Ministry of Transportation and Infrastructure

CONSTRUCTION AND REHABILITATION COST GUIDE

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INTRODUCTION

This booklet provides the reader with a construction cost guideline for new construction and rehabilitation work based only on historic costs.

The user of this booklet must realize that the comparative costs for the construction work is determined by many components related to design, materials, location, trends and construction methods which can all vary widely throughout the Province.

Unless otherwise stated, this booklet excludes property acquisition, planning and evaluation, surveys, supervision, traffic management, utilities and contingencies.

Where possible, we have provided for the reader a range of cost values from the low tender, or from the construction value, for various types of construction and rehabilitation work.

CONCRETE BARRIER COSTS

2007 costs are shown in 2010 dollars

Concrete Roadside Barrier (CRB - 690mm)

average cost to supply and install $115/m

Shoulder preparation (supply material, haul and place)

average cost..... $75/$m^2$

Concrete Median Barrier (CMB - 810mm)

average cost to supply and install $150/m

Concrete Transition Barrier (CTB - 690mm to 460mm)

average cost to supply and install $120/m

Concrete Drainage Barrier (CDB – 690mm)

average supply and install $110/m

Concrete Bull Nose (CBN – 460mm)

average cost to supply and install $70/m

Bridge Parapet Transition (BPT – 810mm)

average cost to supply and install $360/m

BRIDGE STRUCTURE COATING

costs are shown in 2010 dollars

Major structures Recoating

Lions Gate (2004 - 2006)

cost ..... $22.3 million ($300/m^2)

Truss coating

Ingram Bridge (2005)

cost .....$540,000 ($350/m^2)

BRIDGE DECK RESURFACING COSTS

2006 costs are shown in to 2010 dollars

Silica fume modified high performance concrete

Region 1, 2 ..... $375 - $535/$m^2$

Silica fume modified high performance concrete

Region 3 ..... $642 - 750/$m^2$

Hot applied rubberized

asphalt membrane..... $560/$m^2$

Costs can vary due to the following:

- Size of structure
- Grouping of structures
- Percentage of partial and full depth deck repairs
- Complexity of traffic management
- Remoteness of bridge site

Note: Mobilization and Traffic Control are included

STRUCTURE CONSTRUCTION COSTS

(Based on bridge deck surface area)

2007 costs are shown in to 2010 dollars

Low level River Crossings and Road Overpass Crossings:

Regions 1, 2 ..... $2,100 - $3,100/$m^2$

Region 3 ..... $3,100 - $4,700/$m^2$

High level River Crossings:

Regions 1, 2 ..... $2,600 - $4,200/$m^2$

Region 3 ..... $3,700 - $5,200/$m^2$

Low Volume Road

Creek Crossings ..... $2,100 - $3,100/$m^2$

Note: On replacement bridge projects, the above costs are based on structure cost only plus 10% for mobilization, traffic management & quality management where applicable. Demolition of existing bridge is not included.

INTERCHANGES

1992 costs are shown in 2010 dollars

Rural Interchange

A diamond, multi-plate underpass, minimum design standards

cost range..... $4,100,000 - $8,100,000

Urban Interchange

A diamond, partial cloverleaf, trumpet, or directional interchange, concrete structures, high multiplate pipe underpass.

cost range..... $21,000,000 - $33,630,000

Interchange Examples

Swan Lake to Larkin Grading Paving and Bridge

July, 2004

Located on Hwy 97 and 97A

Work consisted of:

Roadway and drainage excavation, watermain installation, paving, signing and electrical. Construction of a single span concrete and girder concrete and girder bridge on concrete abutments on MSE walls and remove and replace level railroad crossing

Conventional contracting methods unless otherwise noted

	2004	2007	2010
contract cost	$10,900,000	$13,840,000	$16,027,000
supervision	$1,280,000	$1,400,000	$1,470,000
material	$85,000	$108,000	$114,000
miscellaneous	$1,058,500	$1,350,000	$1,416,000
contingencies	$1,000,000	$1,270,000	$1,471,000
total	$14,235,000	$17,968,000	$20,498,000

McTavish Interchange

Award Date(main contract): April 2010

Completion Date (main contract): June 2011

Located on Highway 17 at McTavish Road, North Saanich

Work consisted of:

Supply and install new asphalt pavement, signs, sidewalk, curb and gutter, fence, concrete barrier, pilings abutments, columns, superstructure and decks for roadway and pedestrian structures.

Conventional contracting methods unless otherwise noted.

contract cost (main contract)	$12,454,000
wick drains	$331,300
utility relocation	$104,654
proprietary walls	$2,562,750
as & when labour services	$105,900
total	$15,558,604

Monte Creek Interchange

TCH No.1 and Hwy 97, 30 km east of Kamloops

Work consisted of:

4km of 4-lane highway, 3km of frontage road, drainage and storm drain system, 7.8km of fencing, corrugated steel cattle underpass, Monte Creek Flyover, Bostock road Overpass, Monte Creek Bridge, Monte Creek Multiplate, MSE walls, landscaping, signing and electrical, hydro and gas relocation, temporary structures and detours.

Conventional contracting methods unless otherwise noted.

"Highway Contructors Limited" (HCL) Contract

	1999	2007	2010
contract cost	$11,265,000	$15,650,000	$18,125,000
supervision	$1,042,000	$1,250,000	$1,313,000
material	$969,000	$1,347,000	$1,425,000
additional	$256,000	$355,850	$373,000
total	$13,532,000	$18,603,000	$21,236,000

Hwy 91A Queensborough Interchange

North end of the Queensborough Bridge - Marine Way Flyover – Lower Mainland

Work consisted of:

single steel span pedestrian bridge. Six span pile foundation concrete viaduct. Concrete bridge demolition. Grading, drainage, paving, electrical, traffic signals, signs, landscaping pavement markings.

Completed: October 2008

Conventional contracting methods unless otherwise noted.

	2008	2010
contract cost	$19,350,000	$19,936,000
contingencies	$1,100,000	$1,133,000
engineering	$2,100,000	$2,164,000
ministry materials	$55,000	$57,000
miscellaneous	$470,000	$484,000
utility relocation	$150,000	$155,000
total	$23,225,000	$23,929,000

PEDESTRIAN OVERPASSES

Mt. Newton Cross Road Pedestrian Overpass

Located on Hwy 17 near Sidney

Pedestrian overpass over a 4-lane highway

Completed: 1996

Conventional contracting methods unless otherwise noted.

	1996	2007	2010
contract cost	$432,000	$635,000	$735,000
supervision	$64,000	$77,000	$81,000
materials	$43,000	$63,200	$67,000
total	$539,000	$775,200	$883,000

Nanoose Pedestrian Overpass

Located on Hwy 19 near Nanoose

Pedestrian overpass over a 4-lane highway

Completed: 1996

Conventional contracting methods unless otherwise noted

	1996	2007	2010
contract cost	$452,000	$664,400	$770,000
supervision	$43,000	$51,700	$54,000
total	$495,000	$716,100	$824,000

Note: Pedestrian overpass material cost not provided, but it would be comparable to Mt. Newton Crossroad.

CURB AND GUTTER CONSTRUCTION COSTS

2006 costs are shown in 2010 dollars

2-Lane Highway..... .....$90/m

..(Includes remove/dispose asphalt pavement) …….$200/m

4-Lane Highway..... .....$90/m

Slip form only. When Curb and Gutter work includes different aspects such as landscaping, utility work or electrical work the cost per metre will vary depending on the additional work

SIDEWALK COSTS

1.5m wide concrete sidewalk ..... $53 m^2

1.8m wide concrete sidewalk ....$55 m^2

Sidewalk costs do not include such things as: remove and dispose of existing sidewalks, new driveway letdowns, and other work such as landscaping, utility work, will vary the cost per sq. metre depending on these additional works.

FENCING COSTS

2007 costs are shown in 2010 dollars

Standard Wire Fence

Average cost for fencing

Type A, B, or C range fence, wire fabric or barbed wire, mixed wood and steel posts

Type A, B wire fabric ..... $15-$25/m

Type C barbed wire ..... $15-$20/m

Type D chain link ..... $30-$60/m

Wildlife Exclusion Fencing

2.4 m high heavy gauge Paige wire, mixed wood and steel posts.

Flat to rolling terrain with no rock outcroppings

cost ..... $35-$45/m

Rocky conditions where drilling and metal posts are required

cost ..... $75-$85/m

Note: Fencing costs shown are per side of highway. Contractor supplied material and labour costs included.

Fencing Costs (continued)

Bridge Sidewalk Fencing

	Qty	Avg Price	Award Price
2 Rail Sidewalk Fence (2008 $)	36	$200	$138
above costs shown in 2010 $		$232	$160
3 Rail Sidewalk Fence (Gal)(2010)	113	$176	$184
3 Rail Sidewalk Fence (Blk)(2010)	123	$189	$188

2 Rail Fence: Hwy 1 Stocking Creek 16198-0001 (May 2008)

3 Rail Sidewalk Fence: (SS2009 – see amendment SS741-07-01) McTavish Interchange 04338-0001 (Apr 2010)

The numbers reflected above are based on different quantities and market conditions for each identified year

GRADING CONSTRUCTION COSTS

2008 costs are shown in 2010 dollars

2 - Lane Low Volume Road Construction

Easy Conditions ..... $525,000 - $840,000/km

Difficult Conditions ... $1,050,000 - $2,100,000/km

2 - Lane High Volume Highway Construction

Easy Conditions ..... $575,000 - $1,470,000/km

Difficult Conditions ... $1,050,000 - $3,150,000/km

4 - Lane High Volume Highway Construction

Easy Conditions ..... $1,050,000 - $2,310,000/km

Difficult Conditions . $2,620,000 - $10,500,000/km

Note: The above range of costs for 2 lane and 4 lane highway construction include construction and supervision, but do not include engineering design or property acquisition Prices for projects 5 to 8 kms in length average 5% to 7% higher.

Grading examples

Hwy 33 – Four Laning Muir Road to Gallagher Rd

Southern Interior Region

Completion October 2010

Work consisted of:

Grading, pulverizing, superpave, curb & gutter, sidewalks, boulevards, excavation and electrical works (4.5 km)

contract costs	$12,263,436
engineering	$1,300,000
contingencies	$1,137,000
ministry materials	$100,000
miscellaneous	$5,908,000
utility relocation	$40,000

construction cost	$20,748,436
cost per km	$4,611,000

Alaska Hwy No. 97

Corridor Improvements Phase 4 – Fort St. John

Northern Region

Completed: September 2008

Work consisted of:

Four laning of Hwy 97 100th Ave to 269 Rd Intersection, new frontage road system (3.3 km)

	2008	2010
contract cost	$10,870,411	$12,012,000
ministry materials	$138,500	$153,000
miscellaneous	$1,723,700	$1,905,000
utility relocation	$20,000	$22,000

construction costs.....…$14,092,000

cost per km.....$4,270,300

Simon Fraser Bridge Project, Bridge Approaches: Grading, Paving, Drainage and Electrical Construction

South Coast Region

Completed: August 2008

Work consisted of:

Grading, paving and electrical installations for bridge approaches and tie in roadway ramps (1 km)

	2008	2010
contract cost	4,685,000	$5,177,000
ministry materials	$102,000	$113,000

construction costs..... ….….$5,290,000

cost per km.....$5,290,000

Hwy 15: 88th Avenue to 97th Avenue, Grading, Paving, Drainage and Electrical Construction

South Coast Region

Completed October 2008

Work consisted of:

Upgrade to four lanes, new intersection and includes grade construction, asphalt reclamation, asphalt paving and electrical installations (1.8 km)

	2008	2010
contract cost	$5,446,000	$6,017,000
contingencies	$631,500	$698,000
engineering	$650,000	$718,000
ministry materials	$243,700	$269,000
miscellaneous	$100,000	$111,000
utility relocation	$60,000	$66,000

construction costs.....$7,879,000

cost per km.....$4,377,500

Hwy 7 & Hwy 9 Intersection Improvements District of Kent, BC

South Coast Region

Completed: June 2009

Work consisted of:

Utility relocation, BC Hydro duct work, clearing & grubbing, drainage improvements, curbing improvements, electrical installations, grading and paving.

contract costs	$697,000
engineering	$65,000
utility relocation	$5,000
contingencies	$115,000
ministry material	$26,000
miscellaneous	$67,000
construction costs	$975,000
cost per km	$975,000

Okanagan Hwy 97A, Pleasant Valley Cross Road to Lansdowne Road, (4.003 km) Grading and Paving

Southern Interior Region

Completion: September 2011

Work consisted of:

Roadway and drainage excavation, asphalt paving, drainage pipes, watermains, fencing, electrical and signing

contract costs……..…….$13,234,000

contingencies…… $700,000

engineering……$2,470,000

ministry materials……$35,000

miscellaneous……$4,351,000

utility relocation ……$1,150,000

construction costs ……$21,940,000

cost per km ……..……$5,481,000

GROOVED RUMBLE STRIPS

Grooved Rumble strips are on the paved shoulder of the road. Generally 8-10 mm deep with a 300 mm radius by 140 mm wide, 300-400 mm apart.

Average cost including traffic control:

shoulder..... $1,010 /lin. km

centre line with median barrier ..... .$1,280 /lin. Km *

(* 2006 C/L w barrier cost shown in 2010 dollars)

double solid centre line..... $1,200 /lin. km

(lin. km = linear kilometre)

LANDSCAPE ESTABLISHMENT COSTS

Rural Standard

Primarily the grading of existing soils, seeding to rough grass and naturalized/functional plantings; limited use of imported soils, decorative plants and bark mulch; usually no irrigation.

Suburban Standard

A mix of rural and urbanized conditions entailing significant use of imported or amended soils, seeding to mowed grass, upgraded planting and irrigation of shrubs and trees.

Urban Standard Landscaping

A more developed, premium level of landscaping with imported topsoil, significant plantings and bark mulching and/or aesthetic hard surfacing, seeding or sodding to lawn grade grass, and irrigation as required.

To clarify the parameters of the costs noted below:

2006 costs shown in 2010 dollars

the costs have been based on projects encompassing several hectares, but actual values may be highly variable

Landscape items: include supply and planting costs

unirrigated grass	$ 9 - $11/$m^2$
irrigated lawn	$19 - $21/$m^2$
irrigated lawn with boulevard trees	$27 - $32/$m^2$
unirrigated plantations	$21 - $27/$m^2$
irrigated plantations	$38 - $54/$m^2$
decorative stamped concrete/pavers	$80 - $91/$m^2$
hydroseeding	$0.70 - $0.80 m^2

Hydroseeding –including base per/ha material application rates of 1,500kg mulch, 40kg tackifier, 75kg standard seed mix, and 300kg standard fertilizer

Note: The above landscape establishment costs, with the exception of general hydroseeding, usually includes a one year maintenance agreement, which is typically a standard requirement for MoT Landscaping Projects.

PAVEMENT REHABILITATION COSTS

2007 costs shown in 2010 dollars

Hot Mix Paving overlay 50mm (minimal base repair)			
Overlay Width	Life Expectancy	Cost / lane km	Average
Overlay width 1 lane only	15+years	$82,000 - $99,000	$90,000
Overlay width 1 lane and shoulder	15+years	$93,000 - $117,000	$105,000

Average cost for Shouldering including material $32.00 per tonne

Mill and Fill (50 mm) (The recycled asphalt pavement is stockpiled locally)			
	Life Expectancy	Cost/ lane km	Average
1 Lane	15+ years	$88,000 - $105,000	$97,000

Hot In Place Recycle with Add Mix and rejuvenating agent (50 mm depth)			
	Life Expectancy	Cost/ lane km	Average
1 lane	9-11 years	$35,000 - 53,000	$44,000

Milling & Placement of Milling on Side roads (50 mm depth)		
	Life Expectancy	Cost/ lane km
1 lane	7-10 years	$45,000
1 lane and shoulder	7-10 years	$55,000

Surface Treatments			
	Life Expectancy	Cost / One lane km	Average
Single Graded Aggregate Seal	3-7 years	$19,000 - $25,000	$22,000
Graded Aggregate Double Seal	3-7 years	$26,000 - $30,000	$28,000
Microsurfacing	7-11 years	$35,000 - $53,000	$47,000

Note: All the above costs include pavement rehabilitation, project management, Ministry of Transportation site supervision, centre line marking, geotechnical evaluations, construction costs, labour, equipment and materials.

Pavement Rehabilitation examples

Asphalt Surfacing, Quesnel Hydraulic, Dunn's Corner and Marsh Road, Quesnel Area - End Product Specification

(31.7 Lane km)

Work consisted of:

Asphalt surfacing, aggregate production, cold milling, asphalt levelling course, top lift pavement and shouldering work.

Completed: September, 2009

2009 costs are shown in 2010 dollars

contract cost.....$2,639,000

miscellaneous $110,000

contingencies $41,000

engineering $162,500

Ministry material.....$5,100

construction cost.....$2,957,600

cost.....$93,300 per lane km

Asphalt Surfacing, Hwy No. 6, Monashee Pass Cortiana Road to 1.5 km South of the Spruce Grove Cafe - End Product Specification

(40.84 Lane kms)

Work consisted of:

Asphalt surfacing, aggregate production, cold milling, asphalt leveling course, top lift pavement and shouldering work.

Completed: September, 2008

2008 costs are shown in 2010 dollars

contract cost	$2,609,000
miscellaneous	$96,500
engineering	$198,000
ministry material	$5,000
construction cost	$2,908,500
cost	$71,200 per lane km

Asphalt Surfacing Hwy No. 5 Coquihalla, Salem Creek to Comstock Road and Coldwater Lakes Area - End Product Specification

(45.8 Lane Km)

Work consisted of:

Cold Milling, asphalt surfacing, aggregate production, asphalt leveling course, top lift pavement and shouldering work.

Completed: July, 2009

2009 costs are shown in 2010 dollars

contract cost	$3,678,400
miscellaneous	$82,400
engineering	$304,700
ministry material	$3,000
construction cost	$ 4,069,000
cost	$88,800 per lane km

Asphalt Surfacing Hwy No. 97, Clinton to Big Bar Rest Area - End Product Specification

(25.3 Lane Km)

Work consisted of:

Asphalt surfacing, aggregate production, cold milling, asphalt leveling course, top lift pavement and shouldering work.

Completion: October 2010

contract cost	$3,642,000
miscellaneous	$112,400
contingencies	$50,000
engineering	$248,500
construction cost	$4,052,900
cost	$160,200 per lane km

South Peace Roads Sealcoat

(76 Lane Km)

Work consisted of:

Approximately 38 km of Graded Aggregate Sealcoat, supply 750,000 litres of HF150P asphalt emulsion with anti–strip and 300,000 sq. m of graded aggregate sealcoat

Complete: September, 2009

2009 costs are shown in 2010 dollars

contract cost	$1,921,000
miscellaneous	$503,000
engineering	$152,000
contingencies	$203,000
construction cost	$2,779,000
cost	$36,600 per lane km

- Single Seal Application ……240,000 m^2
- Double Seal Application ……. 60,000 m^2

Hot-In-Place Recycling Hwy No. 1, Quartz Road to Walhachin Road (53.5 Lane Kms)

Work consisted of:

200,000 sq. m. of Hot-in-Place Recycling with 60,000 litres of rejuvenating agent and 4,800 tonnes of admix.

Completed: September, 2008

2008 costs are shown in 2010 dollars

contract cost	$2,049,000
miscellaneous	$69,000
contingencies	$51,500
engineering	$159,000
Ministry materials	$2,500
construction cost	$2,331,000
cost	$43,600 per lane km

Hot-In-Place Recycling EPS, Hwy 16, Endako to Fort Fraser Overhead (30.30 km)(60.6 Lane kms)

Work consisted of:

250,000 sq. m. of Hot-in-Place Recycling with 75,000 litres of rejuvenating agent and 7,700 tonnes of admix.

Completed: September, 2008

2008 costs are shown in 2010 dollars

contract cost	$3,152,000
miscellaneous	$133,000
contingencies	$52,000
engineering	$216,000
construction cost	$3,553,000
cost	$58,600 per lane km

RAILWAY CROSSING COSTS

(Two Lane Level crossings are an average 12 m in width)

2007 costs are shown in 2010 dollars

Level Crossing Surface (Single Track)

- softwood planked ..... $5,000 - $7,000
- paved ..... $7,000 - $9,000
- concrete ..... $11,000 -$15,000
- full depth rubber ..... $12,000 - $18,000

Track Reconstruction for Level Crossings (Not including surface)

- simple reconstruction ..... $9,000 - $12,000
- upgrade rail components ..... $19,000 - $29,000

Underpass Structures (Rail over road, single track)

- 2 Lane Hwy ..... $2,000,000 - $2,700,000
- 4 Lane Hwy ..... $2,600,000 - $3,500,000

Overhead Structures (Road over rail)

- 2 Lane overhead
- no sidewalk ..... $3,500 - $4,700/$m^2$

RUNAWAY FACILITIES

2001 costs are shown in 2010 dollars

Arrestor Bed Type

Coarse gravel arrestor bed; approaching and departing lanes and a service lane..... $448,000 -$747,000

Gravitational Type

Gravitational type runaway facilities consist of a runaway lane terminating in a minimal depth arrestor bed on a steep uphill grade.

When constructed in conjunction with a highway construction project ..... $179,300 – $522,800

Runaway Facility examples

Warfield Hill Runaway Lane and Attenuation System

A runaway lane with two 90m long retaining walls incorporating a dragnet attenuation system.

Difficult working conditions.

Completed: February, 2000

	2000 dollars	2010 dollars
contract cost	$230,000	$369,000
supervision	$17,000	$21,000
materials	$381,000	$403,000
day labour	$501,000	$614,000
design/inspection of manufacturer's product	$55,000	$77,000
total	$1,184,000	$1,484,000

RETAINING WALL STRUCTURE COSTS

2007 costs are shown in 2010 dollars

(Supply and install)

Gabion, Lock Block (no Geogrid)

up to 3 courses high (2.25 m to 3 m) .... $486-$695/m^2

Lock Block with Geogrid and Geosynthetic

Reinforced Soil Retaining Systems .... $925-$1,160/m^2

Binwalls and Greenwalls ..... $925-$1,100/m^2

*Mechanically Stabilized Earth Walls . $810-$1,160/m^2

(*not economical under 3 m high)

SIGNALIZATION AND LIGHTING COSTS

2007 costs are shown in 2010 dollars

Electrical Installation Type	Engineering Design Cost	Construction Cost	Annual Power and Maintenance
Urban Traffic Signal	$8,000 - $12,000	$197,000 – $278,000	$3,400 - $3,600
Rural Traffic Signal	$8,000 - $12,000	$174,000 - $232,000	$3,400 - $3,600
Pedestrian Signal	$4,600 -$7,000	$115,000 - $175,000	$1,700
Continuous Lighting *	$2,900 -$4,000	$160,000 - $185,000/km	$4,200 - $5,800/km
Intersection Lighting	$2,300 -$3,500	$13,000 - $25,000 (~$6,400/ lum.)	$240 - $290/lum

Note Continuous lighting costs assumes lighting two lanes with approximately 50m spaced – 250W HPS luminaries