DIAND
COST REFERENCE MANUAL
TID-AM-2

JULY 2004

This publication is developed for the Department of Indian Affairs and Northern Development
by the PWGSC Services for INAC.

Cette publication est également disponible en français.

PREFACE

Cost engineering is an essential part of the planning, design and construction phases of a project, and is aimed at extracting the best possible value for money from all activities with cost implications. In keeping with this philosophy, the Department of Indian and Northern Affairs published the first edition of the *Cost Reference Manual* in 1978, to deal with the planning phase. The manual continues to be improved from year to year based on input from departmental specialists, cost experts and users across Canada. This unique tool enables the user to develop preliminary cost estimates for remote and difficult construction environments typically encountered on First Nations communities and in Northern areas. Commercially available publications of this nature are not specifically adapted to these particular circumstances.

The *Cost Reference Manual* provides a reliable method of developing preliminary estimates (for both "capital" and "operations & maintenance") to permit the review of the cost impact of all feasible alternatives prior to design commitments. All the costs expressed in this manual excludes GST or PST since delivered on First Nations communities are tax exempted.

For the users convenience, cost estimate forms and a step-by-step procedure are included in this appendix. Furthermore, cost estimating workshop is available on request. The workshop provides an overview of estimating, explains the use of the manual and the forms.

NOTE: THIS MANUAL IS A PLANNING TOOL AND IS TO BE USED IN DEVELOPING INDICATIVE COST ESTIMATES, CLASS "C" AND "D" ONLY. FOR DESIGN AND CONSTRUCTION PHASES MORE SUBSTANTIVE COST ESTIMATES, CLASS "A" AND "B" ARE NECESSARY AND ARE OUTSIDE THE SCOPE OF THIS MANUAL.

The department continually seeks to improve this manual not only by developing more objective and accurate assessment criteria but in determining and annually updating various cost components found in the manual. These ongoing improvements are intented to ensure both the reliability and appropriateness of this manual to our interested users. Your suggestions for improvement will continue to play an important part in adapting the manual to your needs.

THE *COST REFERENCE MANUAL* HAS BEEN DEVELOPED FOR USE BY THE PUBLIC SERVICE, TRIBAL COUNCILS AND BAND COUNCILS ONLY.

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LIST OF ABBREVIATIONS

cm	-	centimeter
ea.	-	each
GFA	-	gross floor area
GFR	-	gross funding requirement
ha	-	hectare
kg	-	kilogram
km	-	kilometer
km/h	-	kilometer per hour
kV	-	kilovolt
kVA	-	kilovolt ampere
kW	-	kilowatt
L	-	liter
l.m.	-	linear meter
l.s.	-	lump sum
L/s	-	liter per second
m	-	meter
mm	-	millimeter
m^2	-	square meter
m^3	-	cubic meter
n/av	-	non available
N/A	-	not applicable
NFR	-	net funding requirement
O/C	-	on centre
O&M	-	operation and maintenance
t	-	tonne
T&G	-	tongue and groove
v.m.	-	vertical meter

UNIT OF MEASUREMENT CONVERSIONS[1]

		Imperial Units		Metric Units (SI)
LENGTH	(in < > mm)	1 inch	=	25.4 mm
		0.3937 inch	=	10 mm
	(ft < > m)	1 foot	=	0.3048 m
		3.2808 feet	=	1 m
	(mi < > km)	1 mile	=	1.6093 km
		0.62137 mile	=	1 km
AREA	(in^2 < > cm^2)	1 square inch	=	6.4516 cm^2
		0.1550 sq. in.	=	1 cm^2
	(ft^2 < > m^2)	1 square foot	=	0.0929 m^2
		10.7639 sq. ft.	=	1 m^2
	(a < > ha)	1 acre	=	0.4047 ha
		2.4710 acres	=	1 ha
VOLUME	(in^3 < > cm^3)	1 cubic inch	=	16.387 cm^3
		0.0610 cu. in.	=	1 cm^3
	(ft^3 < > m^3)	1 cubic foot	=	0.0283 m^3
		35.315 cu. ft.	=	1 m^3
	(yd^3 < > m^3)	1 cubic yard	=	0.7646 m^3
		1.3079 cu. yd.	=	1 m^3
LIQUID VOLUME	(oz. fl. < > ml)	1 fl. ounce	=	28.413 ml
		0.0352 fl. oz.	=	1 ml
	(pi < > L)	1 pint	=	0.5683 L
		1.760 pint	=	1 L
	(qt < > L)	1 quart	=	1.1365 L
		0.8799 quart	=	1 L
	(gal. < > L)	1 gallon (Imp.)	=	4.5460 L
		0.21998 gallon	=	1 L
WEIGHT	(oz. av. < > g)	1 ounce (av.)	=	28.349 g
		0.0353 oz. (av.)	=	1 g
	(lb < > kg)	1 pound (av.)	=	0.4536 kg
		2.2046 lb. (av.)	=	1 kg
	(tn s < > t)	1 ton (short)	=	0.9072 tonne
		1.1023 t. (short)	=	1 tonne
	(tn l < > t)	1 ton (long)	=	1.0161 tonne
		0.9842 t. (long)	=	1 tonne

1. CSA Standard Z-234.1

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PART I - CAPITAL COST MANUAL

1.0 CAPITAL COSTS

1.1 INTRODUCTION

1.1.1 General Remarks

The purpose of this publication is to provide reliable capital cost data for departmental facilities from which consistent Class D and Class C indicative capital cost estimates may be prepared. It contains the following information:

a. basic unit costs for nine categories of work. All costs are Toronto based and updated annually (Section 2);

b. geographic construction centre indices for nine categories of work which are updated annually and reflect relative cost differentials between various specific geographic locations (Table 1, Section 1);

c. site-specific indices for six major categories of work which weigh the impact that certain site factors have on construction costs (Table 2, Section 1);

d. architectural engineering and construction risk guidelines along with departmental cost estimating forms are used to complete the estimating process (Sections 3 and 4 and Appendix A);

e. escalation indices, both historical and future, which allow the comparison of construction costs for different years (Section 1.4); and

1.1.2 Definitions

Project cost: comprises the expenditures for all aspects of a project such as the design (preliminary and detailed), contracting, construction, supervision and commissioning of a project. Of these expenditures, a specifically identified part covers any allowances for inflation and contingencies. It is normally associated with all costs incurred following preliminary approval including band costs, operation and maintenance, training and commissioning of a project.

Direct costs or basic construction costs: the costs associated with trade work and its direct supervision. This usually represents the contract value of the work done. It always includes overhead and profit.

Indirect costs or soft costs: the costs incurred for services rendered to the project but otherwise not part of direct trade work or its supervision. This usually represents architectural and engineering design and supervision costs, including project management and quality control, and band involvement where applicable.

Contingency: an allowance for unforeseeable elements of costs which an analysis of previous projects has shown to be statistically likely to occur. This covers change orders due to small design changes, supply problems, small quantity changes -- reasonable changes that cannot be identified prior to construction.

Construction Risk: an area of uncertainty identified in preparing an estimate which may have an effect on costs. This covers uncertainties in the quantity or quality of pre-engineering information, tender and construction schedules, the construction market and non-quantifiable items.

Estimate in constant dollars: an estimate expressed in dollars tied to the base year -- the year in which the estimate is prepared.

Estimate in current dollars: an estimate expressed in dollars tied to the fiscal year in which the expenditure will be made -- also called budget-year dollars.

1.1.3 Scope and Data Base

This publication provides cost data in constant dollar values for the current year. Unit costs are based on DIAND standards or levels of service (as defined in the text), under average construction conditions in Toronto.

Each unit cost must be modified through the use of appropriate indices to reflect geographic cost differentials and site-specific factors.

Price indices (inflation factors) are also provided to permit comparisons with previous project costs or to forecast actual costs in future years.

The unit costs are intended to form a basis for the development of preliminary, indicative capital project cost estimates (Classes D and C). **They must be supplemented by specialized professional assessment of the many varying local or site-specific factors and their impact on the project cost.**

It is the responsibility of project managers/officers to identify project anomalies and variations from normal conditions and to make the necessary cost adjustments.

If required update bulletins will be issued, during the year.

1.1.4 Users

This publication is intended for use by:

a. departmental estimators as a guide for determining facility costs for planning estimates, or preliminary project estimates or reviewing consultant estimates;

b. project managers/officers when discussing estimates and reviewing project submissions with band councils;

c. senior management when evaluating project submissions; and

d. bands when preparing estimates for capital construction projects or program budgets.

1.2 ESTIMATE CLASSIFICATION

Cost estimating is the act of appraising and evaluating the cost of a project before implementing it. All estimates must be dated, as a cost estimate has a limited life, particularly in a period of changing inflation rates and fluctuating market conditions.

The completeness and accuracy of a cost estimate will depend on the amount of information available at the time it is developed. The reliability of the estimate will thus depend on the project status or development stage.

Treasury Board *Manual, Capital Plans, Projects and Procurement*, provides a cost estimate classification system suitable for a broad range of project types involving two categories: "indicative" and "substantive". Within these 2 categories, the former 4-part classification system has been retained to meet the specific needs of DIAND/First Nations projects.

Substantive Estimates

Class A estimate: this is a detailed estimate based on quantity take-off from final drawings and specifications. It is used to evaluate tenders or as a basis of cost control during day-labour construction.

Class B estimate: this is prepared after site investigations and studies have been completed and the major systems defined. It is based on a project brief and preliminary design. It is used for obtaining effective project approval and for budgetary control.

Indicative Estimates

Class C estimate: this is prepared with limited site information and is based on probable conditions affecting the project. It represents the summation of all identifiable project elemental costs and is used for program planning, to establish a more specific definition of client needs and to obtain preliminary project approval.

Class D estimate: this is a preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project, based on the client's broad requirements. This overall cost estimate may be derived from lump sum or unit costs for a similar project. It may be used in developing long term capital plans and for preliminary discussion of proposed capital projects.

1.3 GENERAL QUALIFIERS

Numerous factors and conditions affect the total cost of construction. The unit costs presented in this publication have been compiled in accordance with the following conditions:

Year: The cost figures are for the current year.

Architectural and Engineering Costs: Administration, design and supervision fees incurred by the Department, external consultants or Public Works and Government Services Canada (PWGSC), **are not** included in the basic costs. See Section 3.0 for guidelines on the establishment of architectural and engineering costs.

Contractor's Overhead and Profit: Allowance for a contractor's overhead and profit **are** included in the basic costs.

Contingencies: The costs shown **do not** include any contingencies (see Section 1.1.2).

Special Costs: Each construction project is unique and may require certain extra costs or deductions to cover specific conditions, situations and requirements. All such special costs must be assessed and added or subtracted from the estimated costs derived from this publication. Some of these costs could be considered as "risks" and should be included in the appropriate section of the standard estimating forms (see Section 4.0). Other factors specific to the site such as the ground conditions, transportation, etc., can be calculated using Table 2 at the end of this section.

Facilities: Each facility is costed independently from the other. For example, water and sewer costs to connect a building to the existing mains **are not** included in the base cost of the building.

Electrical Service Drop: All unit costs for dwellings include the cost of electrical service drop which satisfy Canadian electrical codes.

Furniture: The costs of all furniture which is not fixed or attached **are not** included. Examples are stoves, fridges, washers, dryers, steel lockers and special fixtures such as propane gas equipment for chemistry laboratories.

Site Preparation: No allowance has been made for clearing, demolition or filling of the site, unless otherwise stated.

Dumping: It is assumed that no dumping charges will be incurred.

Waste Disposal: It is assumed that waste material can be disposed of in an area located within 1.5 km of the project site.

Aggregate and Gravel: It is assumed that aggregate and gravel are both available within 10 km of the site.

Foundation Conditions: It is assumed that a good load bearing capacity exists for foundations. Excavation and backfilling is normal and no dewatering is required.

Backfill: It is assumed that suitable backfill material is available on-site.

Volume Discounts For Houses: The costs shown cover the construction of one structure at a time. In some situations, however, a number of units are built simultaneously which normally provides some volume discounts. In these situations, the costs of volume construction should be reduced appropriately. If the regions do not have their own volume reduction rates, the following general rule may be applied:

a. for 5 structures or more, reduce the cost by 5%; and
b. for 20 structures or more, reduce the cost by 8%.

Gross Floor Area (GFA): The term gross floor area (GFA) applied to unit building costs in this publication shall be the sum of all enclosed floor areas measured flat on plan to the outside face of perimeter walls, without deductions for any openings, walls, partitions or columns.

The calculation of the GFA will include for buildings other than houses the plan areas of:
- enclosed connecting passageways;
- tunnels, floor areas and basements with headroom of 2 m or more;
- crawl space with concrete floor and headroom of 2 m or more; and
- attached or isolated garages.

For houses, the calculation of the GFA will exclude the plan areas of:
- basements and crawl space of houses;
- garage and carports of houses;
- a crawl space without a concrete floor;
- tunnels, crawl space and floor areas with headroom less than 2 m; and
- unfinished attic areas.

1.4 PRICE INDICES

1.4.1 General Remarks

In preparing project cost estimates it may be useful for estimators to update regional case histories to current year values. Also, as estimates are normally prepared a year or more in advance of actual construction, they must be adjusted to current dollar costs for the year in which the funds will be spent.

The following price indices are provided by the Department of Finance from their Private-Sectors forecasters' survey:

1994/95	**82.9**
1995/96	**84.3**
1996/97	**85.9**
1997/98	**87.1**
1998/99	**88.2**
1999/00	**88.9**
2000/01	**91.7**
2001/02	**93.9**
2002/03	**95.7**
2003/04	**98.6**

The following indices are suggested calculating current dollar cost estimates for projects being implemented in future years. Should there be significant reason to question their appropriateness the subject may be addressed as a risk item.

2004/05	**100.0**
2005/06	**101.4**
2006/07	**103.2**
2007/08	**105.3**
2008/09	**107.4**
2009/10	**109.5**

1.4.2 How to Use Price Indices

If, for example, the cost of a project is estimated using the cost information given in this publication and the project is to be constructed in 2003/2004, the estimate should be increased to current dollars as follows:

$$\text{ESTIMATE FOR 05/06} = \text{04/05 ESTIMATE} \times \frac{\text{05/06 INDEX}}{\text{04/05 INDEX}}$$

$$= \text{02/03 ESTIMATE} \times \frac{101.4}{100.0}$$

Similarly, case histories can be updated to show the estimated cost during construction, in exactly the same way.

Example: 1994 case history for 04/05 construction.

$$\text{94/95 Cost} \times \frac{\text{04/05 INDEX}}{\text{94/95 INDEX}} = \text{94/95 Cost} \times \frac{100.0}{82.9}$$

1.5 GEOGRAPHIC INDICES

The geographic indices provide a composite measure of labour rates, productivity and availability of construction materials and equipment in 34 selected city centres. Urban Toronto is used as a base, i.e. equals 1.00.

Because the blends of labour and material are unique to the type of facility under construction, geographic indices have been calculated for each of nine facility categories for the 34 selected cities. These geographic indices, which are displayed in Table 1, permit adjustment of the unit costs given in Section 2.0 to regional costs. The choice of the source centre will depend largely on the contractor's likely source of material supply and labour.

The selected city centres were chosen according to their importance as representative supply centres in each region. The geographic index does not take into account site-specific conditions such as permafrost or rock. All unique local conditions must be considered by the estimator based on knowledge and experience. Table 2 gives one method of taking these special conditions into account.

The data used in the compilation of geographic indices are provided from cost surveys done by using commercially available construction cost database and undertaken in the second quarter of the current year.

TABLE 1

1.6 2004 GEOGRAPHIC INDICES FOR SELECTED CANADIAN CENTRES

CITY CENTRES	BUILDINGS		UTILITIES				GROUNDS, ROADS AND BRIDGES		
	NON-RESI-DENTIAL	RESI-DENTAL	MECH. PLANT	ELECT. PLANT	WATER/ SEWER	ELECT. DIST.	GRAVEL ROADS/ GROUND	ASPHALT ROADS	BRIDGE
1 Halifax	1.05	1.05	1.00	1.02	0.89	0.96	0.88	0.90	1.03
2 Sydney	1.05	1.06	1.00	1.02	0.86	0.95	0.90	0.96	1.03
3 Moncton	1.02	1.03	1.00	1.02	0.90	0.96	0.89	0.93	1.04
4 Fredericton	1.05	1.06	1.04	1.01	0.96	1.00	0.93	0.98	1.08
5 Quebec	1.01	1.07	1.00	0.97	1.00	1.04	1.09	1.03	1.06
6 Montreal	0.97	1.02	0.97	0.96	0.99	1.03	1.06	1.02	0.99
7 Rouyn	1.06	1.13	1.06	0.98	1.05	1.06	1.12	1.12	1.19
8 Sept-Iles	1.10	1.17	1.09	1.00	1.08	1.11	1.19	1.15	1.23
9 Toronto	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10 Ottawa	1.08	1.13	1.06	1.03	1.01	0.99	0.98	0.93	1.04
11 London	1.00	1.01	1.00	1.01	0.99	0.99	1.01	0.99	0.98
12Sault-Ste-Marie	1.08	1.14	1.06	1.04	1.04	1.04	0.98	0.92	1.02
13 Thunder Bay	1.07	1.08	1.10	1.04	1.11	1.08	0.97	0.98	1.11
14 Sudbury	1.13	1.18	1.13	1.05	1.12	1.08	1.02	0.98	1.10
15 Timmins	1.13	1.20	1.14	1.05	1.12	1.08	1.02	1.02	1.11
16 Winnipeg	1.01	1.00	0.91	0.99	0.84	0.97	1.09	1.00	0.95
17 Thompson	1.15	1.14	1.01	1.06	0.94	1.09	1.20	1.10	1.11
18 The Pas	1.14	1.14	1.01	1.07	0.93	1.07	1.19	1.09	1.11
19 Brandon	1.00	1.00	0.91	1.00	0.85	0.98	1.12	1.02	0.95
20 Regina	0.99	1.00	0.94	1.00	0.88	0.98	1.24	1.10	0.99
21 Saskatoon	1.00	1.01	0.94	1.00	0.90	1.00	1.22	1.09	1.00
22 Prince Albert	1.01	1.02	0.96	1.01	0.93	1.04	1.21	1.08	1.04
23 Calgary	1.17	1.26	1.08	1.10	0.91	1.00	1.00	0.85	1.11
24 Edmonton	1.20	1.31	1.10	1.11	0.89	0.98	0.97	0.86	1.10
25 High Level	1.37	1.39	1.22	1.20	1.00	1.09	1.08	0.95	1.28
26 Fort McMurray	1.36	1.41	1.24	1.17	1.02	1.10	1.18	1.07	1.34
27 Vancouver	1.00	1.00	0.98	1.04	0.95	1.04	0.87	0.84	1.12
28 Victoria	1.00	1.01	1.00	1.05	0.95	1.05	0.85	0.86	1.12
29 Kamloops	1.03	1.02	1.00	1.04	0.95	1.03	0.96	0.93	1.12
30 Prince George	1.09	1.08	1.06	1.06	1.04	1.10	0.98	0.94	1.21
31 Prince Rupert	1.14	1.15	1.12	1.07	1.06	1.11	0.99	0.96	1.28
32 Whitehorse	1.26	1.30	1.29	1.15	1.31	1.36	1.09	1.16	1.40
33 St. John's	1.12	1.15	1.11	1.06	1.06	1.08	0.98	1.02	1.23
34 Yellowknife	1.30	1.34	1.33	1.18	1.35	1.40	1.12	1.19	1.44

Note: These indices are not to be used for calculating operation and maintenance costs. Refer to Part II for operation and maintenance indices.

1.7 PROJECT SPECIFIC INDICES

Project costs are not only affected by regional influences but also by a number of other site-specific considerations. These have been identified in Table 2 under the following headings:

- nature of the site;
- transport;
- schedule;
- personnel;
- materials; and
- administration.

Under each heading a series of criteria are listed, each with a selection of factors which are provided for each construction category. The most appropriate factor should be selected for each criterion group and entered under the appropriate heading in Table 3. If a particular criterion does not apply, enter zero.

The factors entered represent a percentage assessment of the cost impact of each criterion and should be summed and converted to a sub-index by inserting (1.), in front of each total. These sub-indices should be transferred to the bottom of the page, and multiplied to produce an overall project specific index (see example at the end of this section).

It should be emphasized that this method is intended to be used with judgement. When specific site knowledge suggests it is appropriate, the factors provided should be modified using an interpolation process.

If the estimator is aware of the actual cost of any of these site specific considerations, a zero should be entered where applicable on the calculation sheet and the actual cost added as a "cost adjustment" to the basic estimate (refer to Appendix A).

TABLE 2

1.8 PROJECT SITE-SPECIFIC INDEX FACTOR SHEET

1. NATURE OF THE SITE

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
TYPE OF LOCATION						
Within established community	-	-	-	-	-	-
Other building adjacent	02	02	-	-	-	-
Virgin isolated site	05	05	-	-	-	-
AVAILABILITY OF UTILITIES						
No adequate electricity supply	02	02	-	-	-	-
No telephone	02	02	-	-	-	-
No telephone or electricity	04	04	-	-	-	-
AVAILABILITY OF STORAGE						
Not required or adequate	-	-	-	-	-	-
Not available	02	02	02	02	02	02
GROUND CONDITION						
Normal soil or similar	-	-	-	-	-	-
Rocky soil	01	01	02	01	02	01
Rock	02	02	05	03	10	02
Permafrost/special conditions	03	03	10	05	10	03
TYPE OF TERRAIN						
Level and open	-	-	-	-	-	-
Level and treed	01	01	01	01	02	-
Broken and open	-	-	02	02	02	-
Broken and treed	01	01	04	05	04	-
Hilly and open	-	-	04	05	04	-
Hilly and treed	01	01	06	10	06	-

TABLE 2 (cont'd)

1.8 PROJECT SITE-SPECIFIC INDEX FACTOR SHEET

2. TRANSPORTATION

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
METHOD						
Road	-	-	-	-	-	-
Rail	01	01	02	02	01	01
Water	03	03	05	05	02	03
Air	20	20	15	15	08	10
SECONDARY METHOD						
None	-	-	-	-	-	-
Water	04	04	06	06	03	04
Air	25	25	20	20	15	15
This criterion is to be used if access to the site requires more than one stage of transportation.						
RESOURCE CITY - SITE TRANSIT DISTANCE						
Not exceeding 50 km	01	01	-	-	-	-
50 to 200 km	02	02	02	02	02	02
200 to 500 km	05	05	05	05	05	05
Each additional 200 km or part, add 1	-	-	-	-	-	-
LANDING, AIR (if air freight used)						
Existing strip - Hercules	-	-	-	-	-	-
- smaller	20	20	15	15	08	10
Build land strip - Hercules	10	10	10	10	10	10
Build ice strip - Hercules	05	05	05	05	05	05
LANDING FROM SHIP (if ship used)						
Quay	-	-	-	-	-	-
Barge/quay with crane	05	05	05	02	02	05
Barge/quay without crane	10	10	10	04	04	10
Barge/beach with crane	07	07	07	05	05	07
Barge/beach without crane	14	14	14	10	10	14
LANDING FROM BARGE (if barge used)						
Quay with crane	-	-	-	-	-	-
Quay without crane	05	05	05	02	02	05
Beach with crane	03	03	03	02	02	03
Beach without crane	10	10	10	05	05	10
TIDE-SWEPT BEACH (if beach used)	2	2	2	1	1	2
LOAD SIZE						
Complete project	-	-	-	-	-	-
Piecemeal	5	5	5	2	2	5
ACCESS						
All year	-	-	-	-	-	-
Winter only	08	08	08	08	08	08
Summer only	06	06	06	06	06	06

TABLE 2 (cont'd)

1.8 PROJECT SITE-SPECIFIC INDEX FACTOR SHEET

3. SCHEDULE

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
PROJECT DURATION						
Construction work continuous from start to finish	-	-	-	-	-	-
Two construction seasons required	10	10	10	10	10	10
Three construction seasons required	20	20	20	20	20	20
SHIPPING SCHEDULE						
Ship and build same season	-	-	-	-	-	-
Ship and store for following season	10	10	10	10	10	10

4. PERSONNEL

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
AVAILABILITY OF LOCAL LABOUR						
Skilled, semi-skilled and unskilled	-	-	-	-	-	-
Semi-skilled and unskilled only	02	02	01	01	01	02
Unskilled only	04	04	02	02	02	04
None	10	10	10	10	10	10
ACCOMMODATION REQUIRED						
Locally available	02	02	02	02	02	02
Within daily travel (maximum of 2 hours total)	05	05	04	04	04	02
Camp required	10	10	10	10	10	10

TABLE 2 (cont'd)

1.8 PROJECT SITE-SPECIFIC INDEX FACTOR SHEET

5. MATERIALS

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
AVAILABILITY OF CONSTRUCTION LUMBER						
Locally	-	-	-	-	-	-
Not locally	2	2	2	2	2	2
AVAILABILITY OF READY-MIXED CONCRETE						
Locally	-	-	-	-	-	-
Not locally, maximum of 100 km	01	01	-	-	-	01
Not available	04	06	-	-	-	05
AVAILABILITY OF AGGREGATES	-	-	-	-	-	-
Locally	01	01	01	01	02	01
Not locally						
AVAILABILITY OF BUILDING SUPPLIES						
Locally	-	-	-	-	-	-
Not locally	01	01	01	01	-	01
OUTSIZE WEIGHT/VOLUME/SHAPE						
None	-	-	-	-	-	-
Some	01	-	01	01	-	01
Significant	02	-	01	01	-	01

6. ADMINISTRATION

CRITERIA	BUILDINGS		UTILITIES		GROUNDS AND ROADS	BRIDGES
	NON-RESI-DENTIAL	RESI-DENTIAL	WATER/ SEWER	ELECTRI-FICATION		
PLANNING						
Long lead time to prepare bills of quantities and to order transportation	-	-	-	-	-	-
Restricted lead time	05	03	01	01	01	02
Short lead time, fast track, incomplete design	10	06	02	02	02	05
NORTHERN MANAGERIAL EXPERIENCE OF PROJECT TEAM						
Very experienced	-	-	-	-	-	-
Some experience	05	02	02	02	02	05
None	10	05	05	05	05	10

Table 3

1.9 Project site-specific index calculation sheet

ProjectTitle:.....Date:.....
Region:.....Resource Centre:.....

This form summarizes all site-specific factors considered in Table 2

1. NATURE OF SITE

Type of location	.....
+	
Utilities available	.....
+	
Avail of storage	.....
+	
Ground condition	.....
+	
Type of terrain	.....
Total (a)	.....

2 TRANSPORTATION

Primary method	.....
+	
Secondary method	.....
+	
Overall - transit dist.	.....
+	
Landing - aircraft	.....
+	
Landing - ship	.....
+	
Landing - barge.	.....
+	
Tide	.....
+	
Load size	.....
Total (b)	.....

3. SCHEDULE

Project duration	.....
+	
Shipping schedule	.....
Total (c)	.....

4. PERSONNEL

Avail. of local labour	.....
+	
Accommod. Required	.....
Total (d)	.....

5. MATERIALS

Avail. of const. lumber	.....
+	
Ready-mixed concrete	.....
+	
Avail. of aggregates	.....
+	
Gen. Building supplies	.....
+	
Outsize materials	.....
Total (e)	.....

4. ADMINISTRATION

Planning	.....
+	
Experience	.....
Total (f)	.....

7. Site-Specific Index Calculation

1. ..... + **1.** ..... + **1.** ..... + **1.** ..... + **1.** ..... + **1.** ..... = **1.** .....% or **1.** + (..... / 100) = ...
(a) (b) (c) (d) (e) (f) (G) (G) (SSI)

Signature:.....

PART I - CAPITAL COST MANUAL

2.0 FACILITY UNIT COSTS

TABLE OF CONTENTS

2.1 BUILDINGS

2.1.1 INTRODUCTION

The costs displayed in this section have are in the standard format used by the Canadian Institute of Quantity Surveyors and is known as the elemental format. The numbering system used for the specifications and the elemental breakdown corresponds directly with each other. Listed below are the elements and sub-elements which are used in the cost reference format. Refer to Section 1.3 **General Qualifiers**, on page 1-5 for those parameters used to arrive at gross floor area (GFA).

1. SUBSTRUCTURE
a) Normal foundations
b) Basement excavation and backfill
c) Special foundations

2. STRUCTURE
a) Lowest floor construction
b) Upper floor construction
c) Roof construction

3. EXTERIOR CLADDING
a) Roof finish
b) Walls below ground floor
c) Walls above ground floor
d) Windows
e) Exterior doors and screens

4. INTERIOR PARTITIONS AND DOORS
a) Permanent partitions and doors
b) Movable partitions and doors

5. VERTICAL MOVEMENT
a) Stairs
b) Elevators and escalators

6. INTERIOR FINISHES
a) Floor finishes
b) Ceiling finishes
c) Wall finishes

7. FITTINGS AND EQUIPMENT
a) Fittings and fixtures
b) Equipment

8A ELECTRICAL

8B MECHANICAL

For additional information, refer to the following departmental publications:

Corporate Manuals Systems, Volume 1, Capital Facilities and Maintenance with Levels of Services Standards in Annexes.

COST PER m² FOR DIFFERENT TYPES OF BUILDINGS

	TYPE OF BUILDINGS*		PAGE	GFA m²	COST $/m²
2.1.2	**ADMINISTRATIVE**	**Office**	**25**		
		- small		600	1152
		- medium		1000	1133
		- large		1730	1124
		Band hall	**26**	200	1123
2.1.3	**OPERATIVE**	**Garage**	**26**	240	714
2.1.4	**INSTITUTIONAL**	**School**	**27, 28 & 29**		
		School (portable)	**30**		
		- small		71	813
		- large		83	794
		Library	**31**		
		- small		150	1180
		- medium		420	1168
		- large		1000	1152
		Museum	**32**	870	1281
		Police station	**32**	100	1211
		Police/Fire station	**32**		
		- small		200	1320
		- large		250	1262
		Fire station	**34**		
		- 1 bay		100	1371
		- 2 bay		200	1304

* For definitions of the different types of buildings, please refer to the following pages of the BUILDINGS PART by using the appropriate SECTION.

	TYPE OF BUILDINGS*		PAGE	GFA m²	COST $/m²
2.1.5	RESIDENTIAL	**Single-family house**	**35**		
		- urban type			
		- 3 bedrooms and basement		82	1260
		- 4 bedrooms and basement		100	1094
		- rural type			
		- 3 bedrooms and basement		74	1275
		- 4 bedrooms and basement		88	1154
		- 3 bedrooms and crawl space		74	1186
		- 4 bedrooms bi-level		161	839
		- remote type		77	1131
		- remote type		87	1091
		Semi-detached house	**39**		
		- rural type, 1 bedroom		124	994
		- rural type, 2 bedrooms		154	951
		- rural type, single storey		170	997
		Row house	**40**	309	776
		Multiple-family dwelling (4 units)	**41**	535	879
		Dormitory	**42**		
		- 8 students		172	923
		- 24 students		757	787
2.1.6	RECREATIONAL	**Recreation centre**	**43**		
		- small		400	1284
		- medium		1000	1241
		- large		5000	1234
		Community hall	**44**	1000	1236
		Gymnasium	**45**		
		- small		1000	1189
		- medium		1500	1172
		- large		4400	1153
		Arena	**46**	2700	951

* For definitions of the different types of buildings, please refer to the following pages of the BUILDINGS PART by using the appropriate SECTION.

2.1.2 ADMINISTRATIVE

2.1.2.1 OFFICE

DESCRIPTION:
SMALL (GFA: 600 m²) - SINGLE STOREY ABOVE GRADE WITH HALF BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	11.0
2.	Timber post and beam frame.	2.	Structure	17.0
3.	Cedar siding on plywood.	3.	Exterior cladding	26.0
4.	Drywall on timber studs.	4.	Interior partitions	7.0
5.	Timber stairs.	5.	Vertical movement	1.0
6.	Carpet floors, acoustic tile ceiling.	6.	Interior finishes	12.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	4.0
8A.	Power, lighting and telephone.	8A.	Electrical	10.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	12.0
				100.0

DESCRIPTION:
MEDIUM (GFA: 1,000 m²) - SINGLE STOREY ABOVE GRADE WITH HALF BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	10.0
2.	Timber post and beam frame.	2.	Structure	19.0
3.	Cedar siding on plywood.	3.	Exterior cladding	20.0
4.	Drywall on timber studs.	4.	Interior partitions	4.0
5.	Timber stairs.	5.	Vertical movement	1.0
6.	Carpet floors, acoustic tile ceiling.	6.	Interior finishes	12.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	4.0
8A.	Power, lighting and telephone.	8A.	Electrical	11.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	19.0
				100.0.0

DESCRIPTION:
LARGE (GFA: 1,730 m²) - TWO STOREYS ABOVE GRADE WITH HALF BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	8.0
2.	Timber post and beam frame.	2.	Structure	19.0
3.	Cedar siding on plywood.	3.	Exterior cladding	21.0
4.	Drywall on timber studs.	4.	Interior partitions	5.0
5.	Timber stairs.	5.	Vertical movement	1.0
6.	Carpet floors, acoustic tile ceiling.	6.	Interior finishes	22.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	3.0
8A.	Power, lighting and telephone.	8A.	Electrical	10.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	11.0
				100.0

2.1.2.2 BAND HALL

DESCRIPTION:
GFA: 200 m² - SINGLE STOREY ABOVE GRADE WITHOUT BASEMENT, CONSISTING OF GENERAL OFFICE AREA, WAITING ROOM, SIX SMALL OFFICES, MEETING ROOM AND CANTEEN.

	SPECIFICATION		ELEMENT	%
1.	Strip footings with slab on grade.	1.	Substructure	11.0
2.	Timber frame with trussed roof.	2.	Structure	18.0
3.	Cedar siding walls.	3.	Exterior cladding	26.0
4.	100 x 50 mm wood stud partitions.	4.	Interior partitions	7.0
5.	N/A	5.	Vertical movement	-
6.	Drywall.	6.	Interior finishes	13.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	4.0
8A.	Power, lighting and telephone.	8A.	Electrical	11.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	10.0
				100.0

2.1.3 OPERATIVE

2.1.3.1 GARAGE

DESCRIPTION:
GFA: 240 m² - SINGLE STOREY, THREE BAYS WIDE.

	SPECIFICATION		ELEMENT	%
1.	Concrete footings.	1.	Substructure	6.0
2.	Rigid steel frame.	2.	Structure	30.0
3.	Prefabricated metal siding.	3.	Exterior cladding	30.0
4.	Concrete block walls.	4.	Interior partitions	1.0
5.	N/A	5.	Vertical movement	-
6.	Concrete hardener and painted metal.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	1.0
8A.	Power and lighting.	8A.	Electrical	16.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	8.0
				100.0

2.1.4 INSTITUTIONAL

2.1.4.1 SCHOOL

School unit costs were derived by pricing the three DIAND representative schools with inflation indices derived from RPS for INAC. On the following pages, you will find the description of the representative schools which were selected by the regional Real Property Services for INAC and regional Capital Management representatives in 1990.

TOTAL BASIC SCHOOL COSTS

GFA m²	Costs $/m²	GFA m²	Costs $/m²
175	1 805	3 800	1 355
600	1 730	4 200	1 330
1 000	1 670	4 600	1 300
1 400	1 615	5 000	1 285
1 800	1 560	5 400	1 265
2 200	1 515	5 800	1 250
2 600	1 465	6 200	1 240
3 000	1 415	6 600	1 225
3 400	1 390	7 000	1 220

DESCRIPTION:
SMALL (GFA: 1,085 m²) - DIAND REPRESENTATIVE SCHOOL, GOD'S RIVER, MANITOBA.

	SPECIFICATION		ELEMENT	%
1.	Strip footings; column bases; concrete foundation walls.	1.	Substructure	11.0
2.	Timber joists; prefab roof trusses; metal roof.	2.	Structure	16.0
3.	Brick veneer; inverted roof system; double glazed openings.	3.	Exterior cladding	13.0
4.	Drywall; sound insulation; glazed screens; metal and wood doors.	4.	Interior partitions	9.0
5.	Metal stair with concrete filled treads and landings.	5.	Vertical movement	1.0
6.	Floor; carpet; tiling; acoustic ceilings; painted drywall; fire alarm system; sprinklers.	6.	Interior finishes	15.0
7.	Loose furniture excluded.	7.	Fittings & equipment	7.0
8A.	Power, lighting and telephone.	8A.	Electrical	6.0
8B.	Plumbing, forced air flow heaters and ventilation.	8B.	Mechanical	22.0
				100.0

DESCRIPTION:
MEDIUM (GFA: 2,037 m²) - DIAND REPRESENTATIVE SCHOOL, NATASHQUAN, QUEBEC.

	SPECIFICATION		ELEMENT	%
1.	Strip footings; column bases; concrete foundation walls.	1.	Substructure	14.0
2.	Timber joists, prefab roof trusses; metal roof.	2.	Structure	27.0
3.	Brick veneer; inverted roof system; double glazed openings.	3.	Exterior cladding	20.0
4.	Drywall; sound insulation; glazed screens; metal and wood doors.	4.	Interior partitions	5.0
5.	Metal stair with concrete filled treads and landings.	5.	Vertical movement	2.0
6.	Floor; carpet; tiling; acoustic ceilings; painted drywall; fire alarm system; sprinklers.	6.	Interior finishes	8.0
7.	Loose furniture excluded.	7.	Fittings & equipment	6.0
8A.	Power, lighting and telephone.	8A.	Electrical	7.0
8B.	Plumbing, electric baseboard heaters and ventilation.	8B.	Mechanical	11.0
				100.0

DESCRIPTION:
LARGE (GFA: 6,777 m²) - DIAND REPRESENTATIVE SCHOOL, CROSS LAKE, MANITOBA.

	SPECIFICATION		ELEMENT	%
1.	Strip footings; column bases; concrete foundation walls.	1.	Substructure	10.0
2.	Timber joists; prefab roof trusses; metal roof; asphalt shingles; membrane.	2.	Structure	25.0
3.	Brick veneer; inverted roof system; double glazed openings.	3.	Exterior cladding	22.0
4.	Drywall; sound insulation; glazed screens; metal and wood doors.	4.	Interior partitions	10.0
5.	Cast-in-place concrete stairs.	5.	Vertical movement	1.0
6.	Floor; carpet; tiling; acoustic ceilings; painted drywall; fire alarm system; sprinklers.	6.	Interior finishes	7.0
7.	Loose furniture excluded.	7.	Fittings & equipment	7.0
8A.	Power, lighting and telephone.	8A.	Electrical	7.0
8B.	Plumbing; heat pumps; electric boilers; air compressor and ventilation.	8B.	Mechanical	11.0
				100.0

2.1.4.2 SCHOOL (PORTABLE)

DESCRIPTION:
SMALL (GFA: 71 m²) - ONE CLASSROOM CONSISTING OF TWO 3.7 m x 9.8 m TRAILERS INCLUDING HEATING, ELECTRICITY AND INTERIOR FINISHES.

SPECIFICATION	ELEMENT	%
Includes: wood blocking, power, lighting and heating, standard plumbing.	1. Substructure	
	2. Structure	
	3. Exterior cladding	
	4. Interior partitions	
	5. Vertical movement	
	6. Interior finishes	
	7. Fittings & equipment	
	8A. Electrical	
	8B. Mechanical	
		100.0

DESCRIPTION:
LARGE (GFA: 83 m²) - ONE CLASSROOM CONSISTING OF TWO 4.3 m x 9.8 m TRAILERS INCLUDING HEATING, ELECTRICITY AND INTERIOR FINISHES.

SPECIFICATION	ELEMENT	%
Includes: wood blocking, power, lighting and heating, standard plumbing.	1. Substructure	
	2. Structure	
	3. Exterior cladding	
	4. Interior partitions	
	5. Vertical movement	
	6. Interior finishes	
	7. Fittings and equipment	
	8A. Electrical	
	8B. Mechanical	
		100.0

2.1.4.3 LIBRARY

DESCRIPTION:
SMALL (GFA: 150 m²) - SINGLE STOREY ABOVE GRADE WITHOUT BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	4.0
2.	Timber frame and trussed roof.	2.	Structure	16.0
3.	Cedar siding.	3.	Exterior cladding	27.0
4.	Drywall on timber studs.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Carpet floors, acoustic tile ceilings.	6.	Interior finishes	11.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	6.0
8A.	Standard installation.	8A.	Electrical	12.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	20.0
				100.0

DESCRIPTION:
MEDIUM (GFA: 420 m²) - SINGLE STOREY ABOVE GRADE WITHOUT BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	3.0
2.	Timber frame and trussed roof.	2.	Structure	16.0
3.	Cedar siding.	3.	Exterior cladding	27.0
4.	Drywall on timber studs.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Carpet floors, acoustic tile ceilings.	6.	Interior finishes	11.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	7.0
8A.	Standard installation.	8A.	Electrical	12.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	20.0
				100.0

DESCRIPTION:
LARGE (GFA: 1,000 m²) - SINGLE STOREY ABOVE GRADE WITHOUT BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	3.0
2.	Timber frame and trussed roof.	2.	Structure	16.0
3.	Cedar siding.	3.	Exterior cladding	28.0
4.	Drywall on timber studs.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Carpet floors, acoustic tile ceilings.	6.	Interior finishes	11.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	6.0
8A.	Standard installation.	8A.	Electrical	12.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	20.0
				100.0

2.1.4.4 MUSEUM

DESCRIPTION:
SMALL (GFA: 870 m²) - SINGLE STOREY WITH BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings and concrete slab.	1.	Substructure	5.0
2.	Timber frame.	2.	Structure	13.0
3.	Cedar siding.	3.	Exterior cladding	32.0
4.	Drywall on timber studs.	4.	Interior partitions	5.0
5.	Timber stairs.	5.	Vertical movement	1.0
6.	Vinyl tiles, painted drywall.	6.	Interior finishes	9.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	5.0
8A.	Special lighting to exhibit areas.	8A.	Electrical	11.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	19.0
				100.0

2.1.4.5 POLICE STATION

DESCRIPTION:
GFA: 100 m² - SINGLE STOREY WITHOUT BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	12.0
2.	Part concrete and part timber.	2.	Structure	18.0
3.	Cedar siding.	3.	Exterior cladding	26.0
4.	Timber studs, drywall and concrete.	4.	Interior partitions	9.0
5.	N/A	5.	Vertical movement	-
6.	Vinyl tiles and concrete hardener.	6.	Interior finishes	11.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	4.0
8A.	Power, lighting and telephone.	8A.	Electrical	11.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	9.0
				100.0

2.1.4.6 POLICE/FIRE STATION

DESCRIPTION:
(GFA: 200 m²) - SINGLE STOREY TWO-BAY METAL BUILDING ERECTED ON SITE.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	6.0
2.	Metal frame.	2.	Structure	14.0
3.	Insulated sheet metal.	3.	Exterior cladding	31.0
4.	Concrete blockwork.	4.	Interior partitions	11.0
5.	N/A	5.	Vertical movement	-
6.	Painted metal.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	5.0
8A.	Standard installation.	8A.	Electrical	9.0
8B.	Standard installation.	8B.	Mechanical	16.0
				100.0

DESCRIPTION:
(GFA: 250 m²) - SINGLE STOREY CONSISTING OF OFFICE, WASHROOM, TWO CELLS, TWO AND ONE HALF GARAGE BAYS AND TWO HALF BAYS FOR DRYING.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	9.0
2.	Metal grid frame.	2.	Structure	16.0
3.	Masonry.	3.	Exterior cladding	29.0
4.	Concrete blockwork.	4.	Interior partitions	9.0
5.	N/A	5.	Vertical movement	-
6.	Painted drywall and concrete hardener.	6.	Interior finishes	10.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	4.0
8A.	Standard installation.	8A.	Electrical	10.0
8B.	Standard installation.	8B.	Mechanical	13.0
				100.0

2.1.4.7 FIRE STATION

DESCRIPTION:
1 BAY (GFA: 100 m²) - SINGLE STOREY ONE-BAY MASONRY BUILDING.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	9.0
2.	Load bearing masonry walls.	2.	Structure	13.0
3.	Concrete blockwork.	3.	Exterior cladding	32.0
4.	Concrete blockwork.	4.	Interior partitions	9.0
5.	N/A	5.	Vertical movement	-
6.	Painted walls and concrete hardener.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	5.0
8A.	Standard installation.	8A.	Electrical	9.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	15.0
				100.0

DESCRIPTION:
2 BAY (GFA: 200 m²) - SINGLE STOREY, TWO-BAYS, PREFABRICATED METAL BUILDING; INCLUDES OFFICE, WASHROOM, COMMON ROOM, FIRE EQUIPMENT, STORAGE ROOM AND SLEEPING QUARTERS.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	6.0
2.	Metal grid frame.	2.	Structure	12.0
3.	Insulated sheet metal.	3.	Exterior cladding	31.0
4.	Concrete blockwork.	4.	Interior partitions	11.0
5.	N/A	5.	Vertical movement	-
6.	Painted metal and concrete hardener.	6.	Interior finishes	9.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	5.0
8A.	Standard installation.	8A.	Electrical	10.0
8B.	Standard installation.	8B.	Mechanical	16.0
				100.0

2.1.5 RESIDENTIAL

2.1.5.1 SINGLE-FAMILY HOUSE

DESCRIPTION:URBAN TYPE (GFA: 82 m²) - SINGLE STOREY ABOVE GRADE, THREE BEDROOMS, CONCRETE BASEMENT AND ATTACHED GARAGE.

	SPECIFICATION	ELEMENT	%
1.	Strip footings, concrete foundation walls.	1. Substructure	11.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2. Structure	12.0
3.	Brick and aluminum siding; double glazing; asphalt shingles; insulation.	3. Exterior cladding	35.0
4.	Timber framed drywalling; hollow core timber flush doors.	4. Interior partitions	11.0
5.	Timber staircase - domestic basement type.	5. Vertical movement	1.0
6.	Vinyl; parquet; ceramic tiling; drywall to ceiling; paint.	6. Interior finishes	9.0
7.	Toilet accessories; kitchen units; closets; shelving.	7. Fittings & equipment	4.0
8A.	Power, lighting, telephone and TV.	8A. Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B. Mechanical	12.0
			100.0

DESCRIPTION:
URBAN TYPE (GFA: 100 m²) - SINGLE STOREY ABOVE GRADE, FOUR BEDROOMS AND CONCRETE BASEMENT.

	SPECIFICATION	ELEMENT	%
1.	Strip footings, concrete foundation walls.	1. Substructure	10.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2. Structure	11.0
3.	Brick and aluminum siding; double glazing; asphalt shingles; insulation.	3. Exterior cladding	36.0
4.	Timber framed drywalling; hollow core timber flush doors.	4. Interior partitions	11.0
5.	Timber staircase - domestic basement type.	5. Vertical movement	1.0
6.	Vinyl; parquet; ceramic tiling; drywall to ceiling; paint.	6. Interior finishes	5.0
7.	Toilet accessories; kitchen units; closets; shelving.	7. Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A. Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B. Mechanical	11.0
			100.0

DESCRIPTION:
RURAL TYPE (GFA: 74 m²) - SINGLE STOREY ABOVE GRADE, THREE BEDROOMS AND BASEMENT.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	10.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2.	Structure	11.0
3.	Brick and aluminum siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	37.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	10.0
5.	Timber staircase - domestic basement type.	5.	Vertical movement	1.0
6.	No parquet finish on floors.	6.	Interior finishes	9.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	12.0
				100.0

DESCRIPTION:
RURAL TYPE (GFA: 88 m²) - SINGLE STOREY ABOVE GRADE, FOUR BEDROOMS AND BASEMENT CONSTRUCTED OF CONCRETE BLOCKS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	9.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2.	Structure	11.0
3.	Brick and cedar siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	39.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	10.0
5.	Timber staircase - domestic basement type.	5.	Vertical movement	1.0
6.	No parquet finish on floors.	6.	Interior finishes	9.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	4.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	12.0
				100.0

DESCRIPTION:
RURAL TYPE (GFA: 74 m²) - SINGLE STOREY, THREE BEDROOMS AND CRAWL SPACE.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	10.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2.	Structure	10.0
3.	Brick and cedar siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	40.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	10.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish on floors.	6.	Interior finishes	8.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	4.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	13.0
				100.0

DESCRIPTION:
RURAL TYPE (GFA: 161 m²) - BI-LEVEL, FOUR BEDROOMS, CONCRETE FOUNDATIONS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	8.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2.	Structure	12.0
3.	Brick and cedar siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	41.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	9.0
5.	Timber staircase - domestic basement type.	5.	Vertical movement	1.0
6.	No parquet finish on floors.	6.	Interior finishes	7.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	4.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	6.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	12.0
				100.0

DESCRIPTION:
REMOTE TYPE (GFA: 77 m²) - SINGLE STOREY WITH CRAWL SPACE. ONE BEDROOM AND BUNKING FOR EIGHT, WITH UNHEATED STORAGE ROOM.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	11.0
2.	Mineral wool insulation in timber floor.	2.	Structure	10.0
3.	Cedar shingles and vertical cedar siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	37.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	6.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6.	Interior finishes	8.0
7.	Eight bunks and accessories.	7.	Fittings & equipment	10.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	4.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	14.0
				100.0

DESCRIPTION:
REMOTE TYPE (GFA: 87 m²) - SINGLE STOREY WITH CRAWL SPACE. ONE BEDROOM AND BUNKING FOR TWELVE, WITH UNHEATED STORAGE ROOM.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	9.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2.	Structure	11.0
3.	Cedar shingles and vertical cedar siding; double glazing; asphalt shingles; insulation.	3.	Exterior cladding	34.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	11.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6.	Interior finishes	9.0
7.	Fittings include provision of twelve bunks.	7.	Fittings & equipment	10.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	4.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	12.0
				100.0

2.1.5.2 SEMI-DETACHED HOUSE

DESCRIPTION:
RURAL TYPE (GFA: 124 m²) - SINGLE STOREY WITH CRAWL SPACE.
TWO 1-BEDROOM UNITS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	11.0
2.	Timber upper floor and roof trusses.	2.	Structure	11.0
3.	Cedar shingles and vertical cedar siding.	3.	Exterior cladding	32.0
4.	Internal partitions include sound insulated party wall.	4.	Interior partitions	10.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6.	Interior finishes	10.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	6.0
8A.	Power, lighting, telephone and TV.	8A.		Electrical 5.0
8B.	Plumbing, heating and ventilation.	8B.		Mechanical 15.0
				100.0

DESCRIPTION:
RURAL TYPE (GFA: 154 m²) - SINGLE STOREY WITH CRAWL SPACE.
TWO 2-BEDROOM UNITS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	11.0
2.	Timber upper floor and roof trusses.	2	Structure	11.0
3.	Brick and cedar siding.	3.	Exterior cladding	32.0
4.	Internal partitions include sound insulated party wall.	4.	Interior partitions	10.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6.	Interior finishes	10.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	6.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	15.0
				100.0

DESCRIPTION:
RURAL TYPE (GFA: 170 m²) - SINGLE STOREY ABOVE GRADE WITH CONCRETE BASEMENT AND ATTACHED GARAGE. TWO 3-BEDROOM UNITS.

	SPECIFICATION	ELEMENT	%
1.	Strip footings, concrete foundation walls.	1. Substructure	11.0
2.	Concrete basement floor; timber upper floor and roof trusses.	2. Structure	12.0
3.	Brick and aluminum siding.	3. Exterior cladding	30.0
4.	Internal partitions include sound insulated party wall.	4. Interior partitions	14.0
5.	Timber staircase - domestic basement type.	5. Vertical movement	1.0
6.	No parquet finish or ceramic tiling on floors.	6. Interior finishes	11.0
7.	Toilet accessories; kitchen units; closets; shelving.	7. Fittings & equipment	4.0
8A.	Power, lighting, telephone and TV.	8A. Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical 12.0
			100.0

2.1.5.3 ROW HOUSE

DESCRIPTION:
RURAL TYPE (GFA: 309 m²) - SINGLE STOREY WITH CRAWL SPACE. FOUR 2-BEDROOM UNITS.

	SPECIFICATION	ELEMENT	%
1.	Strip footings, concrete foundation walls.	1. Substructure	13.0
2.	Mineral wool insulation in timber floor.	2. Structure	10.0
3.	Cedar shingles and vertical cedar siding.	3. Exterior cladding	28.0
4.	Internal partitions include sound insulated party walls.	4. Interior partitions	14.0
5.	N/A	5. Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6. Interior finishes	10.0
7.	Toilet accessories; kitchen units; closets; shelving.	7. Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A. Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B. Mechanical	15.0
			100.0

2.1.5.4 MULTIPLE-FAMILY DWELLING

DESCRIPTION:
RURAL TYPE (GFA: 535 m²) - TWO STOREYS AND FULL BASEMENT. FOUR 3-BEDROOM UNITS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	13.0
2.	Mineral wool insulation in timber floor.	2.	Structure	10.0
3.	Cedar shingles and vertical cedar	3.	Exterior cladding	28.0
4.	Internal partitions include sound insulated party walls.	4.	Interior partitions	14.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish or ceramic tiling on floors.	6.	Interior finishes	10.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	5.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	15.0
				100.0

2.1.5.5 DORMITORY

DESCRIPTION:
8 STUDENTS (GFA: 172 m²) - SINGLE STOREY WITH CRAWL SPACE. EIGHT BEDROOMS/STUDIES; COMMON LOUNGE AND MECHANICAL AND ELECTRICAL ROOM; TWO BATHROOMS.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1.	Substructure	14.0
2.	Mineral wool insulation in timber floor.	2.	Structure	13.0
3.	Vertical cedar siding.	3.	Exterior cladding	33.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	12.0
5.	N/A	5.	Vertical movement	-
6.	No parquet finish on floors.	6.	Interior finishes	11.0
7.	Beds, desks and other loose furniture are excluded.	7.	Fittings & equipment	5.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	4.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	8.0
				100.0

DESCRIPTION:
24 STUDENTS (GFA: 757 m²) - SINGLE STOREY ABOVE GRADE WITH CONCRETE BASEMENT (250 m²) AND CRAWL SPACE. TWENTY-FOUR BEDROOMS/STUDIES.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, concrete foundation walls.	1	Substructure	18.0
2.	Floor over basement in concrete.	2.	Structure	15.0
3.	Brickwork.	3.	Exterior cladding	26.0
4.	Timber framed drywalling; hollow core timber flush doors.	4.	Interior partitions	9.0
5.	Metal staircase.	5.	Vertical movement	1.0
6.	No parquet finish on floors.	6.	Interior finishes	12.0
7.	Toilet accessories; kitchen units; closets; shelving.	7.	Fittings & equipment	6.0
8A.	Power, lighting, telephone and TV.	8A.	Electrical	4.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	9.0
				100.0

2.1.6 RECREATIONAL

2.1.6.1 RECREATION CENTRE

DESCRIPTION:
SMALL (GFA: 400 m²) - SINGLE STOREY WITH GYMNASIUM, SNACK BAR, CHANGING ROOMS, WASHROOMS AND OFFICE.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	6.0
2.	Steel frame.	2.	Structure	19.0
3.	Prefabricated sandwich panels.	3.	Exterior cladding	30.0
4.	Drywall and concrete blocks.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	9.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Electric heating.	8A.	Electrical	14.0
8B.	Partly air conditioned.	8B.	Mechanical	16.0
				100.0

DESCRIPTION:
MEDIUM (GFA: 1,000 m²) - AS SMALL RECREATION CENTRE BUT WITH GYMNASIUM SPACE AND EXERCISE ROOMS.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	5.0
2.	Steel frame.	2.	Structure	20.0
3.	Prefabricated sandwich panels.	3.	Exterior cladding	29.0
4.	Drywall and concrete blocks.	4.	Interior partitions	5.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	9.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Electric heating.	8A.	Electrical	14.0
8B.	Partly air conditioned.	8B.	Mechanical	16.0
				100.0

DESCRIPTION:
LARGE (GFA: 5,000 m²) - AS MEDIUM RECREATION CENTRE BUT WITH MORE EXTENSIVE FACILITIES.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	5.0
2.	Steel frame.	2.	Structure	21.0
3.	Prefabricated sandwich panels.	3.	Exterior cladding	30.0
4.	Drywall and concrete blocks.	4.	Interior partitions	5.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Electric heating.	8A.	Electrical	14.0
8B.	Partly air conditioned.	8B.	Mechanical	15.0
				100.0

2.1.6.2 COMMUNITY HALL

DESCRIPTION:
GFA: 1,000 m² - SINGLE STOREY WITH GYMNASIUM, STAGE AND STORAGE AREAS, AND ANNEX WITH BOILER ROOM, CLOAK ROOM, KITCHEN, FOYER, CHANGING ROOM AND WASHROOM.

	SPECIFICATION		ELEMENT	%
1.	Strip footings, slab on grade (crawl space annex).	1.	Substructure	5.0
2.	Glulam posts and long span curved beams.	2.	Structure	20.0
3.	Cedar siding.	3.	Exterior cladding	28.0
4.	Timber studs.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	PVC wall in gym and drywall.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Power, lights/spotlights to stage.	8A.	Electrical	13.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	19.0
				100.0

2.1.6.3 GYMNASIUM

DESCRIPTION:
SMALL (GFA: 1,000 m²) - ONE BASKETBALL COURT SIZE GYMNASIUM WITH RELATED FACILITIES.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	5.0
2.	Load bearing masonry and glulam beams.	2.	Structure	19.0
3.	Blockwork and brick veneer.	3.	Exterior cladding	29.0
4.	Blockwork and drywall.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Power and lighting.	8A.	Electrical	13.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	20.0
				100.0

DESCRIPTION:
MEDIUM (GFA: 1,500 m²) - TWO BASKETBALL COURT SIZE GYMNASIUM WITH RELATED FACILITIES.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	5.0
2.	Load bearing masonry and glulam beams.	2.	Structure	20.0
3.	Blockwork and brick veneer.	3.	Exterior cladding	29.0
4.	Blockwork and drywall.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Power and lighting.	8A.	Electrical	13.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	19.0
				100.0

DESCRIPTION:
LARGE (GFA: 4,400 m²) - FOUR BASKETBALL COURT SIZE GYMNASIUM WITH RELATED FACILITIES.

	SPECIFICATION		ELEMENT	%
1.	Strip footings.	1.	Substructure	4.0
2.	Load bearing masonry and glulam beams.	2.	Structure	20.0
3.	Blockwork and brick veneer.	3.	Exterior cladding	29.0
4.	Blockwork and drywall.	4.	Interior partitions	4.0
5.	N/A	5.	Vertical movement	-
6.	Paint and various types of flooring.	6.	Interior finishes	8.0
7.	Loose furniture & equipment excluded.	7.	Fittings & equipment	2.0
8A.	Power and lighting.	8A.	Electrical	13.0
8B.	Plumbing, heating and ventilation.	8B.	Mechanical	20.0
				100.0

2.1.6.4 ARENA

DESCRIPTION:
GFA: 2,700 m² - SINGLE SKATING RINK WITH RELATED FACILITIES.

	SPECIFICATION		ELEMENT	%
1.	Column footings.	1.	Substructure	6.0
2.	Metal frame.	2.	Structure	24.0
3.	Brick veneer.	3.	Exterior cladding	18.0
4.	Concrete blockwork.	4.	Interior partitions	5.0
5.	Concrete.	5.	Vertical movement	1.0
6.	Concrete hardener and rubber flooring.	6.	Interior finishes	8.0
7.	Bleachers.	7.	Fittings & equipment	6.0
8A.	Lighting, power and heating.	8A.	Electrical	11.0
8B.	Plumbing, ventilation, ice making equipment.	8B.	Mechanical	21.0
				100.0

PART I - CAPITAL COST MANUAL

2.0 FACILITY UNIT COSTS

TABLE OF CONTENTS

2.2 UTILITIES

2.2.1 INTRODUCTION

The costs displayed in this section represent construction in urban Toronto under **normal** conditions, unless otherwise stated. Some of the figures are average values; others are ranges. The unit costs for piped water and wastewater systems may be adjusted for specific site conditions using the appropriate multipliers for selected pipe materials, installation depths, soil conditions, development type and construction phasing.

When developing preliminary cost estimates for infrastructure projects, the project manager/officer will have to select those elements likely to be incorporated in the particular project.

For additional information on utilities and their costs, refer to the following departmental publications:

Corporate Manuals Systems, Volume 1, Capital Facilities and Maintenance with Levels of Services Standards in Annexes.

2.2.2 WATER SUPPLY, TREATMENT AND DISTRIBUTION

The costs displayed in this section are for a representative water supply system for a community with a population of less than 1,000.

2.2.2.1 WATER SUPPLY

WELL SUPPLY

	Cost ($)	Unit
a. Drilled well (200 mm):		
rock	213	v.m.
gravel packed (casing)	483	v.m.
b. Bored well (600 mm)	471	v.m.
c Dug well (900 mm)	444	v.m.
d. Well pumping station (including domestic pumps, hydropneumatic tank, piping, meter and adequate structure for about 2 L/s capacity)	47,150	l.s.

LAKE OR RIVER INTAKE SYSTEM

	Cost ($)	Unit
a. Intake structure (normally a steel well screen in a protective wood crib)	6,823	l.s.
b. Underwater intake pipe (normally a 150 mm pipe)	258	l.m.
c. Underground intake pipe (normally a 150 mm pipe buried at a depth of 2 m)	324	l.m.
d. Low level lift station (includes concrete wet well, structure, pumping equipment, hypochlorinator and meter):		
for 50,000 litres/day	59,260	l.s.
for 100,000 litres/day	93,910	l.s.
for 250,000 litres/day	122,960	l.s.
for standby power: add to (d.)	39,150	l.s.

2.2.2.2 WATER STORAGE, TREATMENT, PUMPING STATION

REINFORCED CONCRETE RESERVOIR

	Cost ($)	Unit
a. 1,000,000 L capacity	296,000	l.s.
b. 500,000 L capacity	240,100	l.s.
c. 250,000 L capacity	158,900	l.s.
d. 100,000 L capacity	92,100	l.s.

WATER TREATMENT SYSTEM (conventional)

Includes coagulation, sedimentation, filtration and disinfection capabilities; high lift pumping equipment; meters; standby power; all housed in an adequate structure; assuming usage of 180 L/capita/day.

a. 100,000 litres/day	195,600	l.s.
b. 200,000 litres/day	283,800	l.s.
c. 500,000 litres/day	385,200	l.s.

WATER TREATMENT SYSTEM (reverse osmosis)

Includes pretreatment and filtration, the reverse osmosis unit, high lift pumps, mechanical and electrical, and a diesel generator set.

a. 100,000 litres/day	408,400	l.s.

HIGH LEVEL LIFT STATION

Includes meters, hypochlorinator, domestic pumps and adequate structure.

a. 50,000 litres/day	52,700	l.s.
b. 100,000 litres/day	65,300	l.s.
c. 200,000 litres/day	75,400	l.s.

OPTIONAL EQUIPMENT
(for 50,000 - 200,000 L/d capacity)

a. Extra for fire pump equipment	60,100	l.s.
b. Extra for pressure filter	11,660	l.s.
c. Extra for softening unit	14,400	l.s.
d. Extra for greensand filter	48,900	l.s.
e. Extra for standby power	47,800	l.s.

TREATMENT PLANT BUILDING

The structure for the treatment plant and high lift pump includes insulation, lighting and heating equipment (for treatment plants or very large high lift pumping stations only).	72,500	l.s.

2.2.2.3 WATER DISTRIBUTION SYSTEM

WATER MAINS

Normally buried at a 2 m depth, costs include excavation, bedding, pipes, installation, backfill and a typical number of bends. Prices are for PVC pipes in new subdivisions (For different pipe materials refer to MULTIPLIERS on page 56).

a. Pipes:

Pipe size	Cost per linear meter ($)
100 mm pipe	93
150 mm pipe	106
200 mm pipe	143
250 mm pipe	153
300 mm pipe	200

b. Gate valve and box:

	Cost ($)	Unit
for 100 mm pipe	667	ea.
for 150 mm pipe	801	ea.
for 200 mm pipe	1,221	ea.
c. Air release valve and chamber	4,378	ea.
d. Tees and elbows:		
for 100 mm pipe	236	ea.
for 150 mm pipe	332	ea.
for 200 mm pipe	403	ea.

HOUSE SERVICE CONNECTIONS

Normally 20 mm copper pipe at a 2 m depth, including excavation bedding, pipes, installation and backfill.

	Cost ($)	Unit
a. Pipes:		
20 mm	45	l.m.
50 mm	62	l.m.
b. Curb stop and box:		
20 mm	217	ea.
50 mm	502	ea.
c. Main stop:		
20 mm	217	ea.
50 mm	386	ea.

FIRE HYDRANTS

C/w main tee, secondary valve and 6 m of lead, installed.	3,960	ea.

WATER STANDPIPES

C/w piping, fittings, insulation, wood structure with electric heater and thermostat control, water tap.	7,775	l.s.

WATER STORAGE TANK

1,000 L residential storage tank	1,470	ea.
4,500 L residential storage tank	4,270	ea.

MULTIPLIERS

Certain conditions will require either a cost increase or decrease because of the materials selected or other factors:

Conditions	Description	Multiplier (times installed costs)
Pipe Material	- Ductile iron	1.20
	- Polyvinyl-chloride	1.00
	- Polyethylene pipe, heat traced and insulated	2.50-3.00
Pipe Depth	- 1.2 to 1.5 m cover	0.90
	- 1.5 to 2.5 m cover	1.00
	- 2.5 to 3.5 m cover	1.10
Soils (including rock excavation)	- Refer to project site-specific indices (Section 1.8).	
Development Type	- New subdivision	1.00
	- Existing road:	
	a. with no existing underground services	1.20
	b. with existing underground services	1.50
Construction Phasing	- Refer to project site-specific indices (Section 1.8).	

TRUCKED WATER SYSTEM

The total cost of water trucks will vary according to the area of purchase (refer to geographic indices), the choice of special equipment options and freight costs.

TANK SIZE	CAB AND CHASSIS	INSULATED STEEL TANK	ACCESSORIES	TOTAL	WEIGHT
Litres / (gal)	($)	($)	($)	($)	Tonnes
2,275 (500)	69,525	9,630	18,580	97,735	14.3
4,550 (1,000)	95,010	11,050	18,580	124,640	20.9
6,825 (1,500)	106,600	14,760	18,580	139,940	26.4
8,180 (1,800)	125,140	21,780	18,580	165,500	35.2

Adjustments to Table

1. For a non-insulated steel water tank, decrease the insulated steel tank cost by 45%.
2. For flotation tires, increase the cost by $12,000.

3. For diesel engines, increase the cab and chassis cost by 25%. The fuel consumption rate for diesel engines is 40% less than for gasoline engines at 50 km/h in the city.

4. For stainless steel tanks with indefinite life, multiply the insulated steel tank cost by 3.5.

2.2.3 FIRE PROTECTION APPARATUS

The costs displayed in the following table are for fire protection apparatus bought in Toronto. These costs may vary according to the number, when and where the equipment is purchased (refer to geographic indices), the choice of special equipment options and freight costs.

APPARATUS TYPE	TANK SIZE Litres (gal)	PUMP CAPACITY L/min. (PGM)	TOTAL ($)	GROSS WEIGHT Tonnes
Mini pumper *	1,400 (300)	1,910 (420)	58,720	5
Triple combination pumper *	3,700 (800)	2,840 (625)	143,900	14
Water trailer	2,000 (400)	340 (75)	18,210	

Notes:

1. For diesel, increase the cab and chassis cost by 25%.

2. * Accessories include: body, tank, pump, electric and emergency equipments, special accessories, finishing, warranty.

3. The fire trucks are of the 4 x 4 or 4 x 2 wheel-drive single-axle model.

4. For water delivery/fire fighting trucks, see Trucked Water System section, p. 57, and add $8,200 for portable single-stage fire pump.

2.2.4 WASTEWATER COLLECTION, TREATMENT AND DISPOSAL SYSTEM

The costs displayed in this section are for a representative wastewater collection and disposal system for a community with a population of less than 1,000.

2.2.4.1 WASTEWATER COLLECTION

HOUSE LATERALS
Includes excavation, bedding, pipes, installation and backfill; normally a 100-150 mm PVC pipe.

	Cost ($)	Unit
a. Buried at 2 m depth	79	l.m.
b. Buried at 3 m depth	103	l.m.

SANITARY MAINS

Normally buried at a 3 m depth, includes excavation, bedding, PVC pipe supply and installation, and backfill.

a. 200 mm pipe	124	l.m.
b. 250 mm pipe	132	l.m.
c. 300 mm pipe	196	l.m.

FORCE MAINS

Normally buried at a 2 m depth, includes excavation, bedding, PVC pipe supply and installation, and backfill.

a. 75 mm pipe	83	l.m.
b. 100 mm pipe	93	l.m.
c. 150 mm pipe	106	l.m.

MANHOLES

a. Precast	1,060	v.m.
b. Pour-in-place	1,338	v.m.

LIFT STATION

Building to house 7.6 L/s pumping station.

a. With NO standby power	100,540	l.s.
b. With standby power	154,720	l.s.

LOW PRESSURE SEWER SYSTEM	4,100	l.s.

MULTIPLIERS

Certain conditions will require either a cost increase or decrease because of materials selected or other construction factors:

Conditions	Description	Multiplier (times installed costs)
Pipe Depth	(1.2 - 1.5 m)	0.90
	(1.5 - 2.5 m)	1.00
	(2.5 - 3.5 m)	1.10
Soils (including rock excavation)	Refer to project site-specific indices (Section 1.8).	
Development Type	New subdivision	1.00
	Existing road:	
	a. with no existing underground services.	1.20
	b. with existing underground services	1.50
Construction Phasing	Refer to project site-specific indices (Section 1.8).	

2.2.4.2 WASTEWATER TREATMENT AND DISPOSAL

SEPTIC TANK

Includes excavation, fill, tank and accessories.

	Cost ($)	Unit
a. Tank design capacity:		
2,700 L	1,315	l.s.
9,000 L	4,120	l.s.
22,500 L	8,130	l.s.
b. Disposal field:		
includes 100 mm perforated PVC pipe at 1 m depth, trench excavation, pipe installation and backfill	32	l.m.

SEWAGE LAGOONS

Assume a two-cell facultative lagoon for treatment and storage, control valves and no requirement for a synthetic liner.

For 1 ha of surface area	199,200	l.s.
For 2 ha of surface area	294,600	l.s.
For 4 ha of surface area	377,500	l.s.

AERATED LAGOONS

Assume a two-cell lagoon with aeration equipment consisting of submerged diffusers.

For 0.5 ha	450,300	l.s.
for 1 ha	509,800	l.s.

GRAVITY OUTFALL (from treatment system to surface water)

Normally a 200 mm pipe buried 2 m under ground.

a. Pipe under ground	124	l.m.
b. Pipe under water	324	l.m.

SEWAGE TREATMENT PLANT

The following table provides an estimate for constructing two types of sewage treatment plants according to daily design flows.

	Litres/day	Cost ($)	Unit
a. Rotating biological contactors:			
	23,000	204,900	l.s.
	45,000	245,500	l.s.
	91,000	311,300	l.s.
	136,000	401,000	l.s.
	227,000	569,700	l.s.
	455,000	1,047,400	l.s.
b. Extended aeration treatment plant:			
	23,000	195,100	l.s.
	45,000	298,000	l.s.
	91,000	333,600	l.s.
	136,000	420,000	l.s.
	227,000	557,600	l.s.
	455,000	794,200	l.s.

TRUCKED SEWAGE SYSTEM

a. Truck costs:

The total cost of sewage trucks will vary according to the area of purchase (refer to geographic indices), the choice of special equipment options and freight costs.

TANK SIZE	TRUCK PRICE	TANK WITH ACCESSORIES	TOTAL
Litres / (gal)	($)	($)	($)
2,275 (500)	69,500	28,200	97,700
4,550 (1,000)	95,000	29,600	124,600
6,825 (1,500)	106,600	32,600	139,200
8,180 (1,800)	125,100	40,300	165,400

Adjustments to Table

1. For diesel engines, increase the cab and chassis cost by 25%. The fuel consumption rate for diesel engines is 40% less than for gasoline engines at 50 km/h in the city.

2. For stainless steel tanks with indefinite life, multiply the insulated steel tank cost by 3.5.

3. All the above prices are for the septic tank cleaners equipped with vacuum pump. Prices include the heated valve fixture.

4. For insulated tanks increase the total price by $6,300 to $12,600.

	Cost ($)	Unit
b. Residential sewage holding tanks (1,000 L)	2,380	ea.
(2,000 L)	5,410	ea.

2.2.4.3 STORM WATER COLLECTION SYSTEM

The costs displayed in this section are for a representative storm water system for a community with a population of less than 1,000.

LATERALS

Includes excavation, bedding, PVC pipes, supply and installation, and backfill.

	Cost ($)	Unit
a. 150 mm pipe	88	l.m.
b. 200 mm pipe	130	l.m.
c. 250 mm pipe	170	l.m.

STORM MAINS

Normally buried at a 2 m depth, includes excavation, bedding, CONCRETE pipe supply and installation, and backfill.

a. 300 mm pipe	125	l.m.
b. 375 mm pipe	157	l.m.
c. 450 mm pipe	172	l.m.
d. 525 mm pipe	199	l.m.
e. 600 mm pipe	230	l.m.
MANHOLES (precast type, supplied and installed)	2,420	ea.
CATCH BASINS (precast type, supplied and installed)	1,575	ea.

Refer to MULTIPLIERS under WASTEWATER COLLECTION (Section 2.2.4.1).

2.2.4.4 SOLID WASTE COLLECTION AND DISPOSAL SYSTEM

GARBAGE TRUCK COLLECTION

a. Closed with light compaction type (9.2 m^3)	95,500	ea.
b. Closed with heavy duty compaction	128,400	ea.

SOLID WASTE DISPOSAL AREA

a. Gravel road (6 m surface width)	42,700	km
b. Disposal site (including clearing and grubbing, fencing and excavation) with a pit:		
57 m wide x 57 m long x 3 m deep	111,900	l.s.
40 m wide x 40 m long x 3 m deep	68,500	l.s.

2.2.5 ELECTRICAL POWER SUPPLY AND DISTRIBUTION SYSTEM

The costs displayed in this section are for a representative electrical distribution system in a community with a population of less than 1,000.

2.2.5.1 ON-SITE GENERATION (Community)

POWER SUPPLY

	Cost ($)	Unit
a. For a community population of approximately 400: 2 x 150 kW and 1 x 85 kW diesel generators and 1 synchronizer, 3 x 4,000 barrel tanks, dike, fencing and switch gear (building excluded)	750,700	l.s.
b. For a community population of approximately 1,000: 2 x 300 kW and 1 x 150 kW diesel generators, and 1 synchronizer, 3 x 4,000 barrel tanks, dike, fencing and switch gear (building excluded)	848,300	l.s.
c. Transformer structure at power house for power distribution	14,000	l.s.

DISTRIBUTION

Pressure-treated wood poles, three-phase primary conductors, 25 kVA transformers, 120/240 V secondary distribution, triplex connections at houses.	89,000	km

STREET LIGHTING

High pressure sodium 150 W lamps, fixtures and connections, mounted on existing power distribution poles.	1,680	ea.

2.2.5.2 ON-SITE GENERATION (School and Teacherage)
POWER SUPPLY

	Cost ($)	Unit
a. For a school population of approximately 150: 2 x 50 kW diesel generators non synchronized and switch gear (building excluded)	160,400	l.s.
b. For a school population of approximately 300: 2 x 85 kW diesel generators non synchronized and switch gear (building excluded)	179,300	l.s.

FUEL FARM

a. For a population of 150: 1 x 9,100 litre tank, dike, fencing, tank support and pads	76,400	l.s.
b. For a population of 300: 1 x 136,000 litre tank, dike, fencing, tank supports and pads	89,600	l.s.
c. 100 mm steel pipe (fuel line)	120	l.m.

2.2.5.3 LAND-LINE TAP-OFF

TRANSMISSION LINE

Pressure-treated wood poles, switches,	105,600	km

SUBSTATION

Structure, transformers (44 kV-5 kV) three phase, fencing, switch gear.

a. For a community population of 400	230,800	l.s.
b. For a community population of 1,000	245,900	l.s.

DISTRIBUTION

Pressure-treated wood poles, three-phase primary conductors, 25 kVA transformers, 120/240 V secondary distribution, triplex connections at houses.	89,000	km

STREET LIGHTING

High pressure sodium 150 W lamps, fixtures and connections, mounted on existing power distribution poles.	1,700	ea.

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2.0 FACILITY UNIT COSTS

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2.3 GROUNDS

2.3.1 INTRODUCTION

No two project sites are ever the same, and site development as well as environmental protection costs are significantly influenced by existing conditions, particularly soils, weather, drainage, topography, rocks, vegetative cover and access. They will also be influenced by specific program needs relative to the local cultural aspects, age group of the students and the facilities to be provided for them.

The Class C cost data provided in this section reflects favourable urban Toronto conditions, and assumes the ready availability of trained personnel, machine equipment and materials.

For additional information on site development refer to Section 1.3 and also to the following publications:

Corporate Manuals Systems

2.3.2 GENERAL SITE WORKS

2.3.2.1 CLEARING, GRUBBING AND ROUGH GRADING

DESCRIPTION:
REMOVAL OF TREES, BRUSH, STUMPS AND OTHER DEBRIS, INCLUDING ROUGH GRADING.

SPECIFICATION	COST
1. Clearing and grubbing	
- Brush	$4,540/ha
- Light (trees to 150 mm dia.)	$7,070/ha
- Medium (trees to 250 mm dia.)	$9,060/ha
- Heavy (trees to 400 mm dia.)	$12,340/ha
2. Strip and stockpile topsoil (assumes clear site with no trees, stumps)	$4.46/$m^3$
3. Rough grading (redistribution of approx. 1,000 m^3 of cut and fill)	$4,540 - $6,980/ha
Approximate rough site preparation cost	**$8,680 - $21,060/ha**

2.3.2.2 EXCAVATION

DESCRIPTION:
BULK EXCAVATION AND RELOCATION AND/OR DISPOSAL OF EARTH FILL. COST VARIES WITH ACCESS, VOLUME AND MACHINERY REQUIRED.

SPECIFICATION	COST
1. Bulk excavation	
2. Relocation of excess fill on site	
	$5.78/$m^3$

2.3.2.3 LANDFILL (BACKFILL)

DESCRIPTION:
INCLUDES IMPORTING CLEAN FILL, ROUGH GRADING AND REASONABLE COMPACTION.

SPECIFICATION	COST
1. Excavating, hauling and backfilling	
2. Rough grading and compaction	
	$14.80/m^3

2.3.2.4 ROCK BLASTING AND REMOVAL

DESCRIPTION:
ROCK REMOVAL BY APPROPRIATE MEANS, INCLUDING REMOVAL FROM SITE AS REQUIRED.

SPECIFICATION	COST
1. Rock removal 2. Disposal Note: Prices can vary widely, especially for small volumes and according to hauling distance. Consider also the "sensitivity" of the area.	
	$57.80/m^3

2.3.2.5 TOPSOIL AND FINISHED GRADING

DESCRIPTION:
SUPPLY AND GRADING OF TOPSOIL TO FINAL GRADE.

SPECIFICATION	COST
Supply, spread and finish grade topsoil by machine (100 mm minimum compacted depth)	**$3.83/m^2**
Note: Cost is highly influenced by the quantity required and assumed access to availability of local topsoil source. For typical school yard upgrading situations, use the following: - topsoil supply and spread ($23.75/m^3) - fine grading ($0.48/m^2) - 100 mm topsoil supply and finish graded ($3.03/m^2).	
	$22,480/ha

2.3.2.6 SPECIAL FILL MATERIALS

DESCRIPTION:
SUPPLY AND DELIVERY.

SPECIFICATION	COST
1. Topsoil	$24.42/m^3
2. Sand (such as for tot lots)	$15.51/m^3
3. Stone dust screening (such as for running track surface)	$30.70/m^3
4. Clear crushed stone (20 mm dia.)	$22.13/m^3
5. Clean fill	$9.85/m^3

Note: Prices can vary widely, especially for small volumes and according to hauling distance.

2.3.3 HARD SURFACE AREAS AND ITEMS

2.3.3.1 PEDESTRIAN SURFACES

SPECIFICATION	COST
1. Asphalt sidewalks (50 mm)	$24.40/m^2
2. Stone dust/gravel walks (75 mm)	$8.31/m^2
3. Interlocking pavers (on 100 mm gravel, 50 mm fines)	$83.10/m^2
4. Precast patio pavers (50 x 600 x 600 mm)	$48.85/m^2
5. Concrete walks (100 mm) with 6/6 x 6 Wire Mesh Reinforcing	$60.15/m^2
6. Concrete steps	$258/m^2
7. Timber steps (150 x 300 mm)	$24.45/l.m.
8. Pedestrian foot bridge (timber: 2 m wide x 5 m long, with side rails)	$5,300/ea.
9. Wood boardwalks (cedar or treated)	$62.50/m^2

Note: Prices do not include any clearing, grubbing or rough grading works. Normal compacted granular base is included.

2.3.3.2 VEHICULAR DRIVEWAYS/PARKING SURFACES

SPECIFICATION	COST
1. Asphalt paving (50 mm) with 150 mm base	$28.09/m^2
2. Asphalt paving (75 mm) with 200 mm base	$36.45/m^2
3. Interlocking pavers (on 100 mm gravel, 50 mm fines)	$83.10/m^2
4. Precast patio pavers (50 x 600 x 600 mm)	$48.95/m^2
5. Gravel surface (75 mm)	$15.96/m^2
6. Concrete paving (125 mm)	$62.46/m^2
7. Poured-in-place curbing (150 mm)	$51.24/l.m.
8. Precast concrete curbing	$34.16/l.m.
9. Timber curbing (150 x 150 mm, treated)	$17.08/l.m.
10. Gravel parking stall (2.7 x 6.5 m)	$759 ea.
11. Gravel access drive (6 m wide)	$99.00/l.m.

Note: Prices do not include any clearing, grubbing or rough grading works. Normal compacted granular base is included.

2.3.3.3 WALLS AND STEPS

SPECIFICATION	SPECIFICATION #	COST
1. Concrete walls 1 m above grade with footing		$489/l.m.
2. Gabion walls		$131/m^3
3. Concrete steps		$253/m^2
4. Timber steps (1.5 m wide)		$18.80/l.m.
5. Railroad ties (used)		$18.80/ea.
6. Stone rip-rap (300 mm deep)		$114/m^3
7. Precast "slopeblock" walls (unilock)		$211/m^2
8. Timber (150 x 150 mm) wall, three rows high (450 mm)		99/l.m.

2.3.3.4 SITE FURNITURE

SPECIFICATION	COST
1. Flag poles - aluminum, internal halyard (7 to 8 m high), plus flag, rigging	$3,190/ea.
2. Benches - wood seats, concrete supports	$837/ea.
3. Trash baskets - metal/wood	$629/ea.
4. Bike racks - galvanized pipe, prefabricated	$488/ea.
5. Football/soccer goal posts - galvanized pipe	$3,590/pair
6. Softball backstop - prefabricated (3.6 m high chain link fence 6 x 6 x 6 m long)	$5,650/ea.
7. Bollards - wood (250 x 250 x 1,000 mm high)	$151/ea.
8. Wood decking - pressure treated	$49.00/$m^2$
9. Wood fencing - 1.5 m high	$82.10/$m^2$
10. Chain link fence (vinyl coating - add 54¢/l.m.)	
- 0.9 m high	$30.70/l.m.
- 1.2 m high	$36.45/l.m.
- 1.5 m high	$54.80/l.m.
- 1.8 m high	$62.20/l.m.
- 3.0 m high	$110.80/l.m.
11. Barbed wire fence - 1.5 m high (three-strand)	$18.30/l.m.
12. Project/site sign	$2,810/ea.
13. Picnic table - wood	$490/ea.
14. Bleachers - 5 tiers, 50 seats	$1,650/ea.
15. Swings - 4 seats, 3.6 m high	$2,160/ea.

Note: Prices shown include supply and installation.

2.3.4 SOFT LANDSCAPE ITEMS

2.3.4.1 GRASS AND PLANTS

SPECIFICATION	COST
1. Topsoil (supply and spread)	$24.40/m^3$
2. Seeding (including 100 mm of topsoil)	$3.83/m^2$
3. Mechanical seeding (without topsoil)	$1.80/m^2$
4. Sod (including 100 mm of topsoil)	$7.70/m^2$
5. Sodding (without topsoil)	$4.49/m^2$
6. Tree planting - 50 mm calliper	$298/ea.
7. Tree planting - 75 mm calliper	$413/ea.
8. Evergreen shrub planting (1 m wide)	$71/ea.
9. Deciduous shrub planting (1 m wide)	$42/ea.
10. Cedar hedge (1.5 m high)	$42/m.
11. Flower bed	$17.60m^2$

Note: Trees and shrubs are balled and burlapped, guyed as necessary, locally available, planted and guaranteed for one year.

2.3.5 SITE UTILITY ITEMS

2.3.5.1 NIGHT LIGHTING

SPECIFICATION	COST
1. Parking lot light standards - aluminum pole/luminaire (5 m high)	$3,240 ea.
2. Pedestrian walk light standards - aluminum pole/luminaire (3-4 m high)	$2,600 ea.
3. Night lighting (telephone pole mounted)	
a. Hockey rink	$17,050
b. Softball field	$46,500
4. Winter car plug-ins/bollards	$725 ea.

2.3.5.2 DRAINAGE

SPECIFICATION	COST
1. Sub-surface drainage - tiling	$7.10/l.m.
2. Tile drainage for athletic field area - flexible, perforated (100 mm dia.)	$1,050/ha
3. Culverts - galvanized steel, corrugated (300 mm dia.)	$67.50/l.m.
4. Lawn irrigation - automatic sprinklers (underground)	$41,890/ha
5. Drainage ditch (600 mm deep)	$15.94/l.m.

2.3.5.3 MISCELLANEOUS UTILITIES

SPECIFICATION	COST
1. Drinking fountain (exterior)	$2,325 ea.
2. Hose bib/water tap (exterior)	$845 ea.
3. Incinerator (light domestic trash) Plus 100 mm gravel pad	$3,220 ea.

2.3.6 RECREATIONAL FACILITIES (PLAY/SPORTS AREAS)

2.3.6.1 KINDERGARTEN (TOT-LOT)

SPECIFICATION	COST
Curbed sand area with play equipment to accommodate approx. 25 kindergarten children. Fenced area of 175 m^2.	Cost varies depending on equipment and materials selected. Design to suit age group needs within budget limitations.
1. Play structure	$14,100
2. Timber edging (33 m)	$1,420
3. Sand (34 tonnes)	$1,420
4. Topsoil and sod	$1,420
5. Four trees	$1,920
6. Two benches	$830
7. Fencing (50 m)	$ 2,090
8. Installation and freight	$4,150
Approximate total cost	**$27,350**

2.3.6.2 PLAYGROUND (GRADES 1-5)

SPECIFICATION	COST
Curbed sand area with play structure or equipment to accommodate approx. 20-30 children.	Cost varies depending on equipment and materials selected. Design to suit age group within budget limitations.

1. Play structure	$19,990
2. Sand (58 tonnes)	$2,090
3. Timber edge (300 mm x 46 m)	$2,090
4. Installation	$5,900
5. Freight	$480
Approximate total cost	**$30,550**

2.3.6.3 STANDARD SECONDARY SCHOOL RUNNING TRACK (400 m - 6 LANES)

SPECIFICATION	COST

Includes approx. 3,000 m^2 track surface with:

1. Granular base (150-200 mm)
2. Stone dust fines surfacing (50 mm)
3. Inside wood edge (400 l.m. of 38 x 140 mm)
4. Topsoil/seeded perimeter (5 m wide)
5. Survey control of grades and layout

Note: Lump sum price does not include clearing, grubbing, significant rough grading works, tile drains or the cost of a grassed soccer/football field within track perimeter. Infield area is 10,500 m^2 and add $5,470 for topsoil and sod for finished soccer or football infield.

$47,100

2.3.6.4 STANDARD SECONDARY SCHOOL FOOTBALL/SOCCER FIELD

SPECIFICATION	COST

Includes the finish preparation of a well-graded 70 x 150 m area:

1. Grading (finish) and surface drainage
2. Topsoil (150 mm)
3. Grass (seeded)
4. Goal posts (2 ea.)
5. Line markings

Note: Lump sum price does not include clearing, grubbing or significant cut/fill and rough grading works.

$56,100

2.3.6.5 SOFTBALL FIELD (HIGH SCHOOL/ADULTS)

SPECIFICATION	COST

Includes:

1. Topsoil and finish grading	$9,800
2. Backstop with overhang (prefabricated or 6 x 6 x 6 m long)	$5,650
3. Skinned infield (stone dust and soil mix)	$5,300
4. Seeded outfield (80 m radius)	$24,200
5. Bases and 80 m sideline fences	$4,530

Note: Lump sum price does not include night lighting ($4,530); bleachers ($4,650); players' benches ($1,160); outfield fencing ($5,800); access drive, service lines or peripheral open space treatment. Also not included are significant clearing, grubbing and rough grading works.

$49,480

2.3.6.6 SOFTBALL FIELD (JUNIOR)

SPECIFICATION	COST

Includes:

1. Topsoil and finish grading
2. Backstop (prefabricated)
3. Skinned infield (stone dust)
4. Seeded outfield (50 m radius)
5. Bases

Note: Lump sum price represents only the bare essentials for a small informal field suitable for children under 14 years of age. Price does not include significant clearing, grubbing and rough grading works.

$24,500

2.3.6.7 OUTDOOR HOCKEY RINK

SPECIFICATION	COST

Includes:

1. Minor grading and base preparation	$4,150
2. Supply and installation of 1.2 m boards (39 x 24.5 m) plus access gates	$32,500
3. Exterior latex paint	$750
4. Goal nets	$750

Note: Lump sum price does not include benches and player shelter ($5,800); 1½ in. diameter (37.5 mm) water service standpipe with winter heat protection ($7,530); night lighting ($16,400); clearing, grubbing and rough grading works. For wire mesh protection at end zones, add $4,650.

$38,150

2.3.6.8 TENNIS COURTS

SPECIFICATION	COST

Includes:

1. Minor grading and base preparation (200 mm granular)
2. Asphalt court surface (65 mm)
3. Chain link fence (3.6 m high)
4. Net, net posts and line marking

Note: Lump sum price does not include lighting, clearing, grubbing and rough grading works.

Single court	**$42,500**
Double court	**$59,100**

2.3.6.9 OUTDOOR BASKETBALL COURT

SPECIFICATION	COST

Includes:

1. Minor grading and base preparation
2. Asphalt surface 50 mm (20 x 30 m)
3. Back boards, posts and net hoops
4. Line markings

Note: Lump sum price does not include lighting, clearing, grubbing and rough grading works.

$16,800

2.3.6.10 OUTDOOR VOLLEYBALL COURT

SPECIFICATION	COST

Includes:

1. Minor grading and base preparation
2. Grass or sand/clay mix
3. Net and posts
4. Markings

Note: Lump sum price does not include lighting, clearing, grubbing or major regrading.

$ 3,490

PART I - CAPITAL COST MANUAL

2.0 FACILITY UNIT COSTS

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2.4 ROADS

2.4.1 INTRODUCTION

The majority of roads in and around First Nation communities are gravel surfaced and constructed to various standards depending upon site location and levels of service required. For further information refer to:

Corporate Manuals Systems, Volume 1, Capital Facilities and Maintenance with Levels of Services Standards in Annexes.

2.4.2 SPECIFIC QUALIFIERS AND DEFINITIONS

2.4.2.1 ELEMENTAL COMPONENTS

The Class C cost data presented are in elemental components. Various combinations of these components provide total costs for the different types of roads being constructed. Since each elemental cost forms an integral part of the total cost estimate, adjustments will have to be made to the unit cost if an element is used alone.

2.4.2.2 ROAD WIDTHS

The costs developed for this section were based on roadway widths of 6.0 m, 7.5 m and 8.5 m.

Note: The roadway width includes the shoulders, but not the allowance for rounding.

2.4.3 ROAD CONSTRUCTION ELEMENTS

2.4.3.1 ROADWAY, WIDTH OF 6.0 m (CLASS C ESTIMATE)

CONSTRUCTION ELEMENT	COST
CLEARING (30 m right-of-way)	
Light	$4,020/km
Medium	$9,870/km
Heavy	$13,900/km
DRAINAGE (channel excavation, including structures less than 6 m span)	
Minimum requirement	$2,750/km
Normal requirement	$11,800/km
Maximum requirement	$27,100/km
SUBGRADE (including grubbing)	
a. Turn piking (stripping and filling from ditch excavation)	$23,500/km
b. Cut and fill and borrow (mainly earthwork; short haul)	$68,900/km
c. 30% rock subgrade or 30% long earth hauls or combination	$128,600/km
d. 60% rock subgrade or 60% long earth hauls or combination	$158,600/km
e. 85% rock subgrade or 85% long earth hauls or combination	$173,900/km
SURFACING	
a. Traffic gravel (75 mm depth)	$12,000/km
b. Hot mix asphalt (for 50 mm depth)	
- 6.5 m width	N/A
- 7.5 m width	N/A
- granular base (150 mm depth)	$29,600/km
- granular subbase (300 mm depth)	$51,200/km
c. Surface treatment (local crushed gravel, single application)	
- 6.5 m width	N/A
- 7.5 m width	N/A
- granular base (150 mm depth)	N/A

2.4.3.2 ROADWAY, WIDTH OF 7.5 m (CLASS C ESTIMATE)

CONSTRUCTION ELEMENT	COST
CLEARING (30 m right-of-way)	
Light	$4,020/km
Medium	$9,870/km
Heavy	$13,900/km
DRAINAGE (channel excavation, including structures less than 6 m span)	
Minimum requirement	$2,750/km
Normal requirement	$11,800/km
Maximum requirement	$27,100/km
SUBGRADE (including grubbing)	
a. Turnpiking (stripping and filling from ditch excavation)	$26,700/km
b. Cut and fill and borrow (mainly earthwork; short haul)	$76,400/km
c. 30% rock subgrade or 30% long earth hauls or combination	$142,700/km
d. 60% rock subgrade or 60% long earth hauls or combination	$173,900/km
e. 85% rock subgrade or 85% long earth hauls or combination	$190,500/km
SURFACING	
a. Traffic gravel (75 mm depth)	$13,100/km
b. Hot mix asphalt (for 50 mm depth)	
- 6.5 m width	$65,800/km
- 7.5 m width	$75,8000/km
- granular base (150 mm depth)	$36,900/km
- granular subbase (300 mm depth)	$63,400/km
c. Surface treatment (local crushed gravel, single application)	
- 6.5 m width	$9,600/km
- 7.5 m width	$12,200/km
- granular base (150 mm depth)	$36,200/km

Note: In general, surface treatment is 1 m wider than hot mix surface.

2.4.3.3 ROADWAY, WIDTH OF 8.5 m (CLASS C ESTIMATE)

CONSTRUCTION ELEMENT	COST
CLEARING (30 m right-of-way)	
Light	$4,020/km
Medium	$9,870/km
Heavy	$13,900/km
DRAINAGE (channel excavation, including structures less than 6 m span)	
Minimum requirement	$2,750/km
Normal requirement	$11,800/km
Maximum requirement	$27,100/km
SUBGRADE (including grubbing)	
a. Turnpiking (stripping and filling from ditch excavation)	$ 29,400/km
b. Cut and fill and borrow (mainly earthwork; short haul)	$83,900/km
c. 30% rock subgrade or 30% long earth hauls or combination	$157,400/km
d. 60% rock subgrade or 60% long earth hauls or combination	$191,400/km
e. 85% rock subgrade or 85% long earth hauls or combination	$213,100/km
SURFACING	
a. Traffic gravel (75 mm depth)	$15,600/km
b. Hot mix asphalt (for 50 mm depth)	
- 6.5 m width	$65,800/km
- 7.5 m width	$75,800/km
- granular base (150 mm depth)	$41,900/km
- granular subbase (300 mm depth)	$72,900/km
c. Surface treatment (local crushed gravel, single application)	
- 6.5 m width	$9,570/km
- 7.5 m width	$12,200/km
- granular base (150 mm depth)	$41,900/km

Note: In general, surface treatment is 1 m wider than hot mix surface.

2.4.4 ROAD CONSTRUCTION EXAMPLES

2.4.4.1 LOW COST ROAD (CLASS C ESTIMATE)

30 m right-of-way; roadway width 6.0 m; light clearing; minimum drainage requirement; stripping and filling from ditch excavation; traffic gravel 75 mm depth.

CONSTRUCTION ELEMENT	COST
CLEARING	
Light	$4,020/km
DRAINAGE	
Minimum requirement	$2,750/km
SUBGRADE	
Turnpiking	$23,500/km
SURFACING	
Traffic gravel (75 mm depth)	$12,000/km
TOTAL	**$42,270/km**

2.4.4.2 MEDIUM COST ROAD (CLASS C ESTIMATE)

30 m right-of-way; roadway width 7.5 m; medium clearing; normal drainage requirements; 30% rock subgrade or 30% long earth hauls or combination; and 6.5 m (wide) surface treatment with local crushed gravel, single application on 150 mm deep granular base.

CONSTRUCTION ELEMENT	COST
CLEARING	
Medium	$9,870/km
DRAINAGE	
Normal requirement	$11,800/km
SUBGRADE	
30% rock or 30% long earth haul or combination	$142,700/km
SURFACING	
Granular base (150 mm depth)	$36,200/km
Surface treatment (local crushed gravel, single application)	$9,570/km
TOTAL	**$210,140/km**

2.4.4.3 HIGH COST ROAD (CLASS C ESTIMATE)

30 m right-of-way; roadway width 8.5 m; heavy clearing; maximum drainage requirement; 85% rock subgrade or 85% long earth hauls or combination; granular subbase (300 mm depth); granular base (150 mm depth); and 7.5 m width, hot mix asphalt (for 50 mm depth).

CONSTRUCTION ELEMENT	COST
CLEARING	
Heavy	$14,200/km
DRAINAGE	
Maximum requirement	$27,700/km
SUBGRADE	
85% rock subgrade or 85% long earth hauls or combination	$217,900/km
SURFACING	
Hot mix asphalt (for 50 mm depth) 7.5 m width	$77,500/km
Granular base (150 mm depth)	$42,000/km
Granular subbase (300 mm depth)	$74,700/km
TOTAL	**$454,900/km**

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2.0 FACILITY UNIT COSTS

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2.5 BRIDGES

2.5.1 INTRODUCTION

Bridge components can be divided into three major construction elements: the substructure, the superstructure and miscellaneous components. The unit costs presented in this section relate to these major elements.

2.5.1.1 SUBSTRUCTURE

Abutments, piers and bents, including, but not limited to, the following:

- footings;
- piles;
- caps;
- rock filled cribs;
- bearing seats;
- wing walls;
- back walls;
- sheet piling; and
- granular fill.

2.5.1.2 SUPERSTRUCTURE

Main secondary support members and bridge deck, including, but not limited to, the following:

- girders;
- floor beams;
- stringers;
- bracing;
- trusses;
- bearing devices;
- decking;
- wearing surface;
- expansion joints or devices; and
- curbs/medians/sidewalks.

2.5.1.3 MISCELLANEOUS

Bridge appurtenances, safety devices, erosion and scour protection, including, but not limited to, the following:

- parapet walls;
- railings;
- guide rails;
- pedestrian handrails;
- drains;
- lighting/electrical devices;
- signs/traffic control devices;
- approach surfaces;
- embankments;
- rip rap;
- channel bed protection; and
- retaining walls.

The unit costs shown on the following pages are based on typical bridges found on First Nation reserves. Each major bridge element is divided into specific components to reflect the substance of each unit cost.

Bridge designs vary considerably depending on site conditions, and much of the essential information needed to decide the type of substructure and the length and number of bridge spans is not readily available nor sufficiently detailed at the Class C or D levels of cost estimate. It is therefore important to remember that the unit costs presented in this section are a guideline and must be used with caution. Sufficient site information should be obtained to make appropriate cost adjustments to reflect actual conditions.

Also refer to **Corporate Manuals Systems, Volume 1, Capital Facilities and Maintenance with Levels of Services Standards in Annexes**.

2.5.2 CONCRETE/STEEL BRIDGES

2.5.2.1 VEHICULAR BRIDGE - ONE 32 m SPAN

SPECIFICATION	ELEMENT	COST
Deck width : 9 m Total deck area: 288 m^2 Reinforced concrete deck and abutments, steel girders and pipe piles.		
1. Steel pipe piles Reinforced concrete abutments Granular fill	1. Substructure	\$695/m^2
2. Steel welded plate girders Reinforced concrete deck and curbs Expansion joints Bearings	2. Superstructure	\$1,055/m^2
3. Steel railings Drains Rip rap Approach surfaces	3. Miscellaneous	\$367/m^2
Note: Unit costs are per m^2 of deck area.		
TOTAL		**\$2,117/m^2**

2.5.2.2 VEHICULAR BRIDGE - TWO 19.2 m SPANS

SPECIFICATION	ELEMENTS	COST
Deck width: 7.35 m Total deck area: 282 m^2 Precast prestressed concrete deck stringers, precast concrete abutment and pier caps on steel pipe piles.		
1. Steel pipe piles Precast concrete bearing slabs Precast concrete pier cap Structural steel Granular and common fill	1. Substructure	$735/$m^2$
2. Prestressed concrete deck stringers	2. Superstructure	$735/$m^2$
3. Steel railings Approach guide rail Rip rap Gabions	3. Miscellaneous	$229/$m^2$
Note: Unit costs are per m^2 of deck area.		
TOTAL		**$1,699/$m^2$**

2.5.3 TIMBER BRIDGES

2.5.3.1 VEHICULAR BRIDGE - ONE 8 m SPAN

SPECIFICATION	ELEMENTS	COST
Deck width : 5 m Total deck area: 40 m^2 Treated timber structure with reinforced concrete abutments.		
1. Reinforced concrete abutment Granular fill	1. Substructure	\$544/m^2
2. Timber stringers Timber plank decking Timber running strips Timber curbs	2. Superstructure	\$614/m^2
3. Timber handrails Signs Rip rap	3. Miscellaneous	\$134/m^2
TOTAL		**\$1,292/m^2**

2.5.3.2 PEDESTRIAN BRIDGE - ONE 8 m SPAN

SPECIFICATION	ELEMENTS	COST
Deck width: 5 m Total deck area: 40 m^2 Treated timber structure with timber crib abutments.		
1. Timber crib abutments Granular fill	1. Substructure	$375/$m^2$
2. Timber stringers Timber plank decking	2. Superstructure	$210/$m^2$
3. Timber handrails Rip rap	3. Miscellaneous	$143/$m^2$
TOTAL		**$728/$m^2$**

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2.0 FACILITY UNIT COSTS

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2.6 ENVIRONMENTAL COST CONSIDERATIONS

2.6.1 INTRODUCTION

This section describes typical environmental issues and lists their common cost components. These costs components have not been priced out for this issue of the CRM.

No two environmental development or re-mediation situations are the same; and costs are significantly influenced by existing conditions such as soils, drainage, topography, vegetative cover, weather, and access. They will also be influenced by specific program needs relative to the present day and intended future use of the site. There are also significant cost differences attributed to regional competition (or lack there of) and availability of trained personnel.

Future versions of this section will provide Class C cost data, which will reflect favorable urban Toronto conditions, and will assume the ready availability of trained personnel, machine equipment and materials.

2.6.2 ENVIRONMENTAL SITE ASSESSMENT

2.6.2.1 Groundwater Monitoring Well

Costing is for installation of an individual well. Costs are dependent upon hydro geological conditions, chemical nature of the contaminants, and whether the well bore will be used to conduct geologic investigations. Keep in mind that a contaminated site should have a minimum of 3 monitoring wells to estimate groundwater flow direction.

Common Cost Components:
Drilling of well
Materials

Cost per metre of well (air rotary method): $165
Cost per metre of well (auger method): $105

2.6.2.2 Phase 1 Environmental Site Assessment

Consists of an Historical Review & Site Visit ($2040-$3570).

2.6.2.3 Phase 2 Environmental Site Assessment

Consists of Preliminary Intrusive Investigation to confirm the presence of contamination and areas of environmental concern ($7100-$10,200).

2.6.2.4 Phase 3 Environmental Site Assessment

Consists of a detailed intrusive investigation to delineate the extent of contamination ($10,200-$51,000). Price is dependent on the number of areas of concern and the extent of contamination (lateral/vertical extent in various media).

2.6.3 ENVIRONMENTAL SITE RE-MEDIATION

2.6.3.1 Overview

The costs of the re-mediation technologies discussed herein are design-specific and site-specific in nature and therefore may not reflect conditions at a particular property/design for which these estimates are being compared. These reference estimates are to be checked by an engineer by verifying assumptions used as they relate to site-specific conditions.

2.6.3.2 Contaminated Groundwater Treatment – Oil-Water Separation

This treatment assumes that a 15 metre long cutoff trench is excavated down gradient of an impacted shallow (<4m) groundwater system, and that oil/water is pumped to a treatment at the surface. Separated oil is disposed of and water is re-injected to the groundwater system following treatment.

Common Cost Components:
Excavation of trench
Dump truck, load/haul spoil
Oil-water separator (fixed cost)
Product storage tank
Pump-out unit
Piping for influent/effluent and product discharge
Operation costs (electrical, product disposal)
Operating and Maintenance

Operating and Maintenance costs per month: $820-$1020
System installation: $35,700-$40,800

2.63.3 Soil Capping (Containment and Isolation)

This system assumes a containment and isolation approach using a soil and vegetation cap consisting of a grass layer underlain by 0.3 metres of low permeability soil underlain by geo-textile cloth. These costs assume a 10 ha area to be capped and a 20 year maintenance period.

Applications for soil capping include landfill decommissioning and mine waste restoration. The objectives of capping include storm water run off control, infiltration and oxygen diffusion reduction, erosion control, low maintenance re-mediation, and low life-cycle costs. Soil capping is considered to be a passive re-mediation technology.

Common Cost Components:
Vegetative top cover
Impervious soil cover
Filter layer (geotextile)
Maintenance and repair

Cost per square metre: $36-$46

2.6.3.4 Soil Vapour Extraction

This process assumes the *in situ* treatment of hydrocarbon-impacted soil. Initial hydrocarbon concentrations are assumed to be up to 10,000 mg/kg and it is assumed that final concentrations will be below 2000mg/kg. The soil is assumed to consist of relatively permeable sand and gravel and the treatment period is assumed to be five years. The soil mass quantity is based on an impacted depth of 5 metres, 90m^2 area. Soil vapour extraction wells are assumed to be located at a frequency of 1 per 15m^2 area.

Common Cost Components:

Vapour extraction point installation
Piping
Blower(s)
Charcoal treatment
Operation and maintenance

Cost per tonne: $21-$31

2.6.3.5 Soil Washing

Soil washing is a water-based process for mechanically scrubbing and leaching waste constituents from a contaminated soil for recovery and treatment. This process assumes the excavation and treatment of 2000m^3 of soil using a soil washing plant to remove contaminants, and the reinstatement of restored soil in excavation.

Common Cost Components:

Soil excavation and reinstatement
Soil treatment using a packaged system (includes treatment/disposal of the wash solution)

Cost per tonne of soil: $205-$305

2.6.3.6 Land Treatment (*in situ* biodegradation)

This treatment method assumes that the contamination is biodegradable and shallow (<2 m). The treatment requires some preparation to increase permeability and the addition of nutrients and water to effect biostimulation of naturally occurring microorganisms to consume the biodegradable contaminant. Treatment area is assumed to be 200 m^2 and treatment time is assumed to be 10 years.

Common Cost Components:

Soil preparation (breakup, mix and aerate soil)
Tilling and fertilizer application
Water addition (4 events per year)

Cost per cubic metre: $76-$92

2.6.3.7 E*x Situ* Bioremediation – Biopile

This system assumes the excavation and ex situ treatment of 2000 m^3 hydrocarbon impacted soil in a constructed biocell. Initial hydrocarbon concentrations are assumed to be up to 10,000 mg/kg and it is assumed that final concentrations will be below 2000 mg/kg. The treatment period is assumed to be 2 years.

Common Costs Components:
Excavation and reinstatement
Construction of treatment cell (liner, earthen berm, aeration manifold)
Soil treatment within cell (soil tilling, fertilizer, watering)
Biocell decommissioning

Cost per cubic metre: $41-$62

2.6.4 STORAGE TANK MANAGEMENT

Underground Storage Tanks (USTs) require a regular management schedule which includes regular inspection and eventual removal /replacement, closure or upgrading according to the timetable for upgrading set out in the federal Technical Guidelines and the CCME's Code of Practice for USTs. Upgrading USTs is much more difficult than upgrading above ground storage tanks (ASTs) because of extensive excavation and age and condition of the tank. The cost estimate below will be for removal-replacement and closure only. Permanent closure of an UST system can be accomplished either through disposal in-place or by physical removal. Tank removal is the preferred method of closure since it involves the removal of a contaminant source. Disposal in-place is appropriate when removal of the tanks may damage or undermine adjacent structures or when the presence of underground utilities render removal impractical. Cost reference are given for a UST with 4,500 liter capacity.

2.6.4.1 Professional Fees - General

- Professional engineers (undertakes environmental studies, engineering design, construction supervision and re-mediation work on sites contaminated by leaks, spills or overfills):
- hourly rate is around $92.
- Licensed tank installers (performs the actual tank installations, removals or other tank-related activities):
- hourly rate is around $56.

2.6.4.2 Compliance Assessment

- Compliance assessment costs depend on the location of the tank (remote area or not), type of tank (UST or AST), the province and who is doing the assessment.

Professional Fees

- inspector certified by the province like TSSA (Ontario) or vérificateurs agréés (Québec) ($510-1,530/tank)
- senior inspector from a private company ($1,020/tank)
- federal employee specialist in storage tanks (around $1,020/tank).

Leak Testing

- Precision leak testing (Vacuum method): $660 for a tank, $153 for each line - total of around $1,020/tank and associated piping

Cathodic Testing

- Cathodic protection testing: $357

Note: These costs include the time and the report, but not disbursements such as transportation or lodging.

2.6.2.3.1 Tank Removal - Replacement - Disposal

Closure Planning
- a professional needs to review the existing system, map the services, develop a health and safety plan, contingency planning, determine type and quantity of product and determine where tank will be disposed.

Cost reference is for removing one 4500 l single wall steel UST by a double wall Fibreglass Reinforced Plastic with spill containment, internal leak detection, overfill protection, automatic tank gauging and double wall flexible piping with leak detection:

Cost Components
- Excavation
- Pump remaining liquid from tank and piping
- Purge tank of vapors
- Remove tank and feed lines
- Render unfit for further use
- Prepare old tank for transport and dispose for recycling
- Cover bottom with a geo-textile membrane
- Install new tank and piping system, including accessories
- Installation of electrical system for monitoring devices
- Tank testing
- Backfill
- Monitoring wells

Average Total Cost:
Environmental Assessment under CEAA $1,020 +
Removal; $4,590
Replacement: $28,550
Disposal for metal recycling: $1,530
Disposal in-place with no replacement: $10,200

Note: Replacement with a self contained steel AST is 10 to 15% less expensive. AST are more and more popular to tank managers. According to a survey conducted in 1996 by the Steel Tank Institute, tanks manufacturers are fabricating 3 ASTs for every one UST. ASTs also pose less of a hazard to soil and groundwater as it is easier to monitor them for leaks.

Cost not included:
- Additional delivery fees for all materials going to remote locations.
- Impacted soil encountered.
- Tank filling and piping exceeding 5 metres.
- Presence of concrete slabs

Closure Assessment
- even if there is no evident contamination, several soil and groundwater samples should be taken and analyzed to confirm that no release has occurred.

2.6.5 ENVIRONMENTAL ASSESSMENTS

This section refers specifically to Environmental Assessments conducted pursuant to the Canadian Environmental Assessments Act. Any activity beyond a simple screening done under CEAA is case specific. Comprehensive studies and panel reviews can cost over $ 1M.

Typical simple screening type environmental assessment:

- $1,530 - $2,040

Complex Screening:

- $10,200 and up

Strategic environmental assessment:

- $7,140 and up

Dangerous goods survey

- $610 to $2,040 / site

PART I - CAPITAL COST MANUAL

3.0 ARCHITECTURAL AND ENGINEERING COSTS

3.1 INTRODUCTION

This guideline has been prepared to assist departmental staff to determine architectural and engineering costs when preparing project estimates.

Tables 1 to 5 at the end of this section provide typical average consultant fees as a percentage of construction costs. This information provides guidelines to be used in the **absence of specific project cost data**. The tables were derived from a former PWC publication named: *Market-Based Charging for services: Regional Briefing, Market-Based Charging*. The data of these tables can be considered as a national average i.e. general guideline of consultant fees for services provided by either a private consultant or PWGSC.

In calculating consultant fees, particularly for design and construction supervision services without professional input, the user is advised to use the current **provincial** fee schedules published by the respective professional organizations.

The tables presented in this section are applicable to normal, non-complex projects and do not apply in estimating fees for feasibility studies or restoration work. However, for alterations and additions to existing buildings, one can obtain an approximation by multiplying the applicable consultant fee for a building of comparable size by 150%.

3.2 DEFINITIONS

Project definition: activities involved in planning, conceptualizing and defining the scope, standards and requirements of a project. These activities follow a feasibility study normally provided through separate DIAND capital funding.

Investigation and design: activities involved in field surveys, geo-technical investigations, mapping, air photo interpretation, and preliminary and final designs, and working documents, up to and including tender call.

Construction inspections: activities involved during the construction phase of the project, including inspections, staking, measurements, supervision, testing, surveying and administration.

Project management: activities involved in the overall quality of project delivery, including management in terms of quality control, cost control, scheduling and reporting.

Basic construction cost: the cost associated with the trade work and its direct supervision. This usually represents the contract value of the work and always includes overheads and profits. It **excludes** contingencies, architectural and engineering costs and risks.

3.3 USE OF ARCHITECTURAL AND ENGINEERING COST TABLES

Costs given in the tables are typical average consultant fees expressed as a percentage of the total estimated basic construction cost. These percentages do not include disbursements or band involvement which must be calculated separately (see Appendix A).

Example: The basic construction cost of a building is estimated to be $800,000. Assume a consultant is hired to carry out project design, construction supervision and project management. Also assume the tables are applicable. The architectural and engineering consultant costs would be calculated as follows:

$$\left(\frac{6.4 + 2.2 + 2.1}{100}\right) \times \$800{,}000 = \$85{,}600 + \text{DISB.} + \text{BAND INVOLVEMENT}$$

The indices were found in Table 1 Buildings and Grounds category $600,000 - $1,200,000 on page 3.3.

3.4 REFERENCES

Public Works Canada. Real Property Services Branch. August 1995. *Architectural and Engineering Services and Fees Manual.* (Draft)

3.5 ARCHITECTURAL AND ENGINEERING CONSULTANT COST TABLES (PERCENTAGE OF CONSTRUCTION COSTS)

TABLE 1 - BUILDINGS AND GROUNDS

ESTIMATED CONSTRUCTION COST	PROJECT DEFINITION	INVESTIGATION AND DESIGN	CONSTRUCTION INSPECTIONS	PROJECT MANAGEMENT
UNDER $300,000	0.7	7.2	2.4	2.4
$300,000 TO $600,000	0.7	6.7	2.4	2.3
$600,000 TO $1,200,000	0.6	6.4	2.2	2.1
$1,200,000 TO $2,500,000	0.6	6.3	2.1	2.1
$2,500,000 TO $5,000,000	0.6	6.0	2.1	2.0
OVER $5,000,000	0.6	5.9	2.1	2.0

TABLE 2 - WATER AND SEWER

ESTIMATED CONSTRUCTION COST	PROJECT DEFINITION	INVESTIGATION AND DESIGN	CONSTRUCTION INSPECTIONS	PROJECT MANAGEMENT
UNDER $100,000	1.5	6.5	8.9	3.1
$100,000 TO $500,000	1.4	5.9	8.1	2.8
$500,000 TO $2,000,000	1.2	5.2	7.2	2.5
$2,000,000 TO $4,000,000	1.1	4.7	6.4	2.3
OVER $4,000,000	1.0	4.3	5.9	2.1

TABLE 3 - ELECTRIFICATION

ESTIMATED CONSTRUCTION COST	PROJECT DEFINITION	INVESTIGATION AND DESIGN	CONSTRUCTION INSPECTIONS	PROJECT MANAGEMENT
UNDER $250,000	0.8	8.0	10.0	3.2
$250,000 TO $500,000	0.6	7.0	8.0	2.9
$500,000 TO $4,000,000	0.2	5.0	5.0	2.5
OVER $4,000,000	O.1	3.5	3.0	2.1

TABLE 4 - ROADS

ESTIMATED CONSTRUCTION COST	PROJECT DEFINITION	INVESTIGATION AND DESIGN	CONSTRUCTION INSPECTIONS	PROJECT MANAGEMENT
UNDER $250,000	1.7	6.4	16.0	4.2
$250,000 TO $500,000	1.6	6.2	15.4	3.9
$500,000 TO $1,000,000	1.5	5.7	14.2	3.7
$1,000,000 TO $3,000,000	1.3	5.1	12.7	3.3
OVER $3,000,000	1.2	4.6	11.5	3.0

TABLE 5 - BRIDGES

ESTIMATED CONSTRUCTION COST	PROJECT DEFINITION	INVESTIGATION AND DESIGN	CONSTRUCTION INSPECTIONS	PROJECT MANAGEMENT
UNDER $250,000	1.7	6.6	7.1	2.8
$250,000 TO $500,000	1.6	6.3	6.8	2.7
$500,000 TO $1,000,000	1.5	5.8	6.3	2.5
$1,000,000 TO $3,000,000	1.3	5.2	5.6	2.2
OVER $3,000,000	1.2	4.7	5.1	2.2

PART I - CAPITAL COST MANUAL

4.0 CONSTRUCTION RISK GUIDELINES

4.1 INTRODUCTION

4.1.1 Purpose

All project cost estimates used for Treasury Board and/or program approval shall be reviewed and approved by regional or headquarters engineering and architecture staff. This guideline has been prepared to identify and quantify construction risk areas when preparing cost estimates.

Construction risk elements may be assessed on any project up to tender stage and as such apply to all classes of estimate. However, the impact of risks on project costs would normally decrease as more project and site information becomes available. The more informed the estimate becomes, the lower the risk impact on project costs.

Tables 1 to 5 at the end of this section provide a guideline range of construction risk percentages which can be used as and when appropriate for Classes A, B, C and D estimates and for five categories or types of project.

4.1.2 Scope

While the use of these construction risk guidelines specifically applies to estimates used in project submissions to Treasury Board, it is also expected that the principle of identifying and quantifying risks applies to all projects regardless of the requirement for Treasury Board approval.

4.2 DEFINITIONS

Total project cost: an estimate at one point in time which comprises the proposed expenditures for all aspects of a project, including the design, contracting, construction and commissioning of a facility but **excluding** risks. It is normally associated with all costs incurred following preliminary approval, including band costs and ending with O&M training and commissioning of the project.

Construction Risk: an area of uncertainty **identified** in preparing an estimate which may have an effect on cost. This covers uncertainties in the quantity or quality of pre-engineering information, tender and construction schedules, the construction market, and non-quantifiable items.

Construction contingencies: an allowance for unforeseeable elements of cost which an analysis of previous projects has shown to be statistically likely to occur. This covers change orders due to small design changes, small quantity changes, reasonable change in inflation rate, small estimating changes, etc., which **cannot be identified** prior to construction.

4.3 CONSTRUCTION RISK CATEGORIES

The department has defined four categories of construction risk as follows:

a. Quantity/quality of pre-engineering information.
Examples of such risks would include:

(1) Work involving removal or extension of an existing structure, equipment, etc., when the existing conditions are not completely known.

(2) Preliminary soil investigations revealing the presence of rock or other unsuitable material but the extent of affected excavation is unknown, or the drilling of wells where a large risk of further drilling usually exists depending on actual yields versus expected yields, or the soils information is incomplete at a particular point in time, etc.

(3) The possible presence of a high water table which would require de-watering during excavation.

b. Tender and construction schedule.
Examples of such risks would include:

(1) A tight approval and tender schedule could result in mobilization delays beyond a critical date (for winter roads in particular). This in turn may cause greater cost due to more expensive transportation alternatives. Another option would be to delay construction one or more years which could result in increased expenditures due to inflation.

(2) Delays in the tender approval process could result in the extension of a critical construction activity into the winter season, requiring special construction methods or equipment, usually at an increased cost.

(3) Delays in a tight construction schedule could result in a carry-over of work into the next construction season.

(4) The construction schedule is dependant on the way the contractors bid the work (two construction seasons instead of one in northern remote areas, etc.).

c. Construction market.
Examples of such risks would include:

(1) Other major construction projects may start at the same time and in the same area which would reduce competition in bidding (oil boom in Alberta, limestone project in Manitoba, economic boom in Toronto).

(2) Local construction costs are subject to significant short term fluctuations which cannot be accurately predicted.

(3) Local contractors may not bid, and mobilization and logistics for outside contractors could result in higher costs.

d. Non-quantifiable items.
Examples of such risks would include:

(1) New materials or construction methods will be used for the project, probably resulting in lower productivity and, hence, higher costs.

(2) The availability of special materials or local materials or equipment cannot be determined in advance (if availability was assumed in the estimate).

(3) The contractor may charge a premium to accept a local labour contract clause.

4.4 ASSESSMENT OF CONSTRUCTION RISKS

When there is a significant area of uncertainty (risk) which could result in costs in excess of the estimate, the following procedure should be used:

a. identify and describe the risk;

b. determine the proportion of the total project cost associated with the identified risk;

c. estimate the likely cost impact of the identified risk in current dollars by assessing the risk in constant dollars and converting to a proportion of total project cost in constant dollars which is then applied to the total project cost in current dollars (see CONSTRUCTION RISK ASSESSMENT EXAMPLE).

The proportion of the project cost to which a certain risk applies will vary depending on the category of risk involved. For instance, a construction market risk will normally be assessed on the total project cost whereas a pre-engineering risk such as geo-technical information will impact on a specific component of the project cost such as foundation costs.

At a Class C estimate level, for which this manual has been written, the type of information available at this stage will vary depending on the category of work involved and, hence, the pre-engineering risk assessment method may vary. A Class C estimate for a building is usually a cost per square metre of area and excavation quantities are not itemized, whereas a sewer main project could itemize the approximate excavation quantities.

Let us assume that a normal $\$4/m^3$ excavation cost could jump to $\$18/m^3$ (a 350% impact where impact = (18-4)/4 x 100) due to rock excavation for a building foundation. The pre-engineering risk could be calculated as follows using any of the three following methods:

(1) $\frac{350}{100} \times \frac{\text{excavation costs}}{\text{foundation costs}} \times \text{building costs}$

where excavation costs/foundation costs are approximately 20% for most buildings and foundation costs/building costs can be obtained from Section 2A (p. 2-3, 2-4 and 2-7) of this manual; or

(2) $\frac{350}{100} \times$ excavation costs if known; or

(3) ($\$18/m^3$ - $\$4/m^3$) x approx. excavation quantity.

Let us assume the same project has a tight approval schedule which could result in a construction delay of one year. The construction schedule risk would be assessed at the expected inflation rate provided at p. 1-6 of this manual.

The same assessment principle applies to all the risk categories. A specific problem is identified and assessed based on real data tempered by judgement and experience. The more information is available, the more accurate the base estimate and the lower the risk implications.

4.5 CONSTRUCTION RISK GUIDELINE TABLES

Tables 1 to 5 provide guideline ranges of risk impact for the various categories of work. The percentages are based on the total project cost for ease of presentation only.

It must be emphasized that the tables serve as guidelines only. Risks must be identified and assessed as discussed under the previous section.

TABLE 1 - BUILDINGS AND GROUNDS

RISK	% BY CLASS OF ESTIMATE*			
	D	C	B	A
Quantity/Quality of Pre-Engineering Information	10 - 30	5 - 15	0 - 10	0 - 5
Tender and Construction Schedule	0 - 25	0 - 15	0 - 15	0 - 5
Construction Market	0 - 20	0 - 15	0 - 10	N/A
Non-Quantifiable Items	N/A	0 - 20	0 - 15	0 - 10

*Based on total project cost.

TABLE 2 - WATER AND SEWER

RISK	% BY CLASS OF ESTIMATE*			
	D	C	B	A
Quantity/Quality of Pre-Engineering Information	10 - 35	10 - 25	0 - 10	0 - 10
Tender and Construction Schedule	0 - 25	0 - 10	0 - 10	0 - 5
Construction Market	0 - 10	0 - 10	0 - 5	N/A
Non-Quantifiable Items	N/A	0 - 5	0 - 5	0 - 5

*Based on total project cost.

TABLE 3 - ELECTRIFICATION

RISK	% BY CLASS OF ESTIMATE*			
	D	C	B	A
Quantity/Quality of Pre-Engineering Information	5 - 20	5 - 15	0 - 10	0 - 5
Tender and Construction Schedule	0 - 15	0 - 10	0 - 10	0 - 5
Construction Market	0 - 10	0 - 10	0 - 5	N/A
Non-Quantifiable Items	N/A	0 - 5	0 - 5	0 - 5

* Based on total project cost.

TABLE 4 - ROADS

RISK	% BY CLASS OF ESTIMATE*			
	D	C	B	A
Quantity/Quality of Pre-Engineering Information	10 - 25	5 - 20	5 - 15	0 - 15
Tender and Construction Schedule	0 - 15	0 - 15	0 - 10	0 - 5
Construction Market	0 - 10	0 - 10	0 - 5	N/A
Non-Quantifiable Items	N/A	0 - 5	0 - 5	0 - 5

* Based on total project cost.

TABLE 5 - BRIDGES

RISK	% BY CLASS OF ESTIMATE*			
	D	C	B	A
Quantity/Quality of Pre-Engineering Information	10 - 25	5 - 15	0 - 10	0 - 10
Tender and Construction Schedule	0 - 15	0 - 10	0 - 10	0 - 5
Construction Market	0 - 10	0 - 10	0 - 5	N/A
Non-Quantifiable Items	N/A	N/A	0 - 5	0 - 5

* Based on total project cost.

4.6 CONSTRUCTION RISK ASSESSMENT EXAMPLE

4.6.1 General

This example outline the recommended method of assessing risk impact on a hypothetical project. The intent of this outline is to demonstrate the principles upon which risks are determined for any project.

4.6.2 Description of the project

The original school building on a remote First Nation reserve is old, has been altered and expanded four times and no longer satisfies the educational requirements of the band. A consultant was hired to do a feasibility study to determine the most cost-beneficial option available to the band.

The consultant recommended a new site and that a new school be constructed.

The project is to be funded under Vote 15 (contribution arrangement), will be designed and supervised by consultants and will be constructed through the public tender process. The project management team has recommended that a local labour clause be incorporated in the contract.

The reserve is accessible by summer barge (a period of four months only). A preliminary soil study revealed the presence of bedrock 2 m below the surface in the general area of the proposed school site. The project is the first of its size for the reserve, and the majority of contractors have had no prior experience with the band.

The work is scheduled for construction in the next fiscal year, but the project will be deferred one year if the budget is cut.

Note: Since this example is for demonstration purposes we have incorporated more risks than is normally attached to departmental projects.

4.6.3 Assessment of the Risks

A number of risks are identifiable in the above project description and are assessed as follows:

a. Risk #1 - Quantity/Quality of Pre-Engineering Information:

There are two elements of construction for this particular project which are affected by soil conditions.

% of Total cost: 5%

b. Risk #2 - Tender and Construction Schedule:

The tight schedule for design, effective approval, and tender process could result in mobilization occurring after the summer barge transportation season. This will result in the use of all-terrain vehicles to transport the materials to the site.

% of Total cost: 2%

c. Risk #3 - Construction market:

There will be some major Construction projects in the same area.

% of Total cost: 5%

d. Risk #4 - Non Quantifiable:

The inclusion of a local labour clause in the contract is likely to cause concern to contractors, many of whom may have no prior experience working with this particular band.

% of Total cost: 3%

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C LEVEL PROJECT COST ESTIMATE

Summary

Please enter input in the yellow cells

Section A - Identification

Project name:	Region:	Project No.:

Scope of the project:

Section B - Total project costs

Basic construction cost	$ -
Construction contingencies	$ -
Engineering & Architectural costs	$ -
Total project costs (constant dollars)	**$ -**

Section C - Cash flow and current dollar costs

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Indices for the next 5 years"

Year						Total
Inflation						
Constant dollars						$ -
Current dollars	$ -	$ -	$ -	$ -	$ -	$ -

Section D - Risk analysis (in current $)

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Risks"

Type of risk	%	Amount	Total
Pre-engineering		$ -	$ -
Tender & construction schedule		$ -	$ -
Construction market		$ -	$ -
Non-quantifiable items			$ -
Total			**$ -**

Section E - Breakdown of basic construction cost (direct costs)

Category	Basic Cost
Buildings	$ -
Utilities	$ -
Grounds	$ -
Roads	$ -
Bridges	$ -
Env. Consider.	$ -
Basic constr. costs	**$ -**

Section F - Construction contingencies

	$ -	$ -
%	**Basic construction cost**	Contingencies

Section G - Engineering & Architectural Costs (Indirect costs)

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Arch. & Eng. costs"

Activity	Agency/Item	% of Basic Const. costs	Amount
Identification			$ -
Planning			$ -
Design	Consultant fee		$ -
	Consultant disburs.		$ -
	PWGSC fee		$ -
	PWGSC disburs.		$ -
	Band Admin. (liaise, etc)		$ -
	Band disburs.		$ -
	Other costs (legal surveys, etc)		$ -
	Sub-total		$ -
Construction (Construction supervision & project management)	Consultant fee		$ -
	Consultant disburs.		$ -
	PWGSC fee		$ -
	PWGSC disburs.		$ -
	Band Admin. (liaise, etc)		$ -
	Band disburs.		$ -
	Band training		$ -
	Other costs		$ -
	Sub-total		$ -
Total - Engineering & Architectural costs			**$ -**

Signature:
Date:

Note
Identification & planning activities are normally covered by other sources and are usually not part of the preliminary submission.

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LEVEL PROJECT
C
COST ESTIMATE

Buildings

Please enter input in the yellow cells

Section I - Identification

Project name:	Region:	Project No.:

Section II - Information

(supplement to general information on "Summary" form)

Recreational		Operational		Administrative		Residential	

Institutional	

General description of buildings:

Location within community:

Design life		Type of construction	

Sub-structure		Type of heating	

Gross Floor Area (m²)	

For residential buildings only

No. of units to be built		Gross Floor area (m²) per unit	

Section III - Basic Cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Buildings"

No.	Elements / components	Qty / size	Unit cost	$ amount
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Toronto Basic cost	$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indice
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specific index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Basic cost

Section IV - Costs adjustments

Land acquisition - appraisals, assessments, surveys, purchase — enter -----»
Details:

Special architectural requirements - cultural, religious, etc — enter -----»
Details:

Special equipment - bulldozer, crane, etc — enter -----»
Details:

Special energy conservation - solar, windmill, etc — enter -----»
Details:

Other anticipated costs adjustments — enter -----»
Details:

Name:
Date:

Total adjusted Basic Costs $ -

(this amount will appear in the "Summary")

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LEVEL PROJECT
C COST ESTIMATE

Utilities

Please enter input in the yellow cells

Section I - Identification

Project name:	Region:	Project No.:

Section II - Information

(supplement to general information on "Summary" form)

General description of facilities

Section III - Basic Cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Utilities"

No.	Elements / components	Qty / size	Unit cost	$ amount
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
			Toronto Basic cost	$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specific index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Basic site cost

Section IV - Costs adjustments

Land acquisition - appraisals, assessments, surveys, purchase — enter -----»
Details:

Environmental assessment (EA) conditions — enter -----»
Details:

Socio-economic / cultural / etc. conditions — enter -----»
Details:

Special equipment needed — enter -----»
Details:

O&M training — enter -----»
Details:

Other anticipated costs adjustments — enter -----»
Details:

Name:
Date:

Total adjusted Basic Costs $ -
(this amount will appear in the "Summary")

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C LEVEL PROJECT COST ESTIMATE

Roads

Please enter input in the yellow cells

Section I - Identification

Project name: | Region: | Project no.:

Section II - Information

(supplement to general information on "Summary" form)

Purpose: (e.g. residential, access, etc)

Location: (e.g. from/to)

Road class: I | II | III | Other

Approximate length: km | Width: m | Design speed km/h

Parking areas: (quantity / description)

Type of work:

New construction | re-construction

Surfacing | re-surfacing

Bridge/Major culvert required? no | yes - see "Bridge" form

Road lighting required? no | Yes - see "Utilities" and Electrification" forms

Section III - Basic cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Roads"

Item		Coût unitaire	Distance (km)	Montant
Clearing	light			$ -
	medium			$ -
	heavy			$ -
Drainage	light			$ -
	medium			$ -
	heavy			$ -
Sous-fondation	turnpiking			$ -
	cut and			$ -
	fill (% rock)			$ -
Surfacing	gravel			$ -
	asphalt			$ -
Width: m	surface treatment			$ -
Add	% for miscellaneous & minor items (normally 5%)			$ -
	Toronto basic cost			$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specific index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Basic site cost

Section IV - Costs adjustements (site costs)

Land acquisitions: (e.g. appraisals, easements, surveys, purchase) inscrire ----»
Details

Special equipement required: inscrire ----»
Details

Special environemental protection required: inscrire ----»
Details

Traffic during construction: (e.g. restricted or by-passed) inscrire ----»
Details

Special rehabilitation:
Details inscrire ----»

Other anticipated costs adjustments
Details inscrire ----»

Name:
Date:

Total adjusted basic cost $ -

(this amount will appear in the "Summary" form

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C COST ESTIMATE

Grounds

Please enter input in the yellow cells

Section I - Identification

Project name: | Region: | Project No.:

Section II - Information (supplement to general information on "Summary" form)

Purpose: (e.g. athletic field for high schools)

Please write an "X" or a number in the box.

Facilities to which grouns development relates:

☐ Recreational ☐ Operational ☐ Administrative ☐ Residential ☐ Institutional

Will grounds work be coordinated with construction of primary facility such as building or road?

☐ Yes ☐ No

Approximate area of site to be developed: ____ m²

Soil type

☐ Clay ☐ Sand ☐ Loam ☐ Rock ☐ Peat ☐ Other

Vegetative cover

☐ Pasture ☐ Shrubs ☐ Tundra ☐ Scattered trees ☐ Dense trees

Topography

☐ Flat ☐ Gentle slope ☐ Manageable slope ☐ Steep

Other unusual site characteristics: (explain)

Source of estimate: ☐ Cost Reference Manual ☐ Other:

Section III - Basic Cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Grounds"

Major construction items	Qty / size	Unit	Unit cost		$ amount
					$ -
					$ -
					$ -
					$ -
					$ -
					$ -
			Toronto Basic cost		$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specifics index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Basic site cost

Section IV - Costs adjustments

Land acquisition - appraisals, assessments, surveys, purchase — enter ----------»
Details:

Special equipment needed — enter ----------»
Details:

Special environmental protection required — enter ----------»
Details:

Socio-economic / cultural / etc. conditions — enter ----------»
Details:

Other anticipated costs adjustments — enter ----------»
Details:

Name:
Date:

Total adjusted Basic Costs $ -
(this amount will appear in the "Summary")

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LEVEL PROJECT COST ESTIMATE **C**

Electrification

Please enter input in the yellow cells

Section I - Identification

Project name: | Region: | Project No.:

Section II - Information (supplement to general information on "Summary" form)

Purpose:

Description of existing facility:

Please write an "X" or a number in the box.

Construction: New | Expansion | Replacement

Description of proposed installation:

Owned by: | **Operated by:**

Is service for residence: Limited to 60 amps | Full (100 amps)

Total connected Load (KW):

present requirement: | in 5 years: | in 10 years: | in 20 years:

To be designed by: | Installed by:

Prime supply: On-site generation | Tap-off province grid

For generation: Number of units | at | KVA | Volts, | phase

Will stanby power be required: No | Yes, | units | at | KVA

For tap-off, voltage and length of transmission lines required: | V | Km

Sub-stations required: at community | at tap-off

Approximative length of distribution lines: | Km | for about | buildings

Outdoor lighting: (indicate level of service particulars required. e.g. lux)

Grounds | Bridge

Roadway | Parking lot

Sport facility

Source of estimate: Cost Reference Manual | Other

Section III - Basic Cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Utilities"

Code

G: Generation | T: Transmission | S: Tap-off
D: Distribution | X: Transformation | O: Outdoor light

Code	Descriptior	Qty / size	Unit		Unit cost	Amount
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
			Toronto Basic cost			$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specifics index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

$ -

Section IV - Costs adjustments

Land acquisition - appraisals, assessments, surveys, purchase — enter ----------»
Details:

Temporary requirements — enter ----------»
Details:

Special equipment needed — enter ----------»
Details:

O&M training — enter ----------»
Details:

Other anticipated costs adjustments — enter ----------»
Details:

Name:
Date:

Total adjusted Basic Costs $ -
(this amount will appear in the "Summary")

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C LEVEL PROJECT COST ESTIMATE

Bridges

Please enter input in the yellow cells

Section I - Identification

Project name: | Region: | Project No.:

Section II - Information

(supplement to general information on "Summary" form)

Description: **(e.g. obstruction to be crossed)**

Please write an "X" or a number in the box.

Type of structure: Steel | Concrete | Wood | Culvert | Other

Type of work: New construction | Replacing existing structure

General characteristics:

Design life: years | Loading requirements: MS

No. of spans: | Length of spans: m | Total bridge length: m

Roadwidth: m | Bridge deck width: m | Bridge deck area: m²

Foundation type: piles | Spread footings | Timber crib | Other

Type of soil: rock | gravel | sand | silt | clay | Peat | Other

Road lighting required? No | Yes - see "Utilities" and "Electrification" forms

Source of estimates: Cost Reference Manual | Other

Section III - Basic Cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Bridges"

Construction element		General Description	Deck area m²	Unit costs /m² deck	Amount
					$ -
					$ -
					$ -
				Toronto unit cost	$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specifics index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Section IV - Costs adjustments

Land acquisition - appraisals, assessments, surveys, purchase — enter ----------»
Details:

De-watering requirement: — enter ----------»
Details:

Special environmental protection: — enter ----------»
Details:

Roc excavation: — enter ----------»
Details:

Temporary paths required for: contractor | public — enter ----------»
Details:

Sidewalks required: none | one side | two sides — enter ----------»
Details:

Other anticipated cost adjustements: — enter ----------»
Details:

Name:
Date:

Total adjusted Basic Costs $ -

(this amount will appear in the "Summary")

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LEVEL PROJECT
C
COST ESTIMATE

Environment

Please enter input in the yellow cells

Section I - Identification

Project name:	Region:	Project No.:

Section II - Information

(supplement to general information on "Summary" form)

Description:

Type of enviromental considerations to evaluate:

Environmental site assessment	
Environmental site remidiation	
Storage tank management	
Environmental assessment	

Section III - Basic cost

http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Environmental cost consideration"

Éléments / composantes	Qty/size	Unit cost		Amount
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
Coût de base de Toronto				$ -

Use appropriate Geographic and Project-specific Indices from the Cost Reference Manual

Geographic Indices
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Geographic Indices"
enter ----------»

Project specifics index
http://www.pwgsc.gc.ca/rps/inac/docs/cost_ref_manual-e.pdf
Press "Bookmark - Site Specific Indice (SSI)"
enter ----------»

Base site cost $ -

Section IV - Costs adjustements (site costs)

Land acquisition: (appraisals, easements, surveys, purchase) Details:	enter----------»	
Special equipment required: Details:	enter----------»	
Socio-economic / cultural / etc. conditions: Details:	enter----------»	
O&M training: Details:	enter----------»	
Other anticipated cost adjustments: Details:	enter----------»	

Name:
Date:

Total adjusted basic cost $ -
(this amount will appear in the "Summary")

PART I - CAPITAL COST MANUAL

APPENDIX A

CLASS "C" COST ESTIMATE FORMS
(The forms themselves will be in the Estimating forms PDF file)

1.0 INTRODUCTION

1.1 Purpose

The purpose of these forms is to assist users who have the responsibility for developing Class C estimates to approach the task in a logical and consistent manner. Use of the forms will:

a. ensure all the components of an estimate are included;

b. result in a standardized estimating format; and

c. facilitate the use of this publication.

1.2 Scope and Users

This appendix includes a full set of sample cost estimate forms and brief instructions on their use. More detailed guidance can be given during a Cost Estimating Workshop which is available to all regions on request.

2.0 INSTRUCTIONS FOR USE OF FORMS

The attached cost estimate forms comprise nine sections subdivided into two main groups:

a. a summary form, common to all categories of work (Sections A-G); and

b. separate detail forms (Sections I to IV), provided for each of the following categories:

- buildings;
- utilities;
- electrification;
- grounds;
- roads; and
- bridges.

It should be emphasized that the forms are intended to standardize the presentation of a Class C estimate. Because of the nature of estimating, these forms serve as a guide or reminders for cost estimators and are not intended to be fail safe.

The purpose of the forms is to formalize the estimate so that its assumptions can be recorded and verified.

3.0 ESTIMATING PROCEDURE

Step 1 Complete Section A of the summary estimating form.

Section A - Identification

a. Project Name, Region, Number

Since the form will normally accompany other documents in the project approval process, only the project name, number and region is required for identification purposes.

b. Scope of Project

This is the most important part of the form. The proposed work shall be described in terms of major components or systems involved, its size and the quantity. It will essentially define the reliability of the estimate at that point in time and usually outline the major components or systems by category of work. For instance, a school would involve a building of 10 classrooms 2,350 m^2, 2 x 3 bedroom teacherages 80 m^2 each, sewer main (PVC) 200 mm dia./600 m long, outdoor hockey rink and softball field for adults, etc.

Step 2 Complete the detail forms according to the categories of work described in the scope of the project.

a. Section I - Identification

Use the same information recorded on the summary estimating form.

b. Section II - Information

All detailed information available on the project should be entered here. A form should be filled out for each different work category such as utilities, grounds, electrification, roads, etc. If, for example, a school project consists of a school and teacherages, a building detail form should be completed for each type of building. This also applies to other categories of work. However, all site development costs for the project should probably be included on one "grounds detail" form.

c. Section III - Basic Cost

This section records costs obtained from this manual only. Other more specific site costs or special considerations are entered in Section IV.

The correct geographic and project specific indices should now be calculated in order to convert Toronto costs into site costs (see Section 1.0 for indices). The total basic site project cost is calculated as follows:

Unit Cost x Geographic Index x Project Specific Index = Total Basic Site Cost

d. Section IV - Cost Adjustment

This is an important part of a "C" level estimate. All construction projects are unique and require certain extra costs or deductions to cover abnormal situations. More specific site (local) unit costs may be entered under other anticipated cost adjustments.

When all adjustments have been made, add all the cost adjustments to the basic site cost calculated in Section III to obtain the total adjusted basic site cost, then multiply this by the number of units required.

Repeat this procedure to calculate the basic site cost for each category of work.

Step 3 Once all assets have been estimated, calculate other project related costs on the summary estimating form attached to this appendix.

a. Section E - Basic Construction Cost

Enter the estimated cost of each category of work calculated on the detail form under the appropriate heading in this section. Add all costs to obtain the basic construction cost of the project (Amount E).

b. Section F - Construction Contingencies

Calculate construction contingencies based on the basic construction cost. Contingencies cover unforeseen circumstances occurring during the construction period such as minor variations in quantities, minor design changes, small labour disputes and supply problems. They differ from risks which are identifiable (see Section 4.0). Contingencies should be in order of 10% for departmental projects.

c. Section G - Architectural and Engineering Costs

Normally, a detailed calculation of these costs is based on the best local experience of the estimator. However, if detailed information is not available, see Section 3 for national guidelines. (The guidelines do not include disbursements or band involvement).

Section G follows the same sequence of activities as DRM 10-7/4, Project Management.

When the percentage basis is used to estimate these costs, it is always based on the basic construction cost (Amount E). Construction contingencies are not part of this calculation.

Consultant Costs:

When a consultant is hired to complete the design, provide construction supervision, manage the project, or carry out any combination of these activities the applicable section of the **provincial** fee schedule should be used in estimating the fee.

Consultant disbursements cover all other expenses incurred by the consultant towards the project that are outside the fee agreement. Examples include (but are not limited to) the cost of printing and reproduction, transportation and travel, communication and delivery services (normal postage and local telephone charges excepted), advertising and legal fees, supplementary liability insurance and the cost of other disbursements approved in advance by the project manager.

Public Works & Government Services Canada (PWGSC) Costs:

If the services of PWGSC (outside of the dedicated units) are used, they will provide their proposed expenditures, and the negotiated amount will be stated in a Specific Services Agreement (SSA). For more information refer to DRM 10-7/8, Procedures for Implementation Projects through Public Works Canada.

Disbursements are as described for the consultants.

Band Costs:

Band administration costs for co-ordination, liaison, supervision and other activities related to project management or administration are directly negotiable between the band and DIAND. There are presently no guidelines for this type of estimate.

Normally, these costs are estimated by judging the number of personnel expected to be involved and multiplying by an appropriate salary. Office supplies, use of a duplicating machine, postage and other related expenses are also added.

Band disbursements only take into account expected transport costs and travel expenses.

Other Costs:

Other costs are those expenses not included in the above categories. Examples are survey costs, land acquisition, if applicable, and fees charged by other agencies not included above.

Step 4 On completion of all calculations of project related costs, summarize all costs, calculate escalated projects costs and complete a risk analysis on the summary estimating form.

a. Section B - Total Project Costs

Calculate the total project costs by adding the basic construction cost (Amount E), the construction contingencies (Amount F) and the architectural and engineering costs (Amount G).

b. Section C - Cash Flow and Current Dollars Costs

A Class D or a Class C estimate is normally prepared a number of years prior to construction. Furthermore, some construction projects may be phased over a number of years. Thus, estimates in constant dollars prepared in the base year (year of the estimate) must be escalated to reflect expected current costs in accordance with the project schedule.

A cash flow breakdown by year for project costs is calculated based on the project schedule, and entered in this section. The amounts are then escalated by the appropriate indices found in Section 1.4, and added to obtain the total current project costs.

c. Section D - Construction Risk Analysis

Areas of uncertainty are identified during the preparation of every estimate. Usually, the more detailed the estimate, the fewer the uncertainties. See Section 4.0 for a method of establishing these risks.

PART II - OPERATION AND MAINTENANCE COST MANUAL

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PART II - OPERATION AND MAINTENANCE COST MANUAL

1.0 INTRODUCTION

In 1980-1981, DIAND Technical Services Headquarters (HQ) developed comprehensive guideline operation and maintenance (O&M) costs for different types of departmental capital assets. Concurrent with this, HQ, in conjunction with the regional offices, initiated an extensive undertaking to capture and categorize all real capital assets, located on reserves across Canada, which are funded by DIAND for O&M. During the 1986-1987 fiscal year, a complete review and revision of the Capital Asset Inventory System (CAIS) programs and database was initiated. This process involved the redesign of the input, data manipulation and output programs and a complete review and validation of each regional database to establish a "base year" database as of April 1, 1987. The current fiscal year database established, by validation, the changes that occurred since the "base year" database was established.

2.0 DEVELOPMENT OF O&M UNIT COSTS

O&M base unit costs for the different types of assets have been developed, based on standard O&M cost definitions (Appendix A). The standard definitions were developed to ensure a consistent approach in determining O&M costs. These standard O&M cost definitions were adopted at the National Advisory Sub-Committee meeting for the Maintenance Management System in February 1984 and remain applicable to-date.

Concurrently, the Department undertook a comprehensive evaluation of unit costs for the different types of assets. The data obtained was then evaluated by headquarters staff to ensure that costs were consistent with historical departmental costs and the costs of other agencies for which data were available to the Department. These unit costs are re-evaluated and adjusted annually (Table 1).

The one exception to the unit costs/indices methodology for estimating O&M costs is the method used to estimate the O&M requirement for departmental electrical power generators. These costs are derived by headquarters staff using data updated annually by regional staff. The methodology is described in Appendix B.

3.0 DEVELOPMENT OF O&M CITY CENTRE AND ZONE (REMOTENESS) INDICES

In order to adjust the average unit O&M costs, (based in Toronto) as per Table 1, to the different geographical locations, city centre and zone (remoteness) indices were developed for the Department (Tables 2 and 3). These indices are used in conjunction with the O&M unit cost data to enable forecasting of O&M costs for assets located at any site.

Both city centre and zone indices are calculated from a number of complex interrelationships. Labour, parts and equipment, energy, transportation, use, climate, topography, construction materials, asset condition and other factors affecting maintenance requirements are reflected in the city centre and zone indices which in turn affect the final O&M costs.

Appendix C outlines the definitions used to determine a remoteness classification for the purpose of O&M funding. These definitions are the same as those used in the *Band Classification Manual* issued by the Band Support Program.

When the unit costs and indices are used in calculating O&M estimate for a specific facility or site, users are cautioned that these must take into account local conditions (e.g., life of facility, its physical condition, quality of water, complexity of treatment, size of facility and other site specific considerations) which may increase or decrease the average O&M costs.

4.0 DETERMINATION AND ANALYSIS OF O&M COSTS (Gross Funding Requirement)

The gross funding requirement (GFR) is that amount required to operate and maintain a facility to generally accepted standards. The net funding requirement (NFR) is the GFR less any amount the operator or administrator received as a result of user fees or other income.

O&M costs are determined in the following manner:

O&M Costs (GFR) = Base Unit Cost x City Centre Index x Zone (remoteness) Index x Asset Count.

For the Base Unit Cost refer to Table 1 and select the appropriate facility type.

The appropriate City Centre Index is found in Table 2.

The appropriate Zone Index is found in Table 3.

Generally, O&M costs include those major cost components required to operate and maintain a facility, i.e. labour, fuel, electricity, equipment and material. A detailed description of these cost components, as well as any limits to individual components, is given in Appendix A.

The O&M unit costs represent that cost required to operate and maintain facilities in Toronto. City centre and remoteness indices allow a user to estimate average facility O&M costs in a particular location. In order to apply this methodology to a specific facility it is necessary to make further adjustments considering the life of the facility, its physical condition, the type of construction and the accessibility to the site.

They must be supplemented by specialized professional assessment of the many varying local or site-specific factors and their impact on the project cost.

It is the responsibility of asset managers/officers to identify project anomalies and variations from normal conditions and to make the necessary cost adjustments.

All estimates must be dated as a cost estimate has a limited life, particularly in a period of changing inflation rates and fluctuating market conditions.

5.0 CAPITAL ASSET INVENTORY SYSTEM (CAIS) ASSET DEFINITIONS

In order for regions to properly validate the respective asset in their inventories, precise, definitive descriptions of each asset category, class and subclass are required. Precise definitions, are necessary to maintain consisting in the classification of assets among the regions.

Appendix D contains definitions for each of the classifications for each category of asset. The descriptions contain the asset definition, the unit of measure for that type of asset, typical inclusions as well as typical exclusions.

Table 1

O&M UNIT COSTS (TORONTO = BASE)

FACILITY TYPE	UNIT	COST ($)
BUILDINGS		
Schools	m²	54.66
Teacherages	m²	15.00
Student Residences	m²	51.81
Day Care Centres	m²	55.49
Recreational	m²	29.72
Utility	m²	19.67
Operative	m²	20.04
Administrative	m²	46.98
Fire Stations	m²	26.39
UTILITIES		
Water Supply		
Distribution		
- water mains (unheated)	m	2.20
- water mains (heated)	m	3.78
- storage reservoir	ea.	778.04
- standpipe	ea.	818.22
Pump Houses		
- community well supply	ea.	3,331.44 *
- low level lift station	ea.	4,275.60 *
- high level lift station	ea.	9,265.46 *
Treatment Facilities		
- system	ea.	22,007.98 *
- unit	ea.	3,618.71

* Chlorination unit included.

FACILITY TYPE	UNIT	COST ($)
Wastewater		
Collection		
- sanitary/storm mains	m	1.14
- force mains (included in lift station unit cost)		
Lift Station	ea.	7,267.27
Treatment and Disposal		
- rotating biological contactor	ea.	20,171.78 *
- extended aeration	ea.	22,981.35 *
- lagoon (conventional)	ea.	3,949.10
- lagoon (aerated)	ea.	8,860.34 *
- community septic tank with disposal field	ea.	358.34
- low pressure sewer mains	ea.	180.85
- community septic tank with jet-pump disposal	ea.	851.29
Solid Waste		
Landfill Site	ea.	9,8256.27
Refuse Site	ea.	2,419.24
Incinerator	ea.	13,255.12
Electrical Power		
Transmission	km	1,278.64
Distribution	km	2,675.60
Street Lights	fixture	125.59
Power Generation	l.s.	see Appendix B
Vehicles		
Mini Pumper and Equipment	ea.	7,636.21
Triple Combination Pumper and Equipment	ea.	8,646.51
Refuse Collection Truck (compactor)	ea.	46,630.04
Liquid Waste Collection Truck (pumper)	ea.	45,606.02
Water Delivery Truck (tanker)	ea.	45,492.24
Solid Waste Collection, Liquid Waste Collection and Water Delivery Trucks (all with unmodified chassis up to 6,896 kg (GVW)	ea.	25,954.07

* Chlorination unit included.

FACILITY TYPE	UNIT	COST ($)
TRANSPORTATION		
Roads and Bridges		
Earth Roads	km	3,024.41
Gravel Roads	km	4,406.52
Paved and Bituminous Surface Treatment Roads	km	3,735.67
Bridges	m^2	28.60

Table 2A
CITY CENTRE INDICES

BUILDINGS

CITY CENTRES	SCHOOLS	TEACHERAGES	STUDENT RESIDENCES	RECRE-ATIONAL	UTILITY	OPERATIVE	ADMINIS-TRATIVE	FIRE STATIONS	OTHERS
ATLANTIC									
1. Halifax	0.94	1.09	0.98	1.05	0.90	1.05	1.02	1.01	0.97
2. Sydney	1.05	1.44	1.04	1.16	1.14	1.27	1.23	1.30	1.23
3. Moncton	1.03	1.24	1.04	1.12	1.06	1.20	1.17	1.19	1.13
4. Fredericton	1.04	1.52	1.04	1.16	1.24	1.34	1.28	1.44	1.27
QUEBEC									
5. Quebec	1.36	1.80	1.23	1.32	1.90	1.50	1.56	1.89	1.66
6. Montreal	1.22	1.33	1.14	1.18	1.40	1.25	1.29	1.38	1.34
7. Rouyn	1.48	2.15	1.31	1.41	2.21	1.66	1.74	2.23	1.84
8. Sept-Iles	1.56	2.31	1.35	1.48	2.43	1.72	1.83	2.34	1.94
ONTARIO									
9. Toronto	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10. Ottawa	1.09	1.17	1.07	1.09	1.31	1.15	1.15	1.23	1.20
11. London	0.95	0.84	0.97	0.90	0.89	0.85	0.86	0.86	0.85
12.Sault-Ste-Marie	1.13	1.33	1.10	1.15	1.41	1.25	1.25	1.36	1.27
13. Thunder Bay	1.34	1.54	1.19	1.21	1.68	1.31	1.41	1.61	1.52
14. Sudbury	1.30	1.43	1.19	1.25	1.60	1.31	1.38	1.51	1.49
15. Timmins	1.43	1.60	1.29	1.36	1.87	1.44	1.53	1.72	1.65
MANITOBA									
16. Winnipeg	1.29	1.82	1.16	1.29	2.25	1.45	1.47	1.92	1.68
17. Thompson	1.54	3.00	1.31	1.52	3.70	1.84	1.88	3.12	2.18
18. The Pas	1.42	2.36	1.25	1.42	2.91	1.67	1.69	2.47	1.95
19. Brandon	1.30	1.85	1.17	1.30	2.28	1.46	1.48	1.92	1.71
SASKATCHEWAN									
20. Regina	1.42	1.89	1.27	1.47	2.25	1.59	1.62	1.94	1.81
21. Saskatoon	1.42	1.93	1.25	1.48	2.23	1.59	1.62	1.94	1.85
22. Prince Albert	1.51	2.33	1.36	1.63	2.75	1.77	1.84	2.36	2.11
ALBERTA									
23. Calgary	1.16	1.34	1.10	1.18	1.42	1.24	1.24	1.34	1.33
24. Edmonton	1.30	1.79	1.15	1.30	1.90	1.42	1.47	1.78	1.63
25. High Level	1.50	2.66	1.27	1.51	2.84	1.75	1.81	2.62	2.05
26. Fort McMurray	1.50	2.63	1.27	1.50	2.81	1.74	1.79	2.60	2.05
BRITISH COLUMBIA									
27. Vancouver	0.93	1.15	1.22	1.07	1.01	0.89	0.86	0.87	0.82
28. Victoria	0.94	1.15	1.26	1.10	1.02	0.90	0.85	0.87	0.83
29. Kamloops	1.17	1.55	1.39	1.33	1.51	1.24	1.25	1.29	1.31
30. Prince George	1.22	1.55	1.43	1.34	1.58	1.25	1.29	1.33	1.38
31. Prince Rupert	1.33	1.81	1.49	1.47	2.00	1.47	1.52	1.68	1.67
YUKON									
32. Whitehorse	1.54	4.95	1.63	1.97	3.69	2.36	2.28	3.37	2.51
NFDL									
33. St. John's	1.05	1.35	1.06	1.13	1.12	1.21	1.18	1.23	1.19
N WT									
34. Yellowknife	1.59	5.09	1.68	2.03	3.80	2.43	2.35	3.47	2.59

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 2B
CITY CENTRE INDICES
UTILITIES: WATER SUPPLY

CITY CENTRES	UNHEATED MAINS	HEATED MAINS	STANDPIPE	STORAGE RESERVOIRS	COMMUNITY WELLS	LIFT STATIONS		TREATMENT FACILITIES	
						LOW LEVEL	HIGH LEVEL	SYSTEMS	UNITS
ATLANTIC									
1. Halifax	0.97	1.47	1.03	0.94	1.13	1.13	1.13	1.02	1.02
2. Sydney	0.96	1.47	1.03	0.94	1.12	1.12	1.12	1.01	1.01
3. Moncton	0.96	1.40	1.01	0.93	1.10	1.10	1.10	0.99	0.99
4. Fredericton	0.95	1.29	1.01	0.93	1.06	1.06	1.07	0.97	0.97
QUEBEC									
5. Quebec	1.07	0.94	1.06	1.04	1.03	1.03	1.03	1.02	1.02
6. Montreal	1.06	0.94	1.05	1.04	1.02	1.02	1.02	1.00	1.00
7. Rouyn	1.10	0.94	1.09	1.08	1.04	1.04	1.05	1.05	1.05
8. Sept-Iles	1.14	0.94	1.12	1.13	1.07	1.07	1.06	1.08	1.08
ONTARIO									
9. Toronto	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10. Ottawa	0.99	0.80	0.97	0.98	0.93	0.93	0.93	0.96	0.96
11. London	1.02	0.76	1.00	1.02	0.92	0.92	0.94	0.99	0.99
12.Sault-Ste-Marie	1.10	0.93	1.07	1.08	1.02	1.02	1.03	1.05	1.05
13. Thunder Bay	1.11	0.75	1.08	1.10	0.99	0.99	1.00	1.06	1.06
14. Sudbury	1.10	0.93	1.08	1.09	1.04	1.04	1.05	1.06	1.06
15. Timmins	1.11	0.93	1.09	1.10	1.05	1.05	1.05	1.07	1.07
MANITOBA									
16. Winnipeg	1.06	0.73	1.03	1.05	0.95	0.95	0.95	0.97	0.97
17. Thompson	1.09	0.73	1.06	1.07	0.97	0.97	0.97	0.99	0.99
18. The Pas	1.09	0.73	1.05	1.07	0.97	0.98	0.97	0.99	0.99
19. Brandon	1.07	0.73	1.03	1.05	0.96	0.96	0.96	0.97	0.97
SASKATCHEWAN									
20. Regina	1.12	1.16	1.09	1.14	1.11	1.11	1.12	1.09	1.09
21. Saskatoon	1.13	1.29	1.12	1.13	1.15	1.15	1.17	1.10	1.10
22. Prince Albert	1.16	1.26	1.15	1.17	1.17	1.17	1.19	1.13	1.13
ALBERTA									
23. Calgary	1.11	1.04	1.10	1.09	1.08	1.08	1.08	1.07	1.07
24. Edmonton	1.05	1.06	1.05	1.03	1.03	1.03	1.03	1.01	1.01
25. High Level	1.07	1.11	1.09	1.07	1.08	1.08	1.08	1.04	1.04
26. Fort McMurray	1.09	1.06	1.08	1.05	1.06	1.06	1.07	1.04	1.04
BRITISH COLUMBIA									
27. Vancouver	1.39	0.91	1.34	1.37	1.23	1.23	1.23	1.27	1.27
28. Victoria	1.39	0.92	1.35	1.37	1.22	1.22	1.22	1.27	1.27
29. Kamloops	1.37	0.84	1.34	1.37	1.21	1.21	1.21	1.26	1.26
30. Prince George	1.43	0.76	1.38	1.39	1.22	1.22	1.22	1.29	1.29
31. Prince Rupert	1.36	0.76	1.31	1.35	1.15	1.15	1.18	1.23	1.23
YUKON									
32. Whitehorse	1.26	1.59	1.28	1.25	1.33	1.36	1.37	1.29	1.29
NEWFOUNDLAND									
33. St. John's	1.00	1.34	1.05	0.98	1.10	1.10	1.11	1.03	1.03
NWT									
34. Yellowknife	1.30	1.64	1.32	1.29	1.37	1.40	1.41	1.33	1.33

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 2C
CITY CENTRE INDICES
UTILITIES: WASTEWATER AND SOLID WASTE

CITY CENTRES	SANITARY/ STORM MAINS	LIFT STATIONS	RBC/ TF	EXTENDED AERATION	LAGOONS		COMMUNITY SEPTIC TANKS		LANDFILL SITES	REFUSE SITES	INCINER-ATORS
					CONV.	AERATED	DISPOSAL FIELD & LOW PRESSURE SEWER MAINS	JET-PUMP DISPOSAL			
ATLANTIC											
1. Halifax	0.98	1.14	1.06	1.06	0.95	1.06	1.02	1.02	0.97	0.97	1.02
2. Sydney	0.97	1.13	1.05	1.05	0.94	1.05	1.01	1.01	0.95	0.95	1.01
3. Moncton	0.97	1.11	1.03	1.03	0.94	1.03	1.00	1.00	0.96	0.96	1.00
4. Fredericton	0.97	1.08	1.00	1.00	0.93	1.00	0.99	0.99	0.94	0.94	0.99
QUEBEC											
5. Quebec	1.08	1.04	1.02	1.02	1.06	1.02	1.05	1.05	1.07	1.07	1.05
6. Montreal	1.07	1.03	1.00	1.00	1.05	1.00	1.04	1.04	1.05	1.05	1.04
7. Rouyn	1.11	1.06	1.05	1.05	1.10	1.05	1.08	1.08	1.10	1.10	1.08
8. Sept-Iles	1.15	1.08	1.08	1.08	1.13	1.08	1.11	1.11	1.13	1.13	1.11
ONTARIO											
9. Toronto	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10. Ottawa	1.00	0.93	0.94	0.94	0.97	0.94	0.96	0.96	0.97	0.97	0.96
11. London	1.02	0.93	0.98	0.98	1.02	0.98	1.00	1.00	1.02	1.02	1.00
12. Sault-Ste-Marie	1.11	1.04	1.04	1.04	1.08	1.04	1.06	1.06	1.08	1.08	1.06
13. Thunder Bay	1.10	0.99	1.05	1.05	1.11	1.05	1.09	1.09	1.12	1.12	1.09
14. Sudbury	1.11	1.05	1.05	1.05	1.09	1.05	1.07	1.07	1.10	1.10	1.07
15. Timmins	1.12	1.06	1.05	1.05	1.10	1.05	1.08	1.08	1.10	1.10	1.08
MANITOBA											
16. Winnipeg	1.08	0.96	0.96	0.96	1.04	0.96	1.02	1.02	1.03	1.03	1.02
17. Thompson	1.13	0.98	0.98	0.98	1.05	0.98	1.04	1.04	1.06	1.06	1.04
18. The Pas	1.11	0.98	0.98	0.98	1.05	0.98	1.04	1.04	1.06	1.06	1.04
19. Brandon	1.09	0.97	0.96	0.96	1.04	0.96	1.03	1.03	1.03	1.03	1.03
SASKATCHEWAN											
20. Regina	1.13	1.15	1.08	1.08	1.12	1.08	1.10	1.10	1.08	1.08	1.10
21. Saskatoon	1.14	1.19	1.10	1.10	1.12	1.10	1.11	1.11	1.08	1.08	1.11
22. Prince Albert	1.17	1.21	1.13	1.13	1.16	1.13	1.16	1.16	1.13	1.13	1.16
ALBERTA											
23. Calgary	1.10	1.09	1.08	1.08	1.11	1.08	1.11	1.11	1.14	1.14	1.11
24. Edmonton	1.04	1.04	1.03	1.03	1.04	1.03	1.05	1.05	1.07	1.07	1.05
25. High Level	1.09	1.09	1.06	1.06	1.06	1.06	1.09	1.09	1.09	1.09	1.09
26. Fort McMurray	1.09	1.08	1.06	1.06	1.06	1.06	1.07	1.07	1.09	1.09	1.07
BRITISH COLUMBIA	1.39	1.25	1.27	1.27	1.39	1.27	1.34	1.34	1.40	1.40	1.34
27. Vancouver	1.40	1.26	1.27	1.27	1.39	1.27	1.34	1.34	1.41	1.41	1.34
28. Victoria	1.40	1.23	1.25	1.25	1.35	1.25	1.32	1.32	1.36	1.36	1.32
29. Kamloops	1.44	1.25	1.29	1.29	1.43	1.29	1.36	1.36	1.44	1.44	1.36
30. Prince George	1.37	1.19	1.22	1.22	1.35	1.22	1.30	1.30	1.36	1.36	1.30
31. Prince Rupert											
YUKON											
32. Whitehorse	1.29	1.37	1.28	1.28	1.22	1.28	1.26	1.26	1.21	1.21	1.26
NEWFOUNDLAND											
33. St. John's	1.02	1.13	1.05	1.05	0.97	1.05	1.04	1.04	0.99	0.99	1.04
NWT											
34. Yellowknife	1.33	1.41	1.32	1.32	1.26	1.32	1.30	1.30	1.25	1.25	1.30

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 2D
CITY CENTRE INDICES
UTILITIES: ELECTRICAL POWER SUPPLY AND DISTRIBUTION

CITY CENTRES	TRANSMISSION AND DISTRIBUTION	STREET LIGHTS
ATLANTIC		
1. Halifax	0.96	0.98
2. Sydney	0.98	0.99
3. Moncton	0.95	0.97
4. Fredericton	0.93	0.95
QUEBEC		
5. Quebec	1.08	1.08
6. Montreal	1.06	1.07
7. Rouyn	1.11	1.12
8. Sept-Iles	1.14	1.13
ONTARIO		
9. Toronto	1.00	1.00
10. Ottawa	1.01	1.01
11. London	1.02	1.02
12.Sault-Ste-Marie	1.11	1.11
13. Thunder Bay	1.13	1.12
14. Sudbury	1.14	1.13
15. Timmins	1.14	1.13
MANITOBA		
16. Winnipeg	1.03	1.04
17. Thompson	1.05	1.06
18. The Pas	1.05	1.06
19. Brandon	1.04	1.05
SASKATCHEWAN		
20. Regina	1.08	1.08
21. Saskatoon	1.08	1.11
22. Prince Albert	1.13	1.15
ALBERTA		
23. Calgary	1.10	1.10
24. Edmonton	1.05	1.05
25. High Level	1.08	1.09
26. Fort McMurray	1.08	1.08
BRITISH COLUMBIA		
27. Vancouver	1.38	1.39
28. Victoria	1.39	1.40
29. Kamloops	1.38	1.39
30. Prince George	1.43	1.44
31. Prince Rupert	1.38	1.39
YUKON		
32. Whitehorse	1.21	1.25
NEWFOUNDLAND		
33. St. John's	0.98	1.00
NWT		
34. Yellowknife	1.25	1.29

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 2E
CITY CENTRE INDICES
UTILITIES: VEHICLES

CITY CENTRES	PUMPER		SOLID WASTE COLLECTION		LIQUID WASTE COLLECTION		WATER DELIVERY	
	MINI	TRIPLE COMBINATION	COMPACTOR	UNMODIFIED	PUMPER	UNMODIFIED	TANKER	UNMODIFIED
ATLANTIC								
1. Halifax	0.97	0.98	0.99	0.99	0.99	0.99	0.99	0.99
2. Sydney	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01
3. Moncton	0.97	0.98	0.99	0.99	0.99	0.99	0.99	0.99
4. Fredericton	0.92	0.93	0.95	0.95	0.95	0.95	0.95	0.95
QUEBEC								
5. Quebec	1.01	1.02	1.03	1.03	1.03	1.03	1.03	1.03
6. Montreal	1.03	1.04	1.05	1.05	1.05	1.05	1.05	1.05
7. Rouyn	1.07	1.08	1.09	1.09	1.09	1.09	1.09	1.09
8. Sept-Iles	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
ONTARIO								
9. Toronto	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10. Ottawa	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98
11. London	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12.Sault-Ste-Marie	1.06	1.07	1.07	1.07	1.07	1.07	1.07	1.07
13. Thunder Bay	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
14. Sudbury	1.10	1.11	1.11	1.11	1.11	1.11	1.11	1.11
15. Timmins	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
MANITOBA								
16. Winnipeg	1.02	1.02	1.03	1.03	1.03	1.03	1.03	1.03
17. Thompson	1.03	1.03	1.04	1.04	1.04	1.04	1.04	1.04
18. The Pas	1.03	1.03	1.04	1.04	1.04	1.04	1.04	1.04
19. Brandon	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01
SASKATCHEWAN								
20. Regina	1.04	1.03	1.01	1.01	1.01	1.01	1.01	1.01
21. Saskatoon	1.03	1.02	1.01	1.01	1.01	1.01	1.01	1.01
22. Prince Albert	1.10	1.09	1.07	1.07	1.07	1.07	1.07	1.07
ALBERTA								
23. Calgary	1.16	1.15	1.12	1.12	1.12	1.12	1.12	1.12
24. Edmonton	1.10	1.09	1.06	1.06	1.06	1.06	1.06	1.06
25. High Level	1.11	1.11	1.08	1.08	1.08	1.08	1.08	1.08
26. Fort McMurray	1.11	1.11	1.08	1.08	1.08	1.08	1.08	1.08
BRITISH COLUMBIA								
27. Vancouver	1.40	1.40	1.39	1.39	1.39	1.39	1.39	1.39
28. Victoria	1.41	1.38	1.40	1.40	1.40	1.40	1.40	1.40
29. Kamloops	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
30. Prince George	1.38	1.38	1.37	1.37	1.37	1.37	1.37	1.37
31. Prince Rupert	1.38	1.40	1.39	1.39	1.39	1.39	1.39	1.39
YUKON								
32. Whitehorse	1.27	1.28	1.27	1.27	1.27	1.27	1.27	1.27
NEWFOUNDLAND								
33. St. John's	0.99	1.00	1.01	1.01	1.01	1.01	1.01	1.01
NWT								
34. Yellowknife	1.31	1.32	1.31	1.31	1.31	1.31	1.31	1.31

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 2F

CITY CENTRE INDICES

TRANSPORTATION: ROADS AND BRIDGES

CITY CENTRES	EARTH ROADS	GRAVEL ROADS	PAVED AND BST ROADS	BRIDGES
ATLANTIC				
1. Halifax	1.09	1.24	1.39	0.94
2. Sydney	1.16	1.32	1.50	1.02
3. Moncton	1.07	1.22	1.36	0.93
4. Fredericton	1.08	1.21	1.39	0.93
QUEBEC				
5. Quebec	1.13	1.11	1.19	1.07
6. Montreal	1.06	1.05	1.13	1.09
7. Rouyn	1.18	1.15	1.18	1.12
8. Sept-Iles	1.45	1.37	1.42	1.29
ONTARIO				
9. Toronto	1.00	1.00	1.00	1.00
10. Ottawa	1.01	0.99	0.99	0.92
11. London	0.76	0.85	0.79	1.01
12. Sault-Ste-Marie	1.18	1.17	1.16	1.04
13. Thunder Bay	1.10	1.10	1.11	1.11
14. Sudbury	1.24	1.24	1.23	1.09
15. Timmins	1.27	1.24	1.24	1.12
MANITOBA				
16. Winnipeg	0.78	0.77	0.71	0.97
17. Thompson	0.83	0.84	0.78	1.01
18. The Pas	0.64	0.71	0.60	1.00
19. Brandon	0.62	0.69	0.57	0.97
SASK.				
20. Regina	0.69	0.73	0.63	1.09
21. Saskatoon	0.65	0.70	0.62	1.02
22. Prince Albert	0.70	0.77	0.68	1.16
ALBERTA				
23. Calgary	0.62	0.66	0.61	0.98
24. Edmonton	0.60	0.66	0.60	0.95
25. High Level	0.65	0.70	0.63	1.01
26. Fort McMurray	0.65	0.71	0.64	1.01
BRITISH COLUMBIA				
27. Vancouver	0.91	1.10	0.94	1.37
28. Victoria	0.94	1.13	0.97	1.41
29. Kamloops	1.12	1.22	1.13	1.45
30. Prince George	1.03	1.15	1.05	1.42
31. Prince Rupert	1.14	1.23	1.14	1.38
YUKON				
32. Whitehorse	0.90	0.99	0.86	1.31
NEWFOUNDLAND				
33. St. John's	1.22	1.34	1.56	1.04
NWT				
34. Yellowknife	0.93	1.02	0.89	1.35

Note: These indices are not to be used for calculating capital costs. Refer to Part I for capital cost indices.

Table 3

REMOTENESS INDICES

FACILITY TYPE	ZONE 1	ZONE 2	ZONE 3	ZONE 4
BUILDINGS				
Schools	1.00	1.34	1.66	1.89
Teacherages	1.00	1.62	2.46	3.90
Student Residences	1.00	1.63	1.92	2.24
Day Care Centres	1.00	1.34	1.66	1.89
Recreational	1.00	1.17	1.68	1.90
Utility	1.00	1.31	1.35	1.65
Operative	1.00	1.48	2.10	2.95
Administrative	1.00	1.28	1.67	1.90
Fire Stations	1.00	1.35	1.75	2.00
UTILITIES				
Water Supply				
Systems				
- water mains (unheated)	1.00	1.11	1.25	1.86
- water mains (heated)	1.00	1.00	1.16	1.91
- storage reservoir	1.00	1.09	1.22	1.65
- standpipe	1.00	1.10	1.25	1.89
Pump Houses				
- community well supply	1.00	1.09	1.24	1.96
- low level lift station	1.00	1.09	1.24	1.96
- high level lift station	1.00	1.09	1.24	1.96
Treatment Facilities				
- system	1.00	1.11	1.25	1.92
- unit	1.00	1.11	1.25	1.92
Wastewater				
Collection				
- gravity mains	1.00	1.12	1.26	1.94
- force mains (included in lift station unit cost)				
Lift Station	1.00	1.08	1.23	1.93
Treatment and Disposal				
- rotating biological contactor/trickling filter	1.00	1.09	1.23	1.84
- extended aeration	1.00	1.09	1.23	1.84
- lagoon (conventional)	1.00	1.09	1.23	1.48
- lagoon (aerated)	1.00	1.09	1.23	1.84
- community septic tank with disposal field & low pressure sewer mains	1.00	1.09	1.24	1.79
- community septic tank with jet-pump disposal	1.00	1.09	1.24	1.79

FACILITY TYPE	ZONE 1	ZONE 2	ZONE 3	ZONE 4
Solid Waste				
Landfill Site	1.00	1.10	1.25	1.79
Refuse Site	1.00	1.10	1.25	1.79
Incinerator	1.00	1.09	1.24	1.80
Electrical Power				
Transmission	1.00	1.21	1.46	2.92
Distribution	1.00	1.21	1.46	2.92
Street Lights	1.00	1.22	1.46	2.92
Vehicles				
Mini Pumper and Equipment	1.00	1.04	1.22	1.63
Triple Combination Pumper and Equipment	1.00	1.05	1.22	1.65
Refuse Collection Truck (compactor)	1.00	1.05	1.22	1.66
Refuse Collection Truck (unmodified chassis)	1.00	1.05	1.22	1.66
Liquid Waste Collection Truck (pumper)	1.00	1.05	1.22	1.66
Liquid Waste Collection Truck (unmodified chassis)	1.00	1.05	1.22	1.66
Water Delivery Truck (tanker)	1.00	1.05	1.22	1.66
Water Delivery Truck (unmodified chassis)	1.00	1.05	1.22	1.66
TRANSPORTATION				
Roads and Bridges				
Earth Roads	1.00	1.03	1.06	1.45
Gravel Roads	1.00	1.03	1.08	1.46
Paved and BST (*) Roads	1.00	1.02	1.05	1.40
Bridges	1.00	0.99	1.00	1.18

* Bituminous Surface Treatment

PART II - OPERATION AND MAINTENANCE COST MANUAL

APPENDIX A

OPERATION AND MAINTENANCE COST DEFINITIONS

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Schools	Cleaning or custodial.	Salaries (1).	
		Supplies (2):	- cleaning, and - washroom, paper products.
		Equipment and tools (2):	- purchase, rental and repair.
		Contracted services.	
	Ancillary costs.	Water supply:	- small building type or as part of municipal supply.
		Sewage disposal:	- same as water supply.
		Solid waste disposal:	- site incineration or site only collection.
		Electricity.	
		Heating fuels (2).	
		Snow removal:	- by salaried personnel or contractor.
		Fire protection:	- contracted alarm system, inspection and repair; - extinguisher, recharge and repair; - contracted, off-reserve fire department services; - telephone lines related to alarm, and - on-reserve services.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Schools (cont'd)	Minor repairs or maintenance.	Salaries (1). Preventive maintenance inspections. Supplies, material (2). Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Schools (cont'd)	Grounds maintenance.	Salaries. Material. Equipment repairs. Preventive maintenance inspections. Contracted repair and maintenance services.	General landscape maintenance at an average cost of $2,500 per hectare of developed and maintained school site area for a maximum of $10,000 per school complex. The maximum of $10,000 is based on a regularly maintained school site area of approximately 4.5 hectares (11 acres) with normal site conditions. The assumed range of outdoor grounds facilities covered by the $10,000 are those associated with a Kindergarten to Grade 12 school and would include: - softball field; - soccer field; - general lawns; - running track; - outdoor hockey rink; - circulation routes; - play apparatus areas; - fencing; - drainage ditches; - planting areas, - other. Specifically excluded are: - snow plowing (see Ancillary Cost Element); - waste disposal; - irrigation system, - pools and fountains.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Schools (cont'd)	Emergency repairs/major maintenance.	Emergency repairs. Routine: - window repairs; - painting, and - resurface gym floor.	- maximum $5,000 per site.
	Activity costs specifically excluded from unit costs: - alterations, renovations, additions; - appliance purchase, repair, replacement; - audio-visual equipment rental, repair or purchase; - capital projects; - emergency repairs and major maintenance exceeding $5,000 per site; - energy retrofit, major projects; - fire damage, repair or replacement costs; - furniture purchase, repair or replacement; - insurance premiums; - security guards; - portable building moving costs; - sports equipment, purchase, rental, repair or replacement; - taxes, local improvement; - taxes, property, and - telephone or communication costs.		

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Teacherages	Ancillary costs.	Electricity.	
		Fire protection:	- contracted alarm system, inspection and repair; - contracted off-reserve fire department services; - extinguisher recharge or repair; - on-reserve services, and - telephone lines related to alarm.
		Heating fuel (2).	- site incineration or site only collection. - small building type or as part of a municipal service. - small building type or as a part of a municipal service.
		Solid waste disposal:	
		Sewage disposal:	
		Water supply:	

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Teacherages (cont'd)	Minor repairs or maintenance.	Salaries (1). Preventive maintenance inspections. Supplies, material (2). Equipment and tools:	
		Contracted repair and maintenance services. Furniture and appliance repair or maintenance: Grounds maintenance and repair:	- including purchase, rental and repair of same - purchase excluded. - max. $1,000 per site.
	Emergency repairs/major maintenance.	Emergency repairs. Routine: - window repair; - painting, and - structural repair.	- max. $1,000 per site.
	Activity costs specifically excluded from unit costs: - alterations, renovations and additions; - appliance purchase; - capital projects; - emergency repairs and major maintenance exceeding $1,000 per site; - insurance premiums; - major energy retrofit costs; - portable building moving costs; - taxes, local improvement; - taxes, property, and - telephone or communication costs.		

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Student Residences	Activity costs - same as for Schools. Activity costs specifically excluded from unit costs: - alterations, renovations and additions; - appliance purchase, repair or replacement; - audio-visual equipment, repair or purchase; - food services equipment purchase, repair or replacement; - food for residents; - furniture purchase, repair or replacement; - insurance premiums; - major energy retrofit projects; - security guards; - sports equipment purchases, rental, repair; - taxes, local improvement, and - taxes, property.		
Other Institutional	Activity costs - same as for Schools. Activity costs specifically excluded from unit costs - same as for Student Residences.		
Recreational	Activity costs - same as for Schools. Activity costs specifically excluded from unit costs - same as for Student Residences.		
Daycare Centres	Activity costs - same as for Schools.		
Utility	Minor repairs or maintenance to building only.		Energy costs for building to be included with cost of utility.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

BUILDINGS

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Operative (formerly Industrial Plants)	Activity costs - same as for Teacherages, except that minor repairs and maintenance of furniture and appliances are excluded.		
	Activity costs specifically excluded from unit costs - same as for Teacherages.		
Administrative	Activity costs - same as for Schools.		
	Activity costs specifically excluded from unit costs - same as for Schools.		
Fire Stations	Ancillary costs - same as for Schools.		
	Minor repairs or maintenance.		

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1A - Heated Water Mains: All heat-traced piping used to convey water from source of supply to service line connection at the main. **Unit of measurement:** Metre. **Typical inclusions:** All associated valves and hydrants. **Typical exclusions:** Service lines from the service line connection at the main to the user.	Normal operations. Routine maintenance and minor repairs, including: - general yearly inspection; - hydrant flushing, inspection and servicing; - minor repairs to valves, mains and hydrants. Normal operation and inspection of heat trace.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services. Energy generated by grid system.	Reserve population less than 1,000. Average hydrant spacing 140 m. Valve spacing 225 m. Winter operation for 4 months (8 h/day).

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1B - Water Mains: All piping (except heat-traced -- see B1A) used to convey water from source of supply to service line connection at the main. **Unit of measurement:** Metre. **Typical inclusions:** All associated valves and hydrants. **Typical exclusions:** Service lines from the service line connection at the main to the user.	Normal operations. Routine maintenance and minor repairs including: - general yearly inspection; - hydrant flushing, inspection and servicing; - valves, mains and hydrant minor repairs.	Salaries (l). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000. Average hydrant spacing 140 m. Valve spacing 225 m.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1C - Water Treatment System: All equipment used for conventional water treatment. **Unit of measurement:** Each. **Typical inclusions:** Coagulation, flocculation, sedimentation, filtration equipment and a high level lift station. **Typical exclusions:** Host building.	Normal operations. Minor repairs or maintenance. Inspecting, painting, servicing, cleaning, flushing of pipes, valves and tanks. Testing.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1D - Water Treatment Unit: All equipment used for treating community water supply. **Unit of measurement:** Each. **Typical inclusions:** Softening unit, iron removal unit (greensand filter), pressure filter or equivalent treatment. Each of the above items is one treatment unit. **Typical exclusions:** Host building.	Normal operations. Minor repairs or maintenance. Inspecting, painting, servicing, cleaning, flushing of pipes, valves and tanks. Testing.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1E - Water Storage: All above or below ground facilities 20,000 litres or larger to store water for community use. **Unit of measurement:** Each. **Typical inclusions:** All drains, vents, overflows and related equipment. **Typical exclusions:** Pressure tanks -- these are considered to be included in B1F or B1H.	Normal operations. Routine maintenance and minor repairs including reservoir cleaning and inspections.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1F - Community Wells: All groundwater wells used to supply water to the community at large. **Unit of measurement:** Each. **Typical inclusions:** Well pump, pressure tanks and chlorination equipment. **Typical exclusions:** Host building.	Normal operations. Inspection and servicing of well(s). Routine maintenance of chlorination equipment. General cleaning. Annual inspections. Minor repairs as required.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1G - Water Standpipes: All equipment used for community watering points (standpipes). These would normally be provided on a piped water distribution system to enable users to collect their own water. **Unit of measurement:** Each. **Typical inclusions:** Heat-traced supply pipe, spring release mechanical valve and related equipment. **Typical exclusions:** Host building or shed; heated mains.	Normal Operations. Routine maintenance and minor repairs	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1H - High Level Lift Station: All pumping facilities used to pressurize the main distribution system. In this case the source of raw water is usually either a community well or a low level pump house. **Unit of measurement:** Each. **Typical inclusions:** Pressure tanks, pumps, piping, valves and chlorination equipment. **Typical exclusions:** Host building. High Level Lift Station that is part of a Water Treatment System (see definition for Water Treatment System-B1C).	Normal operations. Inspection and servicing of pump houses. Routine maintenance of chlorination equipment. General cleaning and painting. Annual inspections. Minor repairs as required.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Water Supply, Treatment and Distribution			
B1I - Low Level Lift Station: All equipment to pump water from a surface water supply to treatment facilities or storage. **Unit of measurement:** Each. **Typical inclusions:** Intake line, clear well, pumps, piping, valves and chlorination equipment. **Typical exclusions:** Host building.	Normal operations. Inspection and servicing of pump houses. Routine maintenance of chlorination equipment. General cleaning and painting. Annual inspections. Minor repairs as required.	Salaries (1). Supplies, material (2), including operating chemicals, motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2A - Sanitary Main: All piping used to transport wastewater from service line connection at the main to a community treatment plant or adjacent municipal connection. **Unit of measurement:** Metre. **Typical inclusions:** Network of gravity mains, manholes and appurtenances associated with wastewater collection. **Typical exclusions:** Service lines from the user to the service line connection at the main; lift stations and force mains.	Normal operations and minor repairs or maintenance, including yearly inspections, manholes flushing, unplugging sewers, repairs to manholes, mains, etc.	Salaries (1). Supplies, material (2), including motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000. Average manhole spacing 120 m.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2B - Storm Main: All piping used to collect surface drainage from storm runoff. **Unit of measurement:** Metre. **Typical inclusions:** Network of gravity mains, manholes and catch basins. **Typical exclusions:** Ditches and culverts.	Normal operations and minor repairs or maintenance, including yearly inspections, manholes flushing, unplugging sewers, repairs to manholes, mains, etc.	Salaries (1). Supplies, material (2), including motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000. Average manhole spacing 120 m.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2C - RBC/Trickling Filter: Mechanical treatment plant designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All equipment, tanks, filter media and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Host building.	Normal operations. Testing. Preventive maintenance. General maintenance. Cleaning and painting. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2D - Extended Aeration Plant: Mechanical treatment plant designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All equipment, tanks, aeration system and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Host building.	Normal operations. Testing. Preventive maintenance. General maintenance. Cleaning and painting. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2E - Lagoon: Earthen basin(s) designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All lagoon cells, inlet and outlet devices, piping and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Lift station and force main.	Normal operations. Testing. Preventive maintenance. General maintenance. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2F - Community Septic Tank: Community septic tank/holding tank designed for wastewater disposal. **Unit of measurement:** Each. **Typical inclusions:** Disposal field.	Normal operations. Preventive maintenance. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2G - Jet Pump Disposal: Community septic tank designed for wastewater disposal by means of a sewage ejector system. **Unit of measurement:** Each.	Normal operations. Preventive maintenance. Sludge removal. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2H - Lift Station: All equipment used to lift wastewater from a low point in a collection system to a higher elevation. **Unit of measurement:** Each. **Typical inclusions:** Dry well, wet well, pumps, piping and valves. **Typical exclusions:** Host building.	Normal operations. Station equipment. Preventive maintenance. General maintenance and cleaning. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2I - Aerated Lagoon: Lagoon designed to treat community wastewater by means of mechanical aeration. **Unit of measurement:** Each. **Typical inclusions:** All lagoon cells, piping, aeration equipment and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Buildings housing mechanical treatment equipment.	Normal operations. Testing. Preventive maintenance. General maintenance. Cleaning and painting. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including process chemicals and motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater Collection, Treatment and Disposal System			
B2J - Force Main: All piping used to transport wastewater from a sewage lift station to a gravity collection system or community treatment plant. **Unit of measurement:** Metre. **Typical inclusions:** All pressure mains and appurtenances.	Normal operations and minor repairs or maintenance, including yearly inspections, unplugging sewers, repairs to mains, etc.	Salaries (1). Supplies, material (2), including motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Reserve population less than 1,000.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Wastewater, Collection, Treatment and Disposal System			
B2Q - Low pressure sewer: System to transport wastewater from user to community treatment plant or adjacent municipal connection throught low pressure mains, septics tanks to settle the solids and pumps (non-grinder) to pump liquid from the septic tank to the mains. **Unit of measurement:** Each. **Typical inclusions:** Septic tanks, pumps (non-grinder) and piping.	Preventive maintenance. Sludge removal. Yearly inspection. Minor repairs as required.	Salaries (1). Supplies, material (2), including motive power. Equipment and tools (2), including purchase, rental and repair of same. Contracted repair and maintenance services.	Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included). 2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Electrical Power Supply and Distribution Systems consisting of power transmission, distribution and street lighting but excluding power generation. (See Appendix B for Electrical Power Generation.)	Minor repair, preventive maintenance, routine inspections. Emergency repairs, major maintenance. Activity costs excluded: - major refurbishing programs where distribution lines have exceeded their economical life, and - repairs subject to insurance claims.	Salaries (1). Supplies, material (2). Equipment and tools (2). Contracted repair and maintenance services. Minor repairs as a result of vandalism, lamps and lenses, and fuse replacement, guy wire repairs, etc. Tree trimming, right-of-way brush cutting. Emergency: repair/ replacement costs due to sleet, high winds, lightning, etc. Routine: (frequency of occurrence normally greater than 1 year) overload relay adjustments, transformer oil testing, phase/ circuit balancing, lamp and ballast replacement on burn-out, etc.	Approximate 60 m pole spacing. Winters do not exceed 6 months. Standard artificial street lighting located south of latitude 57 degrees north.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Solid Waste Disposal System			
B4A - Refuse Site: An area used for the disposal of solid waste (garbage dump/pit). **Unit of measurement:** Each. **Typical exclusions:** Vehicles associated with operation.	Occasional spreading and covering of waste.	Salaries (1). Supplies, material (2).	Reserve population less than 1,000.

For vehicles used in operations of above see TRANSPORTATION, Vehicles.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Solid Waste Disposal System			
B4B - Landfill Site: An area assigned to receive solid waste. **Unit of measurement:** Each. **Typical exclusions:** Garbage dump/pit; vehicles associated with operation.	Normal operations, including spreading, compaction and covering waste with soil. These activities include annual clearing, trenching, etc.	Salaries (1). Supplies, material (2).	Reserve population less than 1,000.

For vehicles used in operations of above see TRANSPORTATION, Vehicles.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Solid Waste Disposal System			
B4C - Incinerator: All equipment used in the incineration of community solid waste. **Unit of measurement:** Each. **Typical exclusions:** Incinerators servicing individual facilities such as schools. Excludes 45 gallon drums.	Normal operations and minor repairs or maintenance.	Salaries (1). Supplies, material (2). Equipment and tools (2), including purchase, rental and repair of same.	Reserve population less than 1,000.

For vehicles used in operations of above see TRANSPORTATION, Vehicles.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

UTILITIES

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Vehicles: Dedicated single purpose. Mini pumper and equipment. Triple combination pumper and equipment. Solid waste collection truck. Liquid waste collection truck. Water delivery truck. Specific unmodified trucks: - solid waste, liquid waste, water delivery.	Operating and maintaining the vehicles.	Drivers' salaries (excluding pumpers, all sizes). Supplies, material (2), including fuel, coolant, lubricant, tires, filters, misc. parts. Contracted services/hours of operation.	Road maintenance vehicles excluded. Excludes vehicle registration and insurance.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

TRANSPORTATION

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Earth Roads	1. Grading 2. Litter pickup 3. Vegetation control 4. Sign rep./maint. 5. Guiderail rep./maint. 6. Culvert rep./repl. 7. Culvert inspection/ cleaning 8. Ditch cleaning 9. Snow plowing	O&M costs include: Salaries (1), including labourers, truck drivers, equipment operators and maintenance supervisors. Supplies and material (2) needed to carry out maintenance activities. Operating costs of road maintenance vehicles and equipment, including fuel, parts, licences and insurance. Contracted services.	The Base Unit Cost represents the cost of carrying out maintenance activities at frequencies required to provide adequate levels of service on assets located in Toronto. Maintenance materials are available locally. Maintenance equipment is available locally.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

TRANSPORTATION

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Gravel Roads	1. Grading 2. Gravel patching 3. Dust control 4. Gravelling 5. Litter pickup 6. Vegetation control 7. Mowing 8. Sign rep./maint. 9. Guiderail rep./maint. 10. Culvert rep./repl. 11. Culvert inspection/ cleaning 12. Ditch cleaning 13. Snow plowing 14. Snow removal 15. Sanding	O&M costs include: Salaries (1), including labourers, truck drivers, equipment operators and maintenance supervisors. Supplies and material (2) needed to carry out maintenance activities. Operating costs of road maintenance vehicles and equipment, including fuel, parts, licences and insurance. Contracted services.	The Base Unit Cost represents the cost of carrying out maintenance activities at frequencies required to provide adequate levels of service on assets located in Toronto. Maintenance materials are available locally. Maintenance equipment is available locally.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

TRANSPORTATION

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Paved and BST Roads	1. Asphalt patching 2. Crack sealing 3. Spray patching 4. Shoulder grading 5. Catch basin cleaning 6. Litter pickup 7. Vegetation control 8. Mowing 9. Sign rep./maint. 10. Guiderail rep./maint. 11. Culvert rep./repl. 12. Culvert inspection/ cleaning 13. Ditch cleaning 14. Snow plowing 15. Snow removal 16. Sanding and salting	O&M costs include: Salaries (1), including labourers, truck drivers, equipment operators and maintenance supervisors. Supplies and material (2) needed to carry out maintenance activities. Operating costs of road maintenance vehicles and equipment, including fuel, parts, licences and insurance. Contracted services.	The Base Unit Cost represents the cost of carrying out maintenance activities at frequencies required to provide adequate levels of service on assets located in Toronto. Maintenance materials are available locally. Maintenance equipment is available locally.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserv

TRANSPORTATION

CAPITAL ASSET	ACTIVITY	COST ELEMENT	PARAMETERS
Bridges	1. Inspection 2. Cleaning 3. General maint./rep.	O&M costs include: Salaries (1), including labourers, truck drivers, equipment operators and maintenance supervisors.	The Base Unit Cost represents the cost of carrying out maintenance activities at frequencies required to provide adequate levels of service on assets located in Toronto.
		Supplies and material (2) needed to carry out maintenance activities.	Maintenance materials are available locally.
		Operating costs of road maintenance vehicles and equipment, including fuel, parts, licences and insurance. Contracted services.	Maintenance equipment is available locally.

Note: 1. Salaries include full, part-time and/or casual employees (fringe benefits included).
2. These costs are those delivered to the reserve.

PART II - OPERATION AND MAINTENANCE COST MANUAL

APPENDIX B

SAMPLE CALCULATION
ELECTRICAL POWER GENERATION

1.0 DIESEL - ELECTRIC

Unit O&M costs for diesel powered electric generators are not available. These costs are derived by headquarters using the following annually updated data supplied by the regions:

- peak power;
- site fuel costs;
- number and size of diesel generators, and
- generator synchronizability.

A load factor of 0.5 is to be used for British Columbia and Ontario regions where peak power is provided; otherwise, where generator rating in kilowatts (kW) is provided, a capacity factor of 0.35 is to be used.

For the Quebec region, actual previous year's consumption in kilowatt hours (kWh) is supplied and annually updated for current year application.

A sample calculation is as follows:

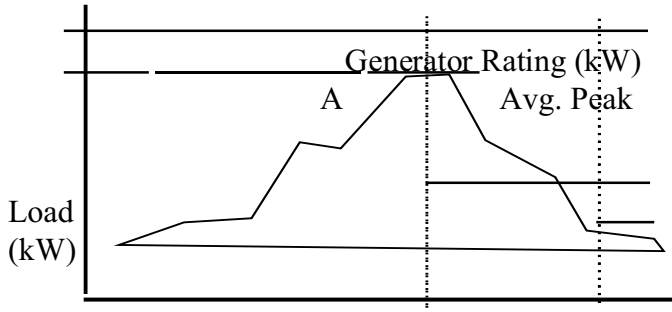
Peak Power	=50 kW
Energy Potential	=50 kW x 8760 hours/year =438,000 kWh/year
Load Factor	=50% (based on an average for 24 hours/day and 365 days/year

Therefore estimated energy consumption

=0.5 x 438,000
=219,000 kWh/year

Cost of fuel delivered =$0.98/L

Assume a generator efficiency of 80% and 75%, capacity loading produces 2.86 kWh/L of fuel. Therefore fuel costs to generate 219,000 kWh



Applying a load factor:
Use 50% * "A" if avg. peak known
Use 35% * "B" otherwise

Unit O&M costs for diesel powered electric generators are not available. These costs are derived by headquarters using the following annually updated data supplied by the regions:

- Typical generating plant peak load (where available);
- Number, type (make and model) and generator capacity (kW) for each diesel-generator unit;
- Indicate which units are synchronizable (ie. run in parallel on the same bus);
- Site fuel costs, fuel consumption; and
- Where available, additional calculations and costs (maintenance, consumables, lube oil, etc.) used to derive the estimated total O&M cost.

$$\frac{219{,}000 \text{ kWh} \times \$0.98}{2.86 \text{ kWh/L of fuel}} = \$75{,}042/\text{year}.$$

40% of cost of fuel is estimated to cover labour, material, travel, lubricating oil, filters, antifreeze, general maintenance and overhaul.

Therefore annual cost of O&M for above example = $75,042 x 1.4 = $105,059

Note: An energetic effiency of 2.86 kWh/L is a general average for Quebec, it is 2.1 kWh/L for Ontario and British Columbia.

PART II - OPERATION AND MAINTENANCE COST MANUAL

APPENDIX C

REMOTENESS INDICES DEFINITIONS

The following are definitions to be used in establishing the appropriate Remoteness Index in determining O&M costs. The zone classification for each reserve or settlement is contained in the *Band Classification Manual.*

Zone 1 A zone where the band is located within 50 km of the nearest service centre by year-round road access. Material prices are competitive. Delivery time and charges are either non-existent or nominal. Skilled labour is plentiful and productive.

Zone 2 A zone where the band is located between 50 km and 350 km from the nearest service centre by year-round road access. Material prices are not as competitive (only one supplier). Transportation time and costs are significant. Only semi-skilled or unskilled labour is available. Skilled labour must be housed or compensated for travel.

Zone 3 A zone where the band is located over 350 km from the nearest service centre by year-round road access. Material prices are excessive. Skilled and semi-skilled labour must be imported and housed on-site.

Zone 4 A zone where the band has no year-round road access to the nearest service centre and as a result has a higher cost of transportation.

It should be noted that a given site does not have to meet every criterion in order to be included in a given category.

PART II - OPERATION AND MAINTENANCE COST MANUAL

APPENDIX D

ASSET DEFINITIONS

CATEGORY: Buildings

CLASS: Administrative

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A1A	Office	A building or space in a building used as office space in which departmental program or band administrative and managerial activities take place. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Band offices, and administration buildings, band council buildings. **Typical exclusions:** Construction supervisor offices, rented office space, foreman offices in other classes of building (e.g. A2B garages), district offices not owned by the department.

CATEGORY: Buildings

CLASS: Operative

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A2A	Trade shop/workshop (municipal)	A building or space in a building where operation and maintenance activities are carried out. These would include equipment and vehicle repair; supplies, equipment and vehicle storage. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Buildings used as workshops, storage or warehouses, including storage of educational supplies, equipment and vehicles; community freezer and ice storage houses; and boat houses when used for band O&M activities. **Typical exclusions:** Nursery or green houses, barns or stables, forest fire towers; operative buildings used for commercial or industrial purposes.
A2B	Garage (municipal)	
A2C	Warehouse (band or school)	

CATEGORY: Buildings

CLASS: Institutional

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A3A	School	A building or space in a building where a curriculum at the kindergarten, primary, elementary or secondary level is taught which could include space for classrooms, industrial arts, home economics, computer science, commercial, library, gymnasium and directly associated support space (e.g. principal's office, staff room, washrooms, storage, etc.). **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Kindergarten, elementary and secondary schools including portable or temporary accommodation for school. **Typical exclusions:** Adult training centres, space used for post secondary education, museums, buildings used for storage of educational supplies and equipment which come under the operative class A2.

CATEGORY: Buildings

CLASS: Institutional

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A3B	Daycare centre	A building or space in a building where educational and recreational activities below the kindergarten level are carried out. Space in the building may be provided for activity rooms, washrooms, office and staff rooms, kitchen, lunch room and storage. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Daycare centre including both permanent, portable or temporary accommodation. **Typical exclusions:** Schools. Space used for the care or rehabilitation of handicapped persons come under the institutional classification A3K, i.e. the training centre (trades, handicap) subclass.

CATEGORY: Buildings

CLASS: Institutional

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A3H	Fire station	A building or part of a building which accommodates fire suppression, prevention and inspection activities. Activities taking place in the building would include storage and minor maintenance of fire fighting equipment and trucks, training, administration, control and dispatch of equipment. The building may include space for storage, workshop, office staff and training rooms/facilities. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** A single building or portion of a multipurpose building which must contain fire suppression apparatus. **Typical exclusions:** Material storage buildings; office space for fire inspector in band administration buildings.

CATEGORY: Buildings

CLASS: Residential

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A4I	Student residence	A building or part of a building where students reside who are attending school as described in the asset definition, School A3A. The facility serves as accommodation for the students in order for them to attend school. The accommodation could include sleeping quarters (rooms), dining facilities including cafeterias, washrooms, office space, recreational and storage rooms. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical exclusions:** Group homes; bunkhouses; hostels; transient centres.

CATEGORY: Buildings

CLASS: Residential

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A4L	Teacherage	A housing unit furnished by the band or department located on a reserve which is used to provide living accommodation for teachers employed at departmental or band-operated schools. The accommodation would include those facilities normally associated with a residential unit. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Single-family houses, semi-detached houses, multiple-family houses, portables, mobile homes or trailers. **Typical exclusions:** Band housing, group homes, hotels, motels, student centres.

CATEGORY: Buildings

CLASS: Utility

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A5A	Water supply/treatment	A building which contains equipment and materials to support the municipal services (Category B - Utility) function. The building may contain pumps, piping, tanks, water and wastewater treatment equipment, power generation equipment, as well as office, washroom, laboratory and storage space. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Water supply, distribution and treatment buildings, wastewater collection treatment and disposal buildings; electrical power generating plants. **Typical exclusions:** Buildings used strictly for storage (e.g. treatment materials), reservoirs, wells, stand pipes, garages for the storage and maintenance of water and waste disposal vehicles; these buildings are to be included in the operative classification A2.
A5B	Wastewater treatment/disposal	
A5C	Electrical power generation	
A5D	Solid waste disposal	
A5E	Central heating plant	

CATEGORY: Buildings

CLASS: Utility

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
A6A	Community recreation centre/hall/cultural centre	A building or space in a building where band or community recreation and cultural activities take place. These could include sports, exercise activities, community meetings, adult education cultural programs. **Unit of measurement:** Square metre, gross floor area (external dimension). **Typical inclusions:** Types of buildings as listed above, curling rinks. **Typical exclusions:** Churches, museums, marina, outdoor rinks and outdoor swimming pools; camp grounds; booths; shelters; sports fields; rodeo grounds.
A6B	Arena	
A6C	Gymnasium	
A6D	Indoor swimming pool	
A6E	Club house/youth centre/senior citizen/drop-in	

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B1A	Heated water mains	All heat-traced piping used to convey water from source of supply to service line connection at the main. **Unit of measurement:** Metre. **Typical inclusions:** All associated valves and hydrants. **Typical exclusions:** Service lines from the service line connection at the main to the user.

B1B	Water mains	All piping (except heat traced - see B1A) used to convey water from source of supply to service line connection at the main. **Unit of measurement:** Metre. **Typical inclusions:** All associated valves and hydrants. **Typical exclusions:** Service lines from the service line connection at the main to the user.

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B1C	Water treatment system	All equipment used for conventional water treatment. **Unit of measurement:** Each. **Typical inclusions:** Coagulation, flocculation, sedimentation, filtration equipment, and a high level lift station. **Typical exclusions:** Host building. (A-5A)
B1D	Water treatment unit	All equipment used for treating community water supply. **Unit of measurement:** Each. **Typical inclusions:** Softening unit, iron removal unit (greensand filter), pressure filter or equivalent treatment. Each of the above items is one treatment unit. **Typical exclusions:** Host building.

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B1E	Water storage	All above or below ground facilities 20,000 litres or larger to store water for community use. **Unit of measurement:** Each. **Typical inclusions:** All drains, vents, overflows and related equipment. **Typical exclusions:** Pressure tanks -- these are considered to be included in BIF or BIH.
B1F	Community well	All groundwater wells used to supply water to the community at large. **Unit of measurement:** Each. **Typical inclusions:** Well pump, pressure tanks and chlorination equipment. **Typical exclusions:** Host building.

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B1G	Water standpipes	All equipment used for community watering points (standpipes). These would normally be provided on a piped water distribution system to enable users to collect their own water. **Unit of measurement:** Each. **Typical inclusions:** Heat-traced supply pipe, spring release mechanical valve and related equipment. **Typical exclusions:** Host building or shed; heated mains.
B1H	High level lift station	All pumping facilities used to pressurize the main distribution system. In this case the source of raw water is usually either a community well or a low level pumphouse. **Unit of measurement:** Each. **Typical inclusions:** Pressure tanks, pumps and chlorination equipment. **Typical exclusions:** Host building. High Level Lift Station that is part of a Water Treatment System (see definition for Water Treatment System-B1C).

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B1I	Low level lift station	All equipment to pump water from a surface water supply to treatment facilities or storage. **Unit of measurement:** Each. **Typical inclusions:** Intake line, clear well, pumps and chlorination equipment. **Typical exclusions:** Host building.

CATEGORY: Utilities

CLASS: Wastewater Collection, Treatment and Disposal System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B2A	Sanitary mains	All piping used to transport wastewater from service line connection at the main to a community treatment plant or adjacent municipal connection. **Unit of measurement:** Metre. **Typical inclusions:** Network of gravity mains, manholes, and appurtenances associated with wastewater collection. **Typical exclusions:** Service lines from the user to the service line connection at the main; lift stations and force mains.
B2B	Storm mains	All piping used to collect surface drainage from storm runoff. **Unit of measurement:** Metre. **Typical inclusions:** Network of gravity mains, manholes and catch basins. **Typical exclusions:** Ditches and culverts.

CATEGORY: Utilities

CLASS: Water Supply, Treatment and Distribution

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B2C	Rotating biological contactors/trickling filter	Mechanical treatment plant designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All equipment, tanks, filter media and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Host building.
B2D	Extended aeration plant	Mechanical treatment plant designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All equipment, tanks, aeration system and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Host building.

CATEGORY: Utilities

CLASS: Wastewater Collection, Treatment and Disposal System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B2E	Lagoon	Earthen basin(s) designed to treat community wastewater. **Unit of measurement:** Each. **Typical inclusions:** All lagoon cells, inlet and outlet devices, piping and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Lift station and force main.
B2F	Community septic tank	Community septic tank/holding tank designed for wastewater disposal. **Unit of measurement:** Each. **Typical inclusions:** Disposal field.
B2G	Jet-pump disposal	Community septic tank designed for wastewater disposal by means of a sewage ejector system. **Unit of measurement:** Each.
B2H	Lift station	All equipment used to lift wastewater from a low point in a collection system to a higher elevation. **Unit of measurement:** Each. **Typical inclusions:** Dry well, wet well, pumps, piping and valves. **Typical exclusions:** Host building.

CATEGORY: Utilities

CLASS: Wastewater Collection, Treatment and Disposal System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B2I	Aerated lagoon	Lagoon designed to treat community wastewater by means of mechanical aeration. **Unit of measurement:** Each. **Typical inclusions:** All lagoon cells, piping, aeration equipment and processes associated with biological treatment; gravity outfall lines. **Typical exclusions:** Buildings housing mechanical treatment equipment.
B2J	Force mains	All piping used to transport wastewater from a sewage lift station to a gravity collection system or community treatment plant. **Unit of measurement:** Metre. **Typical inclusions:** All pressure mains and appurtenances.
B2Q	Low pressure sewer	System to transport wastewater from user to community treatment plant or adjacent municipal connection through low pressure mains, septic tanks to settle the solids and pumps (non-grinder) to pump liquid from the septic tank to the mains. **Unit of measurement**: Each **Typical inclusions:** Septic tanks, pumps (non-grinder) and piping.

CATEGORY: Utilities

CLASS: Electrical Power Supply and Distribution System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B3A	Mini-hydro	INAC/Band-owned water driven electric power generating source on reserves usually in combination with standby diesel-driven generators, rated in kW. **Unit of measurement:** Each. **Typical inclusions:** Dam, water intake system and control. **Typical exclusions:** Generator, building, wind generation.
B3B	Diesel generators	INAC/Band-owned diesel-engine driven electric power generating source on reserves, consisting of one or two units with no synchronizability and a minimum of three units with synchronizability, rated in kW. **Unit of measurement:** Each. **Typical inclusions:** Control panels. **Typical exclusions:** Diesel generator building.

CATEGORY: Utilities

CLASS: Electrical Power Supply and Distribution System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B3C	Street lights	INAC/Band-owned street lights, usually installed on existing power distribution poles, and typically consisting of high-pressure sodium 150 watt lamps and lights. **Unit of measurement:** Each. **Typical inclusions:** Lighting fixtures, mounting hardware, power connection, control and grounding. **Typical exclusions:** Street lights provided under contract by Power Supply Authority.
B3D	Transmission	INAC/Band-owned transmission line, supplying electrical power to a reserve from some remote/outside source. Transmission is almost exclusively via an overhead pole line. **Unit of measurement:** Kilometre. **Typical inclusions:** Pole line and substation. **Typical exclusions:** Distribution lines.

CATEGORY: Utilities

CLASS: Electrical Power Supply and Distribution System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B3E	Distribution	INAC/Band-owned distribution line, distributing power on the reserve from the transmission substation or local generating plant to the various users. Distribution is usually via an overhead pole line with the possible exception of an underground cable run to a school, based on specific site requirements. **Unit of measurement:** Kilometre. **Typical inclusions:** Pole line, transformers, fuses, lightning arresters, guying, tap-offs to loads. **Typical exclusions:** Transmission line and substation.

CATEGORY: Utilities

CLASS: Solid Waste Disposal System

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
B4A	Refuse site	An area used for the disposal of solid waste (garbage dump/pit). **Unit of measurement:** Each. **Typical exclusions:** Vehicles associated with operation.
B4B	Landfill site	An area assigned to receive solid waste including spreading, compaction and covering waste with soil. **Unit of measurement:** Each. **Typical exclusions:** Garbage dump/pit. Vehicles associated with operation.
B4C	Incinerator	All equipment used in the incineration of community solid waste. **Unit of measurement:** Each. **Typical exclusions:** Incinerators servicing individual facilities such as schools. Excludes 45 gallon drums.

CATEGORY: Transportation

CLASS: Reserve Roads

DEFINITION: Public roads including service access roads located on reserve for the benefit of the entire community and for the purpose of providing vehicular access to provincial road systems, residential areas and to public facilities such as schools, band offices, sewage treatment plants, landfill sites, etc. **Reserve roads exclude:** third-party roads, off-reserve roads, private entrances and access roads to private economic ventures.

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
D1A	Earth roads	Seasonal roads constructed of native materials without the addition of surface improvement materials such as gravel. **Unit of measurement:** Kilometre.
D1B	Gravel roads	Roads with a riding surface constructed of crushed, screened or native gravel. **Unit of measurement:** Kilometre.
D1C	Surface treated roads	Roads with low class asphaltic surfaces such as chip seals, bituminous surface treatments, oil treatments, etc. **Unit of measurement:** Kilometre.
D1D	Paved roads	Roads with a riding surface paved with a hot mixed asphaltic concrete. **Unit of measurement:** Kilometre.

CATEGORY: Transportation

CLASS: Reserve Bridges

DEFINITION: Public structures located on reserve for the benefit of the entire community and for the purpose of carrying vehicular and pedestrian traffic across depressions and obstacles such as gullies, roadways, waterways, railways, etc. Reserve bridges **include large culverts whose span exceeds three metres**, and are normally located on roads defined in D1 -- Reserve Roads.

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
D2A	Vehicular bridges	Bridges designed to carry vehicular traffic. **Unit of measurement:** Square metres of deck area.
D2B	Pedestrian bridges	Bridges designed to carry pedestrian traffic only. **Unit of measurement:** Square metres of deck area.
D2C	Large culverts	Structures with a span (width of opening) exceeding three metres which are placed under a road embankment for the passage of surface water, livestock or pedestrians. **Unit of measurement:** Square metres on plan.

CATEGORY: Transportation

CLASS: Other Roads

DEFINITION: Private roads, entrances and third-party roads which are located on or off reserve, and where the band is the major user.

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
D7A	Third-party roads	Portions of road networks belonging to third-party agencies such as provinces, counties, municipalities, etc., located within the boundaries of the reserve. **Unit of measurement:** Kilometre.
D7B	Private access roads	All farm access roads and any other access roads to private economic ventures located on reserve such as sawmills, campgrounds, logging operations, stores, etc. **Unit of measurement:** Kilometre.
D7C	Private entrances	All entrances, laneways and driveways to private dwellings for the exclusive use of the property occupants. **Unit of measurement:** Kilometre.
D7D	Off-reserve roads	Roads located outside the boundaries of the reserve which are used almost exclusively by the band and are often the only link between the reserve and the provincial road system. **Unit of measurement:** Kilometre.

CATEGORY: Transportation

CLASS: Other Bridges

DEFINITION: All vehicular and pedestrian bridges and large culverts, as defined in D2 -- Reserve Bridges, which are located on roads defined in D7 -- Other Roads, and where the band is the major user.

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
D8A	Third-party bridges	Bridges and large culverts located on roads belonging to third-party agencies as defined under D7A. **Unit of measurement:** Square metres of deck area/on plan.
D8B	Private access bridges	Bridges and large culverts located on private access roads defined under D7B. **Unit of measurement:** Square metres of deck area/on plan
D8C	Private entrance bridges	Bridges and large culverts located on private entrances defined under D7C. **Unit of measurement:** Square metres of deck area/on plan.
D8D	Off-reserve bridges	Bridges and large culverts located on off-reserve roads defined under D7D. **Unit of measurement:** Square metres of deck area/on plan.

CATEGORY: Vehicles

CLASS: Fire Fighting

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E1A	Mini pumper	Truck with either 4 x 2 or 4 x 4 wheel drive. Gross Vehicle Weight Rating (GVWR) 4,889 to 5,896 kg (11,000 to 13,000 lb). Fire fighting pump rated at 1,363 litres per minute (300 gallons per minute). Water tank capacity 1,591 litres (350 gallons) or smaller. **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Fire Fighting

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E1B	Triple combination pumper	Truck with either 4 x 2 or 4 x 4 wheel drive. Gross Vehicle Weight Rating (GVWR) 6,550 to 15,876 kg (14,000 to 35,000 lb). With a fire fighting capability to: a. pump water from its own reservoir; b. draft water from a source; c. increase water pressure from a source such as a hydrant, or to a source such as a building sprinkler system. The fire fighting pump may have a rating from 1,932 to 3,750 litres per minute (425 to 825 gallons per minute). Water tank capacity from 2,279 litres to 9,092 litres (500 to 2,000 gallons). **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Fire Fighting

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E1Z	Fire fighting vehicles (others)	Motor vehicle chassis of any size or a towed trailer of any size not specifically designed as a fire truck but which is equipped with a tank and/or pump. **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Solid Waste

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E2A	Compactor	A motor vehicle chassis ranging from 5,896 to 15,876 kg (13,000 to 35,000 lb) Gross Vehicle Weight Rating (GVWR), fitted with a closed container with hydraulic capability to compress solid waste. Loading may be accessible from the rear or either side. **Unit of measurement:** Each.
E2B	Unmodified	A motor vehicle chassis of any size, fitted with a closed or open container which is dedicated part time to the purpose of collecting solid waste. **Unit of measurement:** Each.
E2Z	Other	A motor vehicle chassis of any type or a towed trailer used for the purpose of collection of solid waste on an infrequent or as-necessary basis. **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Liquid Waste

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E3A	Commercial pumper	A motor vehicle chassis ranging from 7,711 to 15,876 kg (17,000 to 35,000 lb) Gross Vehicle Weight Rating (GVWR) commercially designed with special tanks with a capacity range of 2,273 to 6,819 litres, (500 to 1,800 gallons) or more to be used for the purpose of pumping liquid waste water. Pump capacity and type may vary. **Unit of measurement:** Each.
E3B	Unmodified	A motor vehicle of any chassis size onto which a portable tank and pump has been temporarily mounted for the purposes of pumping and collecting wastewater as required. **Unit of measurement:** Each.
E3Z	Other	A motor vehicle chassis of any type or a towed trailer with a tank and/or without a pump used for the purpose of collecting wastewater, on an infrequent or as-required basis. **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Water Delivery

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E4A	Tanker	A motor vehicle ranging from 7,712 to 15,876 kg (17,000 to 35,000 lb) Gross Vehicle Weight (GVWR), fitted with a permanently mounted tank with a capacity ranging from 2,954 to 6,819 litres (650 to 1,500 gallons) either with a pump or gravity dispensing system. **Note:** Some of these vehicles may have a fire fighting capability by the use of an extra pump for pressurizing water (i.e. combination water delivery/fire fighting vehicle). **Unit of measurement:** Each.
E4B	Unmodified	A motor vehicle of any chassis size onto which a portable tank is temporarily mounted for the purpose of delivering potable water, using either a pump or gravity for delivery. **Unit of measurement:** Each.

CATEGORY: Vehicles

CLASS: Water Delivery

SUBCLASS (CAIS CODING)	ASSET NAME	ASSET DEFINITION
E4Z	Other	A portable water tank used for delivery of potable water to a dwelling: a. installed on the rear of a vehicle; or b. a tank trailer, or c. a tank mounted on a single wheeled axle. **Unit of measurement:** Each.