REVENUE BRANCH

Interior Appraisal Manual

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Cost Base
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BRITISH COLUMBIA

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Introduction 1

1.1 Conventions and Terms of Reference

1.1.1 Terms and Conventions

Procedures	*Italics*		Indicate the formal name of a document. e.g. *Forest Act, Interior Appraisal Manual*
	Headings	1. =	Chapter
		1.1 or 1.1.1.1 =	Section of chapter 1
		1.1.1.1, (2) =	Section within chapter 1, with subsection.
		Table 4-2 =	Table 2 within chapter 4

1.1.2 Terms of Reference

The *Forest Act,* sections 103 to 108, and regulations provide the statutory authority for the determination of stumpage for Crown timber.

The *Forest Act,* section 105, requires adherence to the policies and procedures approved for the forest regions by the Minister of Forests. This *Interior Appraisal Manual*, approved by the minister, contains the policies and procedures for determining stumpage rates charged for Crown timber harvested in the area described in section 1.2.

The data used in the manual is based on a broad sampling of timber harvesting, silviculture, and manufacturing costs, and lumber and chip selling prices experienced by licensees in the interior.

1.2 Area of Application

This manual applies to the "Interior", which is defined as that geographic area included within the Northern and Southern Interior Forest Regions, as established by the *Forest Act* and Regulations under the *Forest Act*, and Manning Park.

1.3 Cutting Authority

The term "cutting authority" is defined as:

1. A cutting permit issued under:
    a. a forest licence,
    b. a timber sale licence that provides for the issuance of cutting permits,
    c. a tree farm licence,
    d. a community forest agreement,
    e. a woodlot licence,
    f. a timber licence,
    g. a community salvage licence, or
    h. a master licence to cut.
2. A timber sale licence under which cutting permits have not or will not be issued.
3. All other licences to cut.
4. A road permit.

1.3.1 Cutting Authority Area

The term "cutting authority area" means the area that:

1. Timber may be harvested from, under a cutting authority, and
2. Has a unique timber mark.

1.3.2 Cutblocks within a Cutting Authority Area

Cutblocks included in a single cutting authority area should constitute a logical unit.

The cutblocks must be:

1. Within the same forest district, and
2. Tributary to a common point of appraisal, and
3. Must not exceed a maximum distance of ten kilometres between the furthest boundaries of the furthest cutblocks, except when required for bark beetle epidemic blanket salvage.

1.4 Responsibility for Stumpage

For the purposes of section 105 of the *Forest Act*, the following employees of the ministry are authorized to determine, redetermine and vary stumpage rates.

- regional manager, regional timber pricing co-ordinator, an employee of the regional revenue section designated by the regional manager, and
- director, Revenue Branch, Ministry of Forests and an employee of Revenue Branch.

1.5 Market Pricing System

The Market Pricing System (MPS), subject to a minimum stumpage rate, is the basis for determining stumpage rates for Timber Sale Licences awarded under sections 20 and 21 of the *Forest Act* after January 1, 1999.

1.6 Comparative Value Timber Pricing

Comparative Value Pricing (CVP), subject to the minimum stumpage rate, is the basis for determining stumpage rates for all cutting authorities except those specified under section 1.5. Sections 2.1 (2), (3) and (4) provide the methods that are used for specific products and extraordinary situations.

One component of CVP is the determination of the average stumpage rate for the interior. The stumpage rate for a given stand of timber is more or less than the pre-set average rate (Interior Target Rate) (see chapter 5) depending upon whether the stand value index is more or less valuable than the average stand's value index. To determine the value index of the stand and hence to determine a stumpage rate, the forest officer will typically:

1. Estimate the selling price of the products that can be recovered from the timber stand (see chapter 3).

2. Estimate the least total cost necessary to harvest and deliver timber to a point of appraisal then add the manufacturing cost for that point of appraisal (see chapter 2 and 4).

3. Determine the Value Index (see chapter 5) of the timber stand by subtracting the estimated operating cost from the estimated selling price.

4. Determine the indicated stumpage rate by comparing the Value Index for the timber stand with the Interior Mean Value Index and adding the Interior Base Rate (see chapter 5).

5. Determine the reserve stumpage rate (see chapter 5) by selecting:

    a. the greater of the indicated stumpage rate or the prescribed minimum stumpage rate, or

    b. for an appraised cutting authority area containing timber licence volume, the greater of the adjusted indicated stumpage rate or the prescribed minimum stumpage rate.

6. Determine the upset stumpage rate by adding any development, silviculture, and administration levies (see section 6.7) to the reserve stumpage rate.

7. Determine the total stumpage rate by adding any bonus bid to the upset stumpage rate.

One stumpage rate is determined for all appraised timber in each cutting authority area with the exception of miscellaneous stumpage rates as specified under section 6.8.

The average stumpage rate for the interior is indexed to lumber market values as explained in chapter 5.

1.7 CVP Stumpage Adjustments

Unless a cutting authority or the application and tender for a timber sale licence specifies that stumpage rates are fixed for a specified period or for the full term of the cutting authority, stumpage rates are adjusted quarterly on January 1, April 1, July 1, and October 1, of each year, subject to section 6.6.

Each quarterly stumpage adjustment will be calculated using stumpage appraisal parameters approved by the director, Revenue Branch.

Stumpage appraisal parameters are:

i. Statistics Canada interior composite index,

ii. Interior target rate,

iii. Interior base rate,

iv. Interior mean value index.

The adjusted stumpage rates reflect changes in estimated selling prices and lumber recovery factor update add-ons (as authorized in this manual since the previous adjustment), and the recalculated logging and silviculture costs based on the appropriate trend factors shown in section 4.11. The manufacturing costs used in the adjustment will be those authorized in this manual since the previous adjustment. In addition, the adjustment reflects changes in the Statistics Canada Interior Softwood Lumber Index, the Statistics Canada Pulpwood Chip Index for British Columbia, the Interior Base Rate and the Interior Mean Value Index.

Appraisal Principles and Procedures 2

2.1 Types of Determination

Stumpage rates are determined, redetermined or varied by:

1. An appraisal, reappraisal or quarterly adjustment using the comparative value pricing system,
2. an appraisal, reappraisal or quarterly adjustment using the market pricing system,
3. an Order-in-Council under the *Forest Act,* section 105, or
4. a procedure identified in chapter 6 of this manual.

2.2 Appraisal Procedure

1. An appraisal is a process used to determine a stumpage rate for a cutting authority area using the *Interior Appraisal Manual* in effect on the effective date of the cutting authority.

2. A licensee or BC Timber Sales (BCTS) shall submit an interior appraisal data submission and map (Appendix IV) to the district manager when the licensee or BCTS makes an application for a cutting authority.

3. The licensee or BCTS shall submit to the district manager any other information required by the district manager or their designate for the purposes of the appraisal.

4. The submissions under subsections (2) and (3) of this section must be signed and sealed by a professional forester registered in the Province of British Columbia.

5. The district manager or their designate may review the licensee or BCTS submission and will notify the licensee or BCTS, in writing, of any omissions, errors or provisions of the *Interior Appraisal Manual* that, in the opinion of the district manager or their designate, the signing professional forester may not have considered. The licensees or BCTS signing professional forester will consider the district manager's or their designate's notification and may revise the submission.

6. The district manager or their designate shall give any information supplied by the licensee or BCTS under this section to the person who determines the stumpage rate together with any other information that the district manager or their designate considers relevant to the appraisal.

7. The person who determines the stumpage rate may review the licensee or BCTS submission and information supplied by the district manager or their designate, and will notify the licensee or BCTS, in writing, of any omissions, errors or provisions of the *Interior Appraisal Manual* that, in the opinion of the person who determines the stumpage rate, the signing professional forester may not have considered. The licensee or BCTS signing professional forester will consider the notification and may revise the submission.

8. The person who determines the stumpage rate shall consider, when determining the stumpage rate:

    a. the information provided by the licensee or BCTS and the district manager or their designate, and

    b. any information available to the person who determines the stumpage rate that is relevant to the appraisal.

9. Regional staff will notify the licensee of the total stumpage rate by way of a stumpage advisory notice. Regional staff will advise BCTS of the upset stumpage rate. Once the timber sale has been auctioned regional staff will notify the successful bidder of the total stumpage rate by way of a stumpage advisory notice. Regional staff will also provide the licensee or BCTS with a summary of the information used to determine the stumpage rate or upset stumpage rate.

2.3 Redeterminations and Reappraisals

2.3.1 Redetermination of Stumpage Rate by Agreement

1. Where, within twenty-one days of the date of a Stumpage Advisory Notice, the person to whom the Notice has been sent and an employee of the Ministry of Forest authorized to redetermine a stumpage rate under section 1.4 of this manual agree, the stumpage rate set out in the Notice, hereinafter referred to as the original stumpage rate, may be redetermined by the employee, and the redetermined stumpage rate shall be effective on the effective date of the original stumpage rate.

2. The twenty-one day period referred to in subsection (1) of this section may be extended by agreement between the person to whom the Notice has been sent and the employee.

2.3.2 Reappraisals

1. A reappraisal is a process used to redetermine a stumpage rate for a cutting authority area using the *Interior Appraisal Manual* in effect on the effective date of the reappraisal.

2. A reappraisal is based on a complete reassessment of the cutting authority area at the time of the reappraisal, as if the area has been returned to the condition it was in prior to development or harvesting.

3. At the time of a reappraisal, initial detailed engineering cost estimates may be re-estimated once after construction utilizing information as specified in section 4.3.3. However, development costs originally estimated using ministry approved competitive bids are not re-estimated in a reappraisal.

2.3.2.1 Changed Circumstances

1. An adjustable stumpage rate cutting authority shall be reappraised when a changed circumstance has occurred. The licensee will make a request (including a revised appraisal data submission and map) to the district manager to carry out a reappraisal stating in the request the changed circumstance that has occurred. If the district manager determines that a changed circumstance has occurred and a licensee has not requested a reappraisal, the district manager will notify the licensee in writing that a reappraisal is required, stating the changed circumstance that has occurred. The regional manager must be satisfied that any of the following changed circumstances have occurred:

a. (i) The licensee plans to use a method of harvest to harvest at least fifteen percent of the volume of timber in the cutting authority area that is different from the method planned to be used for that timber prior to the appraisal of the cutting authority area, and

(ii) the method of harvesting that will produce the appraisal least total operating cost estimate in the reappraisal is different from the method of harvesting that was used to produce the appraisal least total operating cost estimate in the appraisal, or

b. there will be at least a fifteen percent change in the total appraised development cost estimate due to changed site conditions upon reappraisal, or

c. land containing merchantable timber has been either added to or deleted from the cutting authority area since the most recent cruise compilation or recompilation was used in an appraisal or reappraisal that exceeds the lesser of

i. fifteen hectares, or

ii. fifteen percent of the area of the cutting authority area as it was prior to the addition or deletion of the land, or

d. at least fifteen percent of the volume of the appraised timber in a cutting authority area has been suddenly and severely damaged, unless the timber was damaged by a fire for which the licensee was responsible and the licensee failed to comply with any of section 75 through 95 of the *Forest Practices Code of British Columbia Act* or the *Forest Fire Prevention and Suppression Regulation*. Despite subsection 2.3.2(2) where the cutting authority area is reappraised because of sudden and severe damage the redetermined stumpage rate is based upon the remaining timber only. The reappraisal cost estimate for development takes into account volume of timber already removed from the cutting authority area. This subsection is applicable to cutting authorities with either a non-adjusting (fixed) stumpage rate or a quarterly adjusted stumpage rate.

2. Where a cutting authority is reappraised under this section, any existing bonus bid remains in effect despite a redetermination of the upset rate.

2.3.2.2 Annual Reappraisal for Road Permits and Blanket Salvage Cutting Permits

1. A road permit must be appraised or reappraised effective June 1 of each year. The stumpage rate determined at the appraisal or reappraisal is fixed for one year.

2. A blanket salvage permit issued on or after September 1, 2004, must be reappraised at the anniversary date of the cutting authority. For blanket salvage permits issued prior to September 1, 2004, the appraisal expiry date may be extended to April 30, 2005.

2.3.2.3 Minister's Direction

1. The Minister of Forests may direct that a reappraisal be made at any time and that the redetermined stumpage rate be effective on any future date, and may specify criteria and procedures for the reappraisal.

2. A reappraisal directed by the Minister of Forests, may be a re-estimation of operating cost, lumber recovery factor, or selling price, or any combination of these, as may be directed by the Minister of Forests.

2.3.2.4 Mathematical Error

a. If a government employee or contractor in the Ministry of Forests or a licensee (or employee or contractor of a licensee) becomes aware of what is or probably is a mathematical error in a stumpage determination, that person shall give written notice of the error ("the Notice") as follows:

   i. in the case of appraisals and reappraisals, to the appropriate regional manager, and

   ii. in the case of quarterly adjustments, to the director of Revenue Branch,

b. the Notice shall describe the stumpage determination or determinations involved and shall describe the nature and cause of the error to the extent reasonably possible,

c. upon receipt of the Notice, the regional manager or the director of Revenue Branch shall make the appropriate investigation to decide whether or not an error has, in fact, been made,

d. if the regional manager or the director of Revenue Branch decides that an error has not been made, they shall notify the person who sent the Notice of the decision and the reasons for it,

e. if the regional manager or director of Revenue Branch, decides that an error has been made, the following shall occur:

   i. the regional manager or the director of Revenue Branch, shall notify the person who sent the Notice of the decision and the reasons for it,

ii. the regional manager or the director of Revenue Branch, shall take reasonable steps to ensure that all licensees who have been affected by the error are informed of the Notice and of the nature and cause of the error,

iii. the cutting authority or authorities under which the error was made shall be reappraised or the quarterly stumpage adjustment recalculated to correct the error unless the cutting authority, the *Interior Appraisal Manual* or the application in tender for a timber sale licence specified that the stumpage rate is fixed, and

iv. the effective date of the redetermined rate shall be the first day of the month following the date on which the Notice was received by the regional manager or the director of Revenue Branch,

f. if an error has occurred and no Notice has been given with respect to it, the Notice shall be deemed to have been given on the date on which the regional manager or the director of Revenue Branch, became aware of the error or probable error,

g. no person who discovers or otherwise becomes aware of a mathematical error in a stumpage determination shall be obliged to send the Notice as required herein if that person, on reasonable grounds, believes that someone else has sent the Notice with respect to the same error,

h. the redetermined rate does not apply to timber scaled before the first of the month following the date upon which the Notice was given. No remedy will be available with respect to timber scaled before the first of the month,

i. in this section, a mathematical error is any of the following:

i. an error in transcribing or compiling approved cruise field data, or in the application of approved loss factors and taper equations,

ii. an error in a calculation made as part of the appraisal data submission,

iii. an error in transcribing the data from an approved appraisal data submission or in performing the calculation specified in the manual, and

iv. an error in the application of published appraisal parameters,

A difference between cruise estimates and actual timber quality or quantity does not constitute an error in the appraisal.

A difference between appraisal estimates of selling price or operating cost and the licensee's experience does not constitute an error in the appraisal.

Omission of data by the licensee on an approved appraisal data submission does not constitute an error in the appraisal.

2.4 Changed Circumstance Reappraisal Procedure

1. The licensee shall submit to the district manager an interior appraisal data submission and map if the cutting authority area must be reappraised because of a changed circumstance under section 2.3.2.

2. The licensee shall submit to the district manager any other information required by the district manager or their designate for the purposes of the appraisal.

3. The submissions under subsections (1) and (2) of this section must be signed by a professional forester registered in the Province of British Columbia.

4. The district manager or their designate may review the licensee's submission and will notify the licensee, in writing, of any omissions, errors or provisions of the *Interior Appraisal Manual* that, in the opinion of the district manager or their designate, the signing professional forester may not have considered. The licensee's signing professional forester will consider the district manager's or their designate's notification and may revise the submission.

5. The district manager or their designate shall give any information supplied by the licensee under this section to the person who determines the stumpage rate together with any other information that the district manager or their designate considers relevant to the appraisal.

6. The person who determines the stumpage rate may review the licensee's submission and information supplied by the district manager or their designate, and will notify the licensee, in writing, of any omissions, errors or provisions of the *Interior Appraisal Manual* that, in the opinion of the person who determines the stumpage rate, the signing professional forester may not have considered. The licensee's signing professional forester will consider the notification and may revise the submission.

7. The person who determines the stumpage rate shall consider, when determing the stumpage rate:

    a. any information provided by the licensee and the district manager or their designate, and

    b. any information available to the person who determines the stumpage rate that is relevant to the reappraisal.

8. Regional staff will notify the licensee of the reappraised stumpage rate in the form of a stumpage advisory notice and will provide the licensee with a summary of the information used to determine the reappraised stumpage rate.

2.4.1 Effective Date of Changed Circumstance Reappraisal

1. The effective date of the reappraisal under section 2.3.2 is the first day of the month following the date of the licensee's written request to the district manager or the district manager's notification to the licensee that a changed circumstance has occurred unless the reappraisal is because of:

    a. amendments to the cutting authority exhibit A area under subsection 2.3.2(1)(c), in which case the reappraisal is effective on the first day of the month following the date that the district manager notifies the licensee of the amendment approval, or

    b. sudden and severe damage to the appraised timber under subsection 2.3.2(1)(d), in which case the effective date of the reappraisal is the first day of the month following the date when the sudden and severe event stopped on the cutting authority area..

2.4.2 Minister Directed Reappraisal Procedure

1. The licensee shall submit to the district manager an interior appraisal data submission, if requested by the district manager or their designate, within forty-five days of the minister's direction.

2. Thereafter, the ministerial direction reappraisal procedure shall be the same procedure as that required by subsections 2.4 (2) through 2.4 (8).

2.5 Fixed Stumpage Rate and Extension of Term

BC Timber Sales (BCTS)

1. A fixed stumpage rate for a BCTS cutting authority means that the reserve stumpage rate, levies and bonus bids will not change during the term of the cutting authority and all extensions. Except where:

   a. a reappraisal is done under section 2.3.2(1)(d) due to sudden and severe damage or

   b. a reappraisal is done under section 2.3.2.3 because of a minister's direction.

Woodlots

2. a. An appraised or reappraised stumpage rate for a cutting authority, other than a road permit, issued under a woodlot licence shall be adjusted quarterly unless a woodlot licensee chooses in accordance with this section, to have, or the woodlot licence has under section 2.5,(2)(c) a fixed stumpage rate for the term of the cutting authority and all extensions.

   b. A licensee may choose to change the adjusting stumpage rate to a fixed stumpage rate at any time upon giving three (3) weeks prior written notice of that choice to the regional timber pricing co-ordinator. Once the choice has been made by the licencee, it is irrevocable and is not retroactive. Where the proper notice above, is given, the stumpage rate will be fixed.

   c. Where a woodlot licence cutting authority has a stumpage rate that is not adjusted quarterly as of April 1, 2003, that stumpage rate shall remain fixed for the term of the cutting authority and all extensions.

   d. Where a woodlot licence cutting authority has a stumpage rate that is fixed by section 2.5(2)(b) or 2.5(2)(c), that cutting authority shall only be reappraised under section 2.3.2.1(1)(d), section 2.3.2.2, or section 2.3.2.3.

Zonal Average Sawlog Stumpage Rates

3. Where the stumpage rate has been determined under section 6.1 or section 6.2 and the term of the cutting authority is extended, the stumpage rate shall continue unchanged during the term of the cutting authority.

Miscellaneous Stumpage Rates

4. Miscellaneous stumpage rates (section 6.8) will be based on the *Interior Appraisal Manual* in effect on the date of scale.

2.6 Point of Appraisal

The appraiser must select the point of appraisal, from Table 2-1, which will produce the least cost total harvesting and transportation estimate for the timber on the cutting authority area unless;

i. five years have passed from the date that a milling facility was permanently rendered incapable of producing lumber and chips, and

ii. it was the only milling facility associated with that point of appraisal.

In which case, the appraiser must select the next the point of appraisal, from Table 2-1, which will produce the least cost total harvesting and transportation estimate for the timber on the cutting authority area.

For the purposes of determining the least cost total harvesting and transportation estimate, the specific locations that were used in measurement of cycle time for each point of appraisal in Table 2-1 as of October 1, 2003, will continue to be used. The appraiser must then assume the manufacturing costs and average market values for the Zone relative to that point of appraisal.

Table 2-1 Points of Appraisal

Northern Interior (Zone 5, 15, 25 & 35)			
Bear Lake	Fort St. James	Mackenzie	Smithers
Burns Lake	Fraser Lake	Prince George	Strathnaver
Clear Lake	Houston	Quesnel	Upper Fraser
Engen	Isle Pierre		Vanderhoof

Skeena (Zone 6, 16, 25 & 36)			
Terrace	Carnaby	Hazelton	Kitwanga

Southern Interior (Zone 7, 17, 25 & 37)			
Adams Lake	Galloway	Merritt	Thrums
Armstrong	Grand Forks	Midway	Valemount
Canal Flats	Kamloops	Okanagan Falls	Vavenby
Canoe	Kelowna	Park Siding	Westbank
Castlegar	Lavington	Princeton	Ymir
Craigellachie	Louis Creek	Radium	
Creston	Lumby	Revelstoke	
Elko	McBride	Slocan	

South Cariboo (Zone 8, 18, 25 & 38)					
100 Mile House	Chasm	Lytton	Squamish	Williams Lake	Boston Bar

Fort Nelson - Peace (Zone 9, 19 & 25)			
Chetwynd	Fort Nelson	Fort St. John	Taylor

2.6.1 Method of Transportation to be Used in Determining Point of Appraisal

The estimate of transportation costs for a cutting authority area must be determined by using the criteria for determining the transportation cost estimate as set out in this manual for the method of transportation referred in this manual to the point of appraisal that will produce the least total harvesting and transportation cost estimate unless:

a. that particular method of transportation is not permitted by the cutting authority, or

b. as provided in section 4.5.1(1).

In considering whether or not a particular method of transportation is not permitted by the cutting authority, the timber pricing co-ordinator must not consider, nor take into account, nor have regard for:

1. Any destination referred to in the cutting authority.

2. Any enactment.

3. Any document other than the cutting authority.

4. Any other fact.

2.7 Calculation Conventions

1. All operating cost calculations will be performed to the full capacity of the calculating machine with the results truncated at four places of decimals and rounded to two places.

2. Results from 5 to 9 will be rounded upward and from 1 to 4 will be rounded downward.

3. Each phase cost estimate ($\$/m^3$) (see chapter 4) will be rounded to the nearest cent and will be added to the other phase cost estimates to obtain the total cost estimate.

4. Where values are specified as limits (constraints or requirements for equations), they will be treated as absolute values and actual measurements or records will not be rounded before use unless otherwise specified in this manual.

5. CVP stumpage rate calculations will be performed according to the methods outlined in the document, entitled *Specifications: Calculating Stumpage Rates for Interior Appraisals*.

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Interior Selling Prices 3

Selling price estimates are based on schedules of lumber and chip values collected and published by Revenue Branch. When the values are compiled and distributed, they become an integral part of this manual.

3.1 Lumber Average Market Values

Monthly market value information for the interior is obtained by Revenue Branch from lumber producers located in each of the recognized average market value zones. Average market values (AMV) for each species are compiled by dividing total sales value by total sales volume for each zone. When there is inadequate data to provide a reasonable average for a species in one zone, the data is adjusted and combined with other species in other zones. Separate AMVs are derived for small log cutting authorities, small log licences, stud lumber, random lumber and Grade 4 hemlock.

The volume that is manufactured to Canadian Lumber Standard/American Lumber Standard (CLS/ALS) sizes is reported in footboard measure (fbm). Lumber manufactured in non-CLS/ALS sizes is adjusted to equivalent CLS/ALS sizes. The total volume for each species includes all sizes and grades of rough and dressed lumber in the green and dried state. Also included are railroad ties, trim blocks, finger jointed CLS/ALS lumber and machine stress rated (MSR) lumber.

The total net sales value for each species is reported in Canadian dollars, after freight, actual sales expenses incurred to a maximum of 5%, cash discounts, duty and entry charges and leased rail car costs have been deducted from the selling price.

1. AMVs for Small Log Cutting Authorities

   Small log AMVs are based on dimension lumber products capable of being produced from small trees.

   Small log AMVs are used for cutting authorities with an average net volume per tree (conifers only) of less than 0.20 m^3 where the governing licence document does not restrict harvesting to stands of timber having a net average cruise volume per tree of less than 0.20 m^3/tree. Cutting authorities meeting this criteria will use lumber AMVs listed under “AMVs for Small Logs” which is included in the quarterly stumpage parameters published by Revenue Branch.

   The selection of a small log AMV zone (Zones 15, 16, 17, 18 and 19) will only affect AMVs and will be made at the time of appraisal or reappraisal. Lumber recovery factors (LRF) and manufacturing costs will continue to be determined by zonation based on point of appraisal.

2. AMVs for Small Log Licences

   AMVs for licences which restrict harvesting to stands of timber having a net average cruise volume per tree of less than 0.20 m^3/tree, are based on dimension lumber products capable of being produced from trees smaller than standard timber merchantability specifications. Removing the effect of the LRF add-on (section 3.1 (1)) from "AMVs for Small Log Cutting Authorities" creates these AMVs.

These AMVs are used for all cutting authorities where the governing licence document restricts harvesting to stands of timber having a net average cruise volume per tree of less than 0.20 m^3/tree. Other similarly restricted licences may also use these AMVs at the regional manager's discretion. Cutting authorities meeting this criteria and having a net average cruise volume/tree of less than 0.20 m^3/tree will use lumber AMVs listed under "AMVs for Small Log Licences" (Zone 25) which is included in the quarterly stumpage parameters published by Revenue Branch.

The selection of AMV Zone 25 will only affect AMVs and will be made at the time of appraisal or reappraisal. Lumber recovery factors and manufacturing costs will continue to be determined by zonation based on point of appraisal.

3. Stud Lumber AMVs

   Stud AMVs are compiled for two species groups; Lodgepole Pine/Douglas-fir/Larch and Spruce/Balsam. No other species are recognized as "stud species".

4. Random Lumber AMVs

   Random AMVs are compiled for all species.

5. Grade 4 Hemlock AMVs

   Grade 4 hemlock AMVs will be used by all cutting authorities, where the district manager required or where the licensee elected utilization of Grade 4 hemlock prior to November 4, 2003, unless otherwise specified by the Director of Revenue Branch under section 4.2 of this manual. Cutting authorities meeting this criteria will use lumber AMVs listed under "AMVs for Grade 4 Hemlock Logs" which are included in the quarterly stumpage parameters published by Revenue Branch.

   The selection of a Grade 4 hemlock AMV zone (Zones 35, 36, 37 or 38) will only affect AMVs and will be made at the time of appraisal or reappraisal. Lumber recovery factors and manufacturing costs will continue to be determined by zonation based on the point of appraisal.

3.1.1 Application of Lumber Average Market Values

Application of the small log cutting authorities, small log licences, stud lumber, random lumber and grade 4 hemlock AMVs in appraisals for all cutting authorities are made according to the formulae in section 3.3.

3.1.2 Lumber Average Market Value Zones

Refer to section 2.6 for a list of points of appraisal by lumber AMV zones.

3.2 Chip Average Market Values

Monthly market value information is obtained and compiled by Revenue Branch.

3.3 Calculation of Species End Product Selling Price

The total end product selling price in $/m^3$ is determined for each species using lumber recovery factors from the cruise compilation summary, LRF update add-ons, current applicable average market values for the species and zone and species chip yield factors. Lumber and chip prices are each calculated to the nearest cent before being totalled.

Burned Timber

In the case of burned timber, the burn percent is used to reduce the selling price of the stand by assigning a zero value to the estimated chip recovery of the burned wood. This is to compensate for an increased manufacturing cost, lower lumber and chip recovery and lower lumber and chip average market values associated with processing burned timber.

$$\text{Burn Percent} = \frac{\text{BT } m^3}{\text{Total } m^3} * 100$$

where

BT m^3 = volume of light, moderate and heavily fire-damaged timber
Total m^3 = total volume *inclusive* of burned wood

The only other adjustment to the appraisal is for heavily fire-damaged timber and is covered under section 4.4.4 (Tree to Truck Additive for Damaged Timber).

The LRFs are determined from the following formulas and tables:

1. Zonal LRF Update Add-ons and Combined Product Recovery Factors

Table 3-1 LRF Update Add-ons and Combined Product Recovery Factors

Zone	Species	LRF Update Add-ons	Combined Product Recovery Factors
Northern Interior (Zone 5)	Lodgepole Pine	87	438
	Spruce	108	438
	Balsam	100	438
	Douglas Fir	77	438
	Larch	73	438
	Cedar	52	438
	Hemlock	54	438
	White Pine	71	438
Skeena (Zone 6)	Lodgepole Pine	50	419
	Spruce	76	419
	Balsam	70	419
	Cedar	21	419
	Hemlock	24	419
Southern Interior (Zone 7)	Lodgepole Pine	78	428
	Spruce	102	428
	Balsam	91	428
	Douglas Fir	65	428
	Larch	65	428
	Cedar	47	428
	Hemlock	50	428
	White Pine	63	428
	Yellow Pine	66	428

Zone	Species	LRF Update Add-ons	Combined Product Recovery Factors
Southern Cariboo (Zone 8)	Lodgepole Pine	76	440
	Spruce	97	440
	Balsam	90	440
	Douglas Fir	66	440
	Larch	66	440
	Cedar	42	440
	Hemlock	47	440
	White Pine	62	440
	Yellow Pine	70	440
Fort Nelson-Peace (Zone 9)	Lodgepole Pine	66	432
	Spruce	84	432
	Balsam	75	432

Example: (Zone 5) Lodgepole Pine	Cruise LRF		LRF Update Add-on		Appraisal LRF
All Logs	180	+	87	=	267

2. Chip Yield Derivation

Chip Yield (BDU/m^3) = (Combined Product Recovery Factor - Appraisal LRF) ∗ Species Chip Yield Factor

3. Chip Yield Factors

Table 3-2 Chip Yield Factors

Species	Factor (BDU/fbm)
Balsam	.00072
Cedar	.00067
Fir	.00098
Hemlock	.00089
Larch	.00119
Lodgepole Pine	.00087
Spruce	.00076
White Pine	.00078
Yellow Pine	.00095

4. Determination of Stud Log Percent

   The stud log percent is determined as follows:

   The stud log percent for each stud species (spruce, balsam, lodgepole pine, Douglas fir and larch) is determined from the cruise compilation summary. The stud log percent is defined as the net volume of 5 m logs with top diameters under 20 cm expressed as a percentage of the total net cruise volume. The stud log percent is calculated and rounded to the nearest whole percentage point.

   The percent stud AMV is determined as follows:

   - If the stud log percent is 45 or greater and less than or equal to 65:

     the percent stud AMV = (5 * stud log %) - 225,

   - If the stud log percent is less than 45, the percent stud AMV = 0, and
   - If the stud log percent is more than 65, the percent stud AMV = 100.

5. Shipping Differential

   The Shipping Differential for the following points of appraisal are:

Table 3-3 Shipping Differentials

$0.58/m^3	$1.01/m^3	$5.80/m^3
Bear Lake	Adams Lake	Fort Nelson
Fort St. James	Clear Lake	
Mackenzie	Louis Creek	
Quesnel	Merritt	
Strathnaver	Midway	
	Okanagan Falls	
	Princeton	
	Slocan	
	Thrums	
	Westbank	
	Ymir	

6. Manufacturing Cost Differential

Table 3-4 Manufacturing Cost Differential

$5.95/m^3
Fort Nelson

7. Calculation of Total Species End Product Selling Price

   a. Lumber AMV = (% Stud AMV/100) ∗ (Stud AMV/1000)
   + (1.0 - (% Stud AMV/100)) ∗ (Random AMV/1000),

   b. Lumber SP = Lumber AMV ∗ Appraisal LRF,

   c. Chip SP = Chip Value ∗ Chip Yield, and

   d. Total Species SP = Lumber SP + Chip SP - D.

Where:	SP	=	Selling Price in $/m^3
	AMV	=	The Lumber Average Market Value (of the appropriate species in the appropriate zone).
	Appraisal LRF	=	The LRF for all logs from Section 3.3 (1).
	Chip Value	=	The Chip Average Market Value (of the appropriate species for the appropriate point of appraisal)
	Chip Yield	=	The Chip Yield for all logs from section 3.3 (2).
	D	=	The Differentials for the appropriate points of appraisal from section 3.3 (5) and 3.3 (6).

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Operating Cost Estimation 4

The operating cost is the sum of the trended total logging cost estimate, the trended basic silviculture cost estimate and the manufacturing cost estimate as detailed in this chapter. The cost estimates in this chapter are applicable to all cutting authorities unless superseded by the procedures outlined in section 2.1.

4.1 Cost Estimates

The timber pricing co-ordinator must estimate development, harvesting and transportation costs for a cutting authority area using the information that the timber pricing co-ordinator has at the time the estimate is made in a manner that will produce the least total development, harvesting and transportation cost estimate.

The estimate of harvesting costs must be determined by using the criteria for determining the harvesting cost estimates as set out in this manual for the method of harvesting referred to in this manual which will produce the least total harvesting and transportation cost estimate unless that particular method of harvesting is not permitted by the cutting authority.

The estimate of transportation costs must be determined by using the criteria for determining the transportation cost estimates as set out in this manual for the method of transportation referred to in this manual to the point of appraisal which will produce the least total harvesting and transportation cost estimate unless:

a. that particular method of transportation is not permitted by the cutting authority, or

b. as provided in section 4.5.1(1).

In considering whether or not a particular method of harvesting or transportation is not permitted by the cutting authority, the timber pricing co-ordinator must not consider, nor take into account, nor have regard for:

1. Any destination referred to in the cutting authority.
2. Any enactment.
3. Any document other than the cutting authority.
4. Any other fact.

Once the least cost point of appraisal has been established, the cost estimate of manufacturing for that point, as specified in section 4.10, is applied.

The phase cost estimating equations and tables in this manual were derived from a survey of logging and lumber manufacturing operations in the interior. The survey includes both employee and contractor operations. The survey collects actual costs to the licensee (including wages, benefits, overtime, depreciation, fuel, supplies, repair and maintenance, moving assistance, applicable licences, insurance, etc.) from a representative sample of interior operations. Contract costs (including contractor profit and risk margins, overhead, crew transportation, etc.) are included.

The phase cost estimates are complete and reflect average conditions, operating practices, and phase accounting allocations experienced in the survey data. Additions and subtractions to phase cost estimating equations and tables to reflect specific operating conditions are not permitted. The cost estimates have an effective cost base date of July 1, 2001.

4.1.1 Specified Operations

In addition to the logging methods and phase costs that are covered by this manual, there are specified operations which require special cost estimating. Table 4-1 contains a complete list of specified operations for which certain phase cost estimates are based on the information on hand rather than on the tables and formulas in this manual. Other phase cost estimates in this manual are combined with the specified operation cost estimate to determine the total operating cost. Where appropriate, specified operations are weighted according to the applicable net cruise volume.

Specified operations shall be recognised only when the treatment is required within the Silviculture Prescription, Site Plan, Cutting Authority Document or the Forest Development Plan as dictated by site conditions. Where a specific treatment is not required based on these conditions, the conventional cost estimate shall apply.

Further information on specified operations may be obtained from the regional timber pricing co-ordinators.

Table 4-1 Specified Operations

Specified Operations	Affected Phase
Root Disease Control	Silviculture (section 4.9).
Skidder Swinging (includes all ground skidding methods)[1]	Tree-to Truck (section 4.4).

1. Skidder swing will only be considered between harvest methods listed in section 4.4.1 (four methods), in order to deliver logs to an existing road/landing.

4.2 Appraisal Data Requirements

The cruise and all other pertinent information required for the appraisal must be submitted by the licensee or BC Timber Sales with the appropriate interior appraisal data submission and map to the district manager.

Unless otherwise specified by the director, Revenue Branch, cruise data must be gathered and compiled according to the approved interior standard timber merchantability specifications in Table 4-2 below and in accordance with the following Ministry of Forests publications:

- *Cruising Manual* (*Cruising Manual* web site: http://www.for.gov.bc.ca/revenue/manuals/cruising/),
- *Cruise Compilation Manual*.

Table 4-2 Interior Standard Timber Merchantability Specifications

Description	
The following standard timber merchantability specifications must be used for all appraisals.	
Stumps (Measured on the side of the stump adjacent to the highest ground.)	
• no higher than	30.0 cm
Diameter (outside bark) at stump height	
• lodgepole pine: all timber that meets or exceeds	15.0 cm
• all other species: all timber that meets or exceeds	20.0 cm
Top diameter (inside bark or slab thickness)	
• for all species and ages, except cedar older than 141 years, all timber that meets or exceeds	10.0 cm
Top diameter (inside bark or slab thickness)	
• for cedar older than 141 years, all timber that meets or exceeds	15.0 cm
Minimum length	
• log or slab	3.0 m

In order to verify the accuracy of the cruise compilation program, the licensee must provide, on request, photocopies of the tally sheets and a magnetic copy of the data list in a format prescribed by the regional manager.

The net cruise volume (m^3) is the gross volume (m^3) less decay, waste and breakage by species. The cutting authority total net cruise volume is calculated by multiplying the net cruise volume per hectare (m^3/ha) by the total merchantable timbered area (ha) to be harvested, net cruise volume is rounded to the nearest cubic metre as required in the *Cruise Compilation Manual*.

Each reappraisal uses a cruise volume by species which is the original net cruise volume adjusted for amendments to the cutting authority since the last appraisal.

4.2.1 Comparative Cruising

Comparative cruising is defined as the borrowing of cruise data from an existing, appropriately comparable, cutting authority in place of site specific data for an appraisal of a new cutting authority. If there is time to perform a full cruise, then the timber will be cruised. However, comparative cruise data may be utilized for cutting authorities with volumes greater than 5 000 m^3 if:

- the area is in an approved Emergency Bark Beetle Management Area (EBBMA) as designated by the Minister of Forests and within an approved Emergency Management Unit (EMU) as designated by the beetle management coordinator,
- the licensee has previously harvested comparative cutting authority's in a timely manner, and
- the regional manager has determined that the requirement to perform a full operational cruise will delay expeditious harvesting and result in further damage.

Comparative cruise data will be chosen following procedures set out in section 2.1.2.3 of the *Cruising Manual*.

For cutting authorities with volumes of 5 000 m^3 or less refer to section 6.2.

4.2.2 Appraisal Data Submission

The form of appraisal Data Submission (ADS) that is required by the director of Revenue Branch may be found at:

http://www.for.gov.bc.ca/hva/ECAS/index.htm

4.2.3 Appraisal Map

The appraisal map must be completed in accordance with the requirements of Appendix IV.

4.3 Development

Development costs are estimated for each of two categories:

1. New construction.

2. Reconstruction and replacement.

Throughout this section the term "roads" includes roads, drainage and other pertinent structures.

a. A total cost ($) is calculated for each category of section 4.3.1, and 4.3.1.1. These category costs are summed to provide a total development cost estimate.

b. In order to calculate a unit ($/$m^3$) cost by category, the applicable volume will be the total net cruise volume (as defined in section 4.2) or the remaining volume (section 4.3.1(2)). The applicable volume includes the deciduous volume where the licence requires harvesting in deciduous stands.

Tributary Volume

The costs for development works may only be allocated to the first tributary cutting authority, subject to section 4.3.1.1.5. A cutting authority is considered to be tributary:

1. If timber from the cutting authority is appraised over the development works in question, or

2. If the development works occur on a main service road. A main service road is defined as a main access road to the operation, necessary to maintain and supply the day-to-day harvesting activities of the cutting authority being appraised. To qualify, a main service road must be used on a regular basis for transportation of bulk fuels, supplies, equipment and the harvesting crew.

Development Cost Estimating

1. Tabular cost estimates are made for construction of roads and drainage structures using the applicable equations in section 4.3.2 of this manual. Tabular estimates must be used for an appraisal when physical dimensions and conditions fall within the tabular limitations.

2. Detailed engineering cost estimates are made when the physical dimensions and conditions of a road section or a drainage structure exceed the tabular limitations of the manual. A detailed engineering estimate is made according to section 4.3.3. Projects eligible for this costing method are listed in section 4.3.3.

4.3.1 Development Cost Categories

Development cost allocation (section 4.3.1.1) applies to all cost estimates made under this section.

New Construction

1. New construction is defined as the following construction phases: subgrade construction, placement of additional stabilizing material and the construction and installation of drainage and other pertinent structures.

   New construction costs are allocated to the first tributary cutting authority (subject to section 4.3.1.1.5).

   a. Road Cost Estimates

      i. Tabular cost estimates

         Each road section cost estimate is determined from the appropriate tables (section 4.3.2). These section costs are totalled to give a road cost estimate for each road. The road costs for all roads are then totalled to give a total cost for tabular roads.

      ii. Detailed engineering cost estimates

         Each project cost is estimated according to section 4.3.3. These projects may include: (see section 4.3.3 for a complete listing).

   The total of the estimated costs for each project is summed to give a total cost ($) for engineered roads.

   b. Drainage Structure Cost Estimates

      Each drainage structure cost estimate is determined either from the appropriate table (section 4.3.2.4) or as a detailed engineering cost estimate (section 4.3.3).

      Where materials are reused by the original purchaser at a second or subsequent location, the cost estimate will include dismantling, transportion and installation at the new site. The initial materials cost and delivery costs are excluded.

      Where used bridge materials are purchased from a legally non-associated party, the cost of purchase and shipping those materials will be included in the cost estimate. The requirements of section 4.1 still apply.

      The total of the estimated costs for all bridges are summed to give a total cost for bridges.

The total costs for tabular roads, engineered roads, and bridges are totalled and then divided by the total net cruise volume to give a unit cost ($/m^3) for new construction.

Reconstruction and Replacement

2. Reconstruction and Replacement are defined as:

   a. replacement or structural repair of a major drainage structure (e.g., replacing stringers, cross ties, or cribbing), or

   b. major resurfacing, which means resurfacing sections of more than 0.3 km in length that were initially surfaced but have deteriorated due to long term wear and tear, or

   c. major reconstruction, which means restoring at least 0.1 km of road (per occurrence) that requires complete rebuilding of the subgrade.

   The costs approved under this section must not qualify under routine maintenance as described in section 4.6.

   Bridges replaced on forest service roads that are included in the Forest Renewal B.C. five year "Bridge Replacement Program on Forest Service Roads", or are otherwise funded by the Crown will not be included in any appraisal. Other major forest service road reconstruction or upgrades that are funded by the Crown will not be included in appraisals.

   Where a Ministry of Transportation (public) road requires reconstruction or upgrade to forest service standards for hauling Crown timber, the project must be approved in advance by the director of Revenue Branch before it can be included in an appraisal of tributary timber. The detailed engineering cost estimate for each project must be based on arms length competitive bids. The approved project costs may be apportioned to multiple users as per section 4.3.1.1.5.

   Reconstruction and replacement cost estimates are determined as detailed engineering cost estimates (section 4.3.3) for works that are approved in advance by the district manager. The cost estimates may be applied to remaining tributary timber (i.e., applicable volume) provided the project was not known of or planned for at the time of appraisal. If the cost estimate is not applied to the remaining tributary volume, it must be applied to the first tributary cutting authority appraised over the reconstruction or replacement. Section 4.3.1.1.5 may be applicable for main roads. Cost estimates for reconstruction and replacement are not to exceed the tabular costs for new construction under similar conditions.

> Costs will not be recognized if the licensee has been negligent or has not followed approved plans or standards as defined under the *Forest Practices Code* and Regulations.

4.3.1.1 Development Cost Allocation

Where proration is required for section 4.3.1.1.1, 4.3.1.1.2 and 4.3.1.1.3:

$$\text{Crown Share} = \text{Total Estimated Cost} * \frac{\text{Appraised Timber Volume}}{\text{Total Timber Volume}}$$

Where:

Crown Share ($)	=	Dollar amount to be allocated to stumpage-bearing timber in the cutting authority being appraised.
Total Estimated Cost ($)	=	Dollar amount of the total development cost estimate.
Appraised Timber Volume (m^3)	=	Volume of Crown timber that is tributary to the project and under the control of the licensee or a company legally associated with the licensee, including volume in all areas contributing to the allowable annual cut determination.
Total Timber Volume (m^3)	=	Total volume of Crown and private timber that is tributary to the project and under the control of the licensee or a company legally associated with the licensee.

In all cases volumes are estimated from the latest approved operational or inventory cruise data and maps of the area within the drainage to the height of land.

The Crown share is a dollar amount which is included in the appraisal of a tributary cutting authority, subject to section 4.3.1.1.5.

Development cost estimate is allocated according to the outline below (see also Appendix III).

4.3.1.1.1 Development Cost Estimates on Crown Lands

1. Development providing access to appraised timber only:

   Total estimated costs are included in the appraisal.

2. Development providing access to non-appraised timber only:

   Cost estimates are not included in the appraisal.

3. Development in appraised timber areas providing access to both appraised and non-appraised timber held by the licensee or a company legally associated with the licensee:

All costs are prorated between appraised and non-appraised timber. The appraised timber portion is then included in the appraisal.

4.3.1.1.2 Development Cost Estimates for Full Appraisal on Timber Licence (TL) Cutting Authorities

New development will be allocated as in section 4.3.1.1.1.

4.3.1.1.3 Development Cost Estimates on Private Land

When a new or reconstructed road or structure on private land is required for Crown timber extraction, the estimated cost of the road or structure will be included in the appraisal of a tributary cutting authority according to the procedures of section 4.3.1.1 and the following guidelines:

1. Development provides access to appraised timber only:

   The total estimated costs are included in the appraisal.

2. Development provides access to non-appraised timber only:

   Cost estimates are not included in any appraisal.

3. Development provides access to both non-appraised and appraised timber.

   All cost estimates are prorated between non-appraised and appraised timber (section 4.3.1.1) and then the Crown portion is included in the appraisal.

4.3.1.1.4 Existing Roads and Structures

The following are defined as existing roads for the cutting authority being appraised and are not eligible for inclusion in development cost estimates:

1. Costs of constructed roads that have been previously considered in appraisals of Crown timber within another cutting authority.

2. Roads previously constructed and used to haul non-appraised timber (excluding right-of-way).

3. Roads previously constructed all or in part for purposes unrelated to logging the cutting authority area being appraised.

4. Roads previously constructed, repaired or reconstructed on private land before August 1,1996.

Winter roads over muskeg or organic soils that use snow and ice for a driving surface are not considered as existing roads.

5. If the existing road requires reconstruction or replacement after August 1, 1996, the cost estimate is made as described in section 4.3.1. If the existing road is on private land, road and land use charges may be recognized as described in section 4.7.

   A road on private land that has previously been included in an appraisal because it was required for only short term timber extraction (as per previous policy) shall continue to be included upon reappraisal.

4.3.1.1.5 Extended Road Amortization

For new appraisals, where the development cost estimate for roads accessing more than one tributary cutting authority exceeds $\$4.00/m^3$, a written agreement may be made which distributes a portion of the development cost estimate to two or more tributary cutting authorities..

The agreement is subject to the following conditions:

1. Each cutting authority area must be in the licensee's approved forest development plan, site plan or woodlot licence area.

2. The road portion that may be included in the agreement ends at the far boundary of the first cutting authority being appraised

3. The agreement must be signed by the licensee and the regional manager or the regional manager's designate.

4. The total lump sum costs may be adjusted once at reappraisal provided no harvest has ocurred on any cutting authority included in the agreement

5. The costs apportioned to each cutting authority under the agreement may be adjusted once, in conjunction with section 4.3.1.1.5,(4), at reappraisal using the same ratio for distributing the costs as in the original agreement. The adjustment can only be made where no harvest has ocurred on any cutting authority included in the agreement.

6. The agreement confers no obligation on the Crown to compensate licensees for any unamortized costs.

4.3.2 Tabular Cost Estimates

These roads are generally a single lane width with turnouts. These roads may or may not be stabilized (ballasted or surfaced) with additional materials.

4.3.2.1 Subgrade Construction

The subgrade construction cost estimate includes:

- clearing,
- grubbing,
- stripping,
- debris disposal,
- stump removal,
- ditch construction,
- turnout construction (not landings),
- material costs, and
- installation of culverts with diameters up to 950 mm or the equivalent cross-section area or single log abutment culverts up to 3.4 m span.

Right-of-way felling and logging is excluded.

4.3.2.2 Subgrade Construction Variables

For appraisal purposes the following subgrade construction variables are recognized:

1. Section length: (L)

   Road sections are recorded in multiples of 0.1 km. Each section should be representative of a single moisture class. Each section should be 1 km or longer, although some individual section lengths less than 1 km but greater than 0.1 km are acceptable for extreme variations of slope or percent rock. The section length includes that portion traversing through landings. For ground skidding, short roads (up to and including 100 m long) that access single landings are included in the tree-to-truck cost estimates (section 4.4) and are not eligible for development cost estimates.

2. Road Type:

   - Snow/Ice Road (WINTER): - A single lane seasonal road including turnouts, with a flat road profile that is built with a combination of snow, ice and dirt, on a surface that may or may not have been stumped. The driving surface is built up using multiple layers of snow and ice such that extra stabilizing material costs are not applicable. A flat road profile means the side slope is less than or equal to 15% and there is minimal side cut. Minimal means, cuts into mineral or organic soil must not exceed 0.5 m in depth for distances up to 0.1 km. Seismic lines being used for roads, that have not previously been used as roads, will be considered as new construction and qualify as snow/ice roads provided they fall within the above criteria.

   - Operational Road (OP): - A single lane road with turnouts, which does not meet the definition of a snow/ice road or a block road. Is generally built under the authority of a road permit but portions may be constructed under the cutting authority. An operational road exists within a cutblock when the road accesses

timber beyond the cutblock or is intended to access timber beyond the block as shown on an approved forest development plan, or forest stewardship plan. There must be a physical separation of the blocks or cutting authorities. Blocks or cutting authorities that share a common boundary are not considered separate for the purposes of defining the road type.

- Block Roads (BLOCK): - A single lane road with turnouts, which does not meet the definition of a snow/ice road or an operational road. Is generally built under the cutting authority and includes roads which are located completely within the cutblock, continuous to the edge of a cutblock, accesses separate portions of a disconnected cutblock, or accesses a series of cutblocks that share a common boundary. Those cutblocks that share boundaries may be included in the cutting authority being appraised or a different cutting authority.

3. Uphill Side Slope: (SLOPE %)

   Uphill side slope percent may show a variation (+/- 15% about the average) within any section length and represents the average of all slopes in the section to a maximum of 50%. To derive an average for uphill side slope percent, several representative cross-section measurements are taken along the section length and the sum of one-half of the distance on each side of the measurement is applied as a weight against the measurement at that cross-section. The uphill side slope percent is measured at right angles to the road centreline and is recorded to the nearest integer. Where the road is located on a bench, the uphill side slope of the bench is used.

4. Percent Rock: (ROCK %)

   Rock includes bedrock and large boulders (each greater than 1.5m in diameter) . It may be rippable or may require drilling and blasting. Rock percent may show a variation (+/- 15% about the average) within any section length and represents the average of all rock percents in the section to a maximum of 50%. To derive an average percent rock, several representative cross-section measurements are taken along the section length and the percent rock calculated. The sum of one-half of the distance on each side of where the measurements were taken is applied as a weight against the percent rock calculated at that cross-section. The percent rock is determined as follows:

$$\text{ROCK \%} = \frac{h^2}{H^2} * 100$$

   Where:

   h = the vertical cut height of all rock measured from the bottom of the ditch

   H = the total vertical cut height of all materials above the bottom of the ditch

   To determine the percent rock for roads not yet constructed, constructed roads on similar land/rock forms are used as a guide. Alternately, where estimates of rock

volume from commercial road design programs are available for tabular sections, that information may be used to estimate the rock percent.

5. Soil Moisture Regime (SMR):

   Those biogeoclimatic zones/subzones with site series identified as "M", "VM" or "W" in the shaded area of the table in Appendix III are considered "Wet" for appraisal purposes.

6. Biogeoclimatic Zones

CWH/MH	-	Coastal Western Hemlock/Mountain Hemlock
BWBS	-	Boreal White and Black Spruce
ICH	-	Interior Cedar Hemlock
SBS	-	Sub Boreal Spruce
SBPS	-	Sub Boreal Pine/Spruce
ESSF	-	Engelmann Spruce - Subalpine Fir
IDF	-	Interior Douglas Fir

4.3.2.3 Subgrade Cost Estimate

For each operational and block road the subgrade cost estimate in $/km is determined from the equation for the appropriate road group.

Road Group	Equation
1	Refer to subsection 4.3.3(14)
2	14708 + (130 * SLOPE%)
3	2764 + (239 * SLOPE%) + (307 * ROCK%) + (10002 * OP)
4	3568 + (479 * SLOPE%) + (5123 * OP)
5	5270 + (94 * SLOPE%) + (311 * ROCK%) + (1982 * SMR) + (5334 * OP)
6	4509 + (258 * SLOPE%) + (6547 * OP)
7	4600 + (192 * SLOPE%) + (4725 * ESSF) + (24998 * ESSF * OP) + (5904 * BWBS * OP) + (7129 * SBS * OP)
8	1767 + (141 * SLOPE%) + (4831 * OP) – (4756 * IDF * OP)
9	7450 + (89 * SLOPE%) + (99 * ROCK%) + (3128 * OP) – (4490 * IDF)
10	637 + (319 * SLOPE%) + (310 * ROCK%) + (7049 * ESSF) + (8201 * MS) ($6,195/km set as minimum. If equation yields less than $6,195 then use $6,195)
11	12213 + (487 *SLOPE%) + (304 * ROCK%)
12	3882 + (510 * SLOPE%) + (5122 * OP) ($4,503/km set as minimum. If equation yields less than $4,503 then use $4,503)

Where:

Road groups are defined in Table 4-3.

OP	=	1 if an Operational Road, otherwise = 0
SMR	=	1 if Soil Moisture Regime is "wet". Otherwise SMR = 0.
ESSF	=	1 if road construction is within this biogeoclimatic zone. Otherwise ESSF = 0
MS	=	1 if road construction is within this biogeoclimatic zone. Otherwise MS = 0
BWBS	=	1 if road construction is within this biogeoclimatic zone. Otherwise BWBS = 0
SBS	=	1 if road construction is within this biogeoclimatic zone. Otherwise SBS = 0
IDF	=	1 if road construction is within this biogeoclimatic zone. Otherwise IDG = 0
	=	

Snow and Ice Roads (winter)

The subgrade cost estimate for all new snow and ice roads (winter) is $6107/km.

Table 4-3 Road Groups

Road Group #	Districts Included	Within the Geographic Boundary of a TSA, SB and TFL
1	Kalum	
2	Skeena Stikine (Bulkley/Cassiar Kispiox)	Lillooet TSA
3	Nadina (Lakes, Morice)	
4		Williams Lake TSA, SBs J, K & L Prince George TSA, SBs G & H, TFLs 30, 53 Quesnel TSA, SBs E, F, G, H & I, TFL52 100 Mile House TSA, SBs, G & H
5	Vanderhoof	Prince George TSA, SBs C, E, F & I, TFL5, TFL 42
6		Mackenzie TSA, SBs G through P, Prince George TSA SB's A & B
7	Peace (Dawson Creek Fort St. John) Fort Nelson	Mackenzie TSA, SBs A through F
8	Chilcotin	Williams Lake TSA, SBs E, F, G, H, and I Quesnel TSA, SBs A, B, C & D 100 Mile House TSA, SBs A, B, C, D, E, F
9	Kamloops	Merritt TSA, TFL 15, 49 Okanagan TSA, SBs 1, 2, 3, 4, 5
10	Rocky Mountain (Cranbrook Invermere)	Boundary TSA, TFL 8
11	Columbia (Golden, Revelstoke) Kootenay Lake	Arrow TSA, TFL 23, 3
12	Headwaters (Clearwater Robson Valley)	Williams Lake TSA, SBs M & N Okanagan TSA, SBs, 6,7,8,9, TFL 33

Woodlot and Timber Licence cutting authorities are assigned to the road group for the area in which they are geographically located.

4.3.2.4 Drainage Structures

An appraisal may include a cost estimate for large drainage structures only where their requirement is substantiated by field data. Such structures shall be placed so as to maintain the natural drainage pattern of the area crossed by the proposed road. All pipe culverts under 950 mm in diameter and all single log abutment culverts under 3.5 m span length are included in the subgrade cost estimates (see section 4.3.2.1).

See page 37 of the *Forest Road Engineering Guidebook* (June 2002) for a detailed description.

See pages 104 (Pipe Culverts) and 106 (Log Culverts) of the *Forest Road Engineering Guidebook* (June 2002) for detailed description.

An electronic version of the above guidebook can be accessed at:

www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/Guidetoc.htm

1. Culverts

   The cost estimates for the supply and installation of culverts from 0.3 m to 1.8 m in diameter are determined from Table 4-4 that follows. Culverts smaller than 0.95 m are included in the subgrade cost estimates in section 4.3.2.3.

   Costs for culverts smaller than 0.95 m are included in Table 4-4 for use where a detailed engineering cost estimate in section 4.3.3 requires the use of culverts smaller than 0.95m. Detailed engineering cost estimates are required for culverts larger than 1.8m No interpolation of values is permitted. Total installation cost for culverts includes all costs of transporting the culvert to the jobsite and all costs of installation of the culvert to the final subgrade stage.

Table 4-4 Culvert Appraisal Cost Estimates

INSTALLED CULVERT COST ESTIMATE ($)												
Culvert Length (m)	Equivalent Round Diameter (m)											
	0.3 m	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8 m
	X-Section Area (m^2)											
	0.07 m^2 †	0.13 †	0.20 †	0.28 †	0.38 †	0.50 †	0.64 †	0.79	1.13	1.54	2.01	2.54 m^2
9	544	630	739	873	1032	1214	1421	1652	2188	2821	3552	4380
10	557	651	773	922	1098	1301	1531	1788	2383	3086	3898	4818
11	569	673	807	971	1164	1387	1640	1923	2578	3352	4244	5256
12	581	695	841	1019	1230	1474	1750	2058	2773	3617	4591	5695
13	593	716	875	1068	1297	1561	1859	2194	2967	3882	4937	6133
14	605	738	908	1117	1363	1647	1969	2329	3162	4147	5283	6571
15	617	760	942	1165	1429	1734	2079	2464	3357	4412	5630	7010
16	630	781	976	1214	1496	1820	2188	2599	3552	4677	5976	7448
17	642	803	1010	1263	1562	1907	2298	2735	3747	4942	6322	7886
18	654	824	1044	1311	1628	1993	2407	2870	3941	5208	6669	8324
19	666	846	1078	1360	1694	2080	2517	3005	4136	5473	7015	8763
20	678	868	1111	1409	1761	2166	2626	3141	4331	5738	7361	9201
21	690	889	1145	1458	1827	2253	2736	3276	4526	6003	7708	9639
22	703	911	1179	1506	1893	2340	2846	3411	4721	6268	8054	10078
23	715	933	1213	1555	1959	2426	2955	3546	4915	6533	8400	10516
24	727	954	1246	1604	2026	2513	3065	3682	5110	6799	8747	10955
25	739	976	1280	1652	2092	2599	3174	3817	5305	7064	9093	11393
26	751	998	1314	1701	2158	2686	3284	3952	5500	7329	9439	11831
27	764	1019	1348	1750	2225	2773	3394	4088	5695	7594	9786	12269
28	776	1041	1382	1799	2291	2859	3503	4223	5889	7859	10132	12708
29	788	1063	1416	1847	2357	2946	3613	4358	6084	8124	10478	13146
30	800	1084	1449	1896	2423	3032	3722	4493	6279	8389	10825	13584

† Cost estimates for 0.3 through 0.9 m diameters are extrapolations using the cost estimating equation.

2. Log Bridges

   Cost estimates for both log bridges and non-log bridges, where required and not included in subgrade cost estimates, are made as detailed engineering cost estimates (section 4.3.3).

   Bridge costs include:

   - crib back-fills to a maximum distance of 15 m on either end,
   - site preparation,
   - protection features such as rip rap,
   - material and equipment supply and delivery,
   - installation.

4.3.2.5 Additional Stabilizing Material

Road stabilization is the placement of gravel or broken rock on the road subgrade to provide stable support and a running surface for logging equipment using the road during the harvesting of tributary timber (see section 4.3.3 (12) for cost estimates pertaining to the use of special materials). Where stabilizing material developed during the subgrade or ditch construction is insufficient, a cost estimate for additional stabilizing material to be trucked in from selected borrow pits may be included in the appraisal.

Unit Cost Estimate

The unit cost estimate ($/km) for the additional stabilizing material includes:

- borrow pit preparation,
- rock drilling, explosives, loading of explosives and blasting,
- loosening and/or pushing materials in borrow pits when required (e.g., compacted or cemented gravel, oversize material, etc.),
- loading gravel trucks,
- truck hauling, and
- spreading and compacting the material.

The cost estimates assume borrow pits are located adjacent to the road side and are not part of the subgrade excavation. If a new road needs to be constructed to access the borrow pit, then an access road cost estimate is required in addition to the in-place unit cost estimates.

For each road, the additional stabilizing material cost estimate ($/km) is determined from the equation for the appropriate road group.

Road Groups	Equation
1	Refer to section 4.3.3(14)
2	13826 + (9294 * QROCK)
3	13826 + (9294 * QROCK)
4	19044
5	9751
6	9939 – (2128 * SBS)
7	7213 + (896 * D)
8	11722
9	8417
10	8417
11	15633
12	12310

Where:

Road groups are defined in Table 4-3.

D = Distance in kilometres from source of ballast to the centre of the section that requires ballast (rounded to the nearest 0.1 km)

QROCK = 1 if road is stabilized with quarry rock that requires drilling and blasting, or rippable rock. Otherwise QROCK = 0

SBS = 1 if road construction is within this biogeoclimatic zone. Otherwise SBS = 0

No cost estimate for additional stabilizing material is allowed for any snow and ice roads.

4.3.2.6 Cattle Guards, Remedial Fences and Pipeline Crossings

Where the cutting authority specifies the installation of cattle guards, wing fences or pipeline cossings, the installed cost using new or recycled material is estimated as follows:

1.	Cattle Guards	$3177 each
2.	Remedial Fences and Wing Fences[1]	$685 per 100 m
3.	Pipeline Crossings	$3400 each

All costs include materials, transportation and installation.

4.3.3 Detailed Engineering Cost Estimates

Where the tabular cost estimating procedures of this manual cannot be used due to their physical limitations, the cost of a project shall be estimated by preparing a detailed engineering cost estimate. The regional manager may approve standardized procedures to generate cost estimates for use in projects as listed below.

Where specific development projects involve detailed engineering cost estimates, the district manager shall be advised of project details no later than 60 days before the start of work on the project.

For appraisal purposes, the estimated development project costs are made on the basis of the site-specific data including the definitions found in section 4.3.2.2 for common subgrade construction variables, the culvert costs included in Table 4-4, and the equipment and labour rates specified in Appendix I. Due consideration is given to arm's length competitive bids for any specific project. The appraisal estimate is not constrained in any way by a licensee's actual costs.

If the ECE is re-estimated once after construction as provided in section 2.3 (using more accurate on site information) the new detailed engineering cost estimate replaces the original (used in the initial appraisal). Apportionment agreement or bid tender cost estimates are not re-estimated only trended. ECE's are not re-estimated due to labour and/or equipment rates being updated periodically in Appendix I.

Where road sections estimated as a detailed engineered cost estimate are contiguous with tabular cost estimates, costs for mobilization and demobilization will only be allowed for

[1] Fencing that is required to remedy, reduce, or manage the impact of timber harvesting activities on range management.

special equipment not required for the construction of the tabular roads. The following specific situations are considered for detailed engineering cost estimates:

1. New construction of long term, primary access road sections, that will have 300,000 cubic metres of harvested crown timber hauled over them annually for at least ten years.

2. Road construction on uphill side slopes greater than 50 percent.

3. When rock percent as calculated in section 4.3.2.2(4) exceeds 50 percent, or terrain class 4 and 5.

4. End haul construction (of roads and landings) requiring removal by truck of excavated material to a separate area to avoid side casting on steep and/or sensitive sites.

5. Overland construction to provide a roadbed by trucking in material for extensive filling; see page 81 of Forest Road Engineering Guidebook for a more detailed description.

6. For log bridges and non-log bridges that are not included in the subgrade cost estimates, eligible costs include site planning and the same phases as listed in section 4.3.2.4(2). All ice bridge construction including construction for additional logging seasons.

7. Structural maintenance of bridges, substructure and cribwork.

8. Reconstruction of roads and pertinent structures. Cost estimates for reconstruction are not to exceed the tabular cost for new construction under similar conditions.

9. Upgrade of roads and pertinent structures. Road upgrade resulting in a change in the standard of the road and structure or where the licensee was not obligated to carry out road maintenance prior to the appraisal. Where road maintenance obligations exist, road upgrade is limited to widening the running surface, vertical and horizontal realignment, and additional culverts.

10. Replacement or addition of road running surfaces for uninterrupted lengths over 0.3 km. Lengths less than 0.3 km are included in road maintenance (section 4.6).

11. Culverts greater than 1.8 m in diameter when specified in the cutting authority, or road permit. Culverts greater than 30 m in length regardless of diameter also qualify. The cost estimate includes all costs of transporting the culvert to the jobsite and all costs of installation of the culvert to the final subgrade stage.

12. Placement of additional stabilizing material where geo-tech fabric, corduroy, crushed and/or screened rock/gravel are used.

13. Retaining walls, railway crossings and other special structures (may include multiple culverts, baffled culverts, arched culverts and other structures determined by the timber pricing co-ordinator).

14. Subgrade and ballast cost estimate in road group 1, Kalum District. The subgrade and ballast cost estimate will be determined using the detailed engineering cost methodolgy specified by the Northern Interior Forest Region.

The data which may be required for excavation and fill estimates are:

1. Plans, profiles, cross-sections showing the ground and design grade lines.

2. Volume summary sheets showing excavation quantities by various soil types, for subgrade and stabilization.

3. Type of construction equipment and quantity of material to be used, or ministry approved competitive bid costing.

4. Location of borrow and waste areas to calculate material haul distances.

The data required for bridges, culverts and for other unusual structures are:

1. Where the bridge span is 15.4 m or less and the crib height is 5.4 m or less and a permanent structure is proposed, an economic life cycle comparison between a log structure and the permanent proposal is required.

2. Where the bridge span is greater than 15.4 m, and/or the crib height is 5.4 m or more and for pipe culverts greater than 1.8 m in diameter or 30 m in length: plans, specifications and design for the proposed structure; detailed estimate of costs of materials; equipment and labour or ministry approved competitive bid pricing; amount of timber accessed by the structure and the number of years of use for harvesting all timber are required.

3. Where bridge materials are reused the cost estimate will include dismantling, transportation and reinstallation at the new site, but will exclude initial materials purchased and initial delivery costs.

Costs that may be included in the detailed engineered cost estimate are:

1. Freight (for materials).

2. Provincial sales tax (for materials).

3. Supervision of construction of complex structures by a professional engineer.

4. Bridge certification by a professional engineer (maximum of three field trips) unless otherwise approved by the regional timber pricing co-ordinator (the costs for professional engineers are permitted whether they are on the licensees staff or hired under contract).

5. Site plans, designs and layouts.

6. Where equipment is not, or will not be already on site for adjoining tabular road, bridge or culvert construction, then the costs of mob and demob may be included in the engineered cost estimate.

GST and supervision costs other than as stated above, are not to be included in the engineered estimate.

Where different timber volumes are used for separate cost estimates, the unit costs are rounded to the nearest cent before totalling.

In some cases, the detailed engineering cost estimates may be apportioned to two or more licensees' tributary cutting authorities, as described under section 4.3.1.1.5.

4.3.3.1 Trending of Detailed Engineering Costs

All detailed engineering costs must be adjusted to match the cost base of the manual in effect at the time of the appraisal or reappraisal (refer to Table 4-5). This includes development costs in apportionment agreements, ministry approved competitive bid tenders, and ECE's prepared using Appendix I.

Table 4-5 Trend Factors for ECE Costs

ECE Cost Year	Multiply by this Trend Factor to Match the 2001 Cost Base
1995	1.045
1996	0.986
1997	0.917
1998	0.968
1999	1.017
2000	1.000
2001	1.000
2002	1.000
2003	1.000

4.4 Tree-to-Truck

Cost estimates included in the tree-to-truck phase of the logging operation include, but are not limited to, expenses incurred for:

- felling
- skidding
- yarding
- bucking
- sorting (bush, dryland, and water)
- loading
- landing construction, rehabilitation and reconstruction (excluding end haul)
- fuel and equipment moves
- pest control
- grass seeding
- all post logging treatments
- crew accommodation for accessible operations
- contractor overhead and profit, fringe benefits
- three metre knockdown
- lop and scatter
- landing burning (includes fireguards)
- roadside debris piling and disposal
- skid and back spar trail construction and rehabilitation/slashing
- slashing
- crew transport
- spur roads for ground skidding of less than or equal to 100 m length (see section 4.3.2.2(1))

4.4.1 Harvesting Methods

Each of the following harvesting methods is recognized only when it is identified on the cutting permit map which is submitted by the licensee with the application for a cutting authority, or with an application for an amendment to a cutting authority. If no harvesting method is identified on the map the method appraised will be the ground skidding clear cut method.

- Helicopter,
- Horse,
- Ground Skidding, and
- Overhead Cable Logging.

4.4.2 Tree-to-Truck Variables

For appraisal purposes the following variables are recognized, based on all compiled cruise plots segregated by logging method where applicable (see section 4.4.5). Where the licence requires harvesting in deciduous stands, applicable variables are to include the deciduous component.

1. Biogeoclimatic Zone

   A separate biogeoclimatic zone may be recognized for each harvest method (section 4.4.1) as part of the regional constant.

2. Slope (SLOPE%)

   The average side slope percent is derived from an area weighted average of the maximum side slope percentage on all cruise plots, rounded to the nearest whole percentage point.

   > If helicopter yarding is uphill the slope is set at 0.

3. Volume per Hectare (VOLHA)

   The average net cruise volume per hectare (m^3/ha), rounded to the nearest cubic metre. For partial cutting, it is based on the actual volume per hectare being harvested.

4. Percent Blowdown (BD%)

   The percentage of the net cruise volume classified as blowdown.

5. Partial Cut Variables (PCUT, DPCUT)

   The term partial cutting includes all forms of harvesting, other than clear cutting.

   Clear cutting is defined as those areas with block opening sizes equal to or greater than 1 hectare and where the volume removal is equal to or greater than 90 percent based on the net volume measured to the Standard Timber Merchantability Specifications (section 4.2).

   Partial cut areas that have less than 90 percent volume removal are not to be averaged with those areas that are equal to or greater than 90 percent. Clear cut areas are to be stratified out before calculating an overall weighted partial cut percent for the cutting authority.

a. PCUT

Where a partial cut is comprised of openings of less than 1 hectare in size, the PCUT percent is based on the cumulative volume of these openings divided by the volume of the block area surrounding them.

The percent partial cut is determined as:

$$PCUT = \frac{\text{Net cruise volume required to be removed using a partial cut system}}{\text{Total net cruise volume on the area where Partial Cutting is required}} * 100\%$$

(except if partial cut percent > = 90% then PCUT = 0).

b. Partial cut dummy variable (DPCUT)

DPCUT = 1 if partial cut percent is greater than 0 and less than 90, otherwise DPCUT = 0.

6. Distance to Support Centre (DS)

Accessible cutting authorities: (see section 4.8.2), the one-way distance to support centre is the distance over continuous road access from the geographic centre of the cutting authority to the main post office (or other location designated by the regional timber pricing co-ordinator) in a community from the following list. The distance to support centre includes the distance covered by a daily barge or ferry service. Where there is more than one block in the cutting authority, the weighted average distance to support centre must be calculated using the individual distances and the individual block volumes. Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre. The following is a list of communities by forest region.

Northern Interior Forest Region

Burns Lake	Kitwanga	Smithers	Terrace
Houston	New Hazelton	Stewart	Prince George
Kitimat	Fort St. James	Fraser Lake	Fort St. John
Chetwynd	Fort Nelson	Mackenzie	Dawson Creek
			Vanderhoof

Southern Interior Forest Region

Boston Bar	Kamloops	Merritt	Salmon Arm
Clearwater	Kelowna	Pemberton	Vernon
Hope	Lillooet	Penticton	Nakusp
Canal Flats	Creston	Grand Forks	Nelson
Castlegar	Fernie	Greenwood	Revelstoke
Cranbrook	Golden	Invermere	100 Mile House
McBride	Valemount	Princeton	Quesnel
Williams Lake			

For isolated cutting authorities (see section 4.8.2), the distance to support centre is the one-way road distance from the geographic centre of the cutting authority to the isolated camp or where there is no isolated camp, to a community from the list above. Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre.

The following distance variables are included:

- NEWDIST200 = 0 IF DS<= 100 km
  = (DS-100) if DS>100 km and <= 200 km
  = 100 if DS>200 km
- DIST200S175 = 0 if DS<=175 km
  = (DS-175) if DS>175 km and <=200 km
  = 25 if DS>200 km

7. Volume per Tree (VOLTREE)

   The average net cruise volume per tree (m^3), rounded to two decimals. For partial cutting, it is based on the trees to be harvested.

8. Gross Volume per Tree (GVOL)

   Gross volume per tree (m^3) is computed as: VOLTREE/(1 - defect %/100).

   Where:

   Defect is the estimate of decay, waste and breakage (DWB) percent of the coniferous gross volume from the cruise summary for the trees to be harvested. Where utilization of deciduous volume is mandatory under the licence, defect percent is taken from the stand volume of the cruise summary. Defect percent is recorded to the nearest whole percentage point for appraisal calculation purposes.

9. Small Tree Volume (SMALL TREEVOL)

   SMALLTREEVOL = Average net merchantable volume (m^3) per tree if <0.34 m^3/tree. If >= 0.34 m^3/tree SMALLTREEVOL = 0.

10. Small Tree Dummy Variable (SMALLTREED)

    SMALLTREED = 1 if average net merchantable volume per tree <0.34 m^3/tree, otherwise = 0.

11. Heli Yarding Distance (HELIYARD)

    The average loaded horizontal yarding distance (in kilometres) flown by helicopter measured to the nearest 0.1 km.

12. Skyline Yarding Distance (SKYYARD)

    Average skyline slope distance (m).

13. Species Percent

    Coniferous species volumes indicated in the harvest method summary of the cruise compilation are entered in species information section of the appraisal data submission. Where a licence requires harvesting in deciduous stands the deciduous volume (all deciduous species) indicated in the harvest method summary of the cruise compilation is entered as a lump sum (all deciduous species) in the cruise information section of the appraisal data submission.

    The species percent data (coniferous and deciduous) used in the tree-to-truck and hauling equations is automatically calculated as:

    Species volume (m^3) / (Total Net Cruise Volume (m^3) + Deciduous Volume (m^3))

HE	- Hemlock	SP	- Spruce
FI	- Fir	LO	- Lodgepole Pine
LA	- Larch	BA	- Balsam
CE	- Cedar		

14. Region Constants

FNP	=	Fort Nelson & Peace Forest Districts
Prince George	=	Fort St. James, Mackenzie, Prince George, and Vanderhoof Forest Districts
Prince Rupert	=	Kalum, Nadina, and Skeena Stikine Forest Districts
Kamloops	=	Cascades, Kamloops, Headwaters and Okanagan Shushwap Forest Districts
Cariboo	=	Chilcotin, 100 Mile House, Central Cariboo and Quesnel Forest Districts
Nelson	=	Arrow Boundary, Columbia, Kootenay Lake and Rocky Mountain Forest Districts

15. Biogeoclimatic Zones:

CWH/MH	-	Coastal Western Hemlock/Mountain Hemlock
ICH	-	Interior Cedar Hemlock
SBS	-	Sub Boreal Spruce
SBPS	-	Sub Boreal Pine/Spruce
ESSF	-	Engelmann Spruce – Subalpine Fir
MS	-	Montane Spruce
IDF	-	Interior Douglas Fir

> Where a harvest method area occupies more than one biogeoclimatic zone, the constant for the zone that occupies the greatest area in the harvest method area shall be used in the calculation of the cost determination algorithm.

4.4.3 Tree-to-truck Cost Estimate

Tree-to-truck costs estimates are determined for each harvesting method as follows:

1. Helicopter Logging

$$\$/m^3 = \text{CONSTANT} - (5.28*\text{SLOPE\%}/100) + (4.18*\text{HELIYARD}) - (5.94*\text{SP\%}/100)$$

> If yarding uphill, slope percent is set to 0.

Where CONSTANT =

	BIOGEOCLIMATIC ZONE		
REGION	**ICH**	**ESSF**	**Other**
Kamloops	66.02	69.32	63.34
Nelson	64.65	67.95	61.97
Other	69.92	73.22	67.24

2. Horse Logging

   No variables are recognized for this method. The cost estimates are applied to the volume of timber to be clear cut or partial cut.

$$\$/m^3 = 27.95$$

3. Ground Skidding

   The ground skidding equipment options include, but are not limited to, rubber tired skidder, crawler tractor, soft track skidder, small cat skidding, hoe chucking, long line skidding, clambunk forwarders, low ground pressure skidders, harvester forwarders and cut-to-length processors. A system does not have to skid wood all the way from the stump to the landing to be included. Some wood may be moved part way by longlining or hoe chucking before being skidded by some other system to the landing. Two variations are recognized:

   a. Clear Cut,

   b. Partial Cut

The tree-to-truck cost estimate for both variations is determined from the equation as follows:

$$\$/m^3 = \text{CONSTANT} + (6.58*SLOPE\%/100) - (5.21*VOLHA/1000) + (3.81*BD\%/100) + (7.67*DEFECT\%/100) + (1.07*DPCUT) + (6.03*SMALLTREED) - (17.58*SMALLTREEVOL) + (1.53*NEWDIST200/100)$$

Where CONSTANT =

	BIOGEOCLIMATIC ZONE					
REGION	**CWH/MH**	**SBS**	**ICH**	**MS**	**SBPS**	**Other**
Cariboo	22.53	15.80	19.77	17.39	14.93	18.64
FNP	20.49	13.76	17.73	15.35	12.89	16.60
Kamloops	21.11	14.38	18.35	15.97	13.51	17.22
Prince George*	21.48	14.75	18.72	16.34	13.88	17.59
Prince Rupert	21.13	14.40	18.37	15.99	13.53	17.24
Other	24.80	18.07	22.04	19.66	17.20	20.91

* Excluding FNP.

4. Overhead Cable Logging

Overhead cable logging cost estimates will be recognized when required. The method includes both highlead (spar) mobile (grapple) yarders and skyline yarders, but variations in machine size, spar/boom height, winch line capacity and yarding technique are not recognized.

Variations recognized within the method are:

a. Highlead and Grapple

The tree-to-truck cost estimate for clear cut and partial cut is determined from the equation as follows:

$\$/m^3 =$ CONSTANT + (10.97*SLOPE%/100) – (11.38*VOLHA/1000) – (3.08*GVOL) + (0.33*GVOLSQR) + (3.13*DPCUT) + (19.42*DIST200S175/100) + (2.01*LO%/100)

Where CONSTANT =

	Biogeoclimatic Zone			
REGION	**CWH/MH**	**IDF**	**ESSF**	**Other**
Kamloops	46.82	28.47	36.30	33.71
Nelson	48.20	29.85	37.68	35.09
Prince George*	43.32	24.97	32.80	30.21
Other	41.31	22.96	30.79	28.20

* Excluding FNP.

b. Skyline and Intermediate Support Skyline

Skyline yarding estimates will be recognized where the average yarding distance is greater than 300 m, or intermediate supports are required.

The average yarding distance is determined by:

1. Drawing a series of transects (minimum four) with their origin at the landing, being equi-angle apart and measured to the back-line. This is done for each block; blocks will not be amalgamated for the purpose of average yarding distance calculation. The volume for the system is the sum of the volumes of qualifying blocks.

2. Yarding distance will be measured as slope distance from the centre of the landing to the falling boundary.

3. The sum of transect lengths divided by the number of transects equals the average yarding distance.

4. The exception to the above; where the ministry and the licensee agree that Forest and Land Management is better served by the use of a skyline system in a particular logging chance, then the average yarding distance greater than 300 meters requirement is waived.

The tree-to-truck cost estimate is determined from the equation as follows:

$$\$/m^3 = \text{CONSTANT} + (24.79*\text{SLOPE\%}/100) - (12.91*\text{GVOL}) + (3.32*\text{GVOLSQR}) + 1.12*\text{SKYYARD}/100)$$

Where CONSTANT =

	Biogeoclimatic Zone
Region	**All**
Nelson	31.79
Other	28.77

4.4.4 Tree-to-Truck Additive for Damaged Timber

The following cost estimate additives are recognized for heavy fire damage (HFD), and dead/live useless snags (DUS). The data is collected as specified by the *Cruising Manual*. The additional costs incurred to harvest blowdown timber are recognized in the tree-to-truck ground skidding and overhead cable logging equations (sections 4.4 (3), 4.4 (4)).

The following additive is determined for all cable and ground skidding harvesting methods and is added to the tree-to-truck cost estimate.

$$\$/m^3 = 0.04 * (DT - 15)$$

Where: DT is the Damaged Timber percent

$$DT = HFD + DUS$$

If: DT is less than 15 percent, DT = 15

If: DT is more than 100 percent, DT = 100

$$\text{Heavy Fire Damage \%} = \frac{\text{Conifer HFD Volume}(m^3) * 100}{\text{Total Net Conifer Volume}(m^3)}$$

$$\text{Dead / Live Useless Snags \%} = \frac{\text{Conifer DUS Snags / ha} * 100}{\text{Net Merchantable Conifer Stems / ha} + \text{Conifer DUS Snags / ha}}$$

4.4.5 Prorating Tree-to-Truck Cost Estimates

Where more than one harvesting method is required, a proration of costs is necessary.

The variables for each required harvesting method must be based on a cruise compilation of only those plots located within the area to be harvested by the method and include the deciduous volume if the licence requires harvesting in deciduous stands.

The additive for damaged timber is also determined for each applicable method.

The final prorated tree-to-truck cost estimate is determined according to the following equation where each component is rounded to the nearest cent before totalling:

$$\$/m^3 = \frac{(\text{Cost Heli(C)})(\text{V Heli(C)})}{(\text{TNCV})} + \frac{(\text{Cost Heli(P)})(\text{V Heli(P)})}{(\text{TNCV})} + \frac{(\text{Cost Horse})(\text{V Horse})}{(\text{TNCV})} + \frac{(\text{Cost OC(C)})(\text{V OC(C)})}{(\text{TNCV})} +$$

$$\frac{(\text{Cost OC(P)})(\text{V OC(P)})}{(\text{TNCV})} + \frac{(\text{Cost GS(C)})(\text{V GS(C)})}{(\text{TNCV})} + \frac{(\text{Cost GS(P)})(\text{V GS(P)})}{(\text{TNCV})} + \frac{(\text{Cost SK})(\text{V SK})}{(\text{TNCV})}$$

Where:

Cost	=	cost estimate ($/m3) including any damaged timber additive
V	=	volume (m3) required to be logged by each system
Heli (C)	=	helicopter logging (clear cut)
Heli (P)	=	helicopter logging (partial cut)
Horse	=	horse logging
GS (C)	=	ground skidding (clear cut)
GS (P)	=	ground skidding (partial cut)
OC(C)	=	overhead cable logging (clear cut)
OC(P)	=	overhead cable logging (partial cut)
SK	=	skyline logging
TNCV	=	total net cruise volume (m^3)

4.5 Log Transportation

The log transportation phase covers all aspects of log movement from the place of initial loading to the point of appraisal, including truck haul, rail, water and other specialized transportation. The use of section 4.5.1, 1., c. does not affect any other provision that requires the use of the least cost point of appraisal.

4.5.1 Truck Haul Variables

1. Cycle Time:

   For appraisal purposes, weighted average Cycle Time (CT) is the estimated time in hours (rounded to the nearest 0.1 hour) for transporting logs from the centre of a cutting authority area to:

   a. the least cost point of appraisal,

   b. the appraisal place of unloading in the case of water or rail transport, or

   c. where the regional manager is satisfied that a transfer of current cutting rights to address a bark beetle infestation will result in:

      i. equal or higher sawlog stumpage rates for the timber to which the current cutting rights are transferred to, when compared to the sawlog stumpage rates for the timber where the current cutting rights are transferred from and,

      ii. an increase in milling consumption of beetle infested timber by the licensee whose current cutting rights are transferred, then

   the place that would have been the point of appraisal if the timber had been harvested in the area from which the current cutting rights are transferred from.

2. To determine weighted average cycle time:

   a. establish the geographical centre point of each cutblock and project this point to the nearest road for measurement purposes,

   b. from this centre point, determine the cycle time to the nearest junction serving all cutblocks,

   c. weight the cycle time for each cutblock by the volume on the cutblock and determine the average weighted cycle time to the junction. If the cutblock volume is not available, the cutblock area is used, and

   d. determine the cycle time from the junction to:

      i. the least cost point of appraisal,

      ii. the appraisal place of unloading,

      iii. if the conditions under 4.5.1 (1)(c) are met, then

the place that would have been the point of appraisal if the timber had been harvested in the area from which the current cutting rights are transferred from.

and add this to the average weighted cycle time from 'c.' above.

The cycle consists of loading, hauling, weighing, unloading, return time, and unavoidable delays. The cycle time will normally be determined by taking into consideration all the factors that may affect it: distance, expected rate of speed, necessary delays, expected standard of roads and their maintenance, traffic density, and seasonal weather conditions.

> In many cases standard cycle time schedules from specific road junctions to the point of appraisal have been developed and should be used (Sector times).

Unavoidable delays are periods when the truck is on the job but not operating due to unpredictable delays such as; tightening binder chains, minor repairs made by driver, checking and adjusting brakes, minor delays prior to loading and unloading, refuelling, etc. Unavoidable delay time does not include any breakdown which requires shop repair, the services of a skilled mechanic, or a spilled load of logs. The time for load, unload and unavoidable delay is set at 75 minutes for cable yarding systems (see section 4.4.3 (4)) and 60 minutes for all other systems (see section 4.4.3 (1), (2), & (3)).

3. Haul Method

Cost estimates do not recognize different types of logging trucks. The estimate is based upon the possible haul method, either highway or off-highway and not specifically on the licensee's particular method.

Highway hauling is assumed when loaded logging trucks must travel in part over roads administered under the *Highway Act*, without truck-to-truck transfer, to the point of appraisal, or on roads administered under the *Highway (Industrial) Act* where prolonged known road restrictions prevent the use of oversize loads, or in all instances where the volume per tree is less than 0.20 m^3.

Off-highway hauling is assumed when loaded logging trucks can travel over roads administered under the *Highway (Industrial) Act* to the point of appraisal, or to a recognized reload. Where prolonged known restrictions (e.g., bridge load limit, narrow road, through rock cut, WCB Regulations, etc.) prevent the use of oversize loads, highway haul is assumed.

4.5.2 Truck Haul Cost Estimates

4.5.2.1 Primary Haul

The primary truck haul cost estimate is determined from the following equation.

1. Highway Haul

   For all highway haul equations if the CT is greater than 0 then the minimum is $0.05/m^3. If CT = 0 then $/m^3 = 0.

   $/m^3 = CONSTANT + (2.05 * CT) - (0.44 * BA%/100) - (1.70 * CE%/100) + (0.89 * DE%/100) + (1.73 * HE%/100) – (1.65 * WH%/100) – (1.03 * SP%/100)

   Where:

REGION	:	Cariboo	FNP	Nelson	Prince George *	Other
CONSTANT	=	0.30	0.38	0.51	-0.27	-0.01

   * Excluding FNP

2. Off-Highway Haul

   For all off-highway haul equations if CT is greater than 0 then the minimum is $0.19/m^3. If CT = 0 then $/m^3 = 0.

   $/m^3 = CONSTANT + (1.41* CT) – (2.88 * CE%/100) – (0.59 * SP%/100)

   Where:

REGION	:	Cariboo	FNP	Kamloops	Nelson	Other
CONSTANT	=	1.67	1.82	1.34	1.66	0.55

For both highway and off-highway:

CT =	Cycle time to the nearest 0.1 hours		
CE =	Cedar	LA =	Larch
HE =	Hemlock	SP =	Spruce
DE =	Deciduous species (all)	WH =	White Pine

A description of how species are automatically calculated is provided in section 4.4.2(13).

FNP	=	Fort Nelson & Peace Forest Districts
Prince George	=	Fort St. James, Mackenzie, Prince George, and Vanderhoof Forest Districts
Prince Rupert	=	Kalum, Nadina and Skeena Stikine Forest Districts
Kamloops	=	Cascades, Kamloops, Headwaters and Okanagan Shushwap Forest Districts
Cariboo	=	Chilcotin, 100 Mile House, Central Cariboo and Quesnel Forest Districts
Nelson	=	Arrow Boundary, Columbia, Kootenay Lake and Rocky Mountain Forest Districts

4.5.2.2 Secondary Haul

The secondary haul cost estimate is made when logs must be truck hauled between the dewater and reload site to the appraisal point.

$$\$/m^3 = 1.761 * CT$$

CT for the secondary haul is determined using the method described in section 4.5.1(2).

4.5.3 Water Transportation Cost Estimate

A water transportation cost estimate is made when logs must be transported by water between the cutting authority and the point of appraisal or reload. The estimate includes the costs of strapping logs on the truck, dumping, booming, developing and operating dumping and booming grounds, and towing. The cost estimate for reservoir lakes applies to all marine appraisals and to Arrow, Kinbasket, Ootsa, Revelstoke and Williston Lakes. All other lakes receive the natural lake cost estimate.

1. Dump and Boom:

   Reservoir Lakes and Marine: $/m^3 = $3.21

   Natural Lakes: $/m^3 = $1.86

2. Tow:

   All $/m^3 = 1.0138 + 0.004419 * d

   Where; d = one-way tow distance in kilometres

3. Dewater and Reload:

   All $/m^3 = $2.38

   Only considered if the mill infeed is not located on the same lake, or a dam transfer is required. Otherwise dewatering is part of the manufacturing cost estimate.

4.5.4 Special Transportation Systems

A special transportation system is recognized in the appraisal where geographic conditions dictate its use.

The cost estimates include all costs associated with servicing the appropriate cutting authorities, excluding all on-site costs of owning and operating a camp facility.

The recognized special transportation systems are as follows:

1. Railway

   a. Truck-to-Rail Transfer

      When logs are appraised by railway for part of the way between the cutting authority and the point of appraisal, the cost estimate for the truck-to-rail transfer part of the phase is:

      Rail - Dease Lake Extension: $/m^3 = $4.11

      All Other Railways: $/m^3 = $3.80

   b. Railway Transportation

      The railway transportation cost estimate is based on the following table for the points of origin shown. Otherwise, the best information on hand is used.

Table 4-6 Rail Log Transportation

Origin	Cost Estimate ($/m^3)	Point of Appraisal
Leo Creek	8.44	Fort St. James
Lovell	11.31	Fort St. James
Bear Lake	16.26	Fort St. James
Minaret Creek	17.78	Fort St. James
Niteal	15.42	Fort St. John

2. Barge/Ferry Used for Truck Haul (Private)

   When a truck haul road is interrupted by a body of water and the operation of a barge system is feasible to provide the road link for logging trucks, the cost estimate for this phase, regardless of ownership is:

   Reservoir Lakes $/m^3 = $3.79

   Natural Lakes $/m^3 = $1.90

3. Barge/Ferry Not Used for Truck Haul (Private)

   The cost estimate includes all costs associated with the operation of the systems and includes bubble systems where applicable.

   When a cutting authority can be served only by water, and daily (operating days only) ferry/barge services are feasible for crew transportation, the cost estimate for this phase, regardless of ownership is:

   All lakes $/m^3 = $0.75

4. Francois Lake Ferry (Private/Public)

   When the least cost truck haul includes using the Francois Lake Ferry crossing, the cost estimate for the ferry phase is:

   Francois Ferry $/m^3 = $0.31

4.6 Road Management

Where the licensee is obliged to carry out road management, it includes but is not limited to, the following:

- grading
- snowplowing and refreezing
- sanding
- spot gravelling (< 0.3 km distance)
- culvert repairs and thawing
- culvert removal (< 950 mm)
- culvert replacement (< 950 mm)
- non-structural maintenance of bridges
- bridge re-decking/wearing surface replacement
- ditching
- road use charges paid to other licensees
- all access management
- seasonal erosion control
- roadside treatments
- sign maintenance
- dust control
- brushing
- minor flood and storm damage repair
- slough removal
- water bar construction (seasonal)
- road ripping
- cross ditch construction
- grass seeding
- all deactivation

The cost estimate for all routine maintenance carried out on logging operations depends on the geographic location of the cutting authority area (refer to Table 4-7).

Cutting authorities issued under forms of tenure not located administratively within a tree farm licence area or timber supply area will be assigned the routine road maintenance cost estimate for the TFL or TSA/supply block in which the cutting authority is geographically located.

The geographic location is recognized by forest region, timber supply area and supply block, and tree farm licence as follows.

Table 4-7 Road Management Cost Estimates

Region	TFL #	TSA	TSA #	Supply Block	$/m3
Northern Interior		Bulkley	3	All	1.97
		Cassiar	4	All	1.97
		Cranberry	42	All	1.97
		Dawson Creek	41	All	2.24
		Fort Nelson	8	All	3.39
		Fort St. John	40	All	2.24
		Kalum	10	All	1.97
		Kispiox	12	All	1.97
		Lakes	14	All	1.53
		Mackenzie	16	All	1.60
		Morice	20	All	1.53
		Nass	43	All	1.97
		Prince George	24	A, B, C	1.60
		Prince George	24	D	1.61
		Prince George	24	E, F, I	1.34
		Prince George	24	G, H	2.90
	1				1.97
	30				2.90
	41				1.97
	42				1.60
	48				2.24
	53				2.90
Southern Interior		100 Mile House	23	All	1.16
		Arrow	1	All	2.91
		Boundary	2	C, D, G	2.91
		Boundary	2	E, F	2.63
		Cranbrook	5	All	2.34
		Golden	7	All	4.89
		Invermere	9	All	2.34
		Kamloops	11	1	2.08
		Kamloops	11	2, 3, 4	1.39
		Kootenay Lake	13	All	2.56

Region	TFL #	TSA	TSA #	Supply Block	$/m3
Southern Interior		Lillooet	15	All	1.97
		Merritt	18	All	1.09
		Okanagan	22	1, 2, 3	2.63
		Okanagan	22	4, 5	1.66
		Okanagan	22	6, 7, 8, 9	2.41
		Quesnel	26	A, B, C, D	0.51
		Quesnel	26	E, F, G, H, I	2.90
		Revelstoke	27	All	4.89
		Robson Valley	17	All	2.08
		Williams Lake	29	A, B, C, D, E, I	1.23
		Williams Lake	29	F, G, H, J	0.99
		Williams Lake	29	K, L	1.19
		Williams Lake	29	M, N	3.50
	3				2.91
	5				1.34
	8				2.63
	14				2.34
	15				2.63
	18				2.08
	23				2.91
	33				2.41
	35				1.39
	49				1.66
	52				2.90
	55				4.89
	56				4.89

4.7 Road and Land Use Charges

Prior to a road or land use charge being included in an appraisal, the licensee must:

a. submit a "Request for Approval of a Road Use Charge" form with the appraisal data submission; and

b. receive written approval of the road or land use charge from the regional manager.

1. Charges as a Share of Road Maintenance

   a. No recognition is made of such charges. The routine road maintenance cost estimate, section 4.6, includes all relevant costs whether incurred directly by the licensee or by payment to another party for services performed.

2. Charges Other Than for Road Maintenance

   There are three main categories of road status:

   a. Forest Service Roads

      A road that is declared, determined, built, maintained or modified by the ministry, as defined in forest legislation. No road use charges will be considered in appraisals,

   b. Permitted Roads

      Roads built on Crown land, authorized by road permit or other cutting authority documents. This category also includes foreshore leases, camp areas and dryland sorts. No road use charges will be considered in appraisals,

   c. Other Roads

      Road use charges for roads on Indian Reserves or on private land owned by an arm's length third party and not subject to a lease held by the licensee, their affiliate or an agent of either, may be considered in appraisals provided there is no lower cost route capable of development through Crown land.

      The charges recognized must be reasonable, must not exceed compensation that might be determined under forest legislation and must be proven through the presentation of auditable documents.

3. Other Land Use Charges

   Only non-governmental land use charges will be considered in appraisals.

4.8 Administration and Other Costs

4.8.1 Overhead

Overhead cost estimates are for the related administration and supervisory activities attributed to development, tree-to-truck, transportation and basic silviculture that occur at the head office, branch office and camp or operation.

Overhead costs include:

- Office Operations,
- Scaling,
- Cruising,
- Environmental Protection,
- Consultants fees (section 4.3.3),
- Archaeological surveys,
- Waste and Residue surveys,
- Right-of-way easements,
- Foreshore and other land leases,
- Tree marking Beetle probing & Pheromone baiting,
- Engineering (road layout, survey including geotechnical surveys, and design, other than those applicable as engineered cost estimate).

Cost estimates by forest district are shown in the following table:

Table 4-8 Overhead Cost Estimates

District	$/m^3	District	$/m^3
100 Mile House	8.11	Kootenay Lake	11.24
Arrow Boundary (Arrow Boundary)	9.06	Mackenzie	6.25
Cascades (Merritt, Lillooet)	8.33	Nadina (Lakes, Morice)	5.59
Central Cariboo (Horsefly, Williams Lake)	7.75	Okanagan Shushwap (Penticton, Salmon Arm, Vernon)	7.06
Chilcotin	9.12	Peace (Ft. St. John, Dawson Creek)	7.72
Columbia	12.51	Prince George	6.40
Fort Nelson	8.33	Quesnel	7.12
Fort St. James	5.40	Rocky Mountain (Cranbrook, Invermere)	9.77
Headwaters (Clearwater, Robson Valley)	10.36	Skeena Stikine (Bulkley/Cassiar, Kispiox)	6.23
Kalum	10.00	Vanderhoof	6.40
Kamloops	7.10		

4.8.2 Isolated Cutting Authority Areas

An isolated cutting authority area has no continuous road access to the nearest support centre (listed in section 4.4.2(6)). The exception is where there is continuous road access, but the route is not routinely used to transport people, equipment or supplies to the cutting authority area. Continuous road access includes public ferry service, private daily ferry and daily barge service.

For isolated cutting authorities not serviced by camps the isolation cost estimate covers, the costs of moving people, equipment and supplies to and across the non-road portions of the route to the cutting authority area whether by crew boat, periodic barge service, air, or rail.

For isolated cutting authorities serviced by camps, the isolation cost estimate includes the depreciation, maintenance and operating costs of any camp facilities and the non-recoverable costs incurred for a cookhouse, family quarters, bunk houses, shop, office and other pertinent buildings. However, the costs of moving people, equipment or supplies by road from the isolated camp location to the cutting authority are covered by the distance variable in the tree-to-truck equation.

The cost estimates for isolated cutting authorities with the following access are:

Rail access:	$\$/m^3 = 6.41$
Water access:	$\$/m^3 = 5.11$

4.8.3 Low Volume Cost Estimate

All fully appraised cutting authorities are eligible for a specific low volume cost estimate in addition to all other phase cost estimates.

1. Where the licence to which the cutting authority belongs has an allowable annual cut of Crown timber greater than 0 m^3 and less than 3 000 m^3:

   $\$/m^3 = 8.35$

2. Where the licence to which cutting authority belongs has an AAC of 3 000 m^3 or greater and the net cruise volume for the cutting authority is less than 3 000 m^3;

The cost estimate is:	Ground Skidding	$\$0.64/m^3$
(prorated by volume)	Highlead & Grapple	$\$0.88/m^3$
	All Other	$\$0.00/m^3$

4.9 Basic Silviculture Cost Estimate

Basic silviculture cost estimates are made for all cutting authorities where basic silviculture is required.

Basic silviculture treatment cost estimates include all treatment costs that are required to achieve the free-growing stocking standards, as referred to in the *Forest Planning and Practices Regulation* (B.C. Reg.14/2004).

Basic silviculture treatment may not be required on some cutting authorities where:

1. this intent has been specified in the licence, cutting authority, or by applicants agreement, or,

2. basic silviculture work is funded by any Crown agency.

When any of these circumstances exist the basic silviculture cost estimate is not included in the appraisal, except as noted in section 6.7 of this manual.

The Table 4-9 lists the associated cost estimates ($/ha) for each BioGeoClimatic (BGC) zone, subzone, and variant across the interior.

Where a cutting authority area includes more than one BGC/subzone/variant, the predominant BGC/subzone/variant by area shall be used for the cost estimate in the appraisal of the cutting authority.

The area to be appraised for silviculture is the net merchantable area(NMA) from the cruise. The area must be the same as the area directly attributed to the appraised Net Merchantable Volume(NMV) of the cutting authority. Where deciduous harvest volume is included in an appraisal the area for the deciduous must also be included as part of the net merchantable area.

The cutting authority silviculture cost estimate is calculated as follows:

$\$/m^3 =$ [NMA(ha) * [BGC/subzone/variant cost($/ha) * (CAPCUT %/100)*1.25]] / NMV(m3)

Where:

If (CAPCUT %) is greater than 80%, then CAPCUT % = 80

(CAPCUT %) = (CANMV(m3) / CA Gross NMV(m3)) * 100

CA Gross NMV(m3) = ^{V}GS(C) + (^{V}GS(P) / GS(PCUT/100)) + ^{V}OC(C) + (^{V}OC(P) / OC(PCUT/100)) + ^{V}SK(C) + ^{V}Horse(C) + ^{V}Heli(C) + (^{V}Heli(P) / Heli(PCUT/100))

And variables are defined as:

PCUT	=	Logging method PCUT (%) from section 4.4.2,(5)
CAPCUT	=	Cutting Authority (CA) partial cut percent
v	=	Net merchantable volume (m3) required to be logged by each system
Heli (C)	=	helicopter logging (clear cut)
Heli (P)	=	helicopter logging (partial cut)
Horse(C)	=	horse logging (clear cut)
GS (C)	=	ground skidding (clear cut)
GS (P)	=	ground skidding (partial cut)
OC(C)	=	overhead cable logging (clear cut)
OC(P)	=	overhead cable logging (partial cut)
SK(C)	=	skyline logging (clear cut)

Table 4-9 BGC Silviculture Cost Estimates*

BGC Zone	Subzone	Variant	$/ha
BWBS	dk	1	1302
BWBS	dk	2	1302
BWBS	mw	1	1779
BWBS	mw	2	1888
BWBS	un		1655
BWBS	vk		1655
BWBS	wk	1	1320
BWBS	wk	2	1320
BWBS	wk	3	1320
CWH	un		1727
CWH	vh	1	1727
CWH	vh	2	1727
CWH	vm		1727
CWH	vm	1	1727

BGC	Subzone	Variant	$/ha
ICH	mk	2	1418
ICH	mk	3	1406
ICH	mm		1965
ICH	mw	1	2014
ICH	mw	2	1799
ICH	mw	3	2426
ICH	un		1965
ICH	vc		1965
ICH	vk	1	2854
ICH	vk	2	2415
ICH	wc		1965
ICH	wk	1	2431
ICH	wk	2	2195
ICH	wk	3	2195

BGC Zone	Subzone	Variant	$/ha
CWH	vm	2	1727
CWH	vm	3	1727
CWH	wh	1	1727
CWH	wh	2	1727
CWH	wm		1727
CWH	ws	1	1727
CWH	ws	2	1727
CWH	xm	1	1727
CWH	xm	2	1727
ESSF	dc	1	1723
ESSF	dc	2	1578
ESSF	dcp	1	1599
ESSF	dcp	2	1599
ESSF	dk		1317
ESSF	dkp		1599
ESSF	dku		1599
ESSF	dv		1709
ESSF	dvp		1599
ESSF	mc		1585
ESSF	mcp		1599
ESSF	mk		1599
ESSF	mkp		1599
ESSF	mm	1	1599
ESSF	mm	2	1599
ESSF	mmp	1	1599
ESSF	mmp	2	1599
ESSF	mv	1	1130
ESSF	mv	2	1358
ESSF	mv	3	1234
ESSF	mv	4	1505
ESSF	mvp	1	1599
ESSF	mvp	2	1599
ESSF	mvp	3	1599
ESSF	mvp	4	1599
ESSF	mw		1566
ESSF	mwp		1599
ESSF	un		1599
ESSF	vc		2855
ESSF	vcp		1599

BGC	Subzone	Variant	$/ha
ICH	wk	4	2195
ICH	xw		1965
IDF	dk	1	727
IDF	dk	2	1209
IDF	dk	3	555
IDF	dk	4	673
IDF	dm	1	922
IDF	dm	2	614
IDF	dw		851
IDF	mw	1	1925
IDF	mw	2	1892
IDF	un		851
IDF	ww		851
IDF	xh	1	1076
IDF	xh	2	1076
IDF	xm		851
IDF	xw		851
MH	un		1727
MS	dc	1	2380
MS	dc	2	2380
MS	dk		1180
MS	dm	1	1490
MS	dm	2	1285
MS	dv		1247
MS	un		1247
MS	xk		1523
MS	xv		861
PP	dh	1	25
PP	dh	2	25
PP	un		25
PP	xh	1	25
PP	xh	2	25
SBPS	dc		711
SBPS	mc		699
SBPS	mk		975
SBPS	un		699
SBPS	xc		548
SBS	dh		1234
SBS	dh	1	1234

BGC Zone	Subzone	Variant	$/ha
ESSF	vv		1696
ESSF	vvp		1599
ESSF	wc	1	2092
ESSF	wc	2	1743
ESSF	wc	3	1606
ESSF	wc	4	2290
ESSF	wcp	2	1599
ESSF	wcp	3	1599
ESSF	wcp	4	1599
ESSF	wk	1	1945
ESSF	wk	2	1526
ESSF	wm		1636
ESSF	wmp		1599
ESSF	wv		1599
ESSF	wvp		1599
ESSF	xc		1547
ESSF	xcp		1599
ESSF	xv	1	1176
ESSF	xv	2	1108
ESSF	xvp	1	1599
ESSF	xvp	2	1599
ICH	dk		1965
ICH	dw		1717
ICH	mc	1	1372
ICH	mc	2	1969
ICH	mk	1	1351

BGC	Subzone	Variant	$/ha
SBS	dh	2	1234
SBS	dk		1078
SBS	dw	1	1220
SBS	dw	2	908
SBS	dw	3	951
SBS	mc	1	1235
SBS	mc	2	1221
SBS	mc	3	1123
SBS	mh		1234
SBS	mk	1	1290
SBS	mk	2	1268
SBS	mm		1369
SBS	mw		1502
SBS	un		1234
SBS	vk		1557
SBS	wk	1	1534
SBS	wk	2	1555
SBS	wk	3	981
SWB	dk		1505
SWB	dks		1505
SWB	mk		1505
SWB	mks		1505
SWB	un		1505
SWB	vk		1505
SWB	vks		1505

* The dollar per hectare ($/ha) cost estimates are net of overhead.

4.10 Manufacturing Cost Estimates

In the interior, appraisal calculations include estimates of the cost of manufacturing lumber and chips. Manufacturing cost estimates are developed from a survey of sawmills and encompass all phases of manufacturing beginning with the unloading of logging trucks at the mill log yard, (land or water or satellite log yards) or the dewatering of logs in cases when the mill infeed is on the same lake as used for towing the logs, and ending when the lumber and chips have been loaded on rail cars or trucks for transport to market.

The survey collects actual costs to the licensee, including wages, benefits, overtime, depreciation, fuel, supplies, repair, maintenance, applicable licences, insurance, etc. from a representative sample of interior operations.

The cost estimates reflect average conditions, operating practices, and phase accounting allocations experienced in the survey data. Because of this averaging, no additions to or subtractions from these estimates are permitted to reflect operation-specific conditions.

The estimates have an effective cost base date of July 1, 2001, and will be used for all appraisals, reappraisals and adjustments of stumpage rates.

Table 4-10 Untrended Manufacturing Cost Estimates

Untrended Manufacturing Cost Estimates ($/m^3) 2001 Cost Survey Base		
	Species	**Manufacturing cost ($/m^3) 0% Decay**
Northern Interior (Zone 5)	LO	35.71
	SP	32.73
	BA	37.31
	FI, LA, WH, YE	51.50
	CE	48.42
	HE	45.31
Skeena (Zone 6)	LO	27.34
	SP	25.85
	BA	28.66
	CE	36.78
	HE	33.60
Southern Interior (Zone 7)	LO	39.75
	SP	35.57
	BA	40.96
	FI, LA, WH, YE	55.73
	CE	52.60
	HE	51.73

Untrended Manufacturing Cost Estimates ($/m^3) 2001 Cost Survey Base		
	Species	**Manufacturing cost ($/m^3) 0% Decay**
Southern Cariboo (Zone 8)	LO	36.96
	SP	33.69
	BA	38.58
	FI, LA, WH, YE	52.22
	CE	45.71
	HE	45.62
Fort Nelson/Peace (Zone 9)	LO	34.85
	SP	31.65
	BA	35.89

To derive the manufacturing cost estimate for decay % from 1 to 50, use the above table values in the following equation:

The cost estimate is calculated to four decimal places, then rounded to the nearest cent. Where decay exceeds 50 percent, the manufacturing cost estimate for 50 percent decay is used.

Manufacturing cost ($/m^3) = decay % ∗ 0.1952 + base value from table.

For a list of points of appraisal by zone, refer to section 2.6.

4.11 Cost Trend

Cost trend factors are separately applied to the total logging, silviculture and manufacturing cost estimates. The factors cover the period from the effective date of the cost base to the effective date of the rate calculation. Cost trend factors are applied at the appraisal effective date and at the date of each stumpage adjustment.

For trend factors applicable prior to November 1, 2004, refer to earlier *Interior Appraisal Manuals.*

Appraisal Effective Dates From August 1, 1996 to November 30, 1997

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.954	1.0
April 1 to June 30, 2005	0.954	1.0
July 1 to September 30, 2005	0.954	1.0
October 1 to December 31, 2005	0.954	1.0

Appraisal Effective Dates From December 1, 1997 to August 31, 1998

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.886	1.0
April 1 to June 30, 2005	0.886	1.0
July 1 to September 30, 2005	0.886	1.0
October 1 to December 31, 2005	0.886	1.0

Appraisal Effective Dates From September 1, 1998 to September 30, 1999

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.936	1.0
April 1 to June 30, 2005	0.936	1.0
July 1 to September 30, 2005	0.936	1.0
October 1 to December 31, 2005	0.936	1.0

Appraisal Effective Dates From October 1, 1999 to August 31, 2000

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.983	1.0
April 1 to June 30, 2005	0.983	1.0
July 1 to September 30, 2005	0.983	1.0
October 1 to December 31, 2005	0.983	1.0

Appraisal Effective Dates From September 1, 2000 to June 30, 2001

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.967	1.0
April 1 to June 30, 2005	0.967	1.0
July 1 to September 30, 2005	0.967	1.0
October 1 to December 31, 2005	0.967	1.0

Appraisal Effective Dates From July 1, 2001 to October 31, 2002

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	0.967	1.0
April 1 to June 30, 2005	0.967	1.0
July 1 to September 30, 2005	0.967	1.0
October 1 to December 31, 2005	0.967	1.0

Appraisal Effective Dates From November 1, 2002 to October 31, 2004

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	1.007	1.0
April 1 to June 30, 2005	1.007	1.0
July 1 to September 30, 2005	1.007	1.0
October 1 to December 31, 2005	1.007	1.0

Appraisal Effective Dates On or After November 1, 2004

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
January 1 to March 31, 2005	1.000	1.0
April 1 to June 30, 2005	1.000	1.0
July 1 to September 30, 2005	1.000	1.0
October 1 to December 31, 2005	1.000	1.0

Stumpage Rate Determination 5

5.1 Indicated Stumpage Rate (ISR)

The indicated stumpage rate is determined by comparing the value index of the stand being appraised to the value index of other stands, as explained in the following sections.

5.2 Value Index

The stumpage rate charged on each cutting authority is tied to the estimated value index of the stand to be harvested. The value index is defined as the selling price less the operating cost, both of which are estimates expected for an average operator in that stand. The formula to be used is:

$$VI = SP - OC$$

Where:

VI	=	Value index for the cutting authority.
SP	=	estimated stand selling price determined in accordance with chapter 3.
OC	=	estimated operating cost applicable to the timber being appraised, and determined in accordance with chapter 4.

5.3 Interior Mean Value Index

The interior mean value index (IMVI) is the benchmark against which individual stands of timber are compared. The interior mean value index is recalculated and published by Revenue Branch at the time of each quarterly stumpage adjustment and becomes an integral part of this manual.

5.4 Market Value Indexing

At the times specified in section 1.7, target rates are adjusted upwards or downwards to reflect changes in the value of softwood lumber and wood chips as indicated by Statistics Canada.

Statistics Canada has replaced the 1992=100 based price series with new series that have a base of 1997=100. For the January 1, 2002, and all subsequent target rates, the 1997=100 price series must be converted to a 1992=100 base before beginning calculation of the composite index described in section 5.4.2.

5.4.1 Converting Indexes From 1997=100 Base to 1992=100 Base

Interior softwood lumber is represented by Statistics Canada price index P4798 (1997=100) which replaces P2459 (1992=100). To convert P4798 to a 1992=100 base, for use in section 5.4.2, multiply by a link factor of 1.752.

Wood chips are represented by Statistics Canada price index P4856 (1997=100) which replaces P2513 (1992=100). To convert P4856 to a 1992=100 base, for use in section 5.4.2, multiply by a link factor of 1.138.

5.4.2 Calculating the Interior Composite Index (ICI)

The average lumber and chip indexes from the appropriate three-month period (shown below) are combined, with lumber receiving a weight of 88.0 percent and chips 12.0 percent. The combined index is then multiplied by a normalization factor of 1.520. This factor equates the new lumber/chip composite index (1992=100) with the Statistics Canada lumber index (1981=100) at April 1, 1998. During the calculations described above, no rounding is done. The final composite index (INDEX) is rounded to one decimal place before being entered into the appropriate formula below.

5.4.3 Calculating the Interior Target Rate

Interior Target Rate (ITR) Calculation

1. If the ICI is less than or equal to 161 then,

$$ITR = \frac{INDEX}{139.0} * 8.59$$

2. If the ICI is greater than 161, but less than or equal to 169.9 then,

$$ITR = 9.95 + \left[\frac{(INDEX - 161)}{25} * 9.35\right]$$

3. If the ICI is greater than 169.9 then,

$$ITR = 13.28 + \left[\frac{(INDEX - 169.9)}{49} * 6.74\right]$$

Where: ITR = Target Rate ($/m^3)

Quarterly Stumpage Rate Adjustment Date	ICI based on Statistics Canada price indexes for the months of:
January 1	Preceding August, September, October
April 1	Preceding November, December, January
July 1	Preceding February, March, April
October 1	Preceding May, June, July

The applicable index is published by Revenue Branch at the time of each quarterly stumpage adjustment and becomes an integral part of this manual.

5.5 Interior Base Rate (IBR)

The interior base rate is redetermined and published by Revenue Branch at the time of each quarterly stumpage rate adjustment and becomes an integral part of this manual.

5.6 Calculation of Stumpage Rate

5.6.1 Calculation of Indicated Stumpage Rate

The indicated stumpage rate for a cutting authority is defined as:

$$ISR = IBR + (VI - IMVI)$$

Where:

ISR = Indicated Stumpage Rate

IBR = Interior Base Rate as defined in Section 5.5

VI = Value Index for the cutting authority as defined in Section 5.2

IMVI = Interior Mean Value Index, as defined in Section 5.3

5.6.2 Prescribed Minimum Stumpage Rate

The minimum stumpage rate is prescribed by the *Minimum Stumpage Rate Regulation* (B.C. Reg. 354/87). The current minimum stumpage rate is $0.25 per cubic metre.

5.6.3 Reserve Stumpage Rate

For each cutting authority area, except those containing timber licence volume, the reserve stumpage rate is determined by selecting the greater of:

- the indicated stumpage rate, or
- the prescribed minimum stumpage rate.

5.6.4 Upset Stumpage Rate

The upset stumpage rate is the total of the reserve stumpage rate plus any development, silviculture and administration levies which may be charged as defined in section 6.7.

5.6.5 Total Stumpage Rate

The total stumpage rate is the upset stumpage rate plus any bonus bid.

Miscellaneous Timber Pricing Policies

6

6.1 Average Stumpage Rates by Forest Zone and Species

Each of the following forest zones used in Tables 6-1, 6-2 and 6-3 is made up of the corresponding forest district areas:

1. North Central Zone - Fort St. James, Mackenzie, Nadina, Prince George, Quesnel and Vanderhoof Forest Districts.

2. North West Zone - Kalum and Skeena Stikine Forest Districts.

3. North East Zone - Fort Nelson and Peace Forest Districts.

4. South East Zone - Arrow Boundary, Columbia, Headwaters, Kamloops, Kootenay Lake, Okanagan Shushwap and Rocky Mountain Forest Districts.

5. South West Zone - 100 Mile House, Cascades, Central Cariboo and Chilcotin Forest Districts.

Where a species of timber is not listed in Table 6-1, the rate that shall be used for that species of timber is the rate listed in the column headed as OTHER.

Table 6-1 Average Sawlog Stumpage Rates by Forest Zone and Species ($/m^3)

FOREST ZONE	BALSAM	CEDAR	FIR	HEMLOCK	LARCH	L. PINE	SPRUCE	OTHER
North Central	24.00	22.52	23.88	19.41	28.75	21.80	24.55	22.79
North West	7.82	10.89	0.25	6.81	-	15.87	12.37	10.33
South East	21.91	14.74	16.38	12.44	13.30	18.79	20.17	17.98
South West	22.35	18.95	14.04	22.28	24.71	14.67	20.52	15.78
North East	10.81	-	-	-	7.51	12.73	9.57	10.55

6.2 Cutting Authorities With 5 000 m^3 or Less Volume

1. This subsection applies to a cutting authority area that has a total coniferous volume of 2 000 m^3 or less :

   a. Sawlog Stumpage Rates by Forest Zone and Species

      Where the licence to which the cutting authority area belongs has a coniferous allowable annual cut of less than 3 000 m^3, or no coniferous allowable cut, the following method may apply:

      i. Except as provided in section 6.4, and in subsections (1)(a)(ii) and (1)(b) of this section, where a cutting authority area has 2 000 m^3 or less of coniferous timber, the stumpage rate for each species of timber must be determined using the stumpage rate prescribed in table 6-1 for the forest zone in which the cutting authority area is located.

      ii. Where the licensee is not required to establish a free growing crop of trees on the cutting authority area, the stumpage rate for a species of timber shall be the sum of the rate prescribed in table 6-1 plus the basic silviculture cost for the species in the forest region or, where the Crown has the responsibility for silviculture, the basic silviculture levy as determined under section 6.7.

      iii. The stumpage rates calculated under this section are not adjusted quarterly.

      iv. For extensions of the cutting authority, see section 2.5(3).

   b. Full Appraisal

      Alternatively, an indicated stumpage rate may be determined through a full appraisal. The stand data may be site-specific (i.e., timber cruised or scaled) or obtained from one or more comparable cutting authorities (e.g., similar stand and terrain characteristics, etc.). When choosing the comparative cruise data, the district manager may require that procedures in section 2.1.2.3 of the *Cruising Manual* be followed. The total stumpage rate is adjustable for the term of the cutting authority, except as provided in section 6.6, or 2.5(2).

      Each full appraisal is made as described in chapters 3, 4 and 5.

2. Total coniferous volume of greater than 2 000 m^3 to 5 000 m^3.

   An indicated stumpage rate is determined on the basis of full appraisal data. The data may be site-specific or the data may be obtained from comparable cutting authorities, as per section 2.1.2.3 of the *Cruising Manual*.

   Each appraisal is made as described in chapters 3, 4 and 5.

These cutting authorities are cruised if specified by the regional manager in accordance with section 4.2 of this manual.

The total stumpage rate is adjustable for the term of the cutting authority, except as provided in section 6.6.

6.3 Right-of-way Cutting Authorities

1. The stumpage rate for a road permit will be determined using Ministry of Forests stumpage billing records.

2. The stumpage rate for a road permit is the weighted average sawlog stumpage rate for:

    a. cutting authorities, other than a road permit, that are located in the same forest district as the area to which the road permit applies, and that are issued under the licence that entitles the licensee to apply for the road permit,

    b. a forestry licence to cut or a timber sale licence under which cutting permits have not or will not be issued, that entitles the licensee to apply for the road permit,

    c. if there are no records from which the stumpage rate may be determined under (a) or (b),

        i. all the cutting authorities, other than road permits, that are for areas located in the same forest district as the area to which the road permit applies, or

        ii. if the licence that the cutting authority is issued under has an annual allowable cut of Crown timber less than 3 000 m^3 per year, all the cutting authorities, other than road permits, that are for licences that have an annual allowable cut of less than 3 000 m^3 in the same forest district as the area to which the road permit applies.

3. The weighted average sawlog stumpage rate is the sum of the stumpage billed for sawlogs of grade code ( ) blank during the billing period referred in subsection 4, divided by the sum of the volume of those sawlogs.

4. The billing period referred to in subsection 3 for a road permit appraisal or reappraisal, with an effective date between June 1 of one year (the first year) and May 31 of the following year, is the twelve-month billing period ending March 31 in the first year.

The costs of roads constructed under road permits are eligible for inclusion as development cost estimates under section 4.3 in the appraisal of the first tributary cutting authority. These roads will not be considered as existing roads under section 4.3.1.1.4 (2).

All road permits will be reappraised in accordance with section 2.3.2.2.

6.4 Salvage Logging Stumpage Rates

1. Salvaged timber is either post harvest material or damaged timber:

2. Post Harvest Material is either:

    a. wooden culverts and bridges, or

    b. post logging residue.

3. Damaged Timber is timber that:

    a. Has been blown down,

    b. Has been damaged by fire, disease, snow press, or

    c. Will die within one year, as determined by the district manager, as a result of the affects of the mountain pine beetle, or other forest pests.

4. The criteria and methodology for the calculation of salvaged timber stumpage rates are:

    a. Post harvest material may not be combined in the same cutting authority area with damaged timber.

    b. Except where damage to adjacent or contiguous timber occurs after harvesting is completed on the adjacent primary logging cutting permit area and the harvesting equipment has been demobilized from the area, damaged timber salvage cutting authority areas must be scattered, and not be adjacent to or contiguous with an existing cutting authority area.

    c. Except as provided in subsection (4)(d) of this section the total area of a clearcut salvage harvesting area shall not exceed 1 hectare.

    d. Where salvage of only damaged stems through partial cutting will leave a stand that meets minimum stocking standards, the area harvested may be larger than 1 hectare.

    e. Salvage logging stumpage rates may only be determined for a cutting authority where more than one-third of the volume of coniferous timber in the cutting authority area is damaged timber.

    f. Post harvest salvage may only occur after primary logging has been satisfactorily completed and residue and waste assessments have been submitted to and accepted by the Ministry.

g. Salvage cannot occur on a road right-of-way which has an active timber mark associated with it.

h. The stumpage rate will be fixed for one year. Multiple year (blanket) salvage cutting authorities will be reappraised annually as per section 2.3.2.2.

5. Where salvaged timber is damaged timber, the stumpage rate for each species of the salvaged timber will be determined using the schedule of Sawlog Stumpage Rates for Salvage of Damaged Timber by Forest Zone and Species found in Table 6-2.

6. Where the source of the salvaged timber is post harvest material, the stumpage rate for each species of timber will be determined using the schedule of Sawlog Stumpage Rates of Post Harvest Material by Forest Zone and Species found in Table 6-3.

Where a species of timber is not listed in Table 6-2 and 6-3, the rate that shall be used for that species of timber is the rate listed in the column headed as OTHER.

Table 6-2 Average Sawlog Stumpage Rates for Salvage of Damaged Timber by Forest Zone and Species ($/m^3)

FOREST ZONE	BALSAM	CEDAR	FIR	HEMLOCK	LARCH	L. PINE	SPRUCE	OTHER
North Central	14.40	20.27	21.50	11.64	25.88	16.35	22.09	13.67
North West	4.69	9.80	0.25	4.09	-	11.90	11.13	6.20
South East	13.14	13.26	14.75	7.46	11.97	14.09	18.15	10.79
South West	13.41	17.06	12.63	13.37	22.24	11.00	18.47	9.47
North East	6.49	-	-	-	6.76	9.54	8.61	6.33

Table 6-3 Average Sawlog Stumpage Rates for Salvage of Post Harvest Material by Forest Zone and Species ($/m^3)

FOREST ZONE	BALSAM	CEDAR	FIR	HEMLOCK	LARCH	L. PINE	SPRUCE	OTHER
North Central	6.00	18.02	11.94	4.85	14.38	10.90	12.27	5.70
North West	1.96	8.71	0.25	1.70	-	7.94	6.18	2.58
South East	5.48	11.79	8.19	3.11	6.65	9.39	10.08	4.49
South West	5.59	15.16	7.02	5.57	12.35	7.34	10.26	3.95
North East	2.70	-	-	-	3.76	6.36	4.78	2.64

6.5 Partially Harvested Timber

Where decked timber, or timber which has been felled and bucked, such as on right-of-way, is sold without competition; and where the volume exceeds 300 m^3, a full cost estimate appraisal is completed upon an "as is, where is" basis.

Phase costs may be based on borrowed data from a representative cutting permit, adjusted for partial phase.

If the timber volume is being sold competitively, the timber may be priced according to the procedures in section 6.2, or 7.5.1 (4).

6.6 BC Timber Sales (BCTS)

1. For appraisal purposes, the BCTS includes:

   - All timber sale licenses issued under the *Forest Act*, sections 20, and
   - all forestry licences to cut issued under the *Forest Act*, section 47.6(3).

Adjustable Stumpage Rates

2. The adjustable stumpage rate option can only be provided to a licensee if the upset rate has been determined by means of a full appraisal and the timber sale licence was advertised before November 1, 2003. The data for the full appraisal may be site-specific or may be obtained from a comparable cutting authority. For cutting authorities with volumes greater than 5 000 m^3, refer to section 4.2.1. For cutting authorities with 5 000 m^3 or less, comparative cruise data will be chosen following procedures set out in section 2.1.2.3 of the *Cruising Manual*.

Fixed Stumpage Rates

3. All timber sale licences awarded under section 20 of the *Forest Act* that were advertised on or after November 1, 2003 will have fixed stumpage rates.

   If the zonal average sawlog stumpage rate method is used, the upset and hence the total stumpage rate is fixed for the term of the cutting authority and all extensions. The only exceptions are if a reappraisal is done under section 2.3.2.1(d) due to sudden and severe damage or section 2.3.2.3 because of a minister's direction.

   A licensee's election of fixed stumpage rates also precludes any correction to the upset stumpage rate determination that would otherwise be warranted because of an error in the appraisal.

6.7 Levies (CVP only)

1. Silviculture Levy:

A silviculture cost estimate is made for every cutting authority that will require basic silviculture, including those with a volume of less than 2 000 m^3.

A basic silviculture levy may be added to the reserve stumpage rate. The levy is equal to the district manager's cost estimate of silviculture liability to be incurred by the Crown.

2. Development/Administration Levy:

    a. A development levy may be added to the reserve stumpage rate. The development levy is equal to the appraisal cost estimate of road construction provided by the Crown as approved by the regional manager.

    b. An administration levy may be added to the reserve stumpage rate. The administration levy is equal to the district manager's cost estimate of administration provided by the Crown for preparing a Forestry Licence to Cut for salvage timber. An administration cost estimate is made for every cutting authority where the district office has to prepare all details of a Forestry Licence to Cut for salvage. No levy is applicable to professional applications.

The amount of any levy may be re-determined at reappraisal only.

6.8 Miscellaneous Stumpage Rates

For the purpose of determining stumpage rates for certain special forest products, including deciduous species, low grade logs and timber in specified areas listed under this section, the miscellaneous stumpage rates tables are to be used.

6.8.1 Special Forest Products and Other Miscellaneous Rates

Table 6-4 is to be used for determining stumpage rates for the specified products from all sources of Crown timber when scaled.

Table 6-4 Miscellaneous Stumpage Rates

All Forest Regions

Species	Product	Reserve Stumpage Rate
Cedar	Shakes	$6.00/$m^3$
Cedar	Blanks	$7.20/$m^3$
Cedar	Fence Posts	$3.00/$m^3$
Cedar	Mining Timbers & Fence Rails	$3.00/$m^3$
All Species	Firewood	$0.50/$m^3$
All Species	Bolts/Blocks	$5.30/$m^3$
Yew	All	$0.25/$m^3$
All Species	Grades: 3, 4, 5 and 6	$0.25/$m^3$
All Deciduous	All (except grades 3, 4, 5 and 6)	$0.50/$m^3$
All Species (except Cedar)	Fence Rails, Mining Timbers, Fence Posts	$1.20/$m^3$
All Species	Pickets & Palings, Mine Cribbing, Car Stakes, Round Stakes & Sticks, Rails (Split), Lagging (Split), Orchard Props	$1.20/$m^3$
All Species	Christmas Tree: under 3m 3-5 m over 5 m	$0.20/each $1.00/each $1.50/each
All Species	Logs salvaged below the high water levels of Reservoir Lakes and the Slocan, Kootenay, Mineral, Babine and Ootsa Lakes	$0.25/$m^3$
All Species	Marine Beachcomb	$0.70/$m^3$
All Species	Trees classified as "Dead Potential" on Cruise-based cutting authorities	$0.25/$m^3$
All Coniferous	For logs harvested from the Alex Fraser (UBC), Aleza Lake (UBC and UNBC) and Fort St. James (UNBC) Research Forests	$0.25/$m^3$
All Species	Firmwood Reject	NIL

Forest District Specific

Description	District	Reserve Stumpage Rate
Gross area cleared for seismic lines, [1] gas or oil well sites and right-of-way to well sites. [2]	Rocky Mountain Peace Ft. Nelson Mackenzie	$1,663/ha $1,731/ha $1,040/ha $2,122/ha

1. The gross area cleared as "Low Impact Seismic" or "Minimal Impact" line (refer to Appendix V) is divided by 2 as defined by the Geophysical Final Plan Cover Sheet and the appropriate per ha rate from the table applied to the adjusted area.

2. For pipe line rights-of-way a stumpage rate may be determined by using the above rates for cutting authorities containing less than 2 000 m^3, of merchantable volume. For cutting authorities of 2 000 m^3 and over see section 6.2.

6.8.2 Miscellaneous Stumpage Rates for Timber Licences

Timber licence cutting authority areas that have not been appraised and have a cutting authority term that began before May 1, 1995, must be appraised effective April 1, 2003.

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Market Pricing System 7

The market pricing system (MPS) policy provided in this chapter is to be used only for timber sale licences awarded under sections 20 and 21of the *Forest Act*.

Chapters 3, 4, 5 and 6 of this manual are only to be used, for sections 20 and 21 timber sale licences (TSL), where directly referenced in chapter 7.

7.1 MPS Introduction

The market pricing system is the basis for determining sawlog stumpage rates for timber sale licences issued under section 20 of the *Forest Act*, subject to a minimum stumpage rate. Sections 2.1 (3) and (4) of this manual provide the methods that are used for deriving stumpage rates for specific products and extraordinary situations.

MPS is a method of estimating the stumpage value of a stand of timber based on the results of previous similar timber stands that were sold competitively.

MPS can only be used where complete appraisal data as per section 4.2 is available for the cutting authority area. Where data is not available see chapter 6 of this manual.

The MPS upset rate and bonus bid applies to coniferous sawlogs only. All deciduous species, special forest products and grade 3, 4, 5 or 6 logs have a default price listed under section 6.8.

7.2 MPS Principles and Procedures

7.2.1 MPS Appraisals

The upset stumpage rate will be calculated using the *Interior Appraisal Manual* and monthly parameters (selling prices and consumer price index (CPI)) in effect on the date of calculating (appraisal effective date). This rate plus the bonus bid remains in effect from the date of award of the sale until the sale expires. All MPS stumpage rates on Section 20 timber sale licences advertised on or after November 1, 2003 are fixed for the term of the timber sale and all extensions.

7.2.2 MPS Stumpage Adjustments

For cutting authorities that were advertised prior to November 1, 2003, that elected to have, or have adjustable stumpage rates, the stumpage rates are adjusted quarterly on January 1, April 1, July 1, and October 1, of each year.

At the time of the quarterly adjustment, the MPS upset rate will be re-calculated based on the equations applicable for the appraisal effective date and the cutting authority data. The monthly parameters effective for the month of the adjustment will be used in the calculation instead of the original values. All other data remain unchanged.

This process is repeated quarterly until the cutting authority is reappraised.

7.2.3 Reappraisals for MPS Appraisals

Revised data and revised monthly parameters will be used with the equations in effect on the reappraisal date. Any reappraisal will follow the policy direction of chapter 2 of this manual. The original bonus bid remains in effect.

7.2.4 Methodology

Calculating the upset stumpage rate for BC Timber Sales, issued under section 20 of the *Forest Act*, will be done using the following methodology:

1. Calculate a selling price (SP) of the products that can be recovered from the stand using sections 7.3.1 and 7.3.2 with the variables as defined.

2. Calculate the market stumpage price using the equation in section 7.4.2, the variables for the stand, and the SP calculated in section 7.3.

3. Calculate the upset stumpage rate by discounting the market stumpage price calculated in section 7.4.2 using the discount factor in section 7.5.

One stumpage rate is determined for all appraised coniferous sawlogs in each cutting authority area. Other products and deciduous species are priced using miscellaneous stumpage rates as specified under section 6.8.

7.3 MPS Selling Prices

Selling prices for MPS are based on three-month averages of schedules of lumber values collected and published monthly by Revenue Branch. When the MPS values are compiled and distributed they become an integral part of this manual.

7.3.1 MPS Lumber Average Market Values

Monthly market value information for the interior is obtained by Revenue Branch from lumber producers located in each average market value zone. The zones are defined by point of appraisal (see section 2.6). Average market values (AMV) for each species are compiled by dividing total sales value by total sales volumes for each zone.

The volume that is manufactured to Canadian Lumber Standard/American Lumber Standard (CLS/ALS) sizes is reported in foot board measure (fbm). Lumber manufactured in non-CLS/ALS sizes is adjusted to equivalent CLS/ALS sizes. The total volume for each species includes all sizes and grades of rough and dressed lumber in the green and dried state. Also included is finger-jointed lumber and machine stress rated lumber.

The total net sales value for each species or species group is reported in Canadian dollars FOB mill. These sales values are rolled up into three-month averages each month. There is approximately a one-month lag in reporting.

7.3.2 Calculation of Species Lumber Selling Price

The total lumber selling price (SP) in $/m^3$ is determined for each species using lumber recovery factors (LRF) from the cruise compilation summary, LRF update add-ons and current applicable lumber average market values (AMV) for the species and zone.

1. Zonal LRF update add-ons are found in Table 7-1, by species.

2. Lumber AMVs as published every month.

3. Calculation of total species lumber selling price.

    a. Appraisal LRF = Cruise LRF + LRF update add-on

    b. Species SP ($/m3) = Species AMV($/mbm)/1000 * Appraisal LRF

4. The stand SP is the volume-prorated sum of the species SP.

Table 7-1 LRF Update Add-ons for MPS

Species	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9
Balsam	100	70	91	90	75
Cedar	52	21	47	42	-
Douglas Fir	77	-	65	66	-
Hemlock	54	24	50	47	-
Larch	73	-	65	66	-
Lodgepole Pine	87	50	78	76	66
Spruce	108	76	102	97	84
White Pine	71	-	63	62	-
Yellow Pine	-	-	66	70	-

7.4 Market Stumpage Price Calculation

The market stumpage price is calculated as detailed in this section. It is assumed that the market stumpage price will approximate the final stumpage rate, including the bonus bid, based on the variables used.

7.4.1 Market Stumpage Price Variables

MSP	=	Market Stumpage Price for the cutting authority in ($/$m^3$).
CPIF	=	B.C. Consumer Price Index (P110000) for current month divided by the base CPI of 109.3.
SP	=	Lumber Selling Price ($/$m^3$). See Section 7.3.
DC	=	Estimated Development Cost Borne by the Licensee ($) calculated using Section 4.3 and divided by the total net cruise coniferous volume.
VOL	=	Total net cruise volume of coniferous timber (m^3).
S%	=	Average cruise side slope for ground and cable yarding systems (does not include the area for horses and helicopter yarding systems).
VPT	=	Prorated net cruise coniferous volume per tree (m^3) for ground and cable yarding systems. Plus horse and helicopter systems use average VPT = 0.5490.
VPH	-	Net cruise coniferous volume per hectare (m^3/ha).
BWDN%	=	Blowdown as a percent of net cruise coniferous volume for ground and cable yarding systems. Does not include the volume for horse and helicopter yarding systems.
BURN%	=	Species volume prorated total burn percent.
CY%	=	Overhead cable yarding coniferous volume (includes skyline) as a percent of total net cruise coniferous volume.
HP%	=	Helicopter yarding coniferous volume as a percent of total net cruise coniferous volume.
HORSE%	=	Horse yarding coniferous volume as a percent of total net cruise coniferous volume.

CYCLE	=	Hauling round trip cycle time from the landing to the point of appraisal or water dumpsite and return (hrs). See section 4.5.1.
WH%	=	White Pine species volume as a percent of the total net cruise coniferous volume.
HECE	=	Combined hemlock, balsam and cedar dummy variable.
Z9	=	Fort Nelson Peace selling price zone, dummy variable.
SAL	=	Damaged timber salvage dummy variable.

7.4.2 Market Stumpage Price Equation

Using the variables defined in section 7.4.1, the selling price calculated in section 7.3.2 and the equation below, calculate the market stumpage price (MSP).

$$MSP = [44.1590 + 0.1895 * SP/CPIF - 0.9615 * DC/CPIF + 0.1747 * (VOL/1000) - 0.1327 * S\% + 9.0319 * \ln(VPT) + 0.009378 * VPH - 12.7571 * (BWDN\%/100) - 7.7502 * (CY\%/100) - 35.8595 * (HP\%/100) - 9.7689 * (HORSE\%/100) - 21.9802 *(BURN\%/100) - 2.0871 * CYCLE - 7.8954 * HECE + 29.5252 * (WH\%/100) - 7.9152 * Z9 - 5.4166 * SAL - 0.5179 * (1/ VPT)] * CPIF$$

For the above equation the following definitions apply:

1. If the percentage of hemlock, balsam and cedar volume in the cutting authority is greater than or equal to 50 percent of the total net cruise coniferous volume, then HECE = 1, otherwise enter 0.

2. If the selling price zone is Fort Nelson Peace (9) then Z9 = 1, otherwise enter 0.

3. If the total net cruise coniferous volume is greater than 50 000, then VOL = 50 000.

4. If horse or helicopter log appraisals, then VPT = 0.5490.

5. Where for salvage (SAL):

    a. greater than one-third of the net cruise volume for the cutting authority has been physically damaged by ice storm, blowdown, fire, snow press, or

    b. greater than one-third of the net cruise volume for the cutting authority has been attacked by mountain pine beetle, or other forest pests, that will result in the death of the attacked trees within one year, as determined by the district manager. Salvage (SAL) shall be = 1, or

    c. except as provided in subsection 5 (a) and (b) SAL shall be = 0.

7.5 MPS Stumpage Rate

7.5.1 MPS Upset Stumpage Rate

1. Subject to subsections (2) (3) and (4) the upset stumpage rate that is determined using the MPS shall be seventy percent of the market stumpage price.

2. Where applications for a timber sale licence with an upset stumpage rate determined under section 7.5.1 (1) have been invited but no applications have been received, the upset stumpage rate shall be equal to the variable cost per cubic metre of preparing the timber for sale when that is requested by the BC Timber Sales manager.

3. Where the director of BC Timber Sales does not anticipate that applications for a timber sale licence with an upset stumpage rate determined under section 7.5.1 (1) will be received because of market conditions, the upset stumpage rate shall be equal to the variable cost per cubic metre of preparing the timber for sale when that is requested by the BC Timber Sales manager.

4. The upset stumpage rate for timber that has been decked for over three years, as determined by the BC Timber Sales manager, shall be equal to the prescribed minimum stumpage rate when that is requested by the BC Timber Sales manager. The deck shall be auctioned by bonus offer.

5. The variable cost per cubic metre of preparing the timber for sale shall be calculated by the BC Timber Sales manager.

6. Not withstanding anything contained in this section the upset stumpage rate must not be lower than the prescribed minimum rate.

7.5.2 Upset Stumpage Rate Calculation

The upset stumpage rate (USR) is calculated by multiplying the Market Stumpage Price (MSP) by the difference between 1 and the discount factor (DF) as follows:

USR = MSP * (1-DF)

Where:

USR = Upset stumpage rate
MSP = Market Stumpage Price as defined in Section 7.4.2
DF = 0.30

7.5.3 Prescribed Minimum Stumpage Rate

The minimum stumpage rate is prescribed by the minimum stumpage rate regulation (BC Regulation 354/87). The current minimum stumpage rate is $0.25 per cubic metre.

7.5.4 Total MPS Stumpage Rate

The total stumpage rate is the upset stumpage rate plus any bonus bid.

7.6 Deciduous and Miscellaneous Forest Products

The stumpage rates for deciduous sawlogs, all species grade 3, 4, 5 and 6 logs and other miscellaneous forest products are found in section 6.8.

Appendices

Appendix I Equipment and Labour Rates

(Cost Base July 1, 2001)

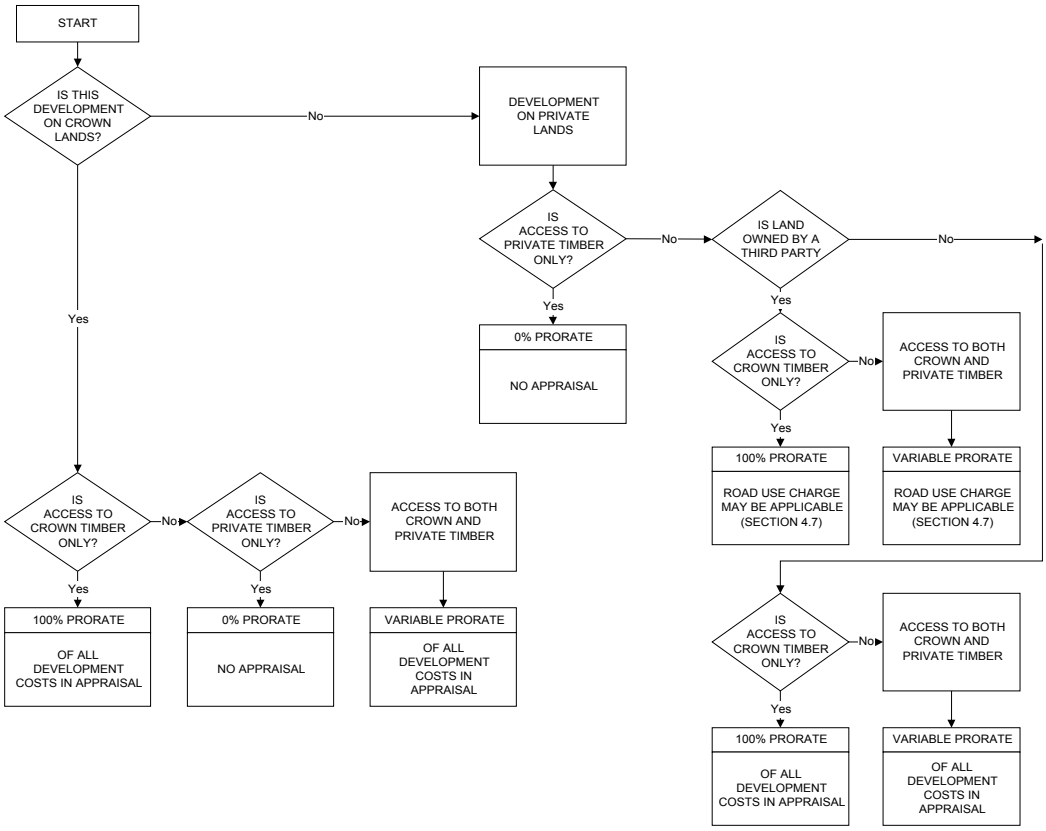
MACHINE DESCRIPTION	TYPICAL MODEL	$/HOUR
Crawler Tractor	Cat D9R, Komatsu D275/355	249.10
Crawler Tractor	Cat D9N (years: 1992 thru 1996)	236.20
Crawler Tractor	Cat D8NLGP, Komatsu D135	186.25
Crawler Tractor	Cat D7H, Liebherr PR742, Fiat Allis FD255	151.65
Crawler Tractor	Komatsu D75A, D65EX	129.10
Crawler Tractor	Cat D6, JD 850C	98.35
Rock Drill (includes labour)	Compressor: 750 cfm on tank chassis	206.01
Grader	Cat 14G, Komatsu GD705,725	112.90
Front End Loader (Gravel)	Cat 970F, Komatsu WA45031, Case 921B	140.65
Front End Loader (Logs)	Cat 972G, Komatsu WA500-1, Volvo 4600	163.15
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 235C, Hitachi EX400, Komatsu PC400LC	238.70
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 330B, Case 220B, Link Belt 4300QTL	196.41
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 229D/EL300/330, Komatsu PC300LC	173.14
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 225DLC, Hitachi EX270LC, JD 792D	158.62
Hydraulic Excavator incl. Brush Guard & Thumb	Cat EL240, Komatsu PC200LC-6, JD 790ELC	146.58
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 320BL, Hitachi EX200LC-5, JD 200LC	136.90
Gradall	Gradall G1000, XL5200	158.50
Logging Truck (Highway)	All Triaxle	90.60
Logging Truck (Off Highway)	All	138.21
Self Loading Log Truck	Highway log truck + 4.5 t deck crane	103.80
Gravel Truck	10.7 m^3	78.93
Gravel Truck Articulated (labour included)	25 - 29 tonne: Cat D30C/D, Terex 766/3066	123.65
Lowbed	5 axle unit: tandem tractor and lowbed	81.50
Lowbed	150 tonne (same as Off-Hwy Truck)	138.21
Concrete Mix Truck	6.1 m^3	87.60
Concrete Vibrator (labour not included)	5 m^3	4.18
Concrete Mixer (labour not included)	0.17 m^3	6.66
Crane - Truck Mounted	18 tonne	93.70
Soft Track Skidder	KMC 2100/2400	137.75
Rubber Tired Skidder	Clark Ranger F68, Franklin 595	94.60
Vibrator Compactor	Clark F68 + 2.7 to 3.6 roller	107.15
Tractor and Grid Roller	Clark F68 + grid roller	108.05
Labourer	Includes 40% payroll loading	30.16
Roadman	Includes 40% payroll loading	30.41
Crib/Culvert Maker, Powderman	Includes 40% payroll loading	31.93
Landingman	Includes 40% payroll loading	32.35
Rockdriller & Powderman (for load & blast only)	Includes 40% payroll loading	69.53
Bridgeman	Includes 40% payroll loading	38.35
Powersaw (labour not included)	All	4.70
Faller, including powersaw cost	Includes 40% payroll loading	58.59

Sources:

Cost surveys, Province of British Columbia Hydro and Power Authority and B. C. Rail Equipment Rental Rate Guide, (rates based on a 3 year old machine), and IWA agreement rates including payroll loading.

- The above rates will be used for all engineered estimates made under this manual,
- The machine rate includes labour for the operator (all found). There are no additions,
- Crew transportation, supervision, and camp/cookhouse costs, where applicable, are included in the standard phase costs of the manual. No additions are required, however, those licensees that incur camp costs (a camp is defined as a permanent structure(s) where capital costs were incurred to establish the camp that must have a cookhouse and a bunkhouse) and recovers the said camp costs from the contractor, and credits an account, in the books of the licensee; is permitted an additive of $50.00 per "person day" for staying at the camp; and
- Use of equipment rates not listed in this appendix must be approved by the Regional Timber Pricing Co-ordinator.

Appendix II Development Cost Allocation



Crown Timber = Appraised timber including appraised Timber Licences

Private Timber = Non-appraised timber

Variable Prorate = A tributary-volume type prorate between appraised and non-appraised timber

Appendix III Relative Soil Moisture to Absolute Soil Moisture Conversion Table

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
SIR	BG	xh1	ED	ED	ED	ED	ED	SD	M	W
SIR	BG	xh2	ED	ED	ED	ED	ED	SD	M	W
SIR	BG	xh3	ED	ED	ED	ED	ED	SD	M	W
SIR	BG	xw1	ED	ED	ED	ED	ED	SD	M	W
SIR	BG	xw2	ED	ED	ED	ED	ED	SD	M	W
SIR	ESSF	dc1	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	dc1	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	dc2	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	dc2	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	dk	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	dv	VD	MD	MD	SD	SD/F	M	VM	W
SIR	ESSF	mw	VD	MD	MD	SD	F	M	VM	W
SIR	ESSF	vc	MD	SD	SD	F	M	VM	VM	W
SIR	ESSF	vc	MD	SD	SD	F	M	VM	VM	W
SIR	ESSF	vv	MD	SD	SD	F	M	VM	VM	W
SIR	ESSF	wc1	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc1	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc2	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc2	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc3	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc4	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wc4	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wk1	MD	MD	SD	F	M	M	VM	W
SIR	ESSF	wm	MD	MD	SD	F	F	M	VM	W
SIR	ESSF	xc	VD	VD	MD	MD	SD	M	VM	W
SIR	ESSF	xv	VD	VD	MD	MD	SD	F	M	W
SIR	ICH	dk	VD	VD	VD	MD	SD	M	VM	W
SIR	ICH	mk1	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mk1	VD	MD	MD	SD	F	M	VM	W

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
SIR	ICH	mk2	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mk3	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mw1	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mw2	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mw2	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mw3	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	mw3	VD	MD	MD	SD	F	M	VM	W
SIR	ICH	vk1	MD	MD	SD	F	M	M	VM	W
SIR	ICH	vk1	MD	MD	SD	F	M	M	VM	W
SIR	ICH	wk1	VD	MD	SD	F	F	M	VM	W
SIR	ICH	wk1	VD	MD	SD	F	F	M	VM	W
SIR	ICH	wk2	VD	MD	SD	F	F	M	VM	W
SIR	ICH	wk4	VD	MD	SD	F	F	M	VM	W
SIR	ICH	xw	VD	VD	VD	MD	SD	M	VM	W
SIR	IDF	dk1	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dk2	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dk3	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dk4	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dm1	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dm1	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	dm2	ED	VD	VD	VD	MD	F	M	W
SIR	IDF	mw1	VD	VD	VD	MD	SD	F	VM	W
SIR	IDF	mw2	VD	VD	VD	MD	SD	F	VM	W
SIR	IDF	mw2	VD	VD	VD	MD	SD	F	VM	W
SIR	IDF	u	ED	VD	VD	MD	MD	F	VM	W
SIR	IDF	ww	VD	VD	VD	MD	SD	F	M	W
SIR	IDF	xh1	ED	ED	VD	VD	MD	SD	M	W
SIR	IDF	xh1	ED	ED	VD	VD	MD	SD	M	W
SIR	IDF	xh2	ED	ED	VD	VD	MD	SD	M	W
SIR	IDF	xm	ED	ED	VD	VD	MD	SD	M	W

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
SIR	IDF	xw	ED	ED	VD	VD	MD	SD	M	W
SIR	IDF	xw	ED	ED	VD	VD	MD	SD	M	W
SIR	MS	dc	VD	VD	VD	MD	SD	M	VM	W
SIR	MS	dk	VD	VD	VD	MD	SD	M	VM	W
SIR	MS	dm1	VD	VD	VD	MD	SD	M	VM	W
SIR	MS	dm1	VD	VD	VD	MD	SD	M	VM	W
SIR	MS	dm2	VD	VD	VD	MD	SD	M	VM	W
SIR	MS	xk	VD	VD	VD	VD	MD	F	M	W
SIR	MS	xk	VD	VD	VD	VD	MD	F	M	W
SIR	MS	xv	VD	VD	VD	MD	SD	F	VM	W
SIR	PP	dh1	ED	ED	ED	VD	VD	SD	M	W
SIR	PP	dh2	ED	ED	ED	VD	VD	SD	M	W
SIR	PP	xh1	ED	ED	ED	ED	VD	SD	M	W
SIR	PP	xh2	ED	ED	ED	ED	VD	SD	M	W
SIR	SBPS	dc	ED	ED	VD	MD	SD	F	M-VM	W
SIR	SBPS	mc	VD	VD	VD	MD	SD	F	M-VM	W
SIR	SBPS	mk	ED	VD	VD	MD	SD	F	M-VM	W
SIR	SBPS	xc	ED	ED	VD	VD	MD	SD	M	W
SIR	SBS	dw1	VD	MD	MD	SD	SD	F	M	W
SIR	SBS	dw2	VD	MD	MD	SD	SD	F	M	W
SIR	SBS	mc1	VD	MD	MD	SD	F	M	VM	W
SIR	SBS	mc2	VD	MD	MD	SD	F	M	VM	W
SIR	SBS	mh	VD	MD	MD	SD	SD	M	VM	W
SIR	SBS	mm	VD	MD	MD	SD	F	M	VM	W
SIR	SBS	mw	VD	MD	MD	SD	F	M	VM	W
SIR	SBS	wk1	VD	MD	SD	F	F	M	VM	W
NIR	BWBS	dk1	VD	MD	MD	SD	SD	F	M-VM	W
NIR	BWBS	dk1	VD	MD	MD	SD	SD	F	M-VM	W
NIR	BWBS	dk2	VD	MD	MD	SD	SD	F	M-VM	W
NIR	BWBS	dk2	VD	MD	MD	SD	SD	F	M-VM	W

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
NIR	BWBS	mw1	VD	MD	MD	SD	F	M	VM	W
NIR	BWBS	mw2	VD	MD	MD	SD	F	M	VM	W
NIR	BWBS	wk1	VD	MD	SD	SD	F	M	VM	W
NIR	BWBS	wk2	VD	MD	SD	SD	F	M	VM	W
NIR	BWBS	wk3	VD	MD	SD	SD	F	M	VM	W
NIR	CWH	vh2	SD	SD	F	F	M	VM	W	W
NIR	CWH	vm1	MD	SD	SD	F	F	M	VM	W
NIR	CWH	vm2	MD	SD	SD	F	F	M	VM	W
NIR	CWH	wm	SD	SD	SD	F	F	M	VM	W
NIR	CWH	ws1	VD	MD	MD	SD	F	M	VM	W
NIR	CWH	ws2	VD	MD	MD	SD	F	M	VM	W
NIR	ESSF	mc	VD	MD	SD	SD	F	M	VM	W
NIR	ESSF	mk	VD	MD	MD	SD	F	M	VM	W
NIR	ESSF	mm1	VD	MD	MD	SD	F	M	VM	W
NIR	ESSF	mv1	VD	MD	SD	SD	F	M	VM	W
NIR	ESSF	mv2	VD	MD	SD	SD	F	M	VM	W
NIR	ESSF	mv3	VD	MD	SD	SD	F	M	VM	W
NIR	ESSF	mv4	VD	MD	SD	SD	F	M	VM	W
NIR	ESSF	wc2	MD	MD	SD	F	M	M	VM	W
NIR	ESSF	wc3	MD	MD	SD	F	M	M	VM	W
NIR	ESSF	wk1	MD	MD	SD	F	M	M	VM	W
NIR	ESSF	wk2	MD	MD	SD	F	M	M	VM	W
NIR	ESSF	wv	MD	SD	SD	F	F	M	VM	W
NIR	ICH	mc1	VD	MD	SD	SD	F	M	MV	W
NIR	ICH	mc1a	VD	MD	SD	SD	F	M	MV	W
NIR	ICH	mc2	VD	MD	SD	SD	F	M	MV	W
NIR	ICH	mm	VD	MD	MD	SD	F	M	VM	W
NIR	ICH	vc	MD	SD	SD	F	M	M	VM	W
NIR	ICH	vk2	MD	SD	SD	F	M	M	VM	W
NIR	ICH	wc	MD	MD	SD	F	F	M	VM	W

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
NIR	ICH	wk1	VD	MD	SD	F	F	M	VM	W
NIR	ICH	wk3	VD	MD	SD	F	F	M	VM	W
NIR	ICH	wk4	VD	MD	SD	F	F	M	VM	W
NIR	MH	mm1	SD	SD	F	F	F	M	VM	W
NIR	MH	mm2	SD	SD	F	F	F	M	VM	W
NIR	MH	wh	SD	SD	F	F	F	M	VM	W
NIR	SBPS	mc	VD	VD	VD	MD	SD	F	M-VM	W
NIR	SBPS	mc	VD	VD	VD	MD	SD	F	M-VM	W
NIR	SBS	dh	VD	MD	MD	SD	SD	F	M	W
NIR	SBS	dk	VD	MD	MD	SD	SD	F	M-VM	W
NIR	SBS	dk	VD	MD	MD	SD	SD	F	M-VM	W
NIR	SBS	dw1	VD	MD	MD	SD	SD	F	M	W
NIR	SBS	dw2	VD	MD	MD	SD	SD	F	M	W
NIR	SBS	dw3	VD	MD	MD	SD	SD	F	M	W
NIR	SBS	mc2	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	mc2	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	mc3	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	mh	VD	MD	MD	SD	SD	M	VM	W
NIR	SBS	mk1	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	mk2	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	mw	VD	MD	MD	SD	F	M	VM	W
NIR	SBS	vk	MD	SD	SD	F	M	M	VM	W
NIR	SBS	wk1	VD	MD	SD	F	F	M	VM	W
NIR	SBS	wk2	VD	MD	SD	F	F	M	VM	W
NIR	SBS	wk3	VD	MD	SD	F	F	M	VM	W
CFR	CDF	mm	VD	VD	MD	MD	MD	SD	F	W
CFR	CWH	dm	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	ds1	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	ds2	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	mm1	MD	SD	SD	F	F	M	VM	W
CFR	CWH	mm2	MD	SD	SD	F	F	M	VM	W

Region	BEC		Relative Soil Moisture Regime Class (from field guide)							
	Zone	Subzone	0	1	2	3	4	5	6	7
CFR	CWH	ms1	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	ms2	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	vh1	SD	SD	F	F	M	VM	W	W
CFR	CWH	vh2	SD	SD	F	F	M	VM	W	W
CFR	CWH	vm1	MD	SD	SD	F	F	M	VM	W
CFR	CWH	vm2	MD	SD	SD	F	F	M	VM	W
CFR	CWH	wh1	SD	SD	SD	F	F	M	VM	W
CFR	CWH	wh2	SD	SD	SD	F	F	M	VM	W
CFR	CWH	ws2	VD	MD	MD	SD	F	M	VM	W
CFR	CWH	xm	VD	MD	MD	SD	F	M	VM	W
CFR	ESSF	mw	VD	MD	MD	SD	F	M	VM	W
CFR	IDF	ww	VD	VD	VD	MD	SD	F	M	W
CFR	MH	mm1	SD	SD	F	F	F	M	VM	W
CFR	MH	mm2	SD	SD	F	F	F	M	VM	W
CFR	MH	wh	SD	SD	F	F	F	M	VM	W

NOTES: ED = Extremely Dry (0, extreme xeric)
VD = Very Dry (1, xeric)
MD = Moderately Dry (2, sub-xeric)
SD = Slightly Dry (3, sub-mesic)
F = Fresh (4, mesic)
M = Moist (5, sub-hygric)
VM = Very Moist (6, hygric)
W = Wet (7, sub-hydric)

Appendix IV Map Content

The map(s) submitted with the appraisal data submission must be at a scale of 1:5000 or 1:10000. Additional maps at other scales may be included as required. At a minimum the map(s) shall indicate the following information:

a. Cutting permit block boundaries.

b. Retention areas within the cutting permit blocks.

c. Delineation of biogeoclimatic zone, subzone and variant areas.

d. Delineation of areas by harvest method (ground, cable, or helicopter, etc.) and partial cut percent.

e. Delineation of areas that are the subject of specified operations cost estimates (e.g., skidder swing, root disease control).

f. The geographic midpoint of each cutblock and common junction of the permit.

g. Existing roads.

h. Roads to be built by type (operational, block, winter) including sections to be gravelled and or sections that are "wet" (as defined in this manual).

i. Location of roads/structures that are the subject of detailed engineered estimates.

j. Location and type of other development such as remedial fencing, cattleguards and pipeline crossings.

The map may include other information considered relevant to the appraisal.

For reappraisal data submissions, reference may be made to the original map submitted. Any change to the harvest plan or area of harvest due to a "changed circumstance (section 2.3.2.1) during the term of the cutting authority must be mapped and promptly submitted to the district.

As part of the initial appraisal data submission the map(s) may be submitted in electronic format. At least two copies shall be submitted to the district in paper form prior to the cutting permit being approved.

Appendix V Seismic Clearance Line Definitions

Regarding the seismic clearing rates in Table 6-4, the following definitions apply:

Minimal Impact Line

For minimal impact lines, very little vegetation is to be cut other than what is required to create a walking trail for foot access. Standing trees are left unharmed while some shrubs may be cut. Hazard trees may be removed for safety reasons.

Low Impact Seismic (LIS)

The objective of low impact seismic is to create a narrow, continuously meandering line. This method reduces the line-of-sight by avoiding large standing trees (meandering avoidance), and leaves the soil and ground cover generally undisturbed. The following criteria apply:

- Average line construction width of 4.0 m (meandering avoidance or less that can be hand or mechanically cut), as determined in the oil and gas commission's Geophysical Final Plan Cover Sheet, and
- Minimizing line-of-sight for wildlife management, to a maximum of 200 m, and
- Avoidance of standing timber up to 7.0 cubic metres per hectare.

Conventional (Straight)

A conventional seismic line is a straight line that is mechanically cut, and ranges in width up to 7.0 m.

For wildlife management purposes, the maximum line of sight must not exceed 400 m in length (or as specified by approval condition). Animal blinds or moose blinds, are typically used on a conventional (straight) cut line to break up the line-of-sight and to allow wildlife refuge from predators. A mechanically cut conventional line provides little protection for forest or wildlife values, so its use in Crown land areas is somewhat restricted.

Only those sections of the geophysical program meeting the minimal or low impact criteria will receive the fifty percent reduction.

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