

REPORT RAPPORT

NORTHERN ROAD INVENTORY AND RATING SYSTEM
NORTHWEST TERRITORIES
JULY 1981

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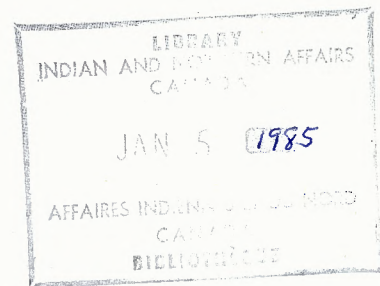
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NORTHERN ROAD INVENTORY AND RATING SYSTEM
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JULY 1981

Transportation Division

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EXECUTIVE SUMMARY

The "Northern Roads Task Force" report of December 1971 noted that the emphasis in future road program development was shifting from the construction of new roads to the reconstruction and upgrading of existing roads. Road reconstruction programs have since been implemented in the N.W.T. and most high priority road sections have been or are in the process of reconstruction. However, in order to substantiate current reconstruction program proposals and to justify future expenditure levels in the N.W.T., it was necessary to update the "Road Inventory & Priority Rating System" Report (EA-HQ-79-3) undertaken in 1977. The system's update is the subject of this report (EA-HQ-81-44).

The Road Inventory and Priority Rating System provides for a physical inventory of the road network and a priority rating of individual road sections based on the adequacy of the original design, existing service functions and maintenance effort. By comparing the data with established standards, an indication of the relative priority for reconstruction was determined.

A comparison of the 1977 and 1981 ratings indicates a general deterioration in the condition of the N.W.T. road network over this 5 year period. An insufficient level of capital expenditures is considered to be the major contributing factor.

The above conclusion is further substantiated by the fact that road expenditure levels of other federally funded agencies indicate annual expenditures in the order of 1.1 to 2.1% of the replacement value of their respective road networks. By comparison, the 1981 replacement value of the road networks in the N.W.T. is estimated at \$570,000,000 with \$3,000,000, or 0.53% of the total road replacement value, being spent annually on reconstruction.

The report recommends, based on an evaluation of the technical priority ratings and expenditure levels of other road agencies, a level of expenditure in the order of 6.5 to 10.0 million (1981 constant) dollars per year. This level of expenditure is considered to be necessary to halt and perhaps reverse the deteriorating trend in the N.W.T. road network.

The report further recommends that the Road Inventory & Priority Rating System be updated annually as a basis for evaluating the impact of road reconstruction expenditures on the condition of the network and for establishing future road reconstruction programs in the N.W.T.

ROAD INVENTORY AND RATING SYSTEM

1.0 INTRODUCTION

As noted in the report "Northern Roads Task Force - December 1971", the emphasis in future road program development was shifting from the construction of new roads to the upgrading of existing roads.

Emphasis was therefore required on the establishment of technical priorities for reconstruction and it was agreed in 1977 that the Transportation Division of the Engineering and Architecture Branch of the Department with the co-operation of the Northern Affairs Program and the Territorial Highway Department develop and implement a road inventory and priority rating system. This system provided the basis for the establishment of priorities for reconstruction and a long range maintenance program. The reconstruction program has since been implemented, and all high priority road sections have been or are in the process of reconstruction. However, in order to re-validate the reconstruction program and to justify future expenditures, it was necessary to update the "Road Inventory & Priority Rating System" Report (EA-HQ-79-3) initially undertaken in 1977. The system's update is the subject of the present report (EA-HQ-81-44).

2.0 SCOPE

The priority rating system includes the physical inventory of the territorial roads network and the priority rating of the individual links in the road network.

2.1 Physical Inventory

By compiling a physical inventory for the road system and comparing the data with established standards for such roadways, an indication of the deficiency level of the roadway can be obtained. The concept of roadway deficiency includes design, service and maintenance factors.

2.2 Priority Rating

The priority rating, based on the physical inventory, can be used to assist in the determination of a reconstruction schedule for the individual sections evaluated.

The priority rating system is designed to evaluate objectively priorities solely on a functional basis. Priority considerations of a more subject nature which are unrelated to design, service, or maintenance factors are not addressed in the rating formulae.

3.0 SYSTEM METHODOLOGY

3.1 Road Classification System

The purpose of road classification is to provide a standard for the identification and description of roads within a limited number of classes, grouped according to function and level of service.

The classification system developed by the Roads and Transportation Association of Canada (RTAC) has been adapted to roads in the Northwest Territories. Provision is made in the RTAC system for separate grouping of the development roads. This grouping has been accepted for all roads which fall below minimum traffic volume requirements for hot mix paving (500 SADT).

Details of the classification system can be found in DRM 10-7/97.3.3. This classification system provides for major variations in terrain conditions and design speeds and provides sufficient flexibility to meet foreseeable needs in the North.

Geometric and structural design standards are based on design speeds and terrain types for the various road classes.

3.2 Tolerable Standards

Because universal and immediate upgrading of all roads which are below the minimum design standards is impracticable, it was therefore necessary to establish a second, lower standard which is still sufficient to ensure traffic safety and capacity. These tolerable standards, which are linked to the classification system, are shown in the chart below and were used for evaluation purposes.

DEVELOPMENT ROAD TOLERABLE STANDARDS

Road Class	DAU		DCU		DLU		
Design Speed Km/hr	100	80	100	80	100	80	50
Min Radius of curve (m)	320	200	320	200	320	200	80
Max. Gradient %	8	10	8	10	10	11	12
Roadway Width (m)	8.5	8.0	8.0	7.5	7.5	7.5	7.0
Stopping Sight Distance (m)	200	140	200	140	200	140	65
Passing Sight Distance (m)	680	560	680	560	680	560	340

4.0 ROAD EVALUATION

4.1 Evaluation System

An evaluation system has been developed to provide a qualitative analysis of existing conditions in comparison to tolerable standards (see EA-HQ-79-03).

The system is based on a detailed analysis of three major areas.

- Geometric Design Adequacy
- Maintenance Factors
- Service Factors

4.1.1 Geometric Design Factors

Geometric design adequacy is measured by comparison of existing dimensions to those specified as tolerable under the relevant classification. Numerical values are assigned to each deficiency. The design rating is such that the higher the score the greater the road design falls below the tolerable design standards. This rating provides information about the physical state of each road section.

4.1.2 Service Factors

Service Factors are measured by assignment of numerical values to recorded traffic volumes, service, function and level. Low service rating for a road indicate that it has low traffic volumes, is part of an access network to an area, and does not serve as a special function route such as a mine haul road or school route.

4.1.3 Maintenance Factors

Maintenance factors are measured by assignment of numerical values to a comparison of existing conditions to defined "Bench Mark" levels. A further assessment of maintenance demand is based on an evaluation of existing maintenance demand compared with estimated reductions in that demand which might be obtained through reconstruction to improved design standards.

High maintenance ratings indicate a road requiring a high degree of maintenance, and a low score indicates a road requiring little maintenance.

This score is based on: the cross-sectional configuration of the roadway (the condition of the side and back slopes); the surface condition (the ease of maintaining the road surface); the draining ability of the roadbed, culverts and ditches; and the maintenance demand due to deficiencies in meeting the design standards.

4.2 Length of Roads

Figure 1 describes the variation in road length by road classification for the Territories.

5.0 ROAD PRIORITY RATING

5.1 Priority Rating

A technical priority rating (in relative terms rather than absolute) can be obtained by summing the numerical values obtained under the headings: Design Factors, Maintenance Factors and Service Factors.

Figure II and III show the final ranking of road sections by priority rating.

5.2 Reconstruction Priority for Roads

The priority ratings are ranked in the same manner as the maintenance and service ratings i.e., the high score indicating a high priority for reconstruction and a low score indicating a low priority for reconstruction.

6.0 APPLICATION OF PRIORITY RATINGS

Using the technical priority ratings as a base, an overall reconstruction program can be planned by superimposing other considerations (economic and political) to develop recommended project phasing and scheduling. Descriptive statistical data can also be extracted for general information.

7.0 REPORT

The numerical format chosen for the report allows the engineer to quickly determine the condition of his roads, determine any problems that may exist, and select the proper reconstruction method necessary to bring that particular section up to an acceptable level of serviceability.

8.0 DATA ANALYSIS AND OBSERVATIONS

8.1 Statistical Inference

Analysis of the data reveals a mean weighted priority rating of 27 for the road network. The mean weighted priority rating is found by multiplying each priority rating by its corresponding section length, adding the products, and dividing the total by the sum of road section lengths (see figure IV).

The cumulative frequency curve (see figure V) of the weighted priority ratings infer that 70.6 percent of the total road network as a mean weighted priority rating of 27 or less. One might therefore consider that 70.6 per cent of the road network is relatively adequate and that any road reconstruction or rehabilitation program be addressed to those road sections which have a mean weighted priority rating of 27 or more.

8.2 Relative Location of Road Sections

It is noted that 29.4% of the road network has a mean weighted priority rating of 27 or more and that these road lengths are all located in the vicinity of the densely populated areas of Yellowknife and Hay River. These areas also have the highest car and truck traffic volumes.

8.3 Physical Condition of the Road Network

Since the 1977 survey, approximately 590 Km of new roads have been added to the N.W.T. road network. The 1981 data was therefore adjusted, by deleting these road sections in order to compare the 1977 and 1981 road priority rating data.

The 1977 data indicated a mean weighted priority rating of 26 whereas the 1981 adjusted data indicated a mean weighted priority rating of 29. (See figures VI and VII).

The mean weighted priority rating increase of 3 units between 1977 and 1981 indicates a general deterioration in the level of service over the period and that the level of expenditure over the same period was not adequate to maintain the 1977 level of service.

8.4 Levels of Expenditures

At present, the Indian and Inuit Affairs Program is spending annually an estimated 1.7% of the replacement value of their road network on reconstruction and upgrading. Parks Canada is spending annually an estimated 2.1% of the replacement value. Similarly, it is estimated that the annual rate of expenditure on roads in the Yukon Territory is 1.1%.

However, the 1981 replacement value of the roads in the N.W.T. is estimated at \$570,000,000 with \$3,000,000 or 0.52% of the total road replacement value being spent on reconstruction. On this basis, the present level of expenditure for reconstruction would appear to be insufficient when compared to other agencies.

A level of expenditure closer to 10 million (constant 1981) dollars per year, equivalent to 1.75% of the total road replacement value, would seem to be warranted to adequately protect the asset and achieve an acceptable level of service equivalent to a priority rating of 27.

The final determination of the actual level of expenditure must be based on factors going beyond the scope of the priority rating system in so far as the system evaluates reconstruction priorities solely on a functional basis. One must also take into consideration the socio-economic and financial aspects in establishing a road reconstruction program.

8.5 Reconstruction Cost Estimates

The reconstruction Class 'C' (constant 1981 dollars) estimates shown in Figure VIII have been provided by the N.W.T. Government based on their evaluation to upgrade each road section to provide an acceptable level

of service. The technical upgrading requirements for each road section have not been evaluated on the assumption that each project will be substantiated by feasibility studies and pre-engineering including the evaluation of alternatives on the basis of Benefit-Cost analysis.

9.0 RECOMMENDATIONS

Based on an evaluation of the technical priority ratings and expenditure levels of other road agencies a level of expenditure in the order of 6.5 to 10.0 million (1981 constant) dollars per year is considered to be necessary to halt and perhaps reverse the deteriorating trend in the N.W.T. road network.

The Road Inventory & Priority Rating System should be updated annually as a basis for evaluating the impact of road reconstruction expenditures on the condition of the network and/or establishing future road reconstruction programs in the N.W.T.

NORTHERN ROADS INVENTORY

KM

HIGHWAY	ARTERIAL		COLLECTOR		LOCAL			ACCESS			WINTER ROAD	SUB-TOTAL
	100	80	100	80	100	80	50	80	70	50		
MacKenzie	745.1								16		299	1,060.1
Hay River	51.5											51.5
Yellowknife			337.9			1.7		17			110	466.6
Ingraham Trail						69.2			11	6		86.2
Ft. Smith			266					14.3				280.3
Ft. Resolution			23.5	67.5								91.0
Liard			107.8									107.8
Dempster				207.1								207.1
TOTAL	796.6		735.2	274.6		70.9		31.3	27	6	409	2,350.6

Figure 1

PRIORITY RATINGS

NORTHERN ROADS CLASSIFICATION AND INVENTORY SYSTEM
NORTHWEST TERRITORIES

FIGURE II
Page 1 of 2

HIGHWAY #	ROAD	CLASSIFICATION	SECTION	LENGTH (KM)	DESIGN FACTORS			SUB-TOTAL (40)	SERVICE FACTOR			SUB-TOTAL (25)	MAINTENANCE FACTORS			SUB-TOTAL (35)	TOTAL (100)		
					HORIZONTAL ALIGNMENT (18)	ROAD WIDTH (16)	VERTICAL ALIGNMENT (6)		UNIQUE MODE (5)	SPECIAL FUNCTION (5)	VOLUME FACTOR (15)		CROSS SECTION (7)	SURFACE CONDITION (10)	DRAINAGE (10)			MAINTENANCE DEMAND (8)	
1.	MACKENZIE HIGHWAY	DAU 100	Alberta Border to Wrigley	860.1															
			(0-60.9)	60.9	0	0	0	0	5	5	4	14	6	8	6	8	28		
			(60.9-84.2(P))	23.3	0	0	1	1	5	5	4	14	7	9	5	8	29		
			(84.2-136.3)	52.1	2	0	6	6	5	5	3	13	5	10	5	8	28		
			(136.3-181.9)	45.6	0	0	0	0	5	5	3	13	3	6	4	6	19		
			(181.9-187.6(P))	5.7	0	0	0	0	5	5	3	13	4	4	0	4	12		
			(187.6-471.3)	283.7	0	0	0	0	5	0	1	6	2	2	5	2	11		
			(471.3-474.7)	3.4	0	0	0	0	5	0	1	6	2	4	6	2	14		
			(471.3-553.3)	82.0	0	0	0	0	5	0	1	6	6	5	6	2	19		
			(558.4-682.7)	124.3	0	0	0	0	5	0	1	6	7	8	6	0	21		
			(1490.0-1547.8))	49.8	0	7	0	7	5	0	1	6	4	0	5	2	11		
			(1547.8-1558.9))	11.1	0	0	0	0	5	0	0	6	0	0	0	0	0		
			(1558.9-1562.1))	3.2	0	0	0	0	5	0	1	6	2	2	0	0	4		
			Kakisa Lake Access Road	DXU 70	(0-13)	13	0	0	0	0	5	0	1	6	4	4	5	2	15
Jean-Marie Access Road (Winter)		(0-28)	28	-	-	-	-	-	-	-	-	-	-	-	-	-			
Norman Wells Airport Access	DXU 70	(0-3)	3	0	0	0	0	5	0	1	11	4	4	5	2	15			
Bear River Access Road (Winter)		(0-71)	71	-	-	-	-	-	-	-	-	-	-	-	-	-			
2.	HAY RIVER HIGHWAY	DAU 100	Enterprise to Hay River	51.5															
			(0.00-38.0(P))	38.0	0	0	0	0	5	5	6	16	2	2	4	2	10		
			(38.0-42.8(P))	4.8	0	4	0	4	5	5	12	22	7	6	3	8	24		
			(42.8-48.5))	5.7	0	0	0	0	5	5	12	22	3	5	5	5	18		
			(32.0-35(P))	3.0	0	0	0	0	5	5	3	13	0	0	0	0	0		
3.	YELLOWKNIFE HIGHWAY	DCU 100	Mackenzie Hwy. to Yellowknife	468.3															
			(0.00-24.1(F))	24.1	4	0	0	4	5	5	1	11	2	2	0	1	5		
			(25.0-243.2)	218.2	1	0	1	2	5	5	1	11	2	3	5	2	12		
			(243.2-335.5)	92.3	0	0	0	0	5	5	4	14	6	5	5	4	20		
			(335.5-338.8(P))	5.0	0	0	0	0	5	5	10	20	5	10	0	5	20		
			(338.8-340.5)	1.7	0	0	0	0	0	0	5	11	5	10	5	5	25		
			Yellowknife Access Road 49th St.	DLU 80	(0-6)	6	0	0	1	1	5	5	4	14	1	3	0	6	
			Port Providence Access Road	DXU 80	(0-110)	110	-	-	-	-	-	-	-	-	-	-	-	-	
Lac La Martre Access Road (Winter)	DXU 80	(0-11)	11	4	0	2	6	5	5	5	15	6	10	10	7	33			
4.	INGRAM TRAIL	DLU 80	Yellowknife to Cameron River	86.2															
			(0.00-1.6(P))	1.6	0	0	0	0	5	5	10	20	5	10	0	5	20		
			(1.6-5.0)	3.4	18	0	6	24	5	5	5	15	7	10	10	3	30		
			(5.0-19.0)	14.0	0	0	0	0	5	5	5	15	1	10	5	3	19		
			(19.0-33)	14.0	18	0	6	24	5	0	5	10	7	10	6	5	28		
			(33.0-69.2)	36.2	12	0	6	18	5	0	5	10	7	10	6	5	28		

PRIORITY RATING

NORTHERN ROADS CLASSIFICATION AND INVENTORY SYSTEM

NORTHWEST TERRITORIES

FIGURE II

Page 2 of 2

HIGHWAY #	ROAD	CLASSIFICATION	SECTION	LENGTH (KM)	DESIGN FACTORS			SUB-TOTAL (40)	SERVICE FACTOR			SUB-TOTAL (25)	MAINTENANCE FACTORS				SUB-TOTAL (35)	TOTAL (100)	
					HORIZONTAL ALIGNMENT (18)	ROAD WIDTH (16)	VERTICAL ALIGNMENT (6)		UNIQUE MODE (5)	SPECIAL FUNCTION (5)	VOLUME FACTOR (15)		CROSS SECTION (7)	SURFACE CONDITION (10)	DRAINAGE (10)	MAINTENANCE DEMAND (8)			
4.	Detah Access Road	DXU 70	(0-11)	11	9	4	3	16	5	5	1	11	7	9	8	7	31	51	
	Cassidy Point Access Road	DXU 50	(0-3)	3	0	8	0	8	5	0	1	6	7	10	9	7	33	41	
	Prelude Lake West Access Road	DXU 50	(0-2)	2	0	4	0	4	5	0	3	8	7	8	5	7	27	35	
	Prelude Lake East Access Road	DXU 50	(0-1)	1	0	11	0	11	5	0	1	6	5	10	8	7	30	51	
5.	FT. SMITH HIGHWAY	DCU 100	Hay River to Port Smith	280.3															
			(0.00-61.3(P))	61.3	0	0	0	0	5	5	4	14	2	2	2	2	8	21	
			(71.3-119.4)	58.1	0	0	0	0	5	5	4	14	2	3	4	3	12	24	
			(119.4-252.6)	133.2	0	0	0	0	5	5	4	14	2	3	5	3	13	21	
			(252.6-266)	13.4	0	0	0	0	5	5	4	14	4	3	0	4	11	21	
Hay River Indian Village Access Rd.	DXU 80	(0-14.3)	14.3	0	7	0	7	5	5	3	13	6	6	4	7	23	41		
6.	FT. RESOLUTION HIGHWAY	DLU 100	Pt. Smith Highway to Pine Point	91															
			(0.00-23.5(P))	23.5	0	1	0	1	5	5	1	11	4	4	5	4	17	21	
	Pt. Resolution Road	DLU 80	Pine Point to Ft. Resolution	67.5	0	1	0	1	5	5	1	11	5	5	7	4	21	31	
			(23.5-81.0)																
7.	LIARD HIGHWAY	DCU 100	Mackenzie Highway to Blackstone River		0	0	0	0	5	0	1	6	0	4	0	0	4	10	
			(0-107.8)																
8.	DEMPSTER HIGHWAY	DCU 80	Yukon to Highway 1	207.1															
			(0-75.7(P))	75.7	0	0	0	0	5	0	3	8	5	8	5	8	26	34	
			(75.7-142.6(P))	66.9	0	0	0	0	5	0	3	8	4	0	8	6	18	24	
			(142.6-207.1)	64.9	0	0	0	0	5	0	3	8	4	0	6	0	10	14	

NOTE: P stands for pavement or surface treatment
 F stands for Ferry Crossing

Northern Roads Inventory and Rating System

Northwest Territories Roads

A - Roads: Ranked by Priority Rating

Priority	Road	Highway #	Classification	Section	Design Sub-Total	Service Sub-Total	Maint. Sub-Total	Priority Rating
1	Ingraham Trail	4	DLU-80	(1.6-5)	24	15	30	69
2	Ingraham Trail	4	DLU-80	(19-33)	24	10	28	62
3	Detah	-	DXU-70	(0-11)	16	11	31	58
4	Ingraham Trail	4	DLU-80	(33-69.2)	18	10	28	56
5	RAE	-	DXU-80	(0-11)	6	15	33	54
6	Hay River	2	DAU-100	(38-42.8)	4	22	24	50
7	MacKenzie	1	DAU-100	(84.2-136.3)	8	13	28	49
8	Cassidy Pt.	-	DXU-50	(0-3)	8	6	33	47
9	Prelude Lake East	-	DXU-50	(0-1)	11	6	30	47
10	MacKenzie	1	DAU-100	(60.9-84.2)	1	14	29	44
11	Hay River Indian Village	-	DXU-80	(0-14.3)	7	13	23	43
12	MacKenzie	1	DAU-100	(0-60.9)	0	14	28	42
13	Yellowknife (49th St.)	3	DLU-80	(338.8-340.5)	0	16	25	41
14	Yellowknife	3	DCU-100	(335.5-338.8)	0	20	20	40
15	Hay River	2	DAU-100	(42.8-48.5)	0	22	18	40
16	Ingraham Trail	4	DLU-80	(0-1.6)	0	20	20	40
17	Prelude Lake West	-	DXU-50	(0-2)	4	8	27	39
18	Yellowknife	3	DCU-100	(243.2-335.5)	0	14	20	34
19	Ingraham Trail	4	DLU-80	(5-19)	0	15	19	34
20	Dempster	8	DCU-80	(0-75.7)	0	8	26	34
21	MacKenzie	1	DAU-100	(136.3-181.9)	0	13	19	32
22	Ft. Resolution	6	DLU-80	(23.5-91.0)	1	11	21	32
23	Ft. Resolution	6	DLU-100	(0-23.5)	1	11	17	28
24	MacKenzie	1	DAU-100	(558.4-682.7)	1	6	21	27
25	Ft. Smith	5	DCU-100	(119.4-252.6)	1	14	13	27
26	Ft. Smith	5	DCU-100	(61.3-119.4)	1	14	12	26
27	Hay River	2	DAU-100	(0-38)	0	16	10	26
28	Dempster	8	DCU-80	(75.7-142.6)	0	8	18	26
29	Norman Wells	-	DXU-70	(0-3)	0	11	15	26
30	Ft. Smith	5	DCU-100	(252.6-266)	1	14	11	25
31	MacKenzie	1	DAU-100	(181.9-187.6)	1	13	12	25
32	Mackenzie	1	DAU-100	(471.3-553.3)	1	6	19	25
33	Yellowknife	3	DCU-100	(25-243.2)	2	11	12	25
34	MacKenzie	1	DAU-100	(1498-1547.8)	7	6	11	24
35	Ft. Smith	5	DCU-100	(0-61.3)	0	14	8	22
36	Ft. Providence	-	DXU-80	(0-6)	1	14	6	21
37	Kasika Lake	-	DXU-70	(0-13)	0	6	15	21
38	MacKenzie	1	DAU-100	(471.3-474.7)	0	6	14	20
39	Yellowknife	3	DCU-100	(0-24.1)	4	11	5	20
40	Dempster	8	DCU-80	(142.6-207.1)	0	8	10	18
41	MacKenzie	1	DAU-100	(187.6-471.3)	0	6	11	17
42	MacKenzie	1	DAU-100	(1547.8-1558.9)	0	13	0	13
43	Hay River	2	DAU-100	(32-35)	0	13	0	13
44	Liard	7	DCU-100	(0-107.8)	0	6	4	10
45	MacKenzie	1	DAU-100	(1558.9-1562.1)	0	6	15	10

B. Winter Roads (Not Rated)

<u>Road</u>	<u>Length</u> (Km)
Bear River	(0-71)
Jean Marie	(0-28)
Lac La Marte	(0-110)
Tuktoyaktuk	(0-200)

Northern Roads Inventory and Rating System

Northwest Territories Roads

A - Roads: Ranked by Priority Rating (1981 wt. mean)

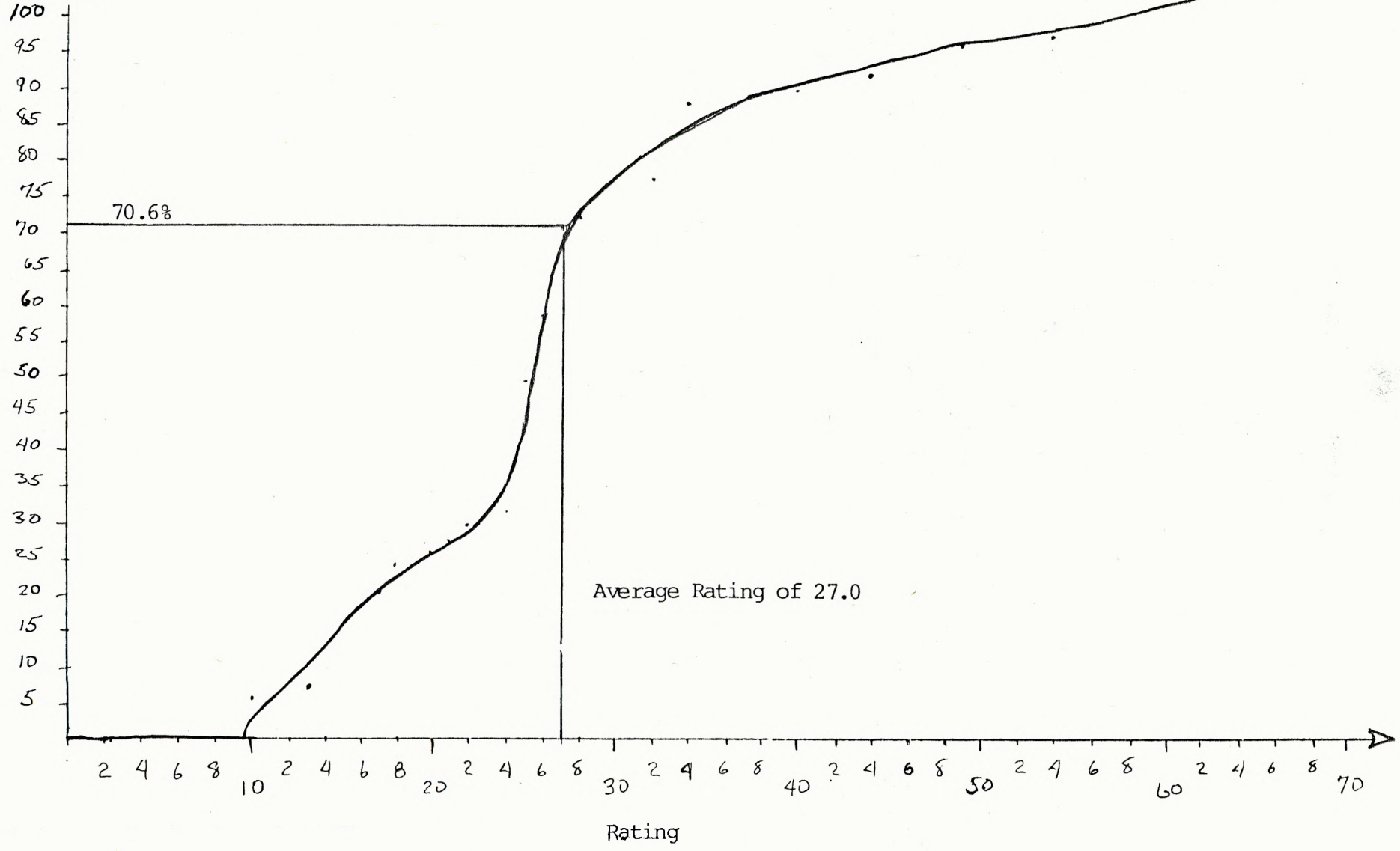
Priority	Road	Highway #	Classification	Section	Section Length	Priority Rating	Wt. Rating
1	Ingraham Trail	4	DLU-80	(1.6-5)	3.4	69	234.6
2	Ingraham Trail	4	DLU-80	(19-33)	14.0	62	868.0
3	Detah	-	DXU-70	(0-11)	11.0	58	638.0
4	Ingraham Trail	4	DLU-80	(33-69.2)	36.2	56	2,027.2
5	RAE	-	DXU-80	(0-11)	11.0	54	594.0
6	Hay River	2	DAU-100	(38-42.8)	4.8	50	240.0
7	MacKenzie	1	DAU-100	(84.2-136.3)	52.1	49	2,552.9
8	Cassidy Pt.	-	DXU-50	(0-3)	3.0	47	141.0
9	Prelude Lake East	-	DXU-50	(0-1)	1.0	47	47.0
10	MacKenzie	1	DAU-100	(60.9-84.2)	23.3	44	1,025.2
11	Hay River Indian Village	-	DXU-80	(0-14.3)	14.3	43	614.9
12	MacKenzie	1	DAU-100	(0-60.9)	60.9	42	2,557.8
13	Yellowknife (49th St.)	3	DLU-80	(338.8-340.5)	1.7	41	69.7
14	Yellowknife	3	DCU-100	(335.5-338.8)	3.3	40	132.0
15	Hay River	2	DAU-100	(42.8-48.5)	5.7	40	228.0
16	Ingraham Trail	4	DLU-80	(0-1.6)	1.6	40	64.0
17	Prelude Lake West	-	DXU-50	(0-2)	2.0	39	78.0
18	Yellowknife	3	DCU-100	(243.2-335.5)	92.3	34	3,138.2
19	Ingraham Trail	4	DLU-80	(5-19)	14.0	34	476.0
20	Dempster	8	DCU-80	(0-75.7)	75.7	34	2,573.8
21	MacKenzie	1	DAU-100	(136.3-181.9)	45.6	32	1,459.2
22	Ft. Resolution	6	DLU-80	(23.5-91.0)	67.5	32	2,160.0
23	Ft. Resolution	6	DLU-100	(0-23.5)	23.5	28	658.0
24	MacKenzie	1	DAU-100	(558.4-682.7)	124.3	27	3,356.1
25	Fort Smith	5	DCU-100	(119.4-252.6)	133.2	27	3,596.4
26	Fort Smith	5	DCU-100	(61.3-119.4)	58.1	26	1,510.6
27	Hay River	2	DAU-100	(0-38)	38.0	26	988.0
28	Dempster	8	DCU-80	(75.7-142.6)	66.9	26	1,739.4
29	Norman Wells	-	DXU-70	(0-3)	3.0	26	78.0
30	Ft. Smith	5	DCU-100	(252.6-266)	13.4	25	335.0
31	MacKenzie	1	DAU-100	(181.9-187.6)	5.7	25	142.5
32	MacKenzie	1	DAU-100	(471.3-553.3)	82.0	25	2,050.0
33	Yellowknife	3	DCU-100	(25-243.2)	218.2	25	5,455.0
34	MacKenzie	1	DAU-100	(1498-1547.8)	49.8	24	1,195.2
35	Ft. Smith	5	DCU-100	(0-61.3)	61.3	22	1,348.6
36	Ft. Providence	-	DXU-80	(0-6)	6.0	21	126.0
37	Kasika Lake	-	DXU-70	(0-13)	13	21	273.0
38	MacKenzie	1	DAU-100	(471.3-474.7)	3.4	20	68.0
39	Yellowknife	3	DCU-100	(0-24.1)	24.1	20	482.0
40	Dempster	8	DCU-80	(142.6-207.1)	64.5	18	1,161.0
41	MacKenzie	1	DAU-100	(187.6-471.3)	283.7	17	4,822.9
42	MacKenzie	1	DAU-100	(1547.8-1558.9)	11.1	13	144.3
43	Hay River	2	DAU-100	(32-35)	3.0	13	39
44	Liard	7	DCU-100	(0-107.8)	107.8	10	1,078
45	MacKenzie	1	DAU-100	(1558.9-1562.1)	3.2	10	32
					1,941.6		52,598.5

wt. mean: $52,598.5 \div 1,941.6 \approx 27$

FIGURE V

CUMULATIVE FREQUENCY

% LESS THAN
RATING



Northern Roads Inventory and Rating System

Northwest Territories Roads

A. Roads: Ranked by Priority Rating (1977 wt. mean, see Art. 8.3)

Priority	Road	Highway #	Classifi- cation	Section	Section Length	Priority Rating	Wt. Rating
1	Ingraham Trail	4	DLU-40	(3-18)	15	60	900
2	Ingraham Trail	4	DLU-40	(2-3)	1	48	48
3	MacKenzie Highway	1	DAU-60	(51-85)	34	46	1,564
4	Ingraham Trail	4	DLU-40	(18-43)	25	43	325
5	Hay River Highway	2	DAU-60	(23-27)	4	42	168
6	Hay River Highway	2	DAU-60	(0-23)	23	35	805
7	Ft.Smith Highway	5	DCU-60	(11-143)	132	34	4,488
8	Ingraham Trail	4	DLU-40	(0-2)	2	30	60
9	MacKenzie Highway	1	DAU-60	(0-38)	38	30	1,140
10	MacKenzie Highway	1	DAU-60	(38-51)	13	29	377
11	Hay River Highway	2	DAU-60	(27-31)	4	27	108
12	Ft.Smith Highway	5	DCU-60	(0-11)	11	27	297
13	Yellowknife Hwy.	3	DCU-60	(170-212)	42	25	1,050
14	Ft.Resolution Hwy.	6	DLU-50	(42-57)	15	25	375
15	Yellowknife Hwy	3	DCU-60	(0-150)	150	24	3,600
16	Yellowknife Hwy	3	DCU-60	(150-170)	20	23	460
17	Ft.Resolution Hwy.	6	DLU-50	(13-42)	29	22	638
18	MacKenzie Hwy	1	DAU-60	(85-296)	211	21	4,431
19	Ft.Smith Hwy	5	DCU-60	(143-158)	15	19	285
20	Liard Hwy	7	DLU-60	(0-21)	21	18	378
21	Yellowknife Hwy	3	DCU-60	(212-214)	2	17	34
22	Ft.Resolution Hwy	6	DLU-60	(0-13)	13	17	221
23	Ft.Smith Hwy	5	DCU-60	(167-179)	12	11	132
24	Ft.Smith Hwy	5	DCU-60	(158-167)	9	8	72
					841 miles		21,956
					or		
					1354 Km.		

Wt. mean: $21,956 \div 841 \approx 26$

Northern Roads Inventory and Rating System

Northwest Territories Roads

A. - Roads: Ranked by Priority Rating (1981 Adjusted wt. mean , See Art. 8.3)

Priority	Road	Highway #	Classifi- cation	Section	Section Length	Priority Rating	Wt. Rating
1	Ingraham Trail	4	DLU-80	(1.6-5)	3.4	69	234.6
2	Ingraham Trail	4	DLU-80	(19-33)	14.0	62	868.0
3	Detah	-	DXU-70	(0-11)	11.0	58	638.0
4	Ingraham Trail	4	DLU-80	(33-69.2)	36.2	56	2,027.2
5	RAE	-	DXU-80	(0-11)	11.0	54	594.0
6	Hay River	2	DAU-100	(38-42.8)	4.8	50	240.0
7	MacKenzie	1	DAU-100	(84.2-136.3)	52.1	49	2,552.9
8	Cassidy Pt.	-	DXU-50	(0-3)	3.0	47	141.0
9	Prelude Lake East	-	DXU-50	(0-1)	1.0	47	47.0
10	MacKenzie	1	DAU-100	(60.9-84.2)	23.3	44	1,025.2
11	Hay River Indian Village	-	DXU-80	(0-14.3)	14.3	43	614.9
12	MacKenzie	1	DAU-100	(0-60.9)	60.9	42	2,557.8
13	Yellowknife (49th St.)	3	DLU-80	(338.8-340.5)	1.7	41	69.7
14	Yellowknife	3	DCU-100	(335.5-338.8)	3.3	40	132.0
15	Hay River	2	DAU-100	(42.8-48.5)	5.7	40	228.0
16	Ingraham Trail	4	DLU-80	(0-1.6)	1.6	40	64.0
17	Prelude Lake West	-	DXU-50	(0-2)	2.0	39	78.0
18	Yellowknife	3	DCU-100	(243.2-335.5)	92.3	34	3,138.2
19	Ingraham Trail	4	DLU-80	(5-19)	14.0	34	476.0
20	MacKenzie	1	DAU-100	(136.3-181.9)	45.6	32	1,459.2
21	Ft. Resolution	6	DLU-80	(23.5-91.0)	67.5	32	2,160.0
22	Ft. Resolution	6	DLU-100	(0-23.5)	23.5	28	658.0
23	Ft. Smith	5	DCU-100	(119.4-252.6)	133.2	27	3,596.4
24	Ft. Smith	5	DCU-100	(61.3-119.4)	58.1	26	1,510.6
25	Hay River	2	DAU-100	(0-38)	38.0	26	988.0
26	Norman Wells	-	DXU-70	(0-3)	3.0	26	78.0
27	Ft. Smith	5	DCU-100	(252.6-266)	13.4	25	335.0
28	MacKenzie	1	DAU-100	(181.9-187.6)	5.7	25	142.5
29	Yellowknife	3	DCU-100	(25-243.2)	218.2	25	5,455.0
30	Ft. Smith	5	DCU-100	(0-61.3)	61.3	22	1,348.6
31	Ft. Providence	-	DXU-80	(0-6)	6.0	21	126.0
32	Kasika Lake	-	DXU-70	(0-13)	13	21	273.0
33	Yellowknife	3	DCU-100	(0-24.1)	24.1	20	482.0
34	MacKenzie	1	DAU-100	(187.6-471.3)	283.7	17	4,822.9
35	Hay River	2	DAU-100	(32-35)	3.0	13	39

1,352.9

39,200.7

Adjusted wt.mean: $39,200.7 \div 1,352.9 \approx 29$

Northern Roads Inventory and Rating SystemNorthwest Territories RoadsA - Roads: Ranked by Priority Rating

Priority	Road	Highway #	Classification	Section	Priority Rating	Class 'C' Estimate X 1000 \$/1981	Cumulative Total X 1000 \$/1981
1	Ingraham Trail	4	DLU-80	(1.6-5)	69	290	290
2	Ingraham Trail	4	DLU-80	(19-33)	62	2470	2760
3	Detah	-	DXU-70	(0-11)	58	1100	3860
4	Ingraham Trail	4	DLU-80	(33-69.2)	56	4500	8360
5	RAE	-	DXU-80	(0-11)	54	1200	9560
6	Hay River	2	DAU-100	(38-42.8)	50	1200	10760
7	MacKenzie	1	DAU-100	(84.2-136.3)	49	6200	16960
8	Cassidy Pt.	-	DXU-50	(0-3)	47	20	16980
9	Prelude Lake East	-	DXU-50	(0-1)	47	10	16990
10	MacKenzie	1	DAU-100	(60.9-84.2)	44	3300	20290
11	Hay River Indian Village	-	DXU-80	(0-14.3)	43	750	21040
12	MacKenzie	1	DAU-100	(0-60.9)	42	8500	29540
13	Yellowknife (49th St.)	3	DLU-80	(338.8-340.5)	41	150	29690
14	Yellowknife	3	DCU-100	(335.5-338.8)	40	680	30370
15	Hay River	2	DAU-100	(42.8-48.5)	40	830	31200
16	Ingraham Trail	4	DLU-80	(0-1.6)	40	290	31490
17	Prelude Lake West	-	DXU-50	(0-2)	39	10	31500
18	Yellowknife	3	DCU-100	(243.2-335.5)	34	6200	37700
19	Ingraham Trail	4	DLU-80	(5-19)	34	500	38200
20	Dempster	8	DCU-80	(0-75.7)	34	300	38500
21	MacKenzie	1	DAU-100	(136.3-181.9)	32	1700	40200
22	Ft. Resolution	6	DLU-80	(23.5-91.0)	32	3030	43230
23	Ft. Resolution	6	DLU-100	(0-23.5)	28	550	43780
24	MacKenzie	1	DAU-100	(558.4-682.7)	27	500	44280
25	Ft. Smith	5	DCU-100	(119.4-252.6)	27	6730	51010
26	Ft. Smith	5	DCU-100	(61.3-119.4)	26	2990	54000
27	Hay River	2	DAU-100	(0-38)	26	1700	55700
28	Dempster	8	DCU-80	(75.7-142.6)	26	300	56000
29	Norman Wells	-	DXU-70	(0-3)	26	180	56180
30	Ft. Smith	5	DCU-100	(252.6-266)	25	710	56890
31	MacKenzie	1	DAU-100	(181.9-187.6)	25	0	56890
32	MacKenzie	1	DAU-100	(471.3-553.3)	25	200	57090
33	Yellowknife	3	DCU-100	(25-243.2)	25	2350	59440
34	MacKenzie	1	DAU-100	(1498-1547.8)	24	5480	64920
35	Ft. Smith	5	DCU-100	(0-61.3)	22	360	65280
36	Ft. Providence	-	DXU-80	(0-6)	21	220	65500
37	Kasika Lake	-	DXU-70	(0-13)	21	700	66200
38	MacKenzie	1	DAU-100	(471.3-474.7)	20	120	66320
39	Yellowknife	3	DCU-100	(0-24.1)	20	2070	68390
40	Dempster	8	DCU-80	(142.6-207.1)	18	0	68390
41	MacKenzie	1	DAU-100	(187.6-471.3)	17	660	69050
42	MacKenzie	1	DAU-100	(1547.8-1558.9)	13	1520	70570
43	Hay River	2	DAU-100	(32-35)	13	0	70570
44	Liard	7	DCU-100	(0-107.8)	10	0	70570
45	MacKenzie	1	DAU-100	(1558.9-1562.1)	10	460	71030
						<u>\$71,030</u>	