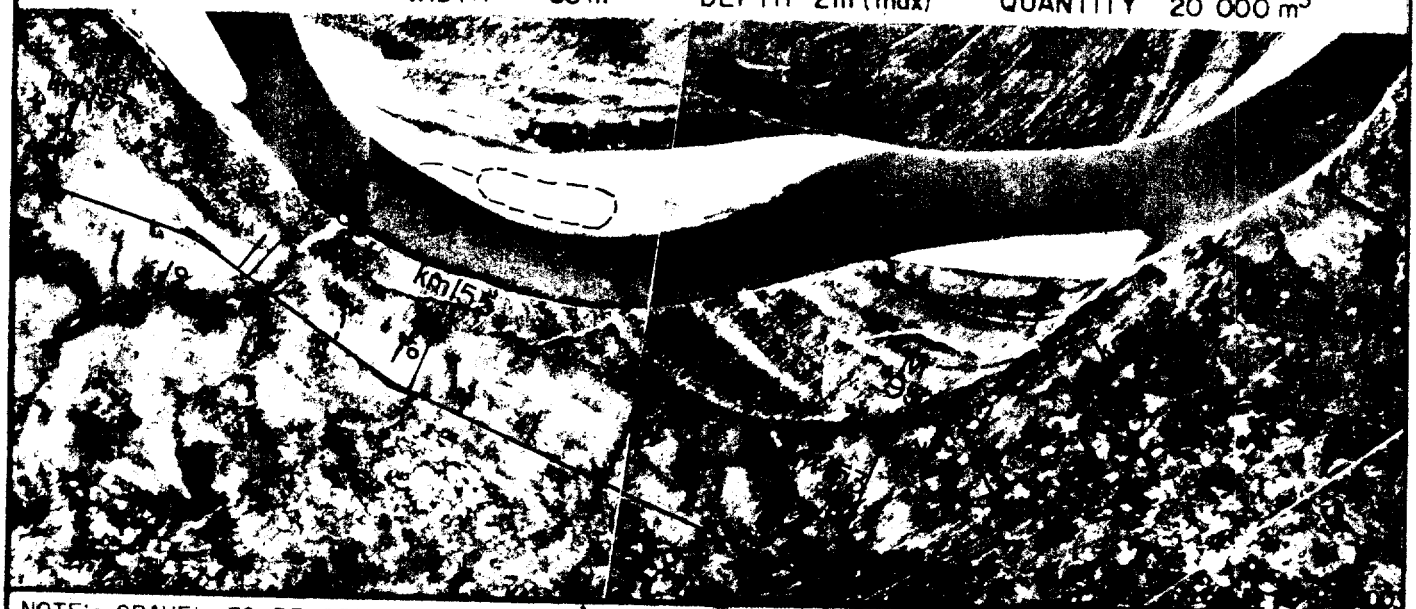
approved by / approuvé par:

project no. / no. du projet: 085816

dwg. no / dessin no.: 7 of 11

DPW 700A





NOTE:- GRAVEL TO BE REMOVED TO WITHIN ONE FOOT OF SUMMER WATER LEVEL OF LIARD RIVER. WHEN COMPLETED THE BAR IS TO BE GRADED AND SLOPED TOWARDS THE WATER SO NO DEPRESSIONS ARE LEFT.

Public Works Canada / Travaux publics Canada

Drawing title: Titre du dessin: GRAVEL BAR BORROW SOURCE

scale: échelle: km 155.0

date: revisions

designed by: conçu par: date

drawn by: dessiné par:

reviewed by: examiné par:

approved by: approuvé par:

project no.: no du projet: 085816

dwg no.: dessin no.: 8 of 11

DPW 700A

CLEARED LENGTH 160m DEPTH 4.0m
CLEARED WIDTH 130m QUANTITY 40 000m^3

AIR PHOTO NO. : A 24871-20,21

Public Works Canada / Travaux publics Canada

Drawing title: Titre du dessin: **157 - 6B**

BORROW SOURCE

scale: échelle: 1:10 000

date: revisions

designed by: conçu par: date:

drawn by: dessiné par:

reviewed by: examiné par:

approved by: approuvé par:

project no.: no. du projet: 085816

dwg. no. dessin no. 9 of 11

DPW 700A

CLEARED LENGTH	280m
CLEARED WIDTH	130m
DEPTH	2.7m
QUANTITY	60 000m^3

AIR PHOTO NO.: A 24871 - 19,20

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 159-78B

BORROW SOURCE

scale / échelle: 1 : 10 000

date: revisions:

designed by / conçu par: date

drawn by / dessiné par:

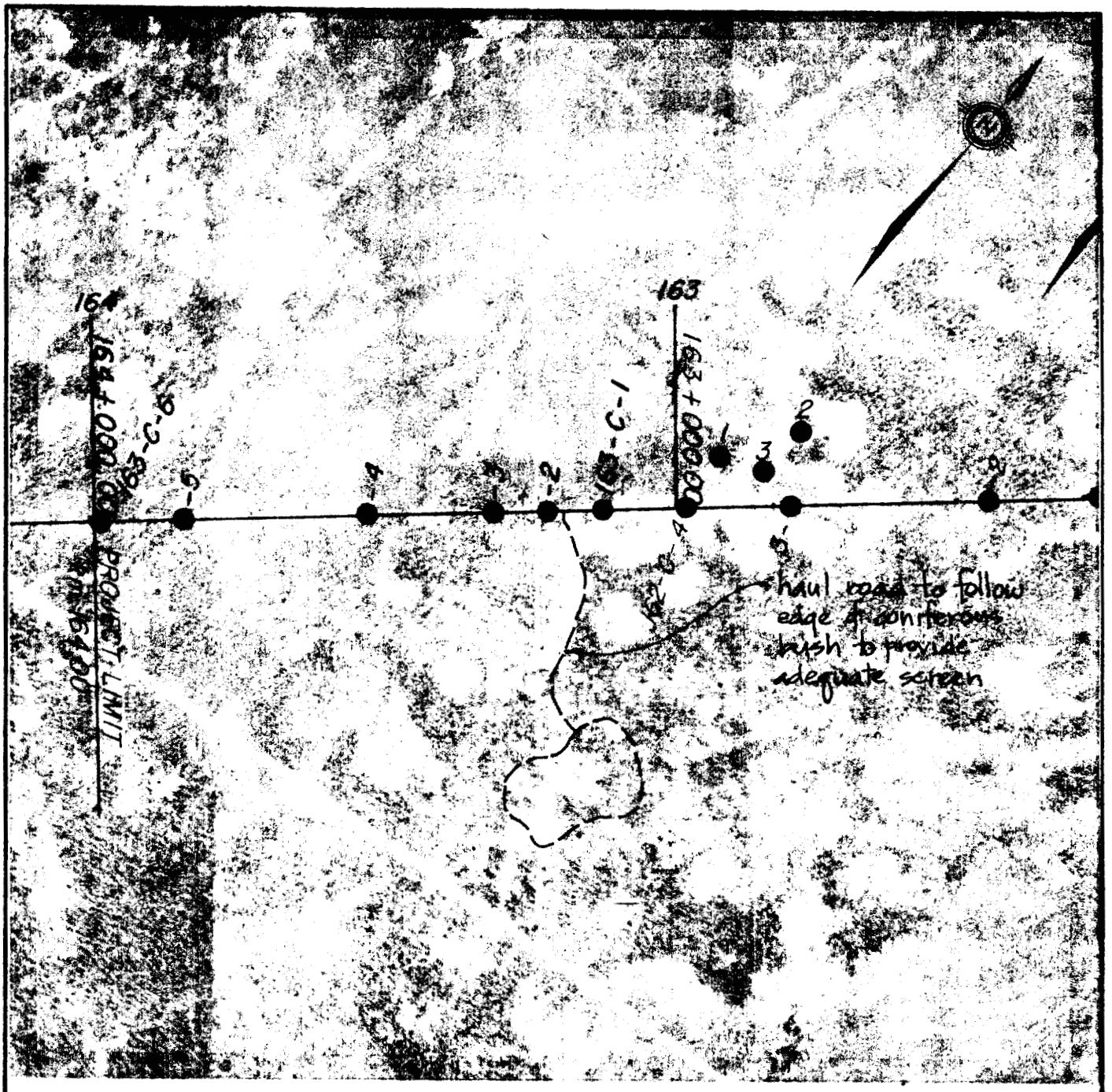
reviewed by / examiné par:

approved by / approuvé par:

project no. / no. du projet: 085816

dwg no / dessin no. 10 of 11

DPW 700A



CLEARED LENGTH	220 m
CLEARED WIDTH	130 m
DEPTH	5.1m for borrow
	below 5.1m for gravel
QUANTITY	95 500 m^3 (borrow)

AIR PHOTO NO.: A24871 - 14, 15

Public Works Canada / Travaux publics Canada

Drawing title / Titre du dessin: 163 - 81B
BORROW SOURCE

scale / échelle: 1 : 10 000

date: revisions

designed by / conçu par: date

drawn by / dessiné par

reviewed by / examiné par:

approved by / approuvé par:

project no. / no. du projet: 085861

dwg no. / dessin no. 11 of 11

DPW 700A

This document is the document referred to as "Plans and Specifications" and marked 'A' in the Articles of Agreement entered into on the

_____ day of _____

1979 between Her Majesty the Queen and

_____
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(_____
Minister

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(_____
Contractor

INDEX

Division	Section		Number of Pages
1. General Requirements	1.	Special Requirements	17
	2.	General Requirements	10
9. Supplemental Specifications	1.	Clearing	3
	2a.	Roadway and Borrow Excavation	5
	3.	Channel Excavation	2
	4.	Embankment Construction	9
	5.	Overhaul	1
	6.	Corrugated Steel Pipe Culverts	4
	7.	Structural Plate Corrugated Steel Pipe Culverts	6
	8.	Traffic Gravel	3
	10.	Water	1
	11.	Rip-Rap	6
	12.	Ditch Linings	2
	14.	Engineer's Camp and Board	3
	15.	Mobilization	1
	16.	Highway Signing	2
	17.	Highway Guiderail	3
Project Drawings	Drawing No. 085816 Sheets 1 to 41 inclusive (Bound separately from Specification)		
Tender Documents	1.	Articles of Agreement	6
	2.	Terms of Payment "B"	4
	3.	General Conditions "C"	18
	4.	Labour Conditions "D" (and Appendix "A")	8
	5.	Insurance Schedule "E"	1
	6.	Land Use Permit and Operating Conditions	7

1.1.1 Description

The work consists of clearing, grading, culvert installations and the placing of traffic gravel on approximately 25.72 kilometers of the Liard Highway in the Northwest Territories.

1.1.2 Location

Kilometre 0 of the Liard Highway is at its junction with the Mackenzie Highway, approximately 61 kilometres southeasterly from the Town of Fort Simpson, N.W.T. From the junction with the Mackenzie Highway, the Liard Highway routing runs in a southwesterly direction to the Northwest Territory - British Columbia boundary, a distance of approximately 255 kilometres. The junction of the Mackenzie Highway and the Liard Highway is at kilometre 416 on the Mackenzie Highway with kilometre 0 being at the Alberta - Northwest Territories boundary.

The northern limit of this project is adjacent to the south bank of the Netla River at kilometre 138.28.

1.1.3 Project Access and Services

Kilometre 57.1 on the Liard Highway is accessible by all weather road from settled parts in Alberta and southern communities in the N.W.T. by way of the Mackenzie Highway and the previously completed section on the Liard Highway from kilometre 0 to kilometre 57.1.

Road access to Fort Simpson, N.W.T. is subject to closure of the Liard River Ferry Crossing during spring breakup and freeze-up in the fall. The Contractor is advised that there is a temporary Bailey Bridge Crossing of the Birch River at kilometre 52.1. A maximum loading of 40 tonnes and a maximum speed of 10 kilometres per hour will be enforced for this structure. There will be no summer road access to this project.

Winter access to the project will be by winter road from the southern limit of construction of the Liard Highway south to the northern limit of the project. The 1979/80 winter road access will be completed by others. Due to Land Use Regulations, the winter road can be expected to be closed to traffic by approximately March 31, 1980. A winter road from Fort Nelson, British Columbia may also be opened by others to the southern limit of the project.

1.1.3 Project Access and Services (cont'd)

All weather access to kilometre 107.8 is scheduled to be completed by July 1980, and the Blackstone River Bridges maybe scheduled to be completed by September 1980. Grading of the Liard Highway from kilometre 108.0 to 138.2 is scheduled to commence by September 1980. The Netla River Bridge is not scheduled for construction until September 1981.

Summer access to the project will be by barge on the Liard River to a barge landing and access road to the Liard Highway adjacent to kilometre 155.5. The construction of the access road to the river, from the borrow area at kilometre 154.4, barge landing site and staging area has been partially completed by others. The barge landing ramp may have to be reconstructed by the Contractor.

These facilities shall, as determined by the Engineer, be available for use by others.

The Nelson and Liard Rivers are navigable from Fort Nelson in British Columbia and Fort Simpson in the Northwest Territories, only during high water. However, barge access from kilometre 34.1 on the Liard Highway to the barge landing site at kilometre 155.5 is generally possible to late September. Final loading date for barge shipment is governed by the barge companies.

There is access by air to Fort Simpson, N.W.T. The Fort Simpson Airport, located approximately 48 kilometres north of kilometre 0 on the Liard Highway, has a paved runway.

The Contractor will be permitted to construct a maximum of one airstrip on this section of highway. The roadway may be widened to a maximum top width of 18 metres for a length of approximately 900 metres. The clearing limits of the airstrip shall be approximately 1375 metres by 46 metres or as determined by the Engineer. The location of the airstrip will be subject to the approval of the Engineer. Measurement for payment for the construction of an airstrip will be in accordance with the appropriate Unit Price Table items. Maintenance will be performed by the Contractor at no cost to the Department.

1.1.3 Project Access and Services (cont'd)

The above information on project access and services is for the Contractor's guidance only, and it will be his responsibility to fully investigate the access and services available in the area and to make himself familiar with the conditions of their use.

1.1.4 Completion Date

All work under this contract shall be completed by September 30, 1980.

1.1.5 Scheduling Restrictions

Installation of culverts and other work in flowing streams will not be permitted during the period May 1 to June 15.

The Contractor's construction activity shall be confined to the right-of-way limits at all times.

Generally travel of the Contractor's vehicles or equipment on the highway right-of-way will be permitted only after embankment has been constructed to a minimum height of one (1) metre above the original ground. The Engineer may, however, authorize movement of vehicles and machinery on the right-of-way when the ground is frozen or on sections of the right-of-way where soil conditions are such that travel will not adversely affect the ground regime.

If the Contractor elects to work in right-of-way cuts during spring break-up, he will not receive payment for wasting any material such as frozen lumps which in the opinion of the Engineer could have been used under thawed conditions.

Restrictions to construction as might be specified in the Operating Terms and Conditions of the Land Use Permit are applicable.

1.1.6 Terrain and Material Restrictions

In determining the schedule of operations, the Contractor should consider the terrain and material conditions outlined below.

1.1.6 Terrain and Material Restrictions (cont'd)

.1 The material to be used from the right-of-way cut at kilometre 138.3 is frozen with moisture content above the liquid limit. This section approximately 100 metres in length, shall be sub-excavated and back-filled with material acceptable to the Engineer. The excavated material from this section will be placed in the core of the fill at kilometre 138.9. This work shall be done during freezing conditions.

The Contractor is hereby advised that all the ditch protection between kilometres 138.3 and 138.7 must be completed prior to spring break-up.

.2 The access road to the granular deposit area adjacent to the Netla River at kilometre 138.4 would best be constructed during freezing conditions.

.3 It is expected that the proposed borrow areas adjacent to kilometres 145.4 and 150 have materials with moisture content at or above the plastic limit. The section of the road that will be constructed with materials from these borrow sources shall receive an extra lift of traffic gravel as directed by the Engineer.

Construction of this section would best be done during freezing conditions. Prior to the placement of traffic gravel this section may require drying as directed by the Engineer.

.4 The material in the cuts at kilometre 155.5 and 156.1 can be expected to be silty clay with moisture contents above the plastic limit. Waste materials from the cuts will be placed in a berm at kilometre 155.8 and in a waste disposal area adjacent to kilometre 155.5. The remaining material will be placed in the core of the fills at kilometres 155.3, 155.8 and 156.6. The work shall be done during freezing conditions.

The Contractor is hereby advised that the rip rap and ditch protection required at the km 155.8 multiplate site must be completed prior to spring break-up.

1.1.6 Terrain and Material Restrictions (cont'd)

Approximately 34 000 tonnes of granular materials will be hauled from a gravel bar in the Liard River adjacent kilometre 155 of the Liard Highway and used to backfill the SPCSP culvert at kilometre 155.8. The gravel hauled from the gravel bar will have to be done during the winter using an ice bridge (see 1.1.13). This select granular material will be measured for payment in accordance with Article 1.1.14.

.5 The material in the proposed borrow area adjacent to kilometre 159.6 is expected to have moisture contents exceeding the plastic limit. The section of the road constructed from this source and from right-of-way excavations at kilometres 155.5 and 156.1 shall be capped with granular materials obtained from the kilometre 155 gravel bar and gravel pit adjacent kilometre 163.2. The capping thickness will be 300 milimetres, or as designated by the Engineer. The grade-line shown on the Plans will be the final grade including the capping materials.

The construction with materials from the kilometre 159.6 source should be done during freezing conditions. Capping shall be done during thawed conditions.

.6 Prior to placing capping materials, the road surface shall be dried, shaped and bladed smooth and the embankment trimmed to the satisfaction of the Engineer.

.7 In order to get summer access to borrow pits without cross-hauling, the Contractor shall, prior to spring break-up, pad low areas and install culverts on the sections of the highway he proposes for construction the following summer.

.8 Granular materials from the gravel bar adjacent kilometre 155 will be removed during the winter months. The Contractor will be required to stockpile approximately 20 500 tonnes of gravel from this source to be used as traffic gravel, capping material and ditch lining material (see Article 1.1.13).

1.1.7 Clearing

Hand clearing will be carried out by others over the entire length of this project, to the limits as defined in these Specifications.

Right-of-way clearing has been completed by others between kilometres 148 and 164. The right-of-way clearing from kilometre 148 north to kilometre 138.28 will be completed by others by March 15th, 1980.

The Contractor is hereby advised that all stumps and debris shall be disposed of by burning or burying in a manner acceptable to the Engineer. The removal and disposal of the stumps and debris shall be considered incidental to the Unit Price Items and will not be paid separately.

Clearing operations under this contract will consist of any required widenings to the clearing previously carried out, clearing of borrow pits, haul roads, disposal areas and clearing for off-take ditches.

Haul roads will be generally cleared to a width of 12 metres or as directed by the Engineer.

1.1.8 Roadway and Borrow Excavation

All roadway and borrow excavations shall be carried out in accordance with Division 9, Section 2(a) of the Specifications. Nothwithstanding Article 9.4.3.1.(i) of the Specifications the use of frozen materials will not be permitted in the construction of embankments except where specifically approved by the Engineer. Excavations 2 metres deep or less will not be permitted during freezing conditions. Excavations deeper than 2 metres will be permitted during freezing conditions providing that the work is carried out in a manner to prevent freezing of thawed materials in the excavations prior to their removal. Snow and ice shall be removed from the areas being excavated, as well as within the limits of the embankment. The embankment shall also be kept free of snow and ice during the placement of material.

1.1.8 Roadway and Borrow Excavation (cont'd)

The removal of snow and ice specified above shall be considered incidental to the grading operations and will not be measured separately for payment.

When excavating during freezing conditions, the work shall be carried out in such a manner as to prevent freezing of thawed materials in the excavation prior to their removal.

To prevent materials in the excavation from freezing, the Contractor shall operate 24 hours a day.

If due to the Contractor's operation, the materials in an excavation freeze and cannot be used in the embankment, the Contractor shall remove this frozen material at no cost to the Department.

The haul road to the borrow area adjacent kilometre 154.4 has been previously constructed by others (see Article 1.1.3). The Contractor is hereby advised that this borrow area has been previously opened by others.

Generally all right-of-way excavations within each balanced section shall be completed prior to excavation of borrow. The Engineer may, however, approve excavation of borrow material for initial roadway access prior to right-of-way excavation.

1.1.9 Compaction

Compaction equipment supplied on the work shall meet the requirements of Division 9, Section 4 of the Specifications.

The Contractor shall supply one each of the sheepsfoot compaction unit and vibratory drum compaction unit Type A.

The vibratory drum compaction unit Type B, self-powered hand-operated vibratory plate unit, and pneumatic hand-operated tamping unit are intended primarily for use in conjunction with culvert installations. The Contractor shall be responsible for determining the number of each type of unit required based on his proposed culvert installation operations.

1.1.10 Culvert Materials

Public Works Canada will supply to the Contractor all culvert and ancillary material required to complete the installations as shown on the Plans or as designated by the Engineer in the field. The materials will be supplied f.o.b. at one or more sites within an eighty (80) kilometre radius of Edmonton, Alberta and will be available for pickup by the Contractor by August 15, 1979. The materials will consist of:

.1 Corrugated Steel Pipe

(a) 800 mm Dia., Thickness 2.0 mm

Section Lengths	4 m,	5 m,	6 m,	7 m.
Number of Sections	25	24	27	24

(b) 1000 mm Dia., Thickness 2.0 mm

Section Lengths	4 m,	5 m,	6 m,	7 m.
Number of Lengths	18	18	18	-

(c) 1200 mm Dia., Thickness 2.8 mm

Section Lengths	4 m,	5 m,	6 m,	7 m.
Number of Sections	6	6	6	-

(d) Couplers c/w Bolts

	800 mm,	1000 mm,	1200 mm
Number of Units	60	40	10

1.1.10 Culvert Materials (cont'd)

.2 Structural Plate Corrugated Steel Pipe

Diameter and Length	Ancillary Equipment Required: Cut-Off Walls	
	Upstream	Downstream
(a) kilometre 152.782 Drawing PWC-L101 1 - 2150 mm x 51.82 m Thickness 3.0 mm		X
(b) kilometre 152.46 1 - 1500 mm x 42.7 m Thickness 3.0 mm		
(c) kilometre 154.001 Drawing PWC-L101 1 - 2150 mm x 43.89 m Thickness 3.0 mm		X
(d) kilometre 155.8 Drawing PWC-L102 1 - 4250 mm x 75.6 m Thickness 7.0 mm		
(e) kilometre 163.870 1 - 1500 mm x 27.8 m Thickness 3.0 mm		

The detailed requirements for each installation site are shown on the drawings referred to in the above list.

Notwithstanding Article 9.6.4 of the Specifications, the quantity of corrugated steel pipe culvert acceptably delivered to the project will be measured for payment separately from the quantity of corrugated steel pipe culvert acceptably installed. The delivery and installation of couplers and related hardware will not be measured separately for payment but shall be considered incidental to the delivery and installation of corrugated steel pipe culverts.

1.1.11 Structural Plate Corrugated Steel Pipe Culverts

The construction of a temporary access across streams shall be considered incidental to the work of culvert installation, and will not be measured separately for payment.

The type and location of a temporary access is subject to the Engineers approval.

1.1.12 Engineer's Camp

Public Works Canada will provide to the Contractor the following trailer units for the purpose of providing an Engineer's camp in accordance with Division 9, Section 14 of the Specifications.

- 1 Office Trailer, 3 m x 12 m
- 3 Eight Man Sleeper Units, 3 m x 15 m
- 1 House Trailer, 3 m x 15 m
- 1 complete recreation complex, 6 m x 15 m (2 units).

The trailer units to be provided by the Department will be at the following locations:

The Office Trailer, House Trailer, Recreation Complex and one Sleeper Unit will be delivered to the barge landing site adjacent to kilometre 99.3 of the Liard Highway on or before September 15th, 1979.

Two Sleeper Units are stored at kilometre 154.5 of the Liard Highway.

The Contractor shall provide washroom facilities for up to approximately 20 Public Works Canada employees by either:

(a) supplying and operating a separate washroom trailer specifically for the purpose, or

(b) increasing the size and capacity of the facilities provided for his own staff.

The facilities shall be fully self-contained and shall include as a minimum washbasins, showers and flush toilets as required to meet the appropriate regulatory requirements.

1.1.12 Engineer's Camp (cont'd)

The Contractor shall also be responsible for supplying a storage shed together with all materials required for hallways and otherwise setting up the trailers as required in the Specifications.

The trailer units shall be placed in the Contractor's camp as required in Division 9, Section 14 of the Specifications. Upon completion of the work under this contract, the Department's trailer units shall be removed from the camp complex and moved by the Contractor to a site on the project designated by the Engineer.

1.1.13 Traffic Gravel

Pit-run gravel shall be placed on all roadway surfaces completed under this contract, except on sections that will be capped with granular materials.

The quantities of traffic gravel applied will be approximately 800 tonnes per kilometre or as designated by the Engineer.

Pit-run gravel will also be used for backfill material around larger culverts as determined by the Engineer. The gravel shall come from the granular sources adjacent kilometres 138.4, 155.0 and 163.2. The Engineer may direct that additional sources be utilized.

In addition to the standard granular material requirements for the SPCSP culvert installation at kilometre 155.8, approximately 34 000 tonnes of granular material will be required as backfill material. This material shall come from the gravel source adjacent kilometre 155.0. The granular base required to be placed along the bottom of the above SPCSP installation shall also come from the kilometre 155.0 source.

Approximately 20 500 tonnes of granular material from the gravel bar adjacent kilometre 155.0 shall be stockpiled at approximately kilometre 154.5 on the Liard Highway, to be used as traffic gravel, ditch lining and capping material.

The construction of an ice bridge across the Liard River and loading from the stockpile at 154.5 will not be measured separately for payment but will be considered incidental to the gravel operation.

1.1.14 Capping Materials

.1 This item consists of excavating, loading hauling and placing granular capping material on the road surface.

.2 The granular materials will be obtained from the granular material sources at kilometres 155.0 and 163.2. Other sources may be used as designated by the Engineer.

.3 The sections of roadway that will require capping materials have been identified in Division 1, Section 1, Article 1.1.6. The exact stations will be determined by the Engineer in the field.

.4 The thickness of capping materials will be 300 millimetres or as designated by the Engineer. The capping materials may be placed in one lift. Stones having dimensions larger than 100 millimetres shall be removed from the top 150 millimetres. The removal of the stones from the road shall be considered incidental to the capping operation and will not be measured separately for payment.

.5 The quantity of capping material measured for payment shall be the number of tonnes of material placed on the roadway in accordance with these Specifications, and is included in the Unit Price Table as pit run gravel and gravel haul.

1.1.15 Rip-Rap

Materials for stone rip-rap shall be sorted and gathered from roadway and borrow excavations on the project or from any other sources of large stone readily available and designated by the Engineer.

1.1.16 Geotechnical and Design Information

Notwithstanding Article 9.2(a).3.2(b) of the Specifications the Tender Plans show the location and designation of exploratory test holes that have been drilled along the proposed highway route and in areas of proposed and potential materials sources. Prospective bidders may obtain copies of the test result sheets for the holes shown from the Project Manager's office in Edmonton, Alberta and these will be considered

1.1.16 Geotechnical and Design Information (cont'd)

part of the tender information. It is hereby emphasized to prospective bidders that the test results represent the conditions found in the exploratory holes on the dates that they were established. Any conclusions concerning material outside the bore holes will be the Contractor's own interpretation of the subsoil conditions.

The design mass diagram prepared for the work will also be made available for review by prospective bidders in the Project Manager's office. This will be made available for general information only and is not to be considered a part of the Plans and Specifications or to be taken as a guarantee of the material sources that will be taken from each source. The Engineer may add to or delete from the material sources indicated on the Tender Plans or in the design mass diagram.

1.1.17 Winter Road

A winter road from kilometre 107 to Fort Liard will be established by others during the winter months of 1979/80, subject to normal land use conditions.

It will be the Contractor's responsibility when working on the project in the winter months to re-establish and maintain winter road access throughout the project.

The construction and maintenance of the winter road shall be considered incidental to other work and will not be measured separately for payment.

When the Contractor is not working on the project, the winter road will be opened and/or maintained by others. No claim will be entertained by the Department because of a greater depth of frost penitration that could result from the operation of a winter road through the project.

1.1.18 Co-operation With Others

The Contractor is also hereby notified that other construction activities in the vicinity of this project will be in progress during the period of this contract. For such activities, the Contractor shall co-operate to the extent considered reasonable by the Engineer in providing other Contractors and their agents road access through the limits of this project. The winter road shall be open to the public at all times.

1.1.19 Funds

The Contractor is advised there may be only $1,000,000 available for this contract from time of award to March 31, 1980. Payment for work in excess of $1,000,000 will become due under the terms of payment of the contract upon receipt of a progress claim application from the Contractor on or after April 1, 1980.

1.1.20 Labour Requirements

.1 The Contractor shall provide all necessary and properly qualified workmen to operate and maintain his equipment and camp.

.2 The Contractor's attention is drawn to the following guideline for local residents and Section 27 (2) of General Conditions "C". Notwithstanding all the terms of Section 27(2), special arrangements shall be enforced for this contract in line with the guidelines. The Contractor, at least two (2) weeks prior to recruiting his work force, shall meet with the:

Manager
Canada Manpower Centre
Fort Simpson, N.W.T.

and acquaint him with all his labour force requirements. This meeting may also be attended by the Federal Department of Indian and Northern Affairs, Public Works Canada, and N.W.T. Gov't. Employment Liaison Officer.

1.1.20 Labour Requirements (cont'd)

The Canada Manpower Centre will identify for the Contractor local residents in the area of the contract who appear to have the qualifications to perform the duties as outlined by the Contractor and the Contractor must show Canada Employment and Immigration Commission just cause in the event these local people are not offered employment.

.3 Liard Highway Project Employment Guidelines

.1 The prime Contractor and Sub-Contractors will be required to notify the Canada Manpower Centre of all jobs at least two (2) weeks prior to recruiting his work force and the Contractor agrees to recruit his workers outside the Northwest Territories only to the extent that qualified residents are not available. The Canada Manpower Centre will act as the only employment referral agency.

.2 The prime Contractor will provide for Training-on-the-Job Contracts to be arranged with the Department of Manpower and Immigration for those indigenous Territorial residents who require special assistance in order to fill available jobs.

.3 Priorities for hiring on the Liard Highway (km 138.28 to 164.0) should be based upon residents in the following areas as of January 1, 1979.

Priority 1. Those residents of the area administered by the Fort Simpson Canada Manpower Office and residents of Fort Providence.

Priority 2. Those residents of other areas in the Northwest Territories.

Priority 3. Those residents of other areas in Canada.

1.1.20 Labour Requirements (cont'd)

In the event that persons are discharged or leave the job, replacement personnel are to be recruited using the same priorities and employment guidelines. Workers on lay off status will be recalled through the Fort Simpson Canada Manpower Centre.

1.1.21 Employment Report

The Contractor shall, no later than the third day of each month, prepare and submit to Public Works Canada a report, showing for each person employed by the Contractor at any time during the previous month, their name, permanent residence, job classification, date hired, and date terminated, if applicable.

Reporting forms will be supplied by Public Works Canada.

1.1.22 Guiderail and Delineators

Guiderail will be installed at the following locations:

- Outside shoulder between Station 152+730 and Station 152+830.

- Both shoulders between Station 155+720 and Station 155+920.

Roll-proof delineators will be installed as directed by the Engineer at kilometres 152, 154 and 155. Public Works Canada will supply all materials to the job site.

1.1.23 Change in Quantities

The Contractor,s attention is drawn to Article II, Paragraphs 2(c) and 2(d) in the Articles of Agreement wherein the Engineer and the Contractor may, by an agreement in writing, amend the price set out in the Unit Price Table where the quantities of that class of labour, plant or material performed, used or supplied by the Contractor in executing the work is less than seventy-five (75) percent or in excess of one hundred and twenty-five (125) percent of the estimated quantities shown in the Unit Price Table.

1.1.24 Maintenance Services

The Contractor shall provide, from time to time, qualified maintenance staff and/or maintenance facilities for the purpose of maintaining the Engineer's equipment. For such work, the measurement for payment shall be according to Clause 45 of General Conditions "C".

1.1.25 Land Use Permit

The Land Use Permit N78E934 is bound at the back of these Specifications. The Permit has been amended to include gravel removal from the Liard River adjacent kilometre 155. In addition to the standard operating conditions the following additional conditions have been added.

.1 "Petroleum spills over 500 litres will be reported to the Land Use Inspector as quickly as possible and in any event within 8 hours".

.2 "Gravel to be removed by scalping down to within one foot of summer water level of Liard River. When finished the bar is to be graded and sloped towards the water so that no depressions are left".

Where imperial units or dimensions have been used in the operating conditions, the equivalent dimensions in metric units shall apply.

1.1.26 Construction Schedule

The Contractor shall prepare and submit to the Engineer a Construction Schedule as outlined in Division 1, Section 2 of the General Requirements no later than two (2) weeks after the Award of Contract.

1.1.27 Acceptance of Winter Construction

Because of the settlements that are anticipated, the Contractor is hereby advised that all grade built during winter conditions will not be accepted prior to September 1st, 1980.

1.2.1 Land Use Regulations

.1 The Land Use Permit included in the Specifications was issued to this Department, granting it the authority to carry out the work described in the Specifications and Plans subject to the Territorial Land Use Regulations of the Territorial Land Use Act. The Land Use Permit and the attached Operating Conditions shall be considered part of the Contract Specifications.

.2 The Contractor's attention is directed to Section 8 of the General Conditions "C" of the Contract and he is hereby advised he will be held fully responsible for all fines and penalties issued against the Department of Public Works as Permittee under the Land Use Permit, and which resulted directly or indirectly from the Contractor's activities on the Project.

1.2.2 Control of Materials

Royalties payable to the Crown under the terms of the Territorial Quarrying Regulations for rock, gravel, sand and/or loam are hereby cancelled for the purpose of carrying out work under this Contract.

1.2.3 Measurement of Quantities

.1 Linear

All linear measurements shall be based on horizontal distances, except for the measurement of culvert installations as noted elsewhere in these Specifications.

.2 Volume

.1 In computing volume of excavation and embankment, the average end area method will be used, except as otherwise agreed to by the Contractor and the Engineer.

.2 When materials are to be measured in the haulage vehicle, the vehicle shall be of a size and type acceptable to the Engineer. Unless approved vehicles are of uniform capacity, each must bear a plainly legible identification mark indicating its specific approved capacity. Loads shall be measured at the point of delivery.

1.2.3 Measurement of Quantitiies (cont'd)

.3 Material specified for measurement by the cubic metre may be weighed and the mass converted to cubic metres for payment purposes. Factors of conversion will be determined by the Engineer and must be agreed to by the Contractor before such method of measurement of pay quantities will be approved by the Engineer.

.3 Mass

.1 All materials which are specified for measurement by mass shall be measured on scales of a type and at a location approved by the Engineer. Trucks used shall be tared empty at such times as the Engineer directs, and each truck shall bear a clearly legible identification mark.

.2 Mass measurements will be made by a scaleman provided by the Department using scales and a scale house to be provided by the Contractor. The scales shall be of suitable design and of sufficient capacity to accommodate any vehicle used on the work in a single weighing operation and shall be inspected and tested for accuracy by the Federal Department of Consumer and Corporate Affairs, Weights and Measures Inspection Branch, as often as may be required by the Engineer. The scale house shall be weatherproof and constructed to afford protection for the recording device of the scales. It shall have one sliding window facing the scale platform, one end window, and a shelf desk at least 600 mm wide and 1800 mm long. Doors shall not open onto the scale platform. The Contractor shall provide adequate lighting and heating.

The furnishing of scales and scale house and the inspection and testing of the scales shall be considered incidental to the work under the Contract and will not be measured separately for payment.

1.2.4 Construction Interruptions for Environmental Protection

.1 The Contractor will be required to temporarily cease operations on certain sections of the Project for reasons of protecting the environment as outlined in Division 1, Section 1, or in the Operating Conditions of the Land Use Permit. The Contractor shall schedule and organize his works so that the maximum of productive work can continue on other sections of the project during the period(s) of constraint.

.2 When an unscheduled shutdown of the Contractor's operation has been ordered for reasons of protecting the environment, other than those reasons specified in Division 1, Section 1, or for those reasons in the Operating Conditions of the Land Use Permit, and when, in the opinion of the Engineer, productive work cannot be performed on other sections of the project by the equipment affected by the shutdown, payment will be made to the Contractor for equipment and labour standby costs as follows:

.1 Production Equipment Standby

Production Equipment shall include only those units listed in the following group:

motor-scrapers, crawler tractors, front end loaders, motor graders, trucks larger than six (6) cubic metres, rock drills, compressors and backhoes, draglines and shovels over 0.4 cubic metres. The formula to be applied in determining standby costs for a piece of equipment shall be fifty (50) percent of the current "Alberta Road-Builders Association Rental Rate less the applicable operator wage rate quoted in the Association rate schedule". Such costs will be applicable up to a maximum of ten (10) hours per day, five (5) days per week.

1.2.4 Construction Interruptions for Environmental Protection (cont'd)

.2 Labour Stand-by

Labour standby costs will be paid for only those operators assigned to production equipment mentioned above and which have been affected by the shutdown. Measurement for payment will be made in accordance with Section 45 of the General Conditions "C" and shall be based on actual standby wage costs and costs of board and camp operation incurred by the Contractor. The Contractor may be required to present copies of his payroll records to support any labour costs claimed under this section. Payment for board and camp operation may be calculated on the basis of the Unit Price Table Item "Board for Engineer's Staff".

.3 The proposed payments outlined above for Production Equipment Standby and Labour Standby shall be considered full and final compensation for all costs directly or indirectly incurred by the Contractor because of unscheduled shutdown of his operations for protection of the environment.

1.2.5 Barricades and Warning Signs

The Contractor shall, at his own cost, provide erect and maintain all necessary barricades, suitable and sufficient lights, danger signals and other signs and take all necessary precautions for the protection of the work and the safety of the public.

1.2.6 Project Signs

The Contractor may be required to erect and maintain a standard Department of Public Works project sign(s) supplied by the Department. Measurement for payment for the erection and maintenance of the sign(s) will be made in accordance with Section 45 of the General Conditions "C".

1.2.7 Layout of Work

The Engineer will set stakes and bench marks establishing the location, alignment and reference elevations for the work. This will generally include the setting out of one set of clearing markers, off-set baseline, bench marks, slope stakes and culvert stakes, together with two sets of second grade stakes.

Any restaking resulting from the careless operations of the Contractor will be at the Contractor's own cost.

1.2.8 Maintenance of Work During Construction

.1 General

The Contractor shall at his own cost maintain all work during construction. The maintenance shall constitute continuous and effective work, prosecuted day by day, with adequate equipment and forces so that the roadway and/or structures are, at all times, kept in a condition satisfactory to the Engineer.

.2 Roadway

(a) Ruts and ridges caused by machinery or vehicles shall be removed from the completed or partially completed roadway.

(b) Any portion of the road used for travel shall be kept free of snow.

(c) Prior to spring thaw, snow shall be removed from the top of the road, including shoulders, for the full length of completed or partially completed construction as directed by the Engineer.

.3 Icing of Culverts

The Contractor shall, at his own cost, thaw out iced culverts to ensure that culverts are functioning during the period of spring break-up.

1.2.9 Use of Roadway During Construction

Vehicles of the Government of Canada and the Northwest Territories, or of the Agents or Contractors thereof, will be allowed access within the limits of the project at all times. Unless otherwise provided in Division 1, Section 1, the Contractor may close the road to the general public during construction. The Engineer may, however, grant the use of the road to other operators.

1.2.10 Construction Camp

The Contractor's camp and service area locations are subject to the approval of the Engineer and shall be set up and operated in accordance with the Government of the Northwest Territories Regulations governing operation of temporary field camps.

The development, maintenance and restoration of the Construction Camp and Service Area shall be considered incidental to the work under the Contract and will not be measured separately for payment.

The Contractor shall make application to the Controller of Water Rights, Department of Indian and Northern Affairs, Yellowknife, N.W.T., for authorization for the use of water and disposal of domestic sewage wastes at the camp in accordance with the Northern Inland Waters Act. The Contractor shall obtain this authorization prior to camp start-up.

Untreated sewage shall not be discharged directly or indirectly into natural waters. Depending on camp population, soil conditions, climatic conditions and the duration of the camp at one site, the following generally are acceptable methods of sewage disposal.

.1 Total underground containment or lagooning by means of:

(a) Discharge directly to a suitably cribbed and covered cesspool.

(b) Discharge to a suitably cribbed leach pit through a septic tank or through a leach cesspool compartment. The septic tank or leach cesspool compartment is for settlement and digestion and for sludge removal as necessary.

1.2.10 Construction Camp (cont'd)

(c) Discharge to an underground holding pit (which could be a cesspool, leach pit or tank) of at least one week retention capacity and discharged weekly from there to a lagoon by a portable pump and flex-hose or other suitable arrangement. The lagoon shall be suitably located at least one hundred (100) metres away from the camp being served. The lagoon shall have a minimum retention period of one (1) year, a liquid depth of approximately two (2) metres, a free board minimum of one-half (.5) metres and impervious berms having a three (3) metre top width and minimum slopes of three to one (3:1). Suitable precautions shall be taken for erosion control.

.2 Package treatment plants such as rotating Bio Disc, Physical Chemical Plant, etc.:

The plants are to be sized and operated to produce an effluent of secondary treatment quality. The Contractor shall make every effort to use water-saving fixtures in the camps such as low water-use toilets, urinals, wash basin taps, shower heads, and washing machines.

.3 Prior to the installation of the camp and related services, a plan of the layout shall be submitted to the Engineer for approval. Upon being vacated, the construction camp and service areas shall be left in a condition acceptable to the Engineer.

1.2.11 Forest Protection and Fire Fighting Equipment

.1 The Contractor shall comply with the requirements for forest protection and fire fighting equipment regulations as outlined in the Land Use Permit and the Forest Protection Ordinance, Chapter 38 of the Revised Ordinances of the Northwest Territories.

.2 The following fire fighting equipment is required for the construction camp(s):

1.2.11 Forest Protection and Fire Fighting Equipment (cont'd)

Equipment	Size of Camp (Men)			
	25	50	75	100
Fire Shovels	5	10	15	20
Pulaski Tools or Axes, Boys	5	10	15	20
Backpack Pumps	10	20	30	30
Power Pumps 40 mm discharge	1	2	2	3
Fire Hose 40 mm standard coupling	610m	1220m	1220m	1830m
Hose Carrying Bags	3	3	6	9
Water Tank, slip on, 2500 litre capacity movable by truck or crawler tractor	1	1	1	2

The power pumps shall be six (6) kilowatt pumps or larger, fully equipped with suction hose, couplings, auxiliary tanks, nozzles, funnels, spare spark plugs, fuel, hose wrenches and other tools.

.3 Fire fighting equipment shall be stored in a conspicuous place in the camp and used exclusively for fire control. Caches should be appropriately signed.

.4 The Contractor shall designate three (3) persons who will be contacts for the Northwest Lands and Forest Service Field Officer. Prior to commencement of work, the Contractor shall contact the Northwest Lands and Forest Service Field Officer who will instruct the Contractor's "designated persons" so that they will become familiar with the fire regulations, safety precautions and general operating procedures in case of fire.

.5 The supply of fire fighting equipment shall be considered incidental to the work under the contract and will not be measured separately for payment.

.6 The Contractor shall construct a fire guard around the entire camp site. The fire guard shall consist of a four (4) metre clearing, completely enclosing the entire camp site and shall be stripped so that the mineral soil is exposed.

entire camp site and shall be stripped so

1.2.12 Labour Requirements

.1 Notwithstanding all the terms of Section 27 (2) of the General Conditions "C", special arrangements for employment of local residents is outlined in Division 1, Section 1.

1.2.13 Climatic Conditions

The Contractor's attention is drawn to the severe climatic conditions at the location of the project. Information regarding the climatic conditions can be obtained from the Department of the Environment.

1.2.14 Environmental Briefings

When he has commenced operation of all equipment necessary to perform the work identified as clearing and excavation, and thereafter approximately every three (3) months, the Contractor shall arrange to have all his field staff available for a period of about one (1) hour for environmental briefings. The Contractor shall provide space for the briefings at his camp. The Department will arrange for and bear the cost of having environmental experts available for the briefings. The briefings will be scheduled to fit in with the Contractor's operation (double shift), so as not to require any shutdown of the construction work.

The Department may also have available in the camp, a short photographic slide presentation or movie outlining environmental concerns and precautions to be taken. If such is available, the Contractor shall ensure that all new employees on the work view this presentation as soon after arrival as possible.

The Contractor's Superintendent shall meet with the Engineer and the Land Use Officer prior to commencement of any work under this Contract to review the requirements of the Land Use Permit Operating Conditions, to identify areas of environmental concern, and to establish special procedures and precautions because of such concern.

1.2.15 Schedules

.1 Tender Schedules

Each Bidder shall submit with his tender a schedule in bar chart form covering excavation, gravel, structural plate culverts, and temporary bridge structures and showing the calendar dates on which activities on each of those items will take place for each five (5) kilometre section of the Contract. This schedule must clearly demonstrate that the Bidder has examined all of the requirements of these Specifications, has examined the site conditions, has made himself aware of the access problems to the site and is aware of schedule limitations which may be brought about by climatic conditions of environmental requirements.

.2 Construction Schedule

After notification of award of Contract, the Contractor must prepare a detailed Construction Schedule showing the calendar time planned for clearing, roadway and borrow excavation, temporary bridge construction, traffic gravel and installation of corrugated steel pipe and corrugated structural plate pipe on the basis of a kilometre by kilometre identification for the total length of the Contract. The schedule must meet the requirements of any milestone dates outlined in Division 1, Section 1.

There will be no payment of progress claims until the Construction Schedule is received in a form acceptable to the Engineer.

9.1.1 Description

This item consists of the removal and disposal, in accordance with these Specifications, of trees, brush, stumps, logs and other surface debris from within the highway right-of-way, haul roads, borrow pits, disposal areas, gravel pits and other areas shown on the Plans or designated by the Engineer.

9.1.2 Materials

Not applicable.

9.1.3 Construction

Clearing shall consist of the removal and disposal of all items mentioned in Article 9.1.1, except for trees and shrubs that are designated for preservation. These trees and shrubs shall be protected from scarring, barking or other injury during the construction operations. Dangerous trees and snags overhanging the right-of-way and leaners along the edge of all cleared areas shall be removed. Shrubs and brush less than one (1) metre in height will not require cutting.

.1 Machine Clearing

The Engineer will designate the areas which may be cleared by machine. Machine Clearing will generally be permitted for the clearing of borrow pits and for the clearing of the right-of-way and haul roads where roadway excavations are proposed.

.2 Hand Clearing

Hand Clearing shall be performed on areas designated by the Engineer and shall consist of cutting to within two-hundred (200) millimetres of original ground surface, all trees and brush. Generally hand clearing will be confined to the right-of-way, offtake ditches and haul roads.

Hand Clearing shall be carried out in a manner that will not damage the existing insulation of organic material. The use of machinery to pile and dispose of the clearing debris will only be permitted over frozen ground conditions.

9.1.3 Construction (cont'd)

.3 Debris Piles

Debris piles consisting of trees, rubbish and/or organic materials existing from previous clearing operations shall be removed and disposed of by the Contractor.

.4 Disposal

All clearing debris shall be disposed of as directed by the Engineer. Generally the disposal of right-of-way debris will consist of burning and placing of any unburned debris in disposal pits or disposal areas designated and/or approved by the Engineer. For the clearing of borrow pits, the Contractor will generally be permitted to place the clearing debris into a section of the pit where excavation is completed or along the outside edge of the pit and to flatten, cover with waste excavation and trim such debris to a condition acceptable to the Engineer.

In specific areas, the Engineer may permit or direct that trees from the hand-cut clearing operation be laid into a uniform mat within the limits of future embankment.

.5 Right-of-Way Clearing Limits

Generally the right-of-way will be cleared to a width of thirty and one-half (30.5) metres or wider, if required, to provide a minimum of five (5) metres from the toe of embankment or from the top of excavation backslope to the edge of the clearing.

.6 Progress of Work

Except as may otherwise be approved or directed by the Engineer, borrow pit areas shall not be cleared in advance of excavation by more than one (1) week. The clearing within the right-of-way shall be completed at least one (1) kilometre in advance of the grading operation.

9.1.3 Construction (cont'd)

Where portions of the right-of-way have previously been cleared by others, the Contractor shall advise the Engineer no later than October 1st of each year of the section of anticipated embankment construction to take place between October 1st and April 15th.

9.1.4 Measurement

The quantity of CLEARING to be measured for payment shall be the number of hectares acceptably cleared in accordance with these Specifications.

The removal of stumps and remaining clearing debris on areas cleared by others shall be considered incidental to the clearing operation and will not be measured separately for payment.

Earth material removed along with the clearing debris during the clearing disposal shall be considered incidental to the clearing operation and will not be measured separately for payment.

9.2(a).1 Description

This item consists of excavating, loading, hauling within the freehaul distance, placing or disposing and trimming of all Roadway and Borrow Excavation materials. The work is to be carried out in accordance with these Specifications and to the lines and grades shown on the Plans or as designated by the Engineer.

9.2(a).2 Materials

.1 Excavation Rock

Excavation Rock is defined as:

(a) Material excavated from solid masses of igneous sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass.

(b) Boulder or rock fragments measuring in volume one and one-half (1.5) cubic metres or more.

.2 Excavation Common

Excavation Common shall consist of all other materials of whatever nature, including dense tills, hardpan and frozen materials that do not come under the classification of Excavation Rock.

9.2(a).3 Construction

.1 Roadway Excavation

(a) Roadway Excavation will include excavation required for construction of contiguous roadway ditches, embankments, installation of culverts, and the removal and disposal of unsuitable materials.

(b) All suitable materials excavated shall be placed in roadway embankments except as otherwise directed by the Engineer. The embankment shall be constructed in accordance with Division 9, Section 4.

(c) All materials which in the opinion of the Engineer are unsuitable for embankments will be disposed of at locations and in a manner as directed by the Engineer.

9.2(a).3 Construction (cont'd)

(d) All roadway excavation shall be carried out in a manner so as to minimize disturbance to the natural ground cover on adjacent areas.

(e) Trimming of all excavation surfaces shall be done in a neat and workmanlike manner. Roadway excavations shall not vary from the grades shown on the Plans or as designated by the Engineer by more than sixty (60) millimetres. In addition the difference between the constructed grade and the designated grade, within any twenty (20) metre length of roadway, shall not vary by more than twenty (20) millimetres.

(f) Where the subgrade is in transition from excavation to embankment, sub-excavation will be carried out in the transition area in accordance with the Plans or as designated by the Engineer.

(g) Where unsuitable material is encountered at the grade level of a cut, the sub-grade shall be sub-excavated to the depth staked by the Engineer.

(h) Where suitable material is encountered at the grade level of a cut, scarifying to a minimum depth of two-hundred (200) millimetres below sub-grade will be performed prior to shaping and compaction.

(i) If during excavation, material appearing to conform to the classification of Excavation Rock is encountered, the Contractor shall notify the Engineer and shall provide ample opportunity for the Engineer to investigate and to make such measurements as are necessary to determine the volume of material in question.

(j) Rock which cannot be ripped, shall be drilled and blasted in such a manner that all material excavated will be usable for embankment construction.

9.2(a).3 Construction (cont'd)

(k) Where solid rock is encountered at the grade level of a cut, the subgrade shall be sub-excavated as shown on the Plans and backfilled with material designated by the Engineer.

(l) Rock slopes shall be scaled down removing boulders and rock fragments to form stable slopes.

.2 Borrow Excavation

(a) The Engineer will designate and approve all borrow sources and haul roads. Haul roads from borrow pits will consist of one (1) two-way road having a maximum surface width of eight and one-half (8.5) metres or two (2) one-way haul roads each having a maximum surface width of six (6) metres. The haul roads will generally be doglegged so that only a short section of the haul road is visible from the highway.

(b) Drill logs in the vicinity of potential borrow sources have been indicated on the Plans. This information has been provided to give the Contractor an appreciation of the general type of material to be encountered in borrow sources and the general spacing of such borrow sources. The actual location, dimensions and depths for excavation of borrow sources will be designated in the field by the Engineer.

(c) Slopes of the excavated borrow pits shall not be steeper than two to one (2:1) for Excavation Common and one-quarter to one (1/4:1) for Excavation Rock, unless otherwise directed by the Engineer.

9.2(a).3 Construction (cont'd)

(d) Unsuitable materials excavated from borrow pits will generally be disposed of by placing it as designated by the Engineer immediately adjacent to the borrow pit in such a location as not to interfere with the natural ground drainage or drainage from or into the borrow pit. The disposed of material will be trimmed as directed by the Engineer. For certain borrow excavations the Engineer may direct that all or part of the unsuitable material be placed back into the excavated area upon completion of the borrow excavation.

(e) If during excavation, material appearing to conform to the classification of Excavation Rock is encountered, the Contractor shall notify the Engineer and shall provide ample opportunity for the Engineer to investigate and to make such measurements as are necessary to determine the volume of material in question.

(f) Rock which cannot be ripped shall be drilled and blasted in such a manner that all materials excavated will be usable for embankment construction.

9.2(a).4 Measurement

.1 The quantity of EXCAVATION COMMON to be measured for payment shall be the number of cubic metres of material in its original position, acceptably excavated and placed in accordance with these Specifications.

Original cross sections will be taken after the clearing is completed.

Scarifying as specified in Article 9.2(a).3.1(h) shall be incidental to the roadway and borrow excavation operation and will not be measured separately for payment.

9.2(a).4 Measurement (cont'd)

.2 The quantity of EXCAVATION ROCK to be measured for payment shall be the number of cubic metres of material in its original position acceptably excavated and placed in accordance with these Specifications.

Original cross sections will be taken on top of the exposed rock surface.

.3 There will be no measurement for payment for material excavated beyond the lines shown on the Plans or as staked by the Engineer except in roadway rock excavations, where in the opinion of the Engineer unavoidable over-break occurs. Measurement for payment will be made for the actual quantity involved provided the over-break does not exceed ten (10) percent of the actual quantity within the lines and grades as staked by the Engineer between the established twenty (20) metre intervals where the over-break occurs. Materials in excess of the allowable over-break when placed in the embankment, will be measured for payment as Excavation Common. Materials in excess of the allowable over-break and not placed in the embankment, will not be measured for payment.

.4 Where the Engineer directs that unsuitable material from a borrow pit be placed back into the excavated area after completion of the borrow excavation, this work will be measured for payment in accordance with Section 45 of the General Conditions "C".

.5 The removal and disposal of all roots, stumps, surface debris and other unsuitable materials shall be considered incidental to the measurement made for Roadway and Borrow Excavation.

9.3.1 Description

This item consists of the excavation required for permanently deepening, widening and relocating water channels, the construction of ditches other than contiguous roadway ditches, loading, hauling within the free haul distance, placing or disposing and trimming of materials in accordance with these Specifications and to the lines and grades shown on the Plans or as designated by the Engineer. Except for intercepter ditches running generally parallel to the roadway embankment but not contiguous with it, channel excavation will be designated beyond a distance of five (5) metres from the staked toe of the embankment.

9.3.2 Materials

.1 Channel Excavation Rock

Channel Excavation Rock is defined as:

(a) Channel material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass.

(b) Boulder or rock fragments measuring in volume one and one-half (1.5) cubic metres or more.

.2 Channel Excavation Common

Channel Excavation Common shall consist of the excavation of all other materials of whatever nature including dense tills, hardpan and frozen materials that do not come under the classification of Channel Excavation Rock.

9.3.3 Construction

All materials excavated shall be disposed of as shown on the Plans or as directed by the Engineer. Suitable material shall be used in the roadway embankment, where considered practical by the Engineer. When excavated material is placed near the banks of a channel or ditch, provision shall be made to ensure proper flow of water from adjacent land to this waterway. The excavation shall be neatly finished and the disposed of material shall be shaped and trimmed to a condition satisfactory to the Engineer. The excavation equipment is subject to the approval of the Engineer.

9.3.3 Construction (cont'd)

All Channel Excavation shall be carried out in a manner as not to damage the natural ground cover on adjacent areas.

9.3.4 Measurement

.1 The quantity of CHANNEL EXCAVATION COMMON to be measured for payment, shall be the number of cubic metres of material, in its original position, acceptably excavated and placed in accordance with these Specifications.

.2 The quantity of CHANNEL EXCAVATION ROCK to be measured for payment, shall be the number of cubic metres of material, in its original position, acceptably excavated and placed in accordance with these Specifications.

.3 Measurement for payment of material excavated beyond the lines shown on the Plans or staked by the Engineer will not be made except that for Channel Excavation Rock where, in the opinion of the Engineer, unavoidable overbreak occurs. Measurement for payment will be made of the actual quantities involved, provided the overbreak quantity does not exceed ten (10) percent of the actual quantity of rock within the lines and grades as staked by the Engineer between the established twenty (20) metre intervals where the overbreak occurs. Channel Excavation Rock beyond the allowable overbreak will not be measured for payment.

.4 Original cross sections will be taken after clearing is completed.

9.4.1 Description

This item consists of the construction of embankments for the highway, haul roads, access roads, ditch blocks and ditch checks and the backfilling of culverts, structures and sub-excavated areas in accordance with these Specifications and to the lines and grades shown on the Plans or as designated by the Engineer.

9.4.2 Materials

The materials shall consist of acceptable earth and/or rock free from wood, brush, roots and other organic matter. All materials shall be subject to the approval of the Engineer prior to use in embankment construction.

9.4.3 Construction

.1 Placing Embankments

(a) The embankment shall be constructed to the lines and grades shown on the Plans and/or staked by the Engineer. If an embankment is constructed beyond the designated lines and grades, the excess material shall be removed by the Contractor and placed where the embankment is below grade level. If the excess material cannot be acceptably used in embankment construction, it shall be disposed of at a location designated by the Engineer in a manner approved by the Engineer.

(b) The initial lift of embankment material on unstable foundations shall have a minimum thickness of one (1) metre for support of construction equipment. The Engineer may permit the initial lift to be placed in a narrow fill along the uphill side of the embankment area to provide access to various works along the right-of-way. Successive lifts on an unstable foundation and all lifts on stable foundations shall be constructed in uniform layers of four-Hundred and fifty (450) millimetres maximum thickness across the entire width of the embankment with the final lift of two-hundred (200) millimetres maximum compacted thickness. In embankments composed primarily of material obtained from rock cuts,

9.4.3 Description (cont'd)

the larger stones shall be carefully distributed and the voids filled with smaller stones and other available material to form a compact mass.

(c) The Contractor shall maintain sufficient crown and/or super-elevation during the embankment construction to ensure ready transverse runoff of surface water.

(d) Preliminary shaping of side slopes shall be done as close behind embankment placement as possible.

(e) Trimming of the top surface, side slopes and toe of the embankments shall be done in a neat and workmanlike manner. Final embankments shall not vary from the grades as shown on the Plans or as designated by the Engineer by more than sixty (60) millimetres. In addition, the difference between the constructed grade and the designated grade, within any twenty (20) metre length of roadway, shall not vary by more than twenty (20) millimetres.

(f) Final trimming shall be under the supervision of a competent foreman and shall be complete by September 15th of each year for all sections of the road which have been constructed to final grade.

(g) The Contractor shall be responsible for determining the type of equipment most suitable for trimming the materials encountered on the project, and shall provide such equipment on the work as required, to acceptably complete the trimming and clean up.

(h) Material used in the final two-hundred (200) millimetre lift of embankment, shall be selected by the Contractor to ensure a minimum of boulders or stone fragments having dimensions larger than one-hundred and fifty (150) millimetres. After placing the final two-hundred (200) millimetre lift, all stones,

9.4.3 Construction (cont'd)

boulders or rock fragments having a major dimension greater than one-hundred and fifty (150) millimetres shall be removed from the material and disposed of at locations approved by the Engineer.

(i) As this project lies within the zone of permafrost, it will be permissible to construct embankment using soils in a frozen state.

.2 Compaction of Embankments

(a) Each layer of embankment material shall be spread evenly to the satisfaction of the Engineer. The hauling equipment shall be directed uniformly over the full width of each layer of material placed.

(b) The Engineer will determine if and when compaction is required in addition to that provided by the hauling units and will designate the type and number of compaction units to be used.

(c) The addition of water to the embankment material may be required during the compaction operation. The Engineer will designate when this is required and the quantities to be applied. The water shall be distributed in accordance with Division 9, Section 10.

.3 Drying of Embankments

During embankment construction, if in the opinion of the Engineer, the material is too wet for compacting, he may direct that drying of the embankment material be carried out. The type and number of drying equipment units and the drying procedure used will be as directed by the Engineer. If in the opinion of the Engineer the weather is not suitable for drying, the drying work will cease and not resume until the Engineer has so directed.

9.4.3 Construction (cont'd)

.4 Embankment Adjacent to Structures

(a) Embankment at Bridge Approaches

The permission of the Engineer must be obtained before any fill is placed against concrete arches, abutments or wing walls.

Approach fills to structures, within the lines shown on the Plans or as directed by the Engineer, shall be constructed of approved material placed in layers of maximum compacted thickness one-hundred and fifty (150) millimetres. The amount of compaction and the type of equipment to be used will be determined by the Engineer. For structures requiring embankments on both sides, the embankment shall be placed simultaneously at the same elevations on both sides of the structure.

(b) Embankment at Culverts

Embankment materials around culverts shall be selected by the Engineer and placed to the limits shown on the Plans or as designated by the Engineer. The material shall be placed and compacted in one-hundred and fifty (150) millimetre layers alternately on each side of the culvert so as not to displace the culvert during installation. The amount of compaction and the type of equipment to be used will be determined by the Engineer. To obtain the required compaction under the haunches, the material in this area shall be placed and tamped by hand to the satisfaction of the Engineer.

(c) Fill - Retaining Walls

The fill behind the walls shall consist of approved material placed in layers not exceeding one-hundred and fifty (150) millimetres in thickness and compacted as directed by the Engineer. In the case of

9.4.3 Construction (cont'd)

cell type retaining walls, the fill behind the wall shall be tamped and kept near but not above the level of the compacted material within the cells. Where fill is to be placed on a sloping surface, the surface must be benched to reduce the load on the retaining structure.

.5 Compaction Equipment

All compactors specified herein for compaction of material shall comply with the following minimum requirements:

(a) Sheepsfoot compactors shall consist of one or more drum units, having a total minimum width of two thousand and four-hundred (2400) millimetres. The length of the tamping feet shall not be less than one-hundred and seventy-five (175) millimetres. Under working conditions, the compactor shall be of such mass that the minimum pressure upon each tamper foot will not be less than two thousand and seven-hundred (2700) kilopascals. The sheepsfoot compactor shall be of the self-cleaning type and the ends of the tamping feet shall at all times be kept in a flat condition acceptable to the Engineer.

(b) Pneumatic-tired rollers shall have a width of not less than one thousand and eight-hundred (1800) millimetres. They shall be equipped with pneumatic tires of equal size and diameter. The space between the side walls of adjacent tires shall be not greater than the tire width, and the rear tires shall be staggered in relation to the front tires. The roller shall be equipped with mechanical means of distributing the contact pressure uniformly among all the tires and the tires shall be uniformly inflated so that the air pressure in all tires does not vary more than thirty-five (35) kilopascals. Pneumatic tired rollers shall be so constructed that the total mass of the roller

9.4.3 Construction (cont'd)

shall be not less than fifteen (15) tonnes and that the roller shall develop a minimum of seventy (70) Newtons per millimetre of tire width. During rolling, the operating mass of the roller and the tire pressure shall be varied as directed by the Engineer to fit the soil conditions.

(c) Grid Rollers shall have a mass not less than fourteen (14) tonnes. The roller shall have a nominal width of two thousand (2000) millimetres with one-hundred and twenty-five (125) millimetres nominal distance between the centre of the bars forming the grid.

(d) Type (A) steel drum vibratory compactors shall be of the articulated frame type having a drum width of not less than 1.83 metres. The mass of the drum end shall be not less than four and one-half (4.5) tonnes with minimum total applied forces of eighty-seven (87) Newtons (combined vertical components of dynamic and static forces) per millimetre of drum width.

(e) Type (B) steel drum vibratory compactors shall consist of a double drum (vibration on both drums), self-propelled compaction unit meeting the following minimum requirements:

Total mass	550 kilograms
Width of drums	600 millimetres
Total applied force (combined vertical components of dynamic and static forces)	35 Newtons per millimetre of drum width

(f) Vibratory padfoot drum compactors shall be of the articulated frame type having a drum width of not less than eighteen-hundred (1800) millimetres. The mass of the drum end shall be not less than four and one-half (4.5) tonnes with a minimum total applied contact pressure (combined dynamic and static pressure) of three thousand and four-hundred (3400) kilopascals.

9.4.3 Construction (cont'd)

(g) Self-powered, hand-operated vibratory plate units for compaction of backfill and/or embankment immediately adjacent to structures and culverts shall be of a design approved by the Engineer and having a mass not less than ninety (90) kilograms.

(h) Pneumatic, hand operated tamping units for compaction of backfill and the haunches of twelve-hundred (1200) millimetres and larger diameter culverts shall be the ramming type of approved design and having a mass not less than fourteen (14) kilograms.

(i) Each compaction unit shall consist of a fully operated compactor. Compaction units described in Articles 9.4.3.5(a), (b), (c), (d), (e) and (f) shall be self-propelled or power-drawn, and be capable of moving at a speed up to seven (7) kilometres per hour, with the exception of the compaction units described in Article 9.4.3.5(e) which shall be capable of moving at speeds up to thirteen-hundred (1300) metres per hour.

.6 Drying Equipment

(a) Drying Equipment shall consist of a heavy duty hinge offset type disc plow meeting the following minimum requirements:

Mass	3600 kilograms with provisions for additional weight as required
Width	2.4 metres
No. of discs	12
Disc diameter	**900 millimetres**

9.4.3 Construction (cont'd)

(b) Each drying unit shall consist of fully operated self-propelled or power-drawn drying equipment. Drying units shall be capable of moving at speeds up to seven (7) kilometres per hour.

.7 Time Recording

(a) All compaction and drying units with the exception of the self-powered and hand operated vibrating plate and tamping units as described in Articles 9.4.3.5(g) and (h) shall be equipped with an approved time recording device which accurately records the number of hours each machine is in operation.

(b) It will be the Contractor's responsibility to ensure that the time recording devices are properly mounted and maintained, that the cards are accurately identified as to the machine, date and shift and to daily deliver said cards to the Engineer.

(c) The Engineer will record the number of operating hours for each machine and both the Engineer and the Contractor will certify daily that such records are correct.

9.4.4 Measurement

.1 The construction of embankments shall be considered incidental to the work under the Unit Price Table Items, and will not be measured separately for payment.

.2 The quantity of Compaction to be measured for payment, shall be the actual number of approved hours each compaction unit is operated as directed by the Engineer in accordance with these Specifications.

.3 The quantity of Drying to be measured for payment, shall be the actual number of approved hours the drying unit is operated as directed by the Engineer in accordance with these Specifications.

9.4.4 Measurement (cont'd)

.4 The Unit Price Table prices for compaction and/or drying units shall be considered all-found fully operated rates including operators as required.

.5 Other equipment used in the drying and/or compaction operations, which is not shown in the Unit Price Table, shall be considered incidental to the drying and compaction operation and will not be measured separately for payment.

.6 Work described in Article 9.4.3.1(a) shall be considered incidental to the embankment construction operation and will not be measured separately for payment. Excess material not used in the embankment but disposed of as directed by the Engineer, will be excluded from the excavation measurement at its source.

.7 The removal and disposal of stones, boulders and/or rock fragments as described in Article 9.4.3.1(h) shall be considered incidental to the embankment construction operation and will not be measured separately for payment.

9.5.1 Description

This item consists of the authorized hauling of excavated material, classified under the various excavation items, in accordance with these Specifications for a distance beyond a free haul distance of one (1) kilometre.

9.5.2 Materials

Not applicable.

9.5.3 Construction

Not applicable.

9.5.4 Measurement

.1 The quantity of Overhaul to be measured for payment shall be the number of cubic metre kilometres of haul of authorized material beyond the one (1) kilometre free haul distance in accordance with these Specifications. The Haul will be calculated by the Mass Diagram Method.

The overhaul distance shall be the distance between the centres of volume of the overhauled material in its original position and its position after placing, less the free haul distance. The haul distance will be measured along the shortest route determined by the Engineer as feasible and satisfactory.

When material is obtained by extra widening of a right-of-way cut, any area of the excavation more than thirty and one-half (30.5) metres from the centreline of the roadway shall, for the purpose of centre of mass and overhaul calculations, be considered as a separate area off the right-of-way and its distance from the roadway will be measured to the centreline of the roadway.

9.6.1 Description

This item consists of the transportation from the designated supply site(s) and the installation of Corrugated Steel Pipe (C.S.P.) Culverts in accordance with these Specifications and to the lines and grades shown on the Plans or as designated by the Engineer.

9.6.2 Materials

.1 Culverts, couplers and hardware will be supplied by the Department at the designated supply site(s) listed in Division 1, Section 1. The materials will be palletized.

.2 Materials used for bedding and the fill around culverts will be selected by the Engineer from items listed in the Unit Price Table.

.3 Materials for water tight joints and insulation will be supplied by the Department to the project.

9.6.3 Construction

.1 Handling of Culvert Material

(a) The Contractor shall transport the culvert material in the existing pallets from the designated supply site(s) to the Contractor's stockpile site(s). The pallets shall be maintained during shipment.

(b) Prior to removing the culvert material from the designated supply site(s), the Contractor shall supply the Engineer with a certificate acknowledging receipt of the material and from then to completion of the project, the Contractor shall assume full responsibility for the materials and shall replace any lost or damaged items.

The culverts have been nested and palletized in a manner most economical for shipment. The pallets are of such size that they will not exceed the width, height and length requirements for highway transport.

9.6.3 Construction (cont'd)

(c) The culvert material shall be handled so as not to bruise or damage the spelter coating. It shall not be dragged on the ground or manipulated with heavy equipment without proper precaution to protect the surface. Any damage to the spelter coating shall be protected by the application of two (2) coats of weather resistant high zinc dust oxide paint meeting the requirements of the C.G.S.B. Specification No. 1-GP181. The areas damaged shall be thoroughly cleaned and rough edges ground smooth prior to the paint application.

.2 Excavation

(a) The location and elevation of excavations for culverts will be staked by the Engineer.

(b) During construction the Contractor may be required to provide a temporary channel diversion outside the limits of the culvert. The location of the channel diversion and the method of construction is subject to the Engineer's approval.

(c) Excavation shall be carried out in accordance with Division 9, Section 2(a) or Section 2(b).

.3 Bedding

The culvert bed shall be constructed to provide a uniform and firm foundation throughout its entire area. When a firm foundation is not encountered at the grade established for the culvert, the bottom of the bed shall be sub-excavated to the dimensions staked by the Engineer. The sub-excavated area shall be back-filled with material approved by the Engineer, and compacted as directed by the Engineer.

9.6.3 Construction (cont'd)

.4 Installation

(a) Corrugated Steel Pipe Culverts shall be placed with the inside circumferential laps pointing downstream. The longitudinal laps for annular corrugated culverts shall be located at the side or quarter points.

(b) The sections of the culverts shall be firmly jointed with coupling bands.

(c) If watertight joints are specified, the method used shall be as directed by the Engineer.

(d) If insulation is specified, installation of insulation materials shall be as shown on the Plans or as directed by the Engineer.

(e) The backfilling around the culvert will be in accordance with the Plans and shall conform with Division 9, Section 4. The material used will be subject to the approval of the Engineer who will also determine the amount of compactive effort required.

(f) Vehicular traffic and construction equipment will not be allowed to cross over a culvert until the backfill has been constructed and compacted to a minimum depth six-hundred and ten (610) millimetres over the highest point of the culvert.

(g) Strutting of culverts will not be allowed without written approval from the Engineer.

9.6.4 Measurement

.1 The quantity of CORRUGATED STEEL PIPE to be measured for payment, shall be the number of metres of the various sizes of pipe specified in the Unit Price Table acceptably delivered and installed in accordance with these Specifications.

The measurement will be based on the nominal length of pipe sections.

9.6.4 Measurement (cont'd)

.2 Installation of watertight joints will be measured for payment in accordance with Section 45 of the General Conditions "C".

.3 Installation of insulation will be measured for payment in accordance with Section 45 of the General Conditions "C".

4. Quantities of culvert excavation, backfill material and compaction will be measured for payment in accordance with the appropriate Unit Price Table Items.

.5 The replacement of any lost or damaged items as described in Article 9.6.3.1(b) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.6 The provision for a temporary channel diversion as described in Article 9.6.3.2(b) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

9.7.1 Description

This item consists of the transportation from the designated supply site(s) and the installation of Structural Plate Corrugated Steel Pipe (SPCSP) Culverts in accordance with these Specifications and to the lines and grades shown on the Plans or as designated by the Engineer.

9.7.2 Materials

.1 The culvert plates, cut-off walls, hold down attachments, steam lines and all hardware will be supplied by the Department at the designated supply site(s) listed in Division 1, Section 1.

.2 Materials used for bedding and the fill around the culverts will be selected by the Engineer from one of the Unit Price Table Items.

.3 Materials for water tight joints and insulation will be supplied by the Department to the project.

9.7.3 Construction

.1 Handling of Culvert Material

(a) The Contractor shall transport the culvert material in the existing bundles and/or pallets from the designated supply site(s) to the Contractors stockpile site(s). The bundles and/or pallets shall be maintained during shipment.

(b) Prior to removing the culvert material from the designated supply site(s), the Contractor shall supply the Engineer with a certificate acknowledging receipt of the material and from then to completion of the project, the Contractor shall assume full responsibility for the materials and shall replace any lost or damaged items.

The culvert material has been palletized in a manner most economical for shipment. The pallets are of such size that they will not exceed the width, height, and length requirements for highway transport.

9.7.3 Construction (cont'd)

(c) The culvert material shall be handled so as not to bruise or damage the spelter coating. It shall not be dragged on the ground or manipulated with heavy equipment without proper precautions to protect the surface. Any damage to the spelter coating shall be restored by the application of two (2) coats of weather-resistant, high zinc dust oxide paint meeting the requirements of the C.G.S.B. Specification 1-GP181. The areas damaged shall be thoroughly cleaned and rough edges ground smooth prior to the paint application.

.2 Excavation

(a) The location, lines and grades of the excavation required for the culvert installations will be as shown on the Plans or as designated by the Engineer.

(b) During the construction, the Contractor may be required to provide a temporary diversion channel outside the limits of the culvert. The location of the channel diversion and the method of construction is subject to the Engineer's approval.

(c) Excavation shall be carried out in accordance with Division 9, Section 2(a) or Section 2(b).

.3 Foundation

The culvert bed shall provide a firm foundation throughout its entire area. The bed shall be subexcavated to the dimensions staked by the Engineer and backfilled with approved material which shall be compacted as directed by the Engineer.

9.7.3 Construction (cont'd)

.4 Assembly

(a) Placing and assembly of the pipe may only proceed after the excavation, foundation and bedding for the pipe have been approved by the Engineer. The assembly shall be in accordance with the Shop Drawings. All holes shall be filled with bolts and shall be tightened to a torque of not less than two-hundred (200) Newton metres and not more than two-hundred and seventy (270) Newton metres.

(b) The Contractor shall, when specified in Division 1, Section 1, arrange to have in the field a fully qualified representative of the culvert supplier during the period of installation to ensure that the culvert assembly, erection and general construction are in accordance with the Supplier's recommendations.

.5 Backfilling

(a) Assembly and tightening of all bolts shall be completed and approved by the Engineer before backfilling may commence. Backfill material will be designated by the Engineer.

(b) Backfill material shall be placed in successive layers and compacted in accordance with the Plans or as directed by the Engineer. Equipment used for the backfilling operation up to one (1) metre above the top of the pipe shall run parallel and as close to the pipe as possible with simultaneous hand spreading and compaction by vibrators and/or mechanical tampers adjacent to the face of the pipe. The material under the haunches shall be hand placed and tamped as directed by the Engineer.

9.7.3 Construction (cont'd)

(c) During the course of backfilling around and above the pipe, the deflections within the pipe will be measured by the Engineer and the results will be made available to the Contractor on a routine basis.

If required, the Contractor shall assist the Engineer in placing the measuring devices. Lateral movement of the pipe shall be prevented by controlling the rate of filling on each side. The Contractor will be responsible for the proper placing of the bedding and backfill as evidenced by the deformation of the pipe from its original shape. No strutting of the pipe will be allowed without written approval from the Engineer.

Unless otherwise directed, the following criteria on deflection will be followed. Only vertical deflections that tend to increase the original vertical dimension will be allowed. Increase in vertical dimension will not be permitted to exceed three (3) percent of the original vertical diameter. Horizontal deflections will not be permitted to exceed a five (5) percent decrease of the original horizontal diameter.

(d) If during the placement of backfill or embankment around and above the pipe the deformations should exceed the above limits, the work shall cease. The Engineer may then order the removal and replacement of the backfill in its entirety or in part and may require that the pipe be strutted either horizontally or vertically. The Contractor shall undertake the corrective work as designated by the Engineer.

9.7.3 Construction (cont'd)

(e) Vehicular traffic and construction equipment will not be allowed to cross over the structure until the backfill has been constructed and compacted to a minimum depth of one (1) metre over the highest point on the pipe, or to a height specified by the culvert supplier for the loadings anticipated.

.6 Cut-Off Walls, Hold Down Attachments, Stiffeners, Steam Lines

Where specified, cut-off walls, hold down attachments and steam lines shall be installed with the culvert installations in accordance with the Plans. Except where otherwise specified, all required materials will be provided to the Contractor along with the culvert materials.

.7 Dewatering

The foundation shall be kept free of water during the excavation and backfilling of the culvert bed and the assembly of the culvert.

During the backfilling of the culvert bed and around and above the culvert, water levels abutting the backfill shall be kept at least six-hundred (600) millimetres below the level of backfilling.

.8 If watertight joints are specified, the method used shall be as directed by the Engineer.

.9 If insulation is specified, installation of insulation materials shall be as shown on the Plans or as directed by the Engineer.

9.7.4 Measurement

.1 The quantity of CORRUGATED STRUCTURAL PLATE PIPE to be measured for payment shall be as a unit for the acceptable delivery and installation of Corrugated Structural Plate Pipe culvert(s) in accordance with these Specifications at each individual site shown on the Plans and referenced in the Unit Price Table.

9.7.4 Measurement (cont'd)

.2 The delivery and installation of cut-off walls, hold down attachments and steam lines where specified in the Plans shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.3 Quantities for culvert excavation, backfill materials and compaction will be measured for payment in accordance with the appropriate Unit Price Table Items.

.4 Installation of watertight joints will be measured for payment in accordance with Section 45 of the General Conditions "C".

.5 Installation of insulation will be measured for payment in accordance with Section 45 of the General Conditions "C".

.6 The replacement of any lost or damaged items as described in Article 9.7.3.1(b) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.7 The provision for a temporary channel diversion as described in Article 9.7.3.2(b) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.8 The provision to have in the field a representative of the culvert supplier as described in Article 9.7.3.4(b) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.9 Corrective work as described in Article 9.7.3.5(d) shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

.10 Dewatering as described in Article 9.7.3.7 shall be considered incidental to the culvert installation operation and will not be measured separately for payment.

9.8.1 Description

This item consists of excavating, screening or otherwise removing oversize material from gravel and loading, hauling and placing the material on the road or in stockpile(s) in accordance with these Specifications or as directed by the Engineer.

9.8.2 Materials

Traffic Gravel will consist of either screened gravel or pit run gravel.

.1 Screened Gravel - 76 millimetre Minus

The material shall consist of screened gravel of clean, hard particles, free from clay lumps, cementation and organic or other deleterious material and shall meet the following gradation requirement:

Sieve No.	Percent Passing (By Mass)
76 millimetre	100%
No. 4	30-70
No. 200	3-10

.2 Pit Run Gravel

The material shall consist of pit run gravel of clean, hard particles free from clay lumps, cementation and organic or other deleterious material. All oversize material shall be removed at the source or at the road. Material exceeding seventy-six (76) millimetres in dimension is classified as oversize material.

9.8.3 Construction

.1 Clearing of material source area(s), haul road(s) and stockpile site(s) shall be in accordance with Division 9, Section 1.

.2 Excavation and disposal of material overlaying the gravel source and the construction of haul road(s) and/or stockpile site(s) shall be in accordance with Division 9, Section 2(a) or 2(b) and Section 4.

.3 To minimize the amount of oversize material hauled to the road, the Contractor shall select and sort out the pit run gravel material at the source.

9.8.3 Construction (cont'd)

.4 Before gravel can be placed either on the road or in stockpile(s), approval must be received from the Engineer.

(a) For placement of gravel on the road, the roadbed surface shall be smooth riding and free from pot-holes and ruts. Scarifying and blading shall be performed as directed by the Engineer.

(b) Hauling equipment shall be directed over the full width of the traffic lanes to ensure uniform compaction of the roadway surface.

(c) The gravel shall be dumped and spread uniformly on the roadbed surface at the rate specified by the Engineer.

(d) When gravel is used to backfill sub-excavated areas, or for back-fill material around culverts, the backfill operation shall be in accordance with Division 9, Section 4.

(e) Stockpile site(s) shall be firm and level and clean of all deleterious material. The stockpile(s) shall be shaped as directed by the Engineer and constructed in layers not exceeding one (1) metre in depth over the entire stockpile area. Stockpiles shall be kept free of snow and ice during the stockpiling operation.

9.8.4 Measurement

.1 The quantity of SCREENED GRAVEL to be measured for payment, shall be the number of tonnes of material acceptably placed on the road or in the designated stockpile(s) in accordance with these Specifications.

.2 The quantity of PIT RUN GRAVEL to be measured for payment, shall be the number of tonnes of material acceptably placed on the road or in the designated stockpile(s) in accordance with these Specifications.

9.8.4 Measurement (cont'd)

.3 The quantity of GRAVEL HAUL to be measured for payment shall be the number of tonne-kilometres of gravel haul for traffic gravel acceptably placed in accordance with these Specifications.

The quantity will be computed by multiplying the mass of the material in tonnes, or fractions thereof, by the haul distance measured in kilometres, or fractions thereof, along the designated route between the point of loading and the designated delivery point.

.4 Removal from the road surface and disposal of oversize pit run material shall be considered incidental to the traffic gravel operation and will not be measured separately for payment.

.5 Clearing, excavation of overburden and construction of haul roads and/or stockpile sites will be measured for payment in accordance with the appropriate Unit Price Table Items.

.6 Preparation of the roadbed surface, maintenance of haulroads, and removal of snow and ice as specified in Article 9.8.3.4(e) shall be considered incidental to the traffic gravel operation and will not be measured separately for payment.

9.10.1 Description

This item consists of loading, transporting and distributing water required for the construction of highway embankment or the placing of road surfacing materials, all in accordance with these Specifications.

9.10.2 Materials

The water shall be free from undesirable quantities of organic matter and mineral salts.

9.10.3 Construction

.1 Watering equipment shall consist of water-tight tank(s) mounted on adequately powered trucks. The water shall be applied through a spray bar or nozzle of such design as to provide a uniform unbroken spread of water over a minimum width of two-thousand, five-hundred (2500) millimetres. A suitable device for positive shutoff of the spray bar shall be so located as to permit control from the cab of the truck.

.2 The Engineer will determine the quantity of water to be applied and the rate of application.

.3 Water used for dust control will not be measured for payment.

9.10.4 Measurement

.1 The quantity of WATER to be measured for payment, shall be the number of cubic metres of water acceptably distributed in accordance with these Specifications.

9.11.1 Description

This item consists of supplying materials and constructing a protective covering of sacked concrete or approved stone, with or without mortar, on an earth bed or granular filter blanket or filter fabric in accordance with these Specifications. Rip-Rap shall be constructed at the locations and in conformity with the lines and grades shown on the Plans or as designated by the Engineer.

9.11.2 Materials

The Contractor will supply all rip-rap materials except for filter fabrics, which will be supplied by the Department to the project. The materials supplied by the Contractor will be subject to approval by the Engineer.

.1 Stone Rip-Rap:

Stone rip-rap materials shall be of approved quality and shall consist of sound, hard and dense stones, boulders or quarry rocks resistant to the action of air and water and free from seams, cracks or other structural defects.

(a) Stone rip-rap materials generally designated for corrugated steel pipe culverts, ditch checks and ditch blocks shall meet the requirements of "Normal Stone Rip-Rap". Normal Stone Rip-Rap shall consist of stones, boulders or quarry rocks having dimensions of not less than one-hundred and fifty (150) millimetres in any one direction.

(b) Stone rip-rap materials generally designated for corrugated structural plate pipe culverts, bridges, and channel bank protection shall consist of stones, boulders or quarry rocks meeting with the requirements for "Heavy Stone Rip-Rap" or "Armour Stone Rip-Rap".

9.11.2 Materials (cont'd)

HEAVY STONE RIP-RAP

Mass of Stones (kgm)	Percentage
360 - 545	40 - 60
180 - 360	20 - 40
23 - 180	10 - 30
Under 23	0

ARMOUR STONE RIP-RAP

Mass of Stones (kgm)	Percentage
545 - 910	60 - 70
180 - 545	20 - 30
90 - 180	10 - 20
Under 90	0

(c) Sand for mortar grout shall conform to the latest C.S.A. Specifications for Aggregate for Masonry Mortar A 82.56-M unless otherwise instructed by the Engineer.

(d) Cement for mortar grout shall be Portland Cement conforming to the latest C.S.A. Specification A8-M.

.2 Sacked Concrete Rip-Rap

(a) The soil material shall consist of a sand and/or gravel as designated or approved by the Engineer.

(b) Sacks shall be manufactured from minimum three-hundred and five (305) gram burlap and shall be approximately five-hundred (500) millimetres by nine-hundred (900) millimetres measured inside the seams when the sack is laid flat. The capacity of each sack shall be approximately ninety-five (95) kilograms.

(c) The cement shall be Portland Cement conforming to the latest C.S.A. Specification A5-M, Type 10.

9.11.2 Materials (cont'd)

.3 Filter Blanket

Filter blanket material shall consist of approved well graded granular material free from undesirable quantities of soft particles, organic or other deleterious material. The source shall be subject to the approval of the Engineer.

.4 Filter Fabrics

Filter fabric materials will be supplied to the Contractor in rolls of approximately sixty-eight (68) kilograms.

9.11.3 Construction

.1 Preparation of Foundation

(a) Aprons and slopes to be rip-rapped shall be excavated as shown on the Plans or as directed by the Engineer to provide adequate foundation upon which the rip-rap shall rest. The foundation bed shall be fine graded to form a uniform and even surface. Depressions shall be filled and thoroughly compacted.

(b) Filter blankets shall be constructed at locations shown on the Plans or where directed by the Engineer, and to the lines and grades as staked by the Engineer.

(c) Filter fabrics shall be placed at locations designated and in a manner directed by the Engineer. A thin lift of fine grained material will generally be placed over the filter fabric when used on other than hand placed rip-rap installation.

.2 Placing of Rip-Rap

(a) Hand Placed Rip-Rap:

The stones, boulders or quarry rocks shall be placed by hand to conform with the lines and dimensions designated by the Engineer. The stones shall be firmly bedded into the slopes and against adjoining stones, with smaller stones used to fill in the voids.

Hand placing will generally be designated for Normal Stone Rip-Rap.

9.11.3 Construction (cont'd)

(b) Machine Placed Rip-Rap:

The stones, boulders or quarry rocks shall be sorted and placed so as to produce a uniform thickness or rip-rap conforming with the lines and grades shown on the Plans or designated by the Engineer. The equipment used for the machine placing operation shall have the capability of handling and positioning individual rip-rap particles.

Machine placing will generally be applicable to Heavy Stone Rip-Rap and Armour Stone Rip-Rap.

(c) Random Rip-Rap:

The stones, boulders and quarry rocks shall be dumped onto the surface to be rip-rapped. Sufficient hand and/or machine work shall be performed to produce a uniform thickness of rip-rap conforming with the lines and dimensions designated by the Engineer.

Random placing may be designated for all types of stone rip-rap.

(d) Sacked Concrete Rip-Rap:

The Engineer will determine the mix design of the concrete. Each burlap sack shall be filled with approximately seventy-six (76) kilograms of concrete and securely stapled or tied with wire ties. Within one half hour after mixing of the concrete the sacks shall be placed in their final position on the prepared base, kneaded, rammed and packed into conformance with the prepared base and adjacent sacks already in place. Additional courses of sacks shall be placed to obtain the required depth within the area as designated by the Engineer.

9.11.3 Construction (cont'd)

The pattern to which the sacks are laid shall be approved by the Engineer. All earth and other debris shall be removed from the surface of sacks in place before succeeding courses are placed.

Following placing, the sacked concrete rip-rap shall be kept moist for a period of twenty-four (24) hours by sprinkling or other means approved by the Engineer.

(e) Grouted Stone Rip-Rap

Grouted stone rip-rap may be of the hand placed or machine placed type. The surface of the stones, boulders or quarry rocks shall be cleaned and thoroughly wetted before applying the mortar. The spaces between the stones, boulders or quarry rocks shall be filled with cement mortar grout with the outer faces of the stones, boulders or quarry rocks left exposed. The grout shall be composed of one (1) part cement to three (3) parts sand, and of such consistency that it can be placed with a mason's trowel. The thickness of the grout between the stones shall be a minimum of 100 mm or one-third (1/3) of the average diameter of the stones, boulder or quarry rock thickness whichever is the greater.

Grouted rip-rap shall be cured using curing compounds or wetted burlap or a blanket of earth kept wet for seventy-two (72) hours, or by sprinkling with a fine spray every two (2) hours during the daytime for a period of three (3) days.

The grouting of the rip-rap can only take place when the air temperature is continuously above freezing.

9.11.4 Measurement

.1 The quantity of RIP-RAP to be measured for payment shall be the number of cubic metres of each type of rip-rap identified in the Unit Price Table which has been acceptably placed in accordance with these Specifications. Measurement of rip-rap will be made in its final position.

.2 Haul of rip-rap materials shall be considered incidental to the rip-rap operation and will not be measured separately for payment.

.3 The quantity of CEMENT to be measured for payment shall be the number of forty (40) kilogram bags of cement acceptably incorporated into the construction of sacked concrete and/or grouted rip-rap in accordance with these Specifications.

.4 The supply and delivery of filter blanket materials will be measured for payment under the appropriate Unit Price Table Items. Placement of the materials will be measured for payment in accordance with Section 45 of the General Conditions "C".

.5 For the purpose of calculating quantities of haul for filter blanket materials, a conversion of one (1) cubic metre being equal to one (1) tonne and eight-hundred (800) kilograms.

.6 Installation of Filter Fabrics will be measured for payment in accordance with Section 45 of the General Conditions "C".

.7 All other work and materials required for the acceptable completion of the rip-rap installations including the preparation of the foundation shall be considered incidental to the rip-rap operation and will not be measured separately for payment.

9.12.1 Description

This item consists of supplying materials and constructing a protective lining of approved stone or gravel along ditch bottoms or on other areas subject to surface scour. Ditch Linings shall be constructed in accordance with these Specifications and at locations and in conformity with the lines and grades shown on the Plans or as designated by the Engineer.

9.12.2 Materials

Ditch lining materials shall consist of sound granular material from sources designated or approved by the Engineer. The materials will generally consist of stones smaller than two-hundred (200) millimetres in diameter. Where designated by the Engineer, the materials shall be selectively excavated to obtain the desired gradation.

Filter fabric materials will be supplied to the Contractor in rolls weighing approximately sixty-eight (68) kilograms.

9.12.3 Construction

.1 Prior to placing, the ditch shall be trimmed to the lines and grades staked by the Engineer. The surface shall be smooth and uniform.

.2 The materials shall be placed and handled in a manner to ensure a uniform layer of the specified thickness. The Engineer may direct that the material be placed in more than one layer from different sources in order to obtain a filter blanket effect.

Hand trimming of the materials in place will be required where the work cannot be acceptably completed by machine.

.3 Oversize materials shall be removed at the pit or at the ditch lining site.

.4 If the use of filter fabric has been designated by the Engineer, it shall be placed as shown on the Plans or as directed by the Engineer.

9.12.4 Measurement

.1 The quantity of DITCH LINING to be measured for payment shall be the number of cubic metres of material acceptably supplied and placed in accordance with these Specifications. The measurement will be made in the haulage vehicle(s).

.2 Haul of ditch lining materials will be measured for payment in accordance with Division 9, Section 5.

.3 Removal and disposal of oversize materials shall be considered incidental to the ditch lining operation and will not be measured separately for payment.

.4 Installation of filter fabrics will be measured for payment in accordance with Section 45 of the General Conditions "C".

9.14.1 Description

This item consists of supplying and/or delivering, setting up, operating, maintaining and dismantling the Engineer's Camp and supplying of meals, linen and cleaning services in accordance with these Specifications.

9.14.2 Accommodation

The Engineer's Camp will be for the exclusive use of the Engineer and his staff for the duration of the work.

.1 The Engineer's Camp will generally consist of the following trailer units: one office trailer, sleeper trailers, one ablution trailer and one recreation trailer.

(a) The trailers specified in Article 9.14.2.1 above shall be placed into a self-contained unit joined by a minimum twelve-hundred (1200) millimetre wide walkway having the same floor elevation as the trailers. The walkway shall be weatherproof, insulated and adequately heated. The layout shall be subject to the Engineer's approval.

(b) All the trailers specified in Article 9.14.2.1 above shall be adequately blocked and weather skirted for winter operation.

.2 In addition to the trailer units specified in Article 9.14.2.1, the Engineer's Camp will consist of:

(a) One (1), only, unheated but weathertight storage shed, a minimum of two-thousand four-hundred (2400) millimetres by three-thousand six-hundred (3600) millimetres and equipped with one locking door and one interior light. The storage shed shall be placed near the Engineer's camp and will be for the Engineer's exclusive use.

(b) Five (5) parking places for vehicles complete with five (5) exterior electrical outlets shall be provided near the office trailer for the exclusive use of the Engineer and his staff.

9.14.2 Accommodation (cont'd)

.3 The Engineer's camp shall be set up and ready for occupancy at the same time as the Contractor's camp.

.4 The Contractor shall be responsible for the operation, repair and maintenance of the trailers, buildings and facilities in the Engineer's camp.

.5 The Contractor shall dismantle, move and re-establish the Engineer's camp whenever he moves his own camp.

.6 The Contractor shall dismantle the Engineer's camp upon completion of the work and shall restore the camp area(s) to a condition satisfactory to the Engineer.

.1 The Contractor shall provide all equipment, supplies and labour required to provide the Engineer's staff meals and services of the same quantity and quality as provided for the Contractor's staff.

.2 The Contractor shall clean trailers daily and change the linen weekly or whenever a change in personnel occurs. "Linen" shall consist of three (3) blankets, two (2) sheets, one (1) pillow, one (1) pillow cover and two (2) towels for each occupant.

.3 A water and sewer system shall be provided by the Contractor for the Engineer's camp or the Contractor shall connect the Engineer's ablution trailer to his own system. The Contractor must include the Engineer's trailer units in his application under the Northern Inland Waters Act.

.4 A steady and dependable source of electric power shall be supplied by the Contractor. The Contractor shall connect all trailers, buildings and exterior outlets to this source.

.5 The Contractor shall supply all the fuel requirements for the camp and shall see that each heating unit is kept supplied with fuel and is in good operating condition.

9.14.3 Measurement

.1 The quantity of the ENGINEER'S CAMP to be measured for payment shall be as a Unit for the acceptable accommodation in accordance with these Specifications.

.2 The quantity of ENGINEER'S BOARD to be measured for payment shall be the number of mandays and fractions thereof that the Engineer's staff is acceptably provided with meals and other related services in accordance with these Specifications.

All part days shall be calculated to the nearest one-third (1/3) based on the number of meals taken by each member of the Engineer's staff.

9.15.1 Description

This item consists of the provision to the Contractor of a fixed sum to cover costs of mobilization of plant, personnel and material, the establishment of temporary buildings, shops, offices, and facilities and licenses, fees and premiums necessary to commence the work and which are not specifically measured under any other Item contained in the Unit Price Table.

9.15.2 Measurement

Measurement for payment for mobilization shall be on the basis of the amount pre-established by the Department and shown on the Unit Price Table. This amount is to be included in the total amount of the tender and will be measured for payment on the following schedule.

.1 Fifty (50) percent of the fixed amount when the Contractor has established his camp, has placed his fuel storage and has delivered to the camp site all the equipment necessary to perform work identified as clearing and excavation.

.2 Twenty-five (25) percent of the fixed amount when the Contractor has commenced operation of all the equipment indicated in Article 9.15.2.1 above in the performance of that work identified as clearing and excavation.

.3 Twenty-five (25) percent of the fixed amount when the Contractor has completed construction of the equivalent of ten (10) percent of the total length of the Contract.

9.16.1 Description

This item consists of installing highway signs, delineators and culvert markers as designated by the Engineer and in accordance with Plans and Specifications.

9.16.2 Materials

All required materials and hardware will be supplied by the Department at a designated supply site(s) listed in Division 1, Section 1.

9.16.3 Construction

.1 The highway signs shall be mounted on single or double steel posts. A single sign installation may include more than one sign plate on each post or pair of posts. The posts shall be embedded into the ground a minimum of one (1) metre by driving in a manner considered acceptable by the Engineer to avoid damage to the posts. Signs shall be attached to the posts using the bolts provided.

.2 Delineators will consist of 1700 mm roll-proof guideposts or steel posts with reflectors mounted. The type of delineator will be specified in Division 1, Section 1.

The roll-proof guideposts shall be placed in augered holes 150 mm in diameter and 400 mm deep. They shall be properly aligned and backfilled as directed by the Engineer.

The steel posts may be installed by driving the posts with a hammer providing no damage is done to the posts.

.3 The highway culvert markers will consist of 1700 mm synthetic or timber posts. The posts shall be embedded 400 mm into the ground. Driving the posts into the ground will be acceptable providing no damage is made to the posts.

9.16.4 Measurement

.1 The quantity of signs that will be measured for payment shall be the number of each type of installation acceptably installed as directed by the Engineer in accordance with these Specifications.

9.16.4 Measurement (cont'd)

.2 The quantity of delineators that will be measured for payment shall be the number of installations acceptably installed as directed by the Engineer in accordance with these Specifications.

.3 The quantity of culvert markers that will be measured for payment shall be the number of installations acceptably installed as directed by the Engineer in accordance with these Specifications.

9.17.1 Description

This item consists of the installation of steel beam type guiderail in accordance with the Plans and Specifications and at the locations directed by the Engineer.

9.17.2 Materials to the Contractors

All required guide posts, rails and hardware will be supplied to the Contractor by the Department at a designated supply site(s) listed in Division 1, Section 1.

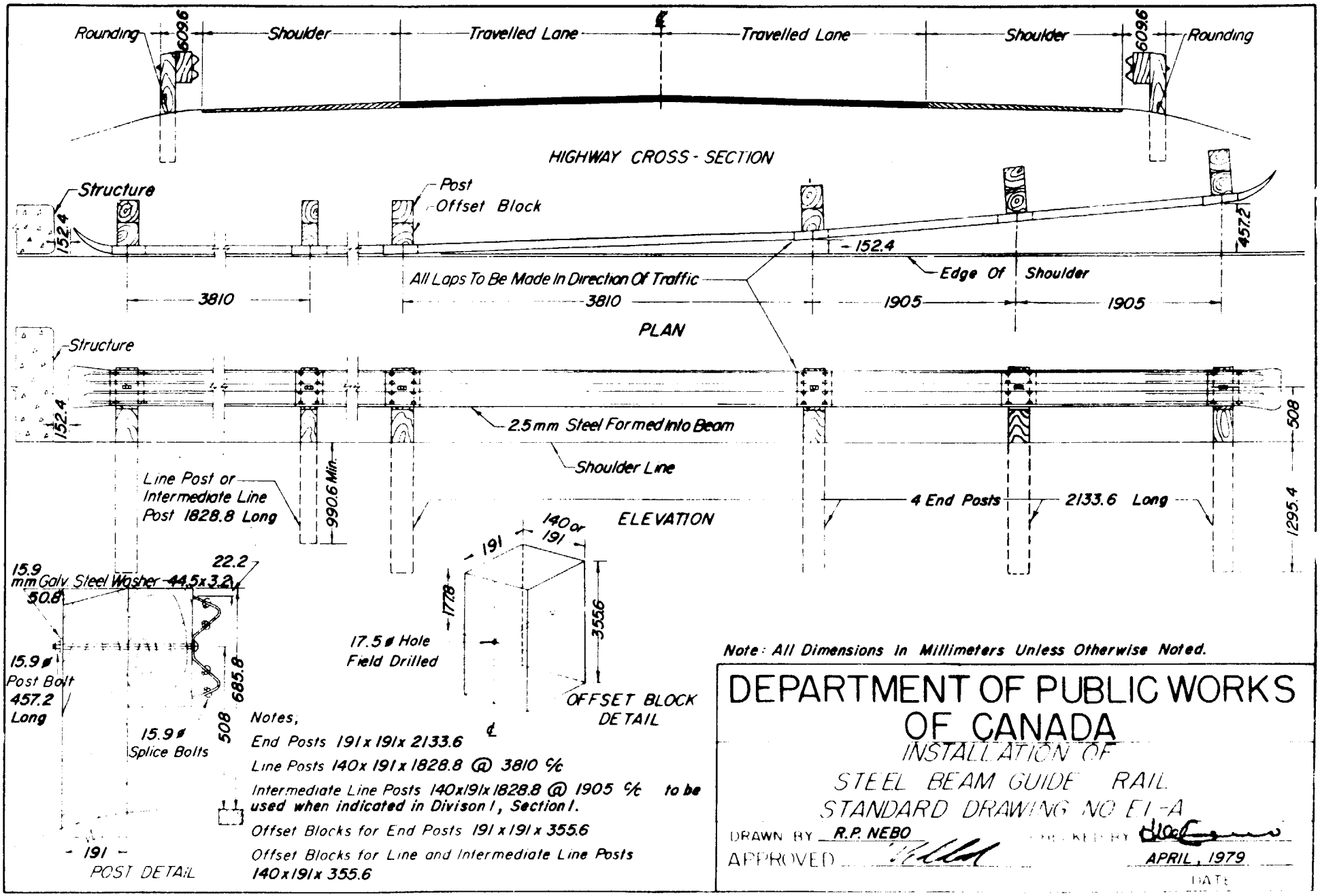
9.17.3 Construction

Guiderail consists of a steel beam mounted on wooden posts. The post holes shall be dug to the depths and at the locations shown on the Plans or as directed by the Engineer. The bottom of the holes shall be rammed so that the post has a firm foundation. After the posts are set the tops shall be cut and the required holes bored at the proper locations. The tops of the posts shall be painted with two coats of creosote oil.

The beam shall be erected as shown on the Plans and shall provide a smooth, taut installation closely conforming to the line and grade of the shoulder. After erection of the beams, the holes shall be backfilled with suitable material and thoroughly tamped. The terminal sections shall be attached to the beam sections at the end posts.

9.17.4 Measurement

The quantity of guiderail that will be measured for payment shall be the number of metres of steel beam guiderail acceptably installed as directed by the Engineer in accordance with these Specifications.



Notes,

End Posts 191 x 191 x 2133.6

Line Posts 140 x 191 x 1828.8 @ 3810 c/c

Intermediate Line Posts 140 x 191 x 1828.8 @ 1905 c/c to be used when indicated in Divison 1, Section 1.

Offset Blocks for End Posts 191 x 191 x 355.6

Offset Blocks for Line and Intermediate Line Posts 140 x 191 x 355.6

Note: All Dimensions In Millimeters Unless Otherwise Noted.

DEPARTMENT OF PUBLIC WORKS OF CANADA

INSTALLATION OF

STEEL BEAM GUIDE RAIL

STANDARD DRAWING NO E1-A

DRAWN BY R.P. NEBO

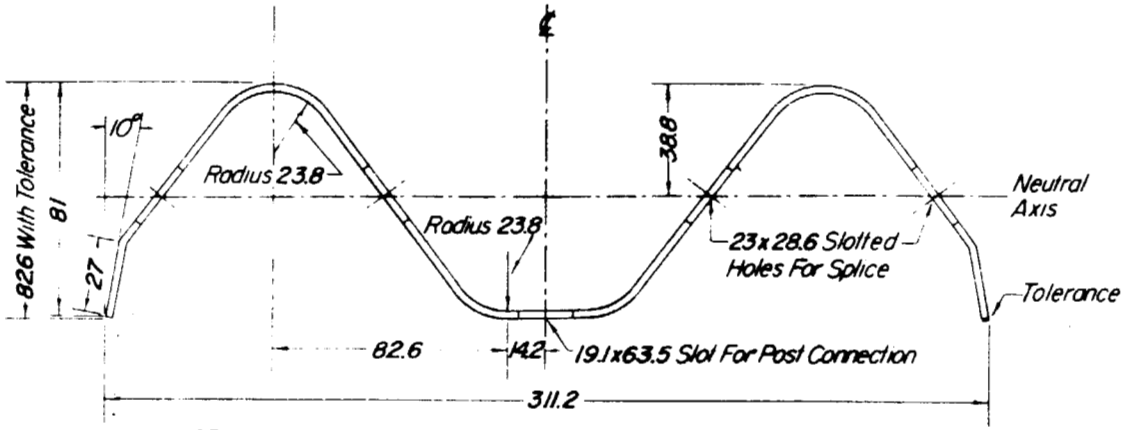
CHECKED BY

APPROVED

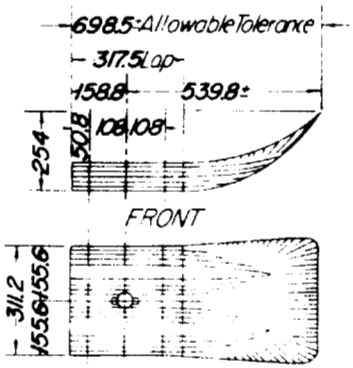
APRIL, 1979

DATE

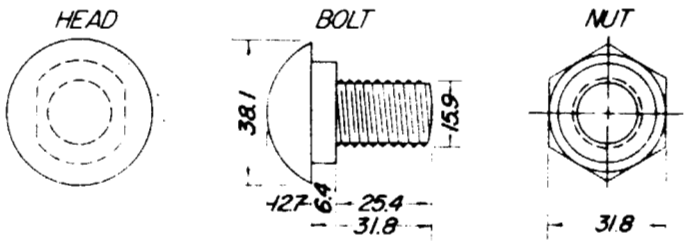
TYPICAL SECTION
OF BEAM



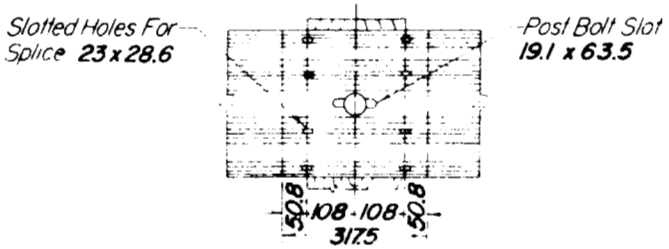
DETAIL OF
TERMINAL SECTION



SPLICE BOLT DETAIL



DETAIL OF BEAM SPLICE



DEPARTMENT OF PUBLIC WORKS OF CANADA

STEEL BEAM GUIDE RAIL STANDARD DRAWING NO E1-B

DRAWN BY R.P.NEBO CHECKED BY

APPROVED

APRIL, 1979

These Articles of Agreement made in duplicate this day

of 19

Between

Her Majesty the Queen, in right of Canada (referred to in the documents forming the contract as "Her Majesty") represented by the Minister of Public Works (referred to in the documents forming the contract as "the Minister")

and

(referred to in the documents forming the contract as the "Contractor")

Witness that Her Majesty and the Contractor covenant and agree as follows:

Article I

The Contractor will between the date of these Articles of Agreement and

in a careful and workmanlike manner execute the following work;

which work is more particularly described in the documents that are attached hereto, entitled "Plans and Specifications" and marked "A" (referred to in the documents forming the contract as the "Plans and Specifications") at the place and in the manner therein set out.

Article II

(1) Her Majesty will pay to the Contractor as consideration for the execution of the portion of the work to which the fixed price arrangement is applicable the sum of $ (subject to any additions or deductions provided for in these Articles, the General Conditions, the Terms of Payment, or the Labour Conditions except any addition or deduction which is expressly stated to be applicable only to a unit price arrangement), at the times and in the manner set out or referred to in the document that is attached hereto entitled "Terms of Payment" and marked "B" (referred to in the documents forming the contract as the "Terms of Payment").

(2) (a) Her Majesty will pay to the Contractor as consideration for the execution of the portion of the work to which the unit price arrangement is applicable a sum equal to the number of units of measurement of each class of labour, plant or material actually performed, used or supplied by the Contractor in the execution of the work as measured by the Engineer and set out in the Engineer's Final Certificate of Measurement multiplied by the price for each such unit of measurement as set out in the Unit Price Table as added to or amended in accordance with paragraphs (b), (c) and (d) of this Article or as, in a proper case, determined in accordance with paragraphs (e) of this Article (such sum being subject to any additions or deductions provided for in the General Conditions, Terms of Payment, Labour Conditions, except any addition or deduction which is expressly stated to be applicable only to a fixed price arrangement) at the times and in the manner set out or referred to in the document that is attached hereto entitled "Terms of payment" and marked "B" (referred to in the documents forming the contract as the "Terms of Payment").

(b) The Engineer and the Contractor may by agreement in writing add to the Unit Price Table classes of labour, plant or material together with units of measurement, prices per unit and estimated quantities therefor where any labour, plant or material which will be included in the Engineer's Final Certificate of Measurement is not included in any class of labour, plant or material set out in the Unit Price Table.

(c) The Engineer and the Contractor may by agreement in writing amend the price per unit set out in the Unit Price Table for any class of labour, plant or material included therein where an estimated quantity is set out therein for that class of labour, plant or material, if the Engineer's Final Certificate of Measurement shows or will show that the total quantity of that class of labour, plant or material performed, used or supplied by the Contractor in executing the work is less than 85% of that estimated quantity.

(d) The Engineer and the Contractor may by agreement in writing amend the price per unit set out in the Unit Price Table for any class of labour plant or material included therein where an estimated quantity is set out therein for that class of labour, plant or material, by establishing a price per unit for units of that class of labour, plant or material performed, used or supplied by the Contractor in executing the work which are in excess of 115% of that estimated quantity.

Article II (Cont'd)

(e) Where the Engineer and the Contractor do not agree as contemplated in paragraphs (b), (c) and (d) of this Article the Engineer shall determine the class of and the unit of measurement of the labour, plant or material involved and the price per unit therefor shall be determined in accordance with section 46 of the General Conditions.

(f) For the information and guidance of the Contractor and the persons administering the contract on behalf of Her Majesty, but not so as to constitute a warranty, representation or undertaking of any nature, either by Her Majesty to the Contractor or by the Contractor to Her Majesty, it is estimated that the total amount payable by Her Majesty to the Contractor for the portion of the work to which the unit price arrangement is applicable will not exceed $

(3) Subsection (1) of this Article is not applicable where the unit price arrangement applies to the whole of the work.

(4) Subsection (2) of this Article is not applicable where the fixed price arrangement applies to the whole of the work.

(1) Subject to subsections (2) and (3) of this Article, the document attached hereto, entitled "General Conditions" and marked "C" (referred to in the documents forming the contract as the "General Conditions"), the document attached hereto entitled "Labour Conditions" and marked "D" (referred to in the documents forming the contract as the "Labour Conditions"), the document attached hereto and entitled "Insurance Schedule" and marked "E" (referred to in the documents forming the contract as the "Insurance Schedule"), the "Plans and Specifications", the "Terms of Payment" and these Articles of Agreement all form part of the contract between Her Majesty and the Contractor.

(2) Any of the provision of these Articles, the Terms of Payment and the General Conditions which are expressly stated to be applicable only to a unit price arrangement are not applicable to the whole or to the portion of the work to which the fixed price arrangement is applicable.

(3) Any of the provisions of these Articles, the Terms of Payment and the General Conditions which are expressly stated to be applicable only to a fixed price arrangement are not applicable to the whole or to the portion of the work to which the unit price arrangement is applicable.

Article IV

The amount of $, that has been deposited with the Minister by the Contractor as a security deposit for the due fulfilment of the contract will be dealt with in accordance with the provisions concerning security deposit in the General Conditions.

The Contractor has furnished and Her Majesty accepts a Performance Bond, (insert details – name of Company, amount, date, etc.)

and a Labour and Material Payment Bond, (insert details – name of Company, amount, date, etc.)

with respect to the execution of the work by the Contractor, which bond or bonds shall operate according to their tenor. The Contractor shall post on the site of the work a notice that a Labour and Material Payment Bond is in force together with the name and address of the surety thereunder, definition of those persons protected thereunder and an outline of the procedure for submitting a claim thereunder.

Article V

For all purposes of or incidental to the contract, the Contractor's address shall be deemed to be:

Article VI

(1) Her Majesty and the Contractor agree that the following table is the Unit Price Table for the purposes of the contract:

Column 1	Column 2	Column 3	Column 4
Class of labour plant or material	Unit of Measurement	Price per Unit	Estimated quantity

(2) The Unit Price Table set out in subsection (1) designates the portion of the work to which the unit price arrangement is applicable.

(3) The portion of the work which does not fall within subsection (2) of this Article is the portion of the work to which the fixed price arrangement is applicable.

Indian and Northern Affairs — Affaires indiennes et du Nord

LAND USE PERMIT — **PERMIS D'UTILISATION DES TERRES**

NORTHERN AFFAIRS PROGRAM — **PROGRAMME DES AFFAIRES DU NORD**

PERMIT CLASS - PERMIS CATEGORIE: A

PERMIT NUMBER - PERMIS N°: N78E934

Subject to the Territorial Land use regulations and the terms and conditions in this permit, authority is hereby granted to:

Sous réserve du règlement sur l'utilisation des terres territoriales et de conditions de ce permis:

PUBLIC WORKS CANADA

Permittee - Détenteur de permis

To proceed with the land use operation described in the application of:

Est autorisé à entreprendre les travaux d'exploitation des terres décrits dans demande de permis du:

DATE	SIGNED BY - SIGNATURE
November 3, 1978	E. Viddal
TYPE OF LAND USE OPERATION / GENRE DE TRAVAUX D'EXPLOITATION DES TERRES	**LOCATION - EMPLACEMENT**
Highway Construction and winter access road	Mile 67.1 to 129.3 (Winter road 35.5 - 129.3)

This permit may be assigned, extended, discontinued, suspended or cancelled pursuant to the territorial land use regulations.

Ce permis peut faire l'objet d'une cession, d'une prolongation, d'une cessation d'une suspension ou d'une annulation, en vertu du règlement sur l'utilisation des terres territoriales.

Dated at / Date à: Yellowknife, N.W.T.

[signature]
Engineer - Ingénieur

This / Ce 14 Day of / jour de December, 19 78

December 15, 1978
Commencement Date - Date du début des travaux

December 15, 1980
Expiry Date - Date d'achèvement

NOTE

IT IS A CONDITION OF THIS PERMIT THAT THE PERMITTEE COMPLY WITH ANY OTHER APPLICABLE ACT, REGULATION, ORDINANCE, BY-LAW OR ORDER. DEFAULT HEREOF MAY RESULT IN SUSPENSION OR CANCELLATION OF THIS PERMIT.

REMARQUE

LE DÉTENTEUR DU PRÉSENT PERMIS DOIT SE CONFORMER À TOUT AUTRE RÈGLEMENT, LOI, DÉCRET, RÈGLEMENT MUNICIPAL OU ARRÊTÉ APPLICABLE. LE MANQUEMENT À CETTE OBLIGATION POURRAIT DONNER LIEU À LA SUSPENSION OU À L'ANNULATION DU PERMIS.

OPERATING CONDITIONS - PART I

The Operator DEPARTMENT OF PUBLIC WORKS - CANADA shall conduct the construct Liard Highway mile 67 to 129.3 and operate winter road mile 35.5 to 129.3.
Land Use Operation authorized by this Land Use Permit in accordance with the following operating conditions:

GENERAL CONDITIONS

1. THE OPERATOR SHALL ADHERE TO ALL APPLICABLE CONDITIONS STATED IN PART I (GENERAL) OF THE TERRITORIAL LAND USE REGULATIONS.

2. THE OPERATOR'S FIELD SUPERVISOR SHALL CONTACT THE Fort Simpson DISTRICT OFFICE OF THE NORTHWEST LANDS AND FOREST SERVICE PHONE NUMBER 695-2231 FORTY EIGHT HOURS PRIOR TO THE COMMENCEMENT OF THIS LAND USE OPERATION.

3. THE OPERATOR IS RESPONSIBLE FOR UNDERTAKING FOREST FIRE PREVENTION AND SUPPRESSION MEASURES, AS DIRECTED BY THE NORTHWEST LANDS AND FOREST SERVICE.

4. PRIOR APPROVAL SHALL BE OBTAINED THROUGH THE LAND USE INSPECTOR FOR PROPOSED CHANGES IN THE APPROVED PLAN OF OPERATIONS, CAMP LOCATIONS AND OTHER ASSOCIATED FACILITIES.

5. THE LAND USE PERMIT AND ANNEXED OPERATING CONDITIONS SHALL BE POSTED AT THE SITE OF OPERATIONS AND ALL PERSONNEL MADE FAMILIAR WITH THE CONTENTS AND INTENT.

6. INSTALLATION OF EROSION CONTROLS AND CLEANUP OF WASTE WILL BE CONTINUOUS AND KEEP PACE WITH PROJECT ACTIVITY.

7. NOTWITHSTANDING THE TERMINATION OF THE PERMIT, THE OBLIGATION OF THE OPERATOR WITH RESPECT TO CLEANUP AND RESTORATION DOES NOT CEASE UNTIL HE IS IN POSSESSION OF A LETTER OF CLEARANCE FROM THE HEAD, LAND USE SECTION, DIAND, YELLOWKNIFE, N.W.T.

FUEL STORAGE

8. PRIOR TO THE INSTALLATION OF FUEL STORAGE FACILITIES EXCEEDING 5,000 GALLONS THE OPERATOR WILL REQUIRE WRITTEN APPROVAL FROM THE HEAD, LAND USE SECTION, DIAND, YELLOWKNIFE, N.W.T.

9. FOR FUEL STORAGE FACILITIES OF 5,000 GALLONS OR LESS THE OPERATOR SHALL LOCATE AND PLACE FUEL STORAGE CONTAINERS SO THAT ANY SPILLED OR LEAKED FUEL WILL BE TOTALLY CONTAINED.

10. FUEL OUTLETS EXCEPTING THE OUTLET CURRENTLY IN USE SHALL BE SEALED TO PREVENT LEAKAGE.

11. THE LAND USE INSPECTOR WILL BE INFORMED OF THE LOCATION OF ALL FUEL CACHES.

12. ALL STATIONARY FUEL STORAGE FACILITIES SHALL BE CLEARLY MARKED WITH FLAGS OR POSTS SO THEY ARE PLAINLY VISIBLE, REGARDLESS OF SNOW COVER, WEATHER OR DAYLIGHT CONDITIONS.

WILDLIFE

13. THE OPERATOR SHALL NOT USE MACHINERY OR OTHERWISE CONDUCT THE OPERATION SO AS TO HARASS OR UNNECESSARILY DISTURB WILDLIFE OR DAMAGE WILDLIFE HABITAT.

14. THE OPERATOR SHALL COOPERATE AT ALL TIMES WITH GAME OFFICIALS TO PROTECT WILDLIFE AND WILDLIFE HABITAT.

15. (A) ALL FIREARMS SHALL BE UNDER THE CONTROL OF SUPERVISORS AND BE USED ONLY FOR PROTECTION.

(B) THE PRESENCE OF A WILD ANIMAL THAT MAY CREATE A HAZARD IS TO BE REPORTED IMMEDIATELY TO THE NEAREST GAME MANAGEMENT OFFICER OR R.C.M.P. DETACHMENT.

(C) THE FEEDING OF WILDLIFE IS PROHIBITED.

16. FOOD AND CAMP KITCHEN WASTE WILL BE HANDLED IN A MANNER TO AVOID ATTRACTING WILDLIFE.

17. HUNTING IS PROHIBITED FOR PERSONS EMPLOYED BY THE OPERATOR OR CONTRACTOR AND RESIDENT IN A PERMITTEE OR CONTRACTOR OPERATED CAMP (I.E. CAMPS WILL NOT BE USED AS A BASE FOR HUNTING).

VEHICLE TRAVEL

18. WINTER COMMENCEMENT AND SPRING SHUTDOWN DATES FOR OVERLAND VEHICLE MOVEMENT WILL BE DETERMINED BY THE HEAD, LAND USE SECTION, BASED ON LOCAL TERRAIN CONDITIONS.

19. WINTER ACCESS ROADS SHALL BE OF PACKED SNOW CONSTRUCTION.

20. IN ORDER TO MINIMIZE SURFACE DISTURBANCE, BULLDOZER BLADES WHEN USED OUTSIDE THE AREA OF CONSTRUCTION ACTIVITY SHALL BE ELEVATED A MINIMUM OF SIX INCHES ABOVE THE GROUND BY MUSHROOM-TYPE SHOES OR A SIMILAR DEVICE. REMOVAL MAY BE AUTHORIZED BY THE LAND USE INSPECTOR FOR SPECIAL PURPOSES.

21. THE OPERATOR SHALL PRESCOUT PROPOSED ROUTES AND LINES AND SHALL INDICATE WITH GROUND MARKERS THE MOST FAVORABLE LOCATIONS FOR CROSSING STREAMS OR AVOIDING TERRAIN OBSTACLES PRIOR TO MOVEMENT OF CRAWLER TRACTORS OR OTHER HEAVY VEHICLES.

22. SHOULD EXCESSIVE TERRAIN DAMAGE RESULT FROM VEHICLES, THEIR USE WILL BE LIMITED OR STOPPED BY THE LAND USE INSPECTOR.

ARCHAEOLOGICAL

23. (A) ARCHAEOLOGICAL FINDS MUST BE MADE KNOWN TO THE LAND USE INSPECTOR.

(B) IDENTIFIED ARCHAEOLOGICAL SITES MUST BE PROTECTED FROM DAMAGE OR INTERFERENCE.

ROW CLEARANCE AND CONSTRUCTION - PART II

CAMPSITES AND STAGING AREAS

24. IN ORDER TO MINIMIZE SURFACE DISTURBANCE OR SOIL SUBSIDENCE THE OPERATOR SHALL PREPARE THE GROUND SURFACE BENEATH ALL FACILITIES AND STRUCTURES ASSOCIATED WITH THIS LAND USE OPERATION.

25. PORTABLE RAMPS WILL BE USED FOR BARGE LOADING AND UNLOADING: PUSH-OUTS WILL NOT BE USED UNLESS AUTHORIZED BY THE LAND USE INSPECTOR.

26. AN AREA CLEARLY SIGNED SALVAGE SHALL BE MARKED OUT, AND USED FOR THE STORAGE OF ALL SURPLUS STORES AND EQUIPMENT AND SALVAGEABLE MATERIAL.

27. THE DISPOSAL OF NONSALVAGEABLE EQUIPMENT AND PARTS SHALL BE BY COMPACTION AND BURIAL AT A SITE APPROVED BY THE LAND USE INSPECTOR.

28. KITCHENS AND WASH CARS SHOULD INCORPORATE WATER SAVING AND WASTE SEPARATION FEATURES.

29. ALL COMBUSTIBLE GARBAGE AND DEBRIS SHALL BE INCINERATED IN A FUEL-FIRED, FORCED-AIR INCINERATOR AT LEAST DAILY, AND THE RESIDUE AND ALL OTHER NONCOMBUSTIBLE GARBAGE AND DEBRIS SHALL BE DISPOSED OF IN A MANNER ACCEPTABLE TO THE LAND USE INSPECTOR.

30. ALL WASTE PETROLEUM PRODUCTS SHALL BE DISPOSED OF DAILY BY INCINERATION.

31. THE TAKING OF WATER AND DISPOSAL OF WATERBORNE WASTE SHALL BE IN ACCORDANCE WITH THE NORTHERN INLAND WATERS ACT.

TIMBER CLEARING AND DISPOSAL

32. DISPOSAL OF TIMBER AND BRUSH FROM THE RIGHT-OF-WAY AND ASSOCIATED FACILITIES WILL BE DONE BY ONE OF THE FOLLOWING METHODS:

    (A) CLEARING AND PLACING TIMBER AND BRUSH WITHIN THE RIGHT-OF-WAY FOR INCORPORATION INTO THE GRADE.

    (B) REMOVAL TO A BORROW SITE OR SIMILAR SUITABLE LOCATION FOR BURNING AND/OR BURIAL.

    (C) BURNING SMALL PILES.

33. WHEN CLEARING AND BRUSHING WITHIN THE RIGHT-OF-WAY IS DONE BY HAND CREWS, STUMPS WILL BE CUT AS CLOSE TO THE GROUND AS POSSIBLE. BRUSH LESS THAN 2 FEET HIGH MAY BE LEFT STANDING.

34. PROCEDURES FOR ADVANCED CLEARING STREAM BANKS OR STEEP SLOPES REQUIRE PRIOR APPROVAL OF THE LAND USE INSPECTOR.

35. ON AREAS ADJACENT TO BORROW PITS AND DESIGNATED AS SPOIL AREAS, TIMBER AND BRUSH MATERIALS WILL BE WALKED DOWN PRIOR TO THE PLACEMENT OF SPOIL MATERIALS.

36. LEANERS AND DEBRIS SHALL NOT BE LEFT IN STANDING TIMBER.

GRUBBING (OR STRIPPING)

37. AREAS TO BE GRUBBED SHALL BE DEFINED BY THE OPERATOR TO THE LAND USE INSPECTOR PRIOR TO COMMENCEMENT.

38. GRUBBING SHALL BE CONFINED TO MINIMUM AREAS FOR PURPOSES OF CUTS, DITCHING AND BORROW PITS.

39. MOVEMENT OF GRUBBING EQUIPMENT SHALL BE CONFINED TO AREAS TO BE GRUBBED AND RIGHT-OF-WAY.

40. DISPOSAL OF GRUBBED MATERIAL WILL BE BY BURNING OR BURIAL.

ACCESS ROADS

41. ACCESS ROUTES REQUIRE PRIOR APPROVAL BY THE LAND USE INSPECTOR.

42. ACCESS TO BORROW PITS SHALL BE LIMITED TO:

    (A) A SINGLE ROUTE OF A MINIMUM WIDTH NECESSARY FOR TWO-WAY PASSAGE OF VEHICLES: OR

    (B) TWO ROUTES OF A MINIMUM WIDTH NECESSARY FOR ONE-WAY PASSAGE OF VEHICLES.

43. DOGLEG APPROACHES ARE REQUIRED ON ALL BORROW PIT ACCESS ROADS.

44. TOTAL DISPOSAL OF TIMBER ON ACCESS ROADS SHALL BE CARRIED OUT TO THE LIMIT OF VISIBILITY FROM THE FINISHED ROADWAY.

BORROW PITS AND WASTE PILES

45. ADDITIONAL DEVELOPMENT AND RESTORATION PROPOSALS FOR BORROW PITS, CUTS AND WASTING AREAS SHALL BE APPROVED BY THE LAND USE INSPECTOR PRIOR TO THE COMMENCEMENT OF CLEARING.

46. IN TIMBERED AREAS A RESIDUAL TIMBER STAND OF 300 FEET SHALL BE MAINTAINED BETWEEN THE HIGHWAY AND BORROW OR WASTE AREAS, UNLESS OTHERWISE AUTHORIZED BY THE LAND USE INSPECTOR.

47. STRIPPED MATERIAL SHALL BE REMOVED IN SUCH A MANNER AND PLACED IN SUCH A LOCATION AT THE EDGE OF THE BORROW AREA AS TO FACILITATE RESTORATION ON COMPLETION OF THE OPERATION.

48. BACKSLOPES IN BORROW AREAS SHALL BE MAINTAINED AT A SLOPE OF TWO HORIZONTAL TO ONE VERTICAL FOR COMMON EXCAVATION, OR OTHERWISE TO THE SATISFACTION OF THE LAND USE INSPECTOR.

49. WASTE PILES WILL HAVE A LOW PROFILE FOR STABILITY.

50. LEVELLING AND SHAPING OF WASTE PILES WILL BE PROGRESSIVE WITH OPERATIONS.

DRAINAGE AND STREAM CROSSINGS

51. THE OPERATOR SHALL MAKE TEMPORARY CROSSINGS OF STREAMS IN SUCH A MANNER AS TO AVOID EXCAVATING OR OTHERWISE UNDULY DISTURBING APPROACHES, SHORES, BANKS AND STREAMBEDS AND, NOTWITHSTANDING THE FOREGOING, NO EXCAVATIONS SHALL BE MADE WITHOUT THE PRIOR APPROVAL OF THE LAND USE INSPECTOR. NO DEBRIS WILL BE DEPOSITED IN ANY STREAM DURING THE OPERATIONS.

52. APPROVAL FOR ALL PERMANENT CROSSINGS MUST BE AUTHORIZED UNDER THE NORTHERN INLAND WATERS ACT.

53. THE PLACEMENT OF CULVERTS WILL BE PROGRESSIVE WITH GRADE CONSTRUCTION IN ORDER TO PREVENT OBSTRUCTION TO NORMAL DRAINAGE.

54. DRAINAGE WILL BE PROVIDED FOR WHEN ESTABLISHING ACCESS ROADS.

55. EXCAVATED MATERIAL NOT SUITABLE FOR PROJECT USE MUST BE DISPOSED OF IN A LOCATION AND MANNER SATISFACTORY TO THE LAND USE INSPECTOR.

56. ANY OBSTRUCTION TO NATURAL DRAINAGE OCCURRING DURING THE LAND USE OPERATION SHALL BE REMOVED AND CONDITIONS RESTORED TO THE ORIGINAL STATE AS QUICKLY AS POSSIBLE.