



July 28, 1995

All Regional Managers and
All Holders of the Interior Appraisal Manual

Dear Manual Holders:

I hereby approve the new *Interior Appraisal Manual* and attach a copy of it for your use.

This manual is in effect on August 1, 1995. It applies to all interior stumpage appraisals. Amendments or revisions to this manual require my further approval.

At this time, I would also like to correct a numbering error contained in my letter of June 13, 1995. In the second sentence, the words "... Sections 2 to 4, 6 to 14, and 18 ...", are hereby replaced with the words "... Sections 2 to 4, 6 to 14, and 19 ...".

Yours truly,

Andrew Petter
Minister

Attachment: (1)

Interior Appraisal Manual

Effective August 1, 1995

Cost Base

Woods: July 1, 1993

Manufacturing: July 1, 1993

New Interior Manual - Highlights

Chapter 1	No significant changes
Section 2.3.1	“to the appraised timber” has been deleted from the first sentence.
Section 2.3.2 b.	“a Specified operation...” has been added.
Section 2.3.2 c.	Reconstruction and replacement now no longer restricted to Forest Service roads only.
Section 2.4	Revised to include section for woodlot licences. New policy is for woodlot licensees to have the option of quarterly adjusting or annual adjusting stumpage rates.
Section 2.5	Points of appraisal now list zones 15 to 19 (volume per tree less than 0.20 m ³ /tree) for convenience.
Section 3.1.2	Stud lumber AMV's now includes lumber up to 10 feet in length.
Chapter 4	Cost estimates have been updated to a July 1993 cost base. This includes surveyed costs up to and including breakup 1994.
Section 4.1.1	Added "Where appropriate, specified operations are weighted according to the applicable cruise volume." Added “further information on specified operations may be obtained from the Regional Appraisal Coordinator.” Pushover logging added to the list of specified operations. Last paragraph was deleted as it was redundant.
Section 4.2	Concerning magnetic copies of cruise information “compilation” revised to “data list”.
Section 4.3.1.6	Replacement of “cross ties” now included under reconstruction and replacement.

Section 4.3.1.8	Deactivation section revised for clarity as to what activities qualify for a cost estimate.
Section 4.3.2.2	% fines deleted as subgrade cost variable. Soil Moisture variable has been added for CWH, MH, ICH, SBS, ESSF Biogeoclimatic zones.
Section 4.3.2.3	Winter roads maximum side slope 15 %. Over 15 % is now considered block roads.
Section 4.3.2.5	Stabilizing depth variable has been deleted. Operational roads and Nelson region has been added as variables.
Section 4.3.3	Clarifies what costs may or may not be included in an engineered estimate (such as freight, PST, GST, Professional Engineers, etc.).
Section 4.4	This section has been reorganized.
Section 4.4.1	Identifies the logging systems that are considered for the purpose of amendments and qualify for reappraisal.
Section 4.4.2	Percent sensitive site is now defined as "Sensitive site ground skidding is only recognized where such treatment is specifically identified in the PHSP or cutting authority documents."
Section 4.4.3.1	Helicopter water and land drop has been deleted. Instead there is now a cost estimate for helicopter clear-cut and helicopter partial cutting.
Section 4.4.3.4	Volume removal of 1 to 99 % (formerly 1 to 89 %) is considered partial cutting for overhead cable logging.
Section 4.5.4.3	Babine Lake no longer requires service barge cost estimate.
Section 4.11	Manufacturing cost estimates have been trended from the October 1, 1994 manual.
Section 4.12	A cost trend of 12 % has been used between 1993 and 1994. A cost trend of 4 % has been used between 1994 and 1995.
Chapter 5	No significant changes.
Section 6.2	Revised low volume additive.

Section 6.5	Policy for Sec 16 and 16.1 (Forest Act) timber sale licences is restated for convenience.
Table 6-1	Some special forest products have been separated into "cedar" and "all other" categories.
Appendix 1	Equipment and Labour Rates, one Hydraulic Excavator type has been added, Excavator models have been further defined by the use of rate factors.

Table of Contents

1 Introduction

1.1 Terms of Reference.....	1-2
1.2 Area of Application.....	1-3
1.3 Cutting Authority.....	1-4
1.3.1 Cutting Authority Area.....	1-4
1.4 Responsibility for Stumpage Determination.....	1-5
1.5 Comparative Value Timber Pricing	1-6
1.6 Stumpage Adjustments	1-8

2 Appraisal Principles and Procedures

2.1 Types of Determination.....	2-2
2.2 Time Schedule - New Appraisals and Reappraisals.....	2-3
2.3 Reappraisal	2-4
2.4 Extension of Term	2-7
2.5 Point of Appraisal	2-9
2.5.1 Method of Transportation to be Used in Determining Point of Appraisal	2-10
2.6 Calculation Conventions	2-11

3 Interior Selling Prices

3.1 Lumber Average Market Values (AMVs).....	3-2
3.1.1 Application of Lumber Average Market Values.....	3-3
3.1.2 Lumber Average Market Value (AMV) Zones	3-3
3.2 Chip Average Market Values	3-4
3.3 Calculation of Species Selling Price.....	3-4

4 Operating Cost Estimation

4.1 Cost Estimates.....	4-2
4.1.1 Specified Operations	4-2
4.2 Appraisal Data Requirements	4-4
4.3 Development	4-5
4.3.1 Development Cost Allocation.....	4-6
4.3.2 Tabular Cost Estimates	4-11

4.3.2.1 Subgrade Construction	4-12
4.3.2.2 Subgrade Construction Variables	4-12
4.3.2.3 Subgrade Cost Estimate.....	4-14
4.3.2.4 Drainage Structures.....	4-15
4.3.2.5 Additional Stabilizing Material (ballast, gravel).....	4-18
4.3.2.6 Cattle Guards, Remedial Fences and Pipeline Crossings	4-19
4.3.2.7 Winter Road Reconstruction.....	4-19
4.3.3 Detailed Engineered Costs.....	4-19
4.4 Tree-to-Truck.....	4-23
4.4.1 Required Logging Systems.....	4-23
4.4.2 Tree-to-Truck Variables.....	4-24
4.4.3 Tree-to-Truck Cost Estimate.....	4-26
4.4.4 Tree-to-Truck Additive for Damaged Timber	4-29
4.4.5 Prorating Tree-to-Truck Cost Estimates.....	4-30
4.5 Log Transportation.....	4-31
4.5.1 Truck Haul Variables	4-31
4.5.2 Truck Haul Cost Estimates.....	4-33
4.5.2.1 Primary Haul	4-33
4.5.2.2 Secondary or Re-Haul	4-33
4.5.3 Water Transportation.....	4-34
4.5.4 Special Transportation Systems.....	4-34
4.6 Road Maintenance	4-37
4.7 Road and Land Use Charges	4-40
4.8 Administration and Other Costs	4-42
4.8.1 Overhead	4-42
4.8.2 Isolated Cutting Authorities	4-44
4.9 Post-Logging Treatment Costs.....	4-45
4.10 Basic Silviculture Cost Estimate.....	4-46
4.11 Manufacturing Cost Estimates.....	4-49
4.12 Cost Trend.....	4-51

5 Stumpage Rate Determination

5.1 Indicated Stumpage Rate	5-2
5.2 Value Index	5-3
5.3 Mean Value Index.....	5-4
5.4 Market Value Indexing	5-5
5.5 Base Rate	5-6
5.6 Calculation of Stumpage Rate.....	5-7

5.6.1 Calculation of Indicated Stumpage Rate	5-7
5.6.2 Prescribed Minimum Stumpage Rate	5-7
5.6.3 Reserve Stumpage Rate.....	5-7
5.6.4 Upset Stumpage Rate.....	5-8
5.6.5 Total Stumpage Rate.....	5-8

6 Miscellaneous Timber Pricing Policies

6.1 Average Value Indexes by District and Species	6-2
6.2 Cutting Authorities With 5 000 m ³ or Less Volume.....	6-3
6.3 Right-of-Way Cutting Authorities	6-5
6.4 Partially Harvested Timber	6-6
6.5 Small Business Forest Enterprise Program (SBFEP) Sales.....	6-7
6.6 Levies.....	6-9
6.7 Miscellaneous Stumpage Rates	6-10
6.7.1 Special Forest Products and Other Miscellaneous Rates	6-10
6.7.2 Miscellaneous Stumpage Rates for Timber Licences.....	6-13

Appendices

Appendix I Equipment and Labour Rates	A-2
Appendix II Lumber Recovery Factors (board feet/cubic metre).....	A-4
Appendix III Development Cost Allocation.....	A-5

Index

Tables

Table 5-1 Timber Licence Stumpage Rate Adjustment Schedule	5-8
Table 6-1 Miscellaneous Stumpage Rates	6-11
Table 6-2 Miscellaneous Stumpage Rates for Timber Licences	6-13

Introduction

1

1.1 Terms of Reference

The *Forest Act*, Sections 81 to 86, and regulations provide the statutory authority for the determination of stumpage for Crown timber.

The *Forest Act*, Section 84, 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, 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 the entire province of British Columbia, with the exception of the Vancouver Forest Region, as established by the *Forest Act* and Regulations, and that part of the Prince Rupert Forest Region west of the Cascade Mountains Administrative Line from Tweedsmuir Park to the state of Alaska.

There is one exception to the above definition. Timber in that portion of the Kalum Forest District, lying west of the Cascade Mountains Administrative Line is appraised using the *Interior Appraisal Manual*.

1.3 Cutting Authority

The term "cutting authority" means one of the following documents authorizing the harvest of a cutting authority area:

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 woodlot licence, or
 - e. a timber licence.
2. A timber sale licence that does not provide for the issuance of cutting permits, not including any proposal deemed to be a part of the licence.
3. A licence to cut.
4. A road permit.

1.3.1 Cutting Authority Area

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

1. is authorized for harvest under a cutting authority, or
2. has a unique timber mark.

1.4 Responsibility for Stumpage Determination

The *Forest Act*, Section 84(1), requires the rates of stumpage to be determined, redetermined and varied by the Regional Manager or a forest officer duly authorized by the Regional Manager, in accordance with the policies and procedures approved for the forest region by the Minister of Forests.

The Regional Appraisal Coordinator, is a forest officer authorized by the Regional Manager to determine stumpage rates, for both appraisals and reappraisals, and to provide interpretations of the policies and procedures approved by the Minister that are contained in the *Interior Appraisal Manual*.

Revenue Branch employees are forest officers for the purpose of adjusting stumpage rates under Section 1.6.

1.5 Comparative Value Timber Pricing

Comparative Value Pricing, subject to a minimum stumpage rate, is the basis for determining stumpage rates with the exceptions noted in subsection 2.1 (2, 3 and 4).

An average stumpage rate for the Interior has been set by the provincial government. The stumpage rate for a given stand of timber is more or less than the pre-set average rate depending upon whether the stand is more or less valuable than the average stand. To make that assessment 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 costs necessary to harvest the timber and realize the estimated selling price (see Chapter 4).
3. Determine the value index of the timber stand by subtracting the estimated operating cost from the estimated selling price (see Chapter 5).
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:
 - i. the greater of the indicated stumpage rate or the prescribed minimum stumpage rate; or
 - ii. 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 development and silviculture levies (if any) to the reserve stumpage rate (see Section 6.6).
7. Determine the total stumpage rate by adding the bonus bid (if any) 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 under Section 6.7.

The average stumpage rate itself is indexed to lumber market values as explained in Chapter 5.

1.6 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, the stumpage rates are adjusted on January 1, April 1, July 1, and October 1 of each year. The new stumpage rates reflect any changes in estimated selling prices (as authorized in this manual since the previous adjustment) and the operating cost trended to the quarterly adjustment date. In addition, the adjustment reflects changes to the Statistics Canada Softwood Lumber Index for the Interior, the Interior Base Rate and the Interior Mean Value Index.

Appraisal Principles and Procedures²

2.1 Types of Determination

Stumpage rates are determined by one of the following methods:

1. A full appraisal as described under Chapter 3 and 4 of this manual.
2. An Order-in-Council directive setting rates under the *Forest Act*, Section 84.
3. Pricing under Chapter 6 of this manual.
4. The use of stumpage rates in a region developed by regional revenue staff, and approved by the regional manager.

2.2 Time Schedule - New Appraisals and Reappraisals

Timeliness is an important factor in the stumpage appraisal process. The following schedule applies:

1. For each cutting authority, the licensee must submit to the district manager, an appraisal data submission (Interior Appraisal Data Sheet), at least 90 calendar days prior to the appraisal effective date for new appraisals, or at least 60 calendar days prior to the anniversary date for reappraisals.

If the licensee fails to provide an appraisal data submission as stated above, then the district manager must use the best appraisal information available and steps 2 through 7 need not apply.

2. The district manager reviews the submitted data and all other available information, and completes the appraisal data sheet to reflect what best represents the cutting authority.
3. The district manager or the licensee may request a meeting to discuss the appraisal data submission.
4. At the meeting, the licensee may clarify data previously submitted. The district manager may revise the appraisal data sheet as a result of the meeting.
5. The licensee is notified by the district manager of changes, if any, made to the appraisal data.
6. The appraisal data sheet is then sent to the regional office by the district manager as part of the appraisal package.
7. The licensee and district manager are notified by the regional revenue staff of any further changes made to the appraisal data sheet.
8. The licensee is notified, by letter or facsimile transmission, of the stumpage rate and summary of the appraisal information used in determining the stumpage rate.
9. The licensee must advise the issuing regional office immediately, in writing, of any disagreement with the information contained in the stumpage advisory notice and provide adequate factual data to permit a review. At this point the disagreement is not considered as an administrative review or appeal under Section 154 of the *Forest Act*.
10. After such a review, the regional revenue staff send a letter notifying the licensee by mail or facsimile transmission of the results of the review and summary appraisal information.

2.3 Reappraisal

A reappraisal is a re-estimation of Operating Cost and Selling Price according to the Appraisal Manual in effect on the effective date of the re-estimation. Except in the case of "sudden and severe damage" as explained below, a reappraisal is based upon a complete reassessment of a cutting authority carried out by "standing up the trees, unbuilding the roads and drainage structures and returning the stand to its original condition" before making a re-estimation of the operating costs. The operating cost data may be revised to reflect changes to the cutting authority or left unchanged at the time of the reappraisal. At the time of a reappraisal, initial detailed engineering cost estimates may be re-estimated once after construction to reflect more accurate on-site information. However, development costs originally estimated using ministry approved competitive bids, or costs that have been apportioned to more than one cutting authority are not re-estimated in a reappraisal.

A reappraisal is made only if one of five situations arises:

1. Sudden and Severe Damage

If the Regional Manager is satisfied that sudden and severe damage has occurred, the cutting authority is reappraised upon the licensee's request. The effective date of the redetermined rate is the first of the month following the occurrence of the damage, unless otherwise specified by the Regional Manager. A reappraisal is not made in the case of fire damage caused by the licensee if they have failed to comply with the *Forest Act*, Part 10, and relevant regulations.

In the case of "sudden and severe damage" the redetermined rate is based upon the remaining timber only. The Regional Manager may approve the use of appraisal data obtained from comparable cutting authorities. The reappraisal cost estimate for development and silviculture includes volume already removed.

This policy on "sudden and severe damage" applies to fixed rate cutting authorities as well as to adjustable rate cutting authorities. Any existing bonus bid and/or levy is payable in addition to the redetermined upset stumpage rate.

2. Amendments

A reappraisal may be triggered if a cutting authority area or cutting authority (see Section 1.3) is amended:

- a. If accumulated amendments (either addition or deletion of merchantable timbered stumpage-bearing area), exceed 10 ha or 10 percent of the merchantable area, whichever is less, then the entire cruise must be recompiled and the stumpage rate redetermined,

- b. an amendment requiring a Specified Operation or different logging system (see Sections 4.1.1 and 4.4.1), that affects at least 10 percent of the cutting authority volumes, or
- c. an amendment requiring major subgrade reconstruction or replacement or reconstruction of a major drainage structure. In these instances, the cost estimate is based solely upon remaining timber volume (i.e., applicable volume).

The redetermined stumpage rate becomes effective on the first day of the month following the notice to the licensee which approves the amendment.

3. Reappraisal at Anniversary Date

"Anniversary date" means the annual recurrence of the month and day when the term of the cutting permit or where there is no cutting permit, the term of the licence began.

Reappraisals must be carried out on all adjustable stumpage rate cutting authorities with subsequent anniversary dates when the following conditions are satisfied:

- a. timber is expected to be scaled on the cutting authority during the next year, and
- b. there is at least 2 000 m³ of all merchantable timber remaining on the cutting authority.

Where the above conditions have not been met, reappraisals may be made at either the District or Regional Manager's or licensee's option. See Section 2.2 (Time Schedule - New Appraisals and Reappraisals).

These reappraisals are made in accordance with the appraisal manual in effect on the anniversary date. In this case the effective date of the redetermined stumpage rate is the anniversary date.

If a reappraisal is not made, the untrended logging and silviculture cost estimates from the current appraisal will continue to be trended quarterly to determine stumpage rates.

4. Error in Appraisal

If a mathematical error is discovered in the most recent appraisal, the cutting authority is reappraised with the exception of all competitive Small Business Forest Enterprise Program timber sale licences. The effective date of the redetermined rate is the first of the month following the date upon which notification of the error was given. There is no retroactive change to the stumpage rate.

A mathematical error is defined as consisting only of:

- a. an error in transcribing or compiling approved cruise field data, or in the application of approved loss factors and taper equations,
- b. an error in a calculation made as part of the Appraisal Data Sheet,
- c. an error in transcribing the data from an approved Appraisal Data Sheet or in performing the calculations specified in this manual, or
- d. 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.

5. Minister's Direction

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. The reappraisal is made according to the appraisal manual in effect on the effective date of the reappraisal.

2.4 Extension of Term

1. Small Business Forest Enterprise Program

When a licensee has elected the fixed stumpage rate option for a timber sale licence in the Small Business Forest Enterprise Program, that stumpage rate remains fixed for the term and all extensions.

Definition: Under the Small Business Forest Enterprise Program a fixed stumpage rate means that the reserve stumpage rate, levies and bonus bids are fixed and will not change during the term of the cutting authority and all extensions. The only exceptions are if a reappraisal is done under Section 2.3.1 - Sudden and Severe Damage or Section 2.3.5 - Minister's Direction.

2. Woodlots

Instead of the quarterly stumpage adjustment, a woodlot licensee may elect an annual stumpage adjustment, where the initial stumpage rate shall remain in effect until the anniversary date of the cutting authority, at which time it will be reappraised. If the election is not made within the specified time, the quarterly stumpage adjustment will apply.

The election of quarterly or annual stumpage adjustment becomes effective August 1, 1995, and will apply as follows:

- a. All new woodlot cutting permits will be offered a non-revocable selection at the time of the initial appraisal,
- b. All existing woodlot cutting permits that have not been offered the opportunity to make an election will now have an opportunity at the cutting permit's anniversary date,
- c. Woodlot cutting permits that have had the opportunity to elect and have elected non-adjusting rates will remain unchanged during the original term of the cutting permit. At the time of extension, the cutting permit will be reappraised and the new stumpage rate will apply until the expiry date. A reappraisal will then be required at the time of each future extension. There will be no opportunity to change the original election,
- d. There will be no change to all other woodlot cutting permits that have elected a quarterly stumpage adjustment. They will continue to adjust quarterly and be subject to annual reappraisal.

Amendments to cutting authorities with the annual stumpage adjustment option (as defined in Section 2.3.2) would be subject to reappraisal at the time of the amendment. The new stumpage rate would then not be adjusted until the cutting permit's anniversary date or expiry, whichever occurs first.

3. District Average Value Index

When the stumpage rate was determined under Section 2.1 (4) and the term is extended, the regional manager may either extend that stumpage rate or reappraise the cutting authority. When the term of a cutting authority is extended and that cutting authority is reappraised, the notification requirements of Section 2.2 do not apply.

4. Miscellaneous Stumpage Rates

Miscellaneous stumpage rates (Section 6.7) will be based on the appraisal manual in effect on the date of scale, except for those cutting authorities that contain miscellaneous stumpage rates specified in their cutting authority document.

5. Timber Licence

When a cutting authority that includes the authorization to harvest timber licence volume has the term extended, the stumpage rate will be determined under 4. above, if:

- the cutting authority has a term that began before May 1, 1995, and
- the cutting authority area was not appraised.

2.5 Point of Appraisal

The appraiser must select the point of appraisal from those listed below which will produce the least total operating cost estimate for the cutting authority area. All species, qualities and sizes of timber must be appraised to a single point of appraisal. The appraiser must estimate the cost of transporting timber to the sawmill which is near the point of appraisal and produces the least total operating cost estimate and must assume manufacturing costs and average market values applicable for that point of appraisal.

A sawmill is defined as a conversion facility capable of producing lumber and chips and includes the log sorting/storage areas and satellite mill yards if applicable.

The logs are deemed to have reached the point of appraisal once they have entered the site upon which the sawmill is located. All further log handling costs are deemed to be part of the manufacturing cost estimate.

POINTS OF APPRAISAL

Northern Interior (Zone 5) (Volume per tree less than 0.20 m³/tree, Zone 15)

Bear Lake	Burns Lake	Carnaby	Clear Lake
Engen	Fort St. James	Fraser Lake	Hazelton
Houston	Isle Pierre	Kitwanga	Mackenzie
Prince George	Quesnel	Smithers	Strathnaver
Upper Fraser	Vanderhoof		

Skeena (Zone 6) (Volume per tree less than 0.20 m³/tree, Zone 16)

Terrace

Southern Interior (Zone 7) (Volume per tree less than 0.20 m³/tree, Zone 17)

Adams Lake	Armstrong	Boston Bar	Canal Flats
Canoe	Castlegar	Craigellachie	Cranbrook
Creston	Donald	Elko	Galloway
Grand Forks	Kamloops	Kelowna	Lavington
Louis Creek	Lumby	Lytton	McBride
Merritt	Midway	Okanagan Falls	Park Siding
Princeton	Radium	Revelstoke	Slocan
Squamish	Thrums	Valemount	Vavenby
Westbank	Ymir		

Southern Cariboo (Zone 8) (Volume per tree less than 0.20 m³/tree, Zone 18)

100 Mile House

Chasm

Lillooet

Williams Lake

Fort Nelson - Peace (Zone 9) (Volume per tree less than 0.20 m³/tree, Zone 19)

Chetwynd

Fort Nelson

Fort St. John

Taylor

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

The appraiser must base his estimate of transportation costs on the method of transportation which will produce the least total operating cost estimate for the cutting authority area, unless that particular method of transportation is not possible under the cutting authority. In considering whether or not a particular method of transportation is possible under the cutting authority, the appraiser must not have regard for:

1. any destination referred to in the cutting authority, or
2. any document other than the cutting authority.

2.6 Calculation Conventions

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

Results from 5 to 9 are rounded upward and from 1 to 4 rounded downward.

After each phase cost estimate (\$/m³) has been rounded to the nearest cent it is summed with other estimates to obtain the total cost estimate.

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

Stumpage rate calculations are performed according to the methods specified in the document entitled, "SPECIFICATIONS: CALCULATING STUMPAGE RATES FOR INTERIOR APPRAISALS", approved by the Director, Revenue Branch.

Interior Selling Prices

3

Selling price estimates are based upon schedules of lumber and chip values collected and published by Revenue Branch. The values when compiled and distributed become an integral part of this manual.

3.1 Lumber Average Market Values (AMVs)

Monthly market value information from the Interior is obtained by Revenue Branch from lumber producers located in each of the recognized Average Market Value Zones. A zonal Average Market Value (AMV) for each species is compiled by dividing total sales value by total sales volume. Separate AMVs are derived for stud and for random lumber.

The total volume for each species includes all sizes and grades of rough or dressed lumber in the green or dried state, manufactured to Canadian Lumber Standard/American Lumber Standard (CLS/ALS) sizes and reported in foot-board measure (fbm). Also included are railroad ties, fingerjointed CLS/ALS lumber and machine stress rated (MSR) lumber.

Lumber manufactured in non-CLS/ALS sizes is adjusted to equivalent CLS/ALS volumes and included with the above.

The total net sales value for each species is reported in Canadian dollars, f.o.b. mill, after adjusting the selling price for all applicable freight charges, exchange adjustments, commissions, cash discounts, duty and entry charges and net railcar lease costs.

1. Small Log AMVs

Separate from stud and random length lumber AMVs is an AMV based on smaller, dimension lumber products capable of being produced from small trees.

Small log AMVs are used for all cutting authorities with an average volume per tree (conifers only) of less than 0.20 m³. Cutting authorities meeting this criteria will use lumber AMVs listed under Small Log AMVs in the Lumber AMV pages of 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 and Manufacturing costs will continue to be determined by zonation based on point of appraisal.

2. Stud Lumber AMVs

Studs are defined as all lumber which is 10 feet (approx. 3.25 m) or shorter in length, and which has a nominal thickness and width of 2 inches x 6 inches (approximately 5 cm x 15 cm) or smaller, as produced by any lumber manufacturer. Stud AMVs are compiled for two species groups; Lodgepole Pine/Douglas-fir/Larch and Spruce/Balsam. No other species are recognized as "stud species".

3. Random Lumber AMVs

Random AMVs are compiled for all species.

Wherever the data are inadequate to provide a reasonable average for a species within a zone, the data are combined with other species or zones (with appropriate adjustments) before use.

3.1.1 Application of Lumber Average Market Values

Application of the Stud and Random lumber AMVs in appraisals for all cutting authorities are made according to the formula in Section 3.3.

3.1.2 Lumber Average Market Value (AMV) Zones

Refer to Section 2.5 for a list of Points of Appraisal by Lumber Average Market Value (AMV) Zones.

3.2 Chip Average Market Values

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

3.3 Calculation of Species Selling Price

The total selling price in \$/m³ is determined for each species using lumber recovery factors (LRF) from the cruise compilation summary, LRF update add-ons, current applicable average market values for the species, zone, and species chip yield factors. Lumber and chip prices are each calculated to the nearest cent before being totalled.

In the case of burned timber, the appraisal chip price will be determined as the prorate of normal value for the volume undamaged or lightly burned, and zero value for the volume moderately and/or heavily damaged. The factors are determined from the following applicable formulas or tables:

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

<u>Zone</u>	<u>Species</u>	<u>LRF Update Add-Ons</u>	<u>Combined Product Recovery Factors</u>
Northern Interior (Zone 5) & Skeena (Zone 6)	Lodgepole Pine	60	424
	Spruce	63	424
	Balsam	59	424
	Douglas Fir	24	424
	Larch	23	424
	Cedar	19	424
	Hemlock	22	424
	White pine	22	424
<u>Southern Interior</u> (<u>Zone 7</u>)	Lodgepole Pine	60	402
	Spruce	66	402
	Balsam	59	402
	Douglas Fir	26	402
	Larch	25	402
	Cedar	21	402
	Hemlock	23	402
	White Pine	24	402
	Yellow Pine	26	402

<u>Southern Cariboo</u> (Zone 8)	Lodgepole Pine	49	412
	Spruce	54	412
	Balsam	50	412
	Douglas Fir	16	412
	Larch	15	412
	Cedar	12	412
	Hemlock	13	412
	White pine	12	412
	Yellow pine	15	412

<u>Fort Nelson-Peace</u> (Zone 9)	Lodgepole Pine	44	412
	Spruce	45	412
	Balsam	39	412

Example: Zone 5

<u>Lodgepole Pine</u>	<u>Cruise LRF</u>		<u>Update Add-on</u>		<u>Appraisal LRF</u>
All Logs	180	+	60	=	240

2. Chip Yield Derivation

Chip Yield (BDU/m³) = (Combined Product Recovery Factor - Appraisal LRF)
* Species Chip Yield Factor

3. Chip Yield Factors

<u>Species</u>	<u>Factor (BDU/fbm)</u>
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 percent (%) stud log is determined as follows:

The percent stud log for each stud species (spruce, balsam, lodgepole pine, Douglas fir and larch) is determined from the cruise compilation summary. The percent stud log 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 percent stud log is calculated and rounded to the nearest whole percentage point.

The percent (%) stud AMV is determined as follows:

$$\% \text{ stud AMV} = (5 * \% \text{ stud log}) - 225$$

If the percent stud log is less than 45, the percent stud AMV = 0;

If the percent stud log is more than 65, the percent stud AMV = 100.

5. Shipping Differential

The Shipping Differentials for the following points of appraisal are:

<u>\$0.40/m³</u>	<u>\$0.70/m³</u>	<u>\$4.03/m³</u>
Bear Lake	Adams Lake	Fort Nelson
Fort St. James	Clear Lake	
Mackenzie	Merritt	
Strathnaver	Midway	
Quesnel	Okanagan Falls	
	Princeton	
	Thrums	
	Westbank	
	Ymir	

6. Manufacturing Cost Differential

\$2.95/m³

Fort Nelson

7. Calculation of Total Species Selling Price

- a. Lumber AMV = $(\% \text{ Stud AMV}/100) * (\text{Stud AMV}/1000)$
 $+ (1.0 - (\% \text{ Stud AMV}/100)) * (\text{Random AMV}/1000)$
- b. Lumber SP = Lumber AMV * Appraisal LRF
- c. Chip SP = Chip Value * Chip Yield
- d. Total Species SP = (b) + (c) - D

Where	SP	=	Selling Price in \$/m ³
	AMV	=	The Average Market Value for lumber 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.

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 trended 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 appraiser must estimate operating costs for a cutting authority area in a manner which will produce the least total operating cost estimate for the cutting authority area. To this end, the appraiser must base his estimate of transportation costs on the operating cost estimates set out in this manual for the method of transportation which will produce the least total cost estimate to the point of appraisal, unless that particular method of transportation is not possible under the cutting authority.

In considering whether or not a particular method of transportation is possible under the cutting authority, the appraiser must not have regard for:

1. any destination referred to in the cutting authority, or
2. any document other than the cutting authority.

Operating cost estimates have been determined from a survey of logging and sawmilling operations in the Interior. The survey includes both employee and contractor operations.

The survey collects experienced 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.

The phase cost estimating formulas and tables in this manual were derived from this cost survey. Contract costs, including contractor profit and risk margins, overhead, crew transportation, etc., are included.

The phase cost estimates in this manual are complete and 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 to reflect operation-specific conditions are permitted. The estimates have an effective cost base date of July 1, 1993.

4.1.1 Specified Operations

In addition to the logging phases and systems that are covered by this manual, there are specified operations which require special cost estimating. The following is 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 manual phase cost estimates 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.

Further information on Specified Operations may be obtained from the Regional Appraisal Coordinator.

SPECIFIED OPERATIONS***AFFECTED PHASE***

Pushover Logging	Tree-to-Truck (Sec. 4.4)
Salvage Logging*	Tree-to-Truck (Sec. 4.4)
Skyline Logging (over 300m or requiring intermediate supports)	Tree-to-Truck (Sec. 4.4)
Stump removal for Root Disease Control	Silviculture (Sec. 4.10)
Skidder Swinging (includes all ground skidding methods)	Log Transportation (Sec. 4.4)
Ocean Tow	Log Transportation (Sec. 4.4)
Timber Harvested in Licenced Domestic Watershed (less than or equal to 90 km ² in size)	Development (Sec. 4.3), Road Maintenance (Sec. 4.6), Administration and Other Costs (Sec. 4.8)

* The salvage logging specified operation is for cutting authorities issued for the harvest of small, widely dispersed, patches of timber (e.g., blanket salvage permits).

4.2 Appraisal Data Requirements

The cruise and all other pertinent information required for the appraisal must be submitted with the appropriate **Interior Appraisal Data Sheet**.

Unless otherwise specified by the Director, Revenue Branch, cruise data must be gathered and compiled according to the approved utilization specifications and in accordance with the following Ministry of Forests Publications:

- *Forest Service Cruising Procedures & Cruise Compilation (Cruising Manual)*
- *Cruise Compilation Program - Documentation Manual*
- *Cruise Compilation System - Change Specification Detailed Requirements & Design*
- *Regional Publications - (e.g., Operational Cruising Requirements in a Forest Region)*
- *Forest Service Policies - (e.g., Timber Utilization Policy & Procedures for the Interior of the Province).*

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 determined by multiplying the net cruise volume per hectare (m^3/ha) by the total merchantable timbered area (ha) to be harvested in the cutting authority.

Each reappraisal uses the net cruise volume by species determined by adjusting the original cruise volume on the basis of approved amendments since the last appraisal.

4.3 Development

Development costs are estimated for the following construction phases: subgrade construction, placement of additional stabilizing material, and construction and installation of drainage and other pertinent structures.

The costs for development works may only be allocated to tributary cutting authorities. A cutting authority is considered to be tributary if:

1. 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, bulk fuels, supplies, equipment and the harvesting crew should be transported on this road on a daily basis.

Two methods of estimating development costs are used in the appraisal system:

1. Tabular cost estimates are made for construction of roads and drainage structures using the applicable formulas 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. If a tabular estimate cannot be made due to table limitations then 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.

Total estimated costs are divided by the applicable net cruise volumes and summed to determine the unit cost estimate (\$/m³) for development. Where utilization of deciduous volume is mandatory, the deciduous volume must be included in the applicable net cruise volume.

Where applicable, these cruised volumes and development cost estimates must be segregated on the basis of legal boundaries.

Throughout this section the term "roads" is meant to include roads, drainage and other pertinent structures.

4.3.1 Development Cost Allocation

Where proration is required for Section 4.3.1 part 1, 2 and 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 Cost Estimate (\$)	=	dollar amount of the total development cost estimate.
Appraised Timber Volume (m ³)	=	volume of appraised timber 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 tributary to the project and under the control of the licensee or a company 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 written off against the first cutting authority, subject to Section 4.3.1 (5).

The development cost estimated is allocated as follows:

1. New development cost estimates in appraised timber areas on Crown lands.

- a. Development providing access to appraised timber only;

Total estimated costs by tabular or detailed engineering methods are included in the appraisal of the cutting authority;

- b. Development providing access to non-appraised timber only;

Cost estimates are not included in the appraisal.

- c. Development in appraised timber areas providing access to both appraised and non-appraised timber;

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

2. Development cost estimates for full-appraisal on Timber Licence (TL) cutting authorities.

- a. New development will be allocated as in part 1 of Section 4.3.1.

- b. Unamortized development on the TL that is required for access to the cutting authority will be included in the appraisal of that cutting authority. Unamortized development is defined as:

- i. the development started after January 1, 1988;
- ii. development cost estimates were not included in any prior appraisal calculation for Crown timber (or were considered as zero), and
- iii. having had no non-appraised timber transported over the development (excluding Right of Way timber).

Costs for this type of existing development are exempt from Section 4.3.1, part 4.

Cost estimates for these existing roads will be derived from the nearest appraised cutting authority by:

- i. establishing the average road cost per kilometre from that appraisal estimate, excluding bridges and pertinent structures, and
- ii. multiply that \$/km by the kilometres of tributary road in the TL cutting authority.

Cost estimates for bridges or pertinent structures will be derived from the tables in Section 4.3.2.4 or from the detailed engineering estimates as defined in Section 4.3.3. At reappraisal, these initial cost estimates for existing development will be trended as provided for in Section 4.12, but will not otherwise be revisited.

3. Development Costs on Private Land

A part of a new or reconstructed road may lie on private land and may have a reasonable probability of being required on a major or long term basis for either timber extraction, future management of Crown forest land and/or present or future public use. In order to be considered in stumpage appraisal cost estimates, the right-of-way ownership must first be transferred to the Crown, except as stated below.

When a road on private land is required for only short term timber extraction the estimated cost of the road is included in the appraisal according to the procedures of Sections 4.3.

4. Existing Roads and Structures

The costs of previously constructed roads that have been included in appraisals of Crown timber, roads constructed to develop non-appraised timber and roads constructed all or in part for purposes unrelated to logging the cutting authority being appraised are considered to be "existing roads" and are not eligible for inclusion in development cost estimates. If the "existing road" requires reconstruction, the cost estimate is made as described in Section 4.3.3. If the "existing road" is on private land, road and land use charges may be applicable as described in Section 4.7.

5. Extended Road Amortization

Development cost estimates are applied against the first cutting authority appraised. However, where the total development cost estimates exceeds \$4.00/m³, a written agreement may be made at the time of the initial appraisal which apportions the main access road cost estimate to two or more tributary cutting authorities. The main access road ends at the far boundary of the first cutting authority.

The agreement is subject to the following conditions:

- a. Only the main access roads serving the tributary cutting authorities (as defined in Section 4.3) may be considered. The roads must be on Crown land.
- b. Each cutting authority must be in the licensee's approved forest development plan.
- c. The agreement must be signed by the licensee and the licensor.
- d. The amount apportioned will be a fixed lump sum, which will be trended as provided for in Section 4.12 but not otherwise revisited.
- e. The term of the agreement must not exceed the terms of the cutting authorities.
- f. The agreement will only be valid under Comparative Value Timber Pricing (CVP) and confers no obligation on the Crown to compensate licensees for any unamortized costs.

6. Reconstruction and Replacement

Reconstruction and Replacement are defined as replacement or structural repair of; a major drainage structure (e.g., replacing stringers, cross ties, or cribbing), major resurfacing of a section of road or major reconstruction of a section of road.

Major resurfacing means resurfacing sections each more than 0.3 km in length that were initially surfaced but have deteriorated due to long term wear and tear.

Major reconstruction means restoring at least 0.1 km of road per occurrence that requires complete rebuilding of the subgrade. The occurrence must be due to some cause other than the failure of the licensee to carry out required maintenance procedures.

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

Reconstruction and replacement cost estimates will be determined as detailed engineering cost estimates (Section 4.3.3.) and must be approved in advance by the District Manager. The cost estimates may be applied to remaining tributary timber (i.e., applicable volume).

Where bridge materials are re-used, at the second and subsequent locations, the cost estimate will include dismantling, transport and installation at the new site, but will exclude initial materials purchased and initial delivery costs of same.

Note: Costs may not be recognized if the licensee has been negligent or has not followed approved plans or standards.

7. Access Management

Access management is defined as the temporary removal of a major drainage structure or construction of a barrier, including a gate, excavation, or placement of boulders with the purpose of temporarily eliminating all vehicular traffic.

An access management cost estimate will be determined by an engineered estimate.

The access management must be required in the cutting authority document (based on a formal Access Management Plan).

Costs may be determined for more than one removal/replacement of the structure/barrier if the cutting authority term warrants it.

Costs approved under this section must not qualify under routine maintenance as described in Section 4.6.

8. Deactivation

The objective of deactivation is to return the site to as near its original site condition as required in the approved deactivation plan. A deactivation project must eliminate all vehicular access.

Only specific deactivation activities listed below that are required in a cutting authority document may be considered in appraisals. Temporary (seasonal) deactivation is considered as routine maintenance under Section 4.6.

For the purpose of this manual, deactivation includes the following activities:

- bridge removal,
- major culvert (i.e., over 950 mm or greater) removal,
- pull back unstable sidecast or road fills,
- cut/fill slope stabilization,
- recontouring, and
- deep fill removal.

Where a cutting authority containing timber licence volume is appraised, the only roads to be included for deactivation cost estimates are those that are appraised under Section 4.3.1.2 part 2.

A deactivation cost estimate will be calculated as a detailed engineering cost estimate (Section 4.3.3) and must be approved in advance by the District Manager. The cost estimates may only be applied to the cutting authority being appraised or to tributary timber. Cost recognition will only be given to those deactivation activities that are over and above those covered under the road maintenance cost estimate.

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 and grubbing, stripping, stump removal, ditch construction, turnout construction, 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 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 1.0 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. Short roads (up to 100 m long) that access single landings are included in the Tree-to-Truck cost estimates and are not eligible for development cost estimates.

2. **Road Type:**

Operational Roads: (OP)- are generally built under the authority of a Road Permit but portions may be constructed under the authority of a Cutting Permit. These roads do not include any roads built on a Forest Service right-of-way (i.e., addendum roads).

Operational roads exist within cut blocks only when the road accesses timber beyond the cutblock, or is intended to access timber beyond the block as shown on a development plan.

Block Roads: (BLOCK) - are generally built under the authority of a cutting permit.

Block roads include roads which are located within the cutblock boundaries and terminate within the cutblock.

Winter Roads: (WINTER) - are constructed for winter logging only using compacted and frozen mud, snow and debris. A minimal amount of subgrade excavation is performed and in the following spring the road is not passable and may be barely recognizable as a road.

It must be reconstructed if logging is not completed in a single winter logging season. This road type includes operational and block road categories. Stabilizing costs are not applicable to Winter Roads.

Winter Roads with a side slope over 15% are considered Block Roads.

3. **Slope:** (SLOPE %)

Uphill side slope percent may show a range of variation ($\pm 15\%$ about the average) within any section length and represents all slopes in the section. To derive a meaningful average for 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 slope percent is measured at right angles to the road centreline and recorded to the nearest integer. Where the road is located on a bench, the slope of the bench is used.

4. **Percent Rock:** (ROCK %)

Rock including large boulders, may be rippable or may require drilling and blasting. The 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.

5. **Soil Moisture:**

Wet is only applicable in soil moisture regimes 'sub-hygic, hygric, sub-hydric or hydric', and in CWH, MH, ICH, SBS, and ESSF Biogeoclimatic Zones.

Enter 1 in the equation under Section 4.3.2.3 if applicable.

6. **Region:**

Cariboo Forest Region (CA)

Kamloops Forest Region (KA)

Nelson Forest Region (NE)

Prince George Forest Region (excluding Forest Nelson, Fort St. John, and Dawson Creek Forest Districts (PG)

Prince Rupert Forest Region (PR)

Fort Nelson - Peace (includes Fort Nelson, Fort St. John, and Dawson Creek Forest Districts) (FNP)

4.3.2.3 Subgrade Cost Estimate

For each operational and/or block road the subgrade cost estimate is determined from the formula for the appropriate biogeoclimatic zone as follows:

$$\begin{aligned} \$/\text{km} = & \text{CONSTANT} + (186 * \text{ROCK}\%) + (a * \text{SLOPE}\%) \\ & + (2.08 * \text{ROCK}\% * \text{SLOPE}\%) + (b * \text{WET}) \\ & + (3831 * \text{NE}) + (c * \text{OP}) \end{aligned}$$

Where CONSTANT =

		Biogeoclimatic Zone									
		BWBS	CWH	MH	ICH	IDF	MS	SBPS	SBS	ESSF	Other
Constant		3316	8869	8869	8493	10	3316	56	3316	3316	3316
a		182	564	564	182	182	81	182	98	182	182
b		0	2995	2995	2995	0	0	0	2995	2995	0

		Region					
		CA	FNP	KA	NE	PG	PR
c		4167	3907	1739	0	6370	5653

For the above equations the following limits apply:

The subgrade cost estimate may not be less than \$1,000/km.

SLOPE % maximum = 80 (i.e., if SLOPE % exceeds 80%, 80 is used in calculation)

ROCK % maximum = 80 (i.e., if ROCK % exceeds 80%, 80 is used in calculation)

OP = 1 if an Operational Road, otherwise = 0

WET = 1 if Soil Moisture regime 'sub-hygic, hygric, sub-hydric or hydric' and in CWH, MH, ICH, SBS or ESSF biogeoclimatic zones; otherwise WET = 0.

NE = 1 if Nelson Region, otherwise NE = 0.

Also see Detailed Engineered Costs Section 4.3.3 (3).

WINTER ROADS

The subgrade cost estimate is determined from the following table for Winter Roads.

Side Slope %	All Winter Roads (\$/km)
0-5	3,200
6-10	4,100
11-15	4,900

Slopes over 15% are considered block roads (see Section 4.3.2.2).

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).

1. Culverts

The cost estimates for the supply and installation of culverts from 0.95 to 1.8 m diameter inclusive are determined from the following table. Detailed engineered estimates are required for culverts larger than 1.8 m in diameter, or outside this table, no interpolation of values is permitted.

INSTALLED COST ESTIMATE (\$)

Circular or oval pipes

	1.0	1.2	1.4	1.6	1.8	Diameter (m)
	0.78	1.13	1.54	2.00	2.54	X-Section Area (m ²)
Length (m)						
8	900	900	1199	1768	2337	
9	900	1057	1697	2337	2977	
10	900	1483	2194	2906	3617	
11	1128	1910	2692	3475	4257	
12	1483	2337	3190	4044	4897	
13	1839	2763	3688	4613	5537	
14	2194	3190	4186	5182	6177	
15	2550	3617	4684	5750	6817	
16	2906	4044	5182	6319	7457	
17	3261	4470	5679	6888	8097	
18	3617	4897	6177	7457	8738	
19	3972	5324	6675	8026	9378	
20	4328	5750	7173	8595	10018	
21	4684	6177	7671	9164	10658	
22	5039	6604	8169	9733	11298	
23	5395	7031	8666	10302	11938	
24	5750	7457	9164	10871	12578	
25	6106	7884	9662	11440	13218	
26	6462	8311	10160	12009	13858	
27	6817	8738	10658	12578	14498	
28	7173	9164	11156	13147	15138	
29	7528	9591	11653	13716	15778	
30	7884	10018	12151	14285	16419	

2. Log Bridges

Cost estimates are made for bridges where their necessity is substantiated by field data. Cost estimates for non-log bridges, where required, are made as detailed engineering estimates (Section 4.3.3).

Cost estimates for log bridges are based on span lengths (distance between the centres of the top sill logs) and average crib height (measured from the bottom of the bottom sill log to the point where the stringer rests on the top sill log at the centre line of the bridge) from the table that follows. Cost estimates for bridge sizes greater than the table limits require detailed engineering data as described in Section 4.3.3.

Table values are for both timber-decked and gravel-surfaced bridges. Gravel-surfaced bridges have guard logs lashed to the cribs and stringers. Crib back-fills and all site preparation and protection features such as rip rap are included, as well as material and equipment supply and delivery. No adjustment of table values is permitted. Input data within table boundaries is rounded to fit; no interpolation of values is permitted.

LOG BRIDGE COST ESTIMATE

(Thousands of Dollars)

Span Length (m)	Single Log Sill	Multi-Log Crib Average Crib-Height (m)			
		2	3	4	5
4	4.6	7.3	9.4	11.4	13.5
5	5.4	8.1	10.1	12.2	14.3
6	6.2	8.9	10.9	13.0	15.1
7	7.0	9.7	11.7	13.8	15.9
8	7.8	10.5	12.5	14.6	16.6
9	8.6	11.3	13.3	15.4	17.4
10	9.4	12.1	14.1	16.2	18.2
11	10.2	12.8	14.9	17.0	19.0
12	11.0	13.6	15.7	17.8	19.8
13	11.8	14.4	16.5	18.6	20.6
14	12.5	15.2	17.3	19.3	21.4
15	13.3	16.0	18.1	20.1	22.2

4.3.2.5 Additional Stabilizing Material (ballast, gravel)

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. Where stabilizing material developed during the subgrade or ditch construction is insufficient, a cost estimate for additional stabilizing material may be included in the appraisal for the material required to be trucked in from selected borrow pits.

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 and quarries 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 the access road cost estimate is required in addition to the in-place unit cost estimates.

For each road, the additional stabilizing material cost estimate is determined from the formula for the appropriate Biogeoclimatic Zone as follows:

$$\$/\text{km} = \text{CONSTANT} + (a * \text{SLOPE}\%) + (c * \text{OP}) + (73 * \text{HAULD}) + (5202 * \text{QROCK}) + (-3997 * \text{NE})$$

Where CONSTANT =

	Biogeoclimatic Zone									
	BWBS	CWH	MH	ICH	IDF	MS	SBPS	SBS	ESSF	Other
Constant	6944	10434	10434	11358	6944	9815	6944	6944	9645	6944
a	0	259	259	0	0	0	0	0	0	0

	Region					
	CA	FNP	KA	NE	PG	PR
c	0	0	0	4278	2868	1492

For the above equations:

- QROCK = 1 if road is stabilized with quarried rock that requires drilling and blasting. Otherwise QROCK = 0.
- SLOPE % = The average side slope percentage for the road section being stabilized. SLOPE % maximum = 80 (i.e., if SLOPE % exceeds 80%, 80 is used in the calculation).
Also see Detailed Engineered Costs Section 4.3.3 (3).
- HAULD = The distance from the mid-point of the road section being stabilized to the nearest source of stabilizing material, measured to the nearest 0.1 km. Distances less than 0.1 km are not recognized.
- OP = 1 if an Operational Road. Otherwise OP = 0.
- NE = 1 if Nelson Region. Otherwise NE = 0.

4.3.2.6 Cattle Guards, Remedial Fences and Pipeline Crossings

Where the cutting authority specifies the installation of cattle guards, the installed cost of each, using new or recycled materials, is estimated at **\$3,000** each. This cost includes transportation, installation and gates. Wing and remedial fences, when required, are an additional cost at **\$450.00 per 100 m** of fence.

When a pipeline crossing is necessary a cost estimate is made by using the Detailed Engineered Cost Method as described in Section 4.3.3.

4.3.2.7 Winter Road Reconstruction

Winter Road Reconstruction is defined as the reconstruction of previously used winter roads and seismic lines; as defined under Winter Roads, Section 4.3.2.2. These costs are included in the road maintenance cost estimate; Section 4.6.

4.3.3 Detailed Engineered Costs

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 estimate.

In all cases, the items listed from 1 to 16 require detailed engineering cost estimates for appraisals.

Where specific development projects involve detailed engineering estimates, the District Manager shall be advised of project details no later than 60 days before the start of work on the project, or no later than 60 days before the appraisal meeting, whichever event occurs first.

For appraisal purposes, the estimated project costs are made on the basis of the site-specific data and the equipment and labour rates specified in Appendix 1. 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. The following specific situations reported by the licensee's are considered for detailed engineered cost estimates:

1. New construction and upgrading of Forest Service roads that meet the criteria and conditions provided in the Main Access Roads policy.
2. Road traversing private land.
3. Road construction on side slopes greater than 80%, or when rock percent exceeds 80%.
4. Road construction on terrain with two or more gullies over 10 m deep at centreline in a 0.3 km section.
5. End haul construction requiring removal of excavated material to a spoil area.
6. Overland construction to provide a roadbed by trucking in material for extensive filling.
7. Multispan bridges, non-log bridges (i.e., Glulam, etc. including portable bridges), log bridges with greater than 5.4 m average crib height, and/or greater than 15.4 m span length, or ice bridges including ice bridge reconstruction for additional logging seasons following the procedures outlined in Section 4.3.2.7.
8. Structural maintenance of bridges.
9. Reconstruction or upgrade of roads, or pertinent structures.
10. Replacement of road running surfaces with uninterrupted lengths over 0.3 km and loose depth of stabilizing material over 5 cm.
11. Metal culverts greater than 1.8 m in diameter when specified in the cutting authority.
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.
14. Deactivation of roads (see Section 4.3.1 (8)) which are part of the development phase cost estimate; or are tributary to the cutting authority.
15. Double lane roads.
16. Pipeline crossings.

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.

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

1. If the span is 15.4 m or less and a permanent structure is proposed, an economic comparison between a log structure and the permanent proposal is required.
2. For spans greater than 15.4 m; plans, specifications and design for 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 the timber.
3. For pipe culverts greater than 1.8 m in diameter or 30 m in length, information similar to bridge spans greater than 15.4 m.

Costs that may be included in the engineered estimate are:

- Freight (for materials),
- Provincial sales tax (for materials),
- Supervision of construction of complex structures by a Professional Engineer, and
- Bridge certification by a Professional Engineer (maximum of three field trips) unless otherwise approved by the Regional Appraisal Co-ordinator.

The costs for Professional Engineers are permitted whether they are on the licensees staff or hired under contract.

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 above cost estimates may be apportioned to two or more licensee's tributary cutting authorities and the apportioned total dollar amount recognized in the stumpage rate determination of those cutting authorities, as described under Subsection 4.3.1. (5).

Small Business Forest Enterprise Program projects which are constructed or reconstructed at Crown expense are estimated separately to enable the determination of an appropriate development cost levy.

4.4 Tree-to-Truck

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

- felling
- skidding
- yarding
- bucking
- bush sorting
- loading
- landing construction and reconstruction
- back spar trail construction and rehabilitation
- skid trail construction and rehabilitation
- accommodation (for non-isolated cutting authorities)
- fuel and equipment moving costs
- contractor overhead and profit
- tree marking
- three metre knockdown
- lop & scatter
- landing burning (includes fireguards)
- roadside debris piling and disposal
- crew transportation
- mistletoe control
- landing rehabilitation (includes seeding)
- pheromone treatment
- slashing

4.4.1 Required Logging Systems

These are recognized only when constraints on the logging system and required volumes are specified in the cutting authority document.

For the purpose of amendment (see Section 2.3 - 2 ii) any change in the following systems affecting at least 10% of the cutting authority volume, is cause for reappraisal. These changes must be required in the cutting authority documents or PHSP.

- Helicopter,
- Horse,
- Ground Skidding (conventional),
- Ground Skidding (sensitive site), and
- Overhead Cable Logging.

4.4.2 Tree-to-Truck Variables

For appraisal purposes the following variables are recognized, based upon all compiled cruise plots segregated by logging system where applicable (see Section 4.4.5).

1. Biogeoclimatic Zone

A separate biogeoclimatic zone may be recognized for each of overhead cable (clear cut), overhead cable (partial cut), ground skidding (clear-cut) and ground skidding (partial cut) logging systems.

2. Volume per Tree (VOLTREE)

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

3. Volume per Hectare (VOLHA)

The average net merchantable 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 Defect (DEFECT%)

Percent defect is the estimate of decay, waste and breakage (DWB) percent of gross stand coniferous volume from the cruise summary for the trees to be harvested. DEFECT% is recorded to the nearest whole percentage point for appraisal calculation purposes.

5. Percent Partial Cut (PCUT)

Partial cutting includes silviculture systems such as faller selection, shelterwood, and group selection (where the opening size does not exceed one hectare).

The percent partial cut is determined as:

$$\frac{\text{Net merch volume required to be removed using the Partial Cut System}}{\text{Total net merch stand volume on the area where Partial Cut System is required}} * 100$$

6. Slope (SLOPE)

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

7. Percent Sensitive Site (also known as Low Ground Pressure Skidding)

The system is recognized when the required volume equals or exceeds 1%. Sensitive site ground skidding is only recognized where such treatment is specifically identified in the PHSP or cutting authority documents.

8. Percent Blowdown (BD%)

The percentage of the net cruise volume classified as blowdown.

9. Distance to Support Centre (DS)

Accessible 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 main post office or other location designated by the Regional Appraisal Coordinator in a community from the following list. Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre.

List of Communities by Forest RegionPrince Rupert

Burns Lake	New Hazelton	Smithers	Stewart
Kitwanga	Houston	Kitimat	
Terrace			

Kamloops/Vancouver

Boston Bar	Clearwater	Hope	Kamloops
Kelowna	Lillooet	Merritt	Pemberton
Penticton	Princeton	Salmon Arm	Vernon

Prince George

Chetwynd	Dawson Creek	Fort Nelson	Prince George
Fort St. John	Mackenzie	McBride	Fraser Lake
Valemount	Vanderhoof	Fort St. James	

Nelson

Castlegar	Cranbrook	Creston	Fernie
Golden	Grand Forks	Greenwood	Invermere
Nakusp	Nelson	Revelstoke	Canal Flats

Cariboo

100 Mile House	Quesnel	Williams Lake
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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.

4.4.3 Tree-to-Truck Cost Estimate

Tree-to-Truck costs estimates are determined for each logging system as follows:

1. Helicopter Logging

It is the policy of the Ministry of Forests to pre-designate areas where helicopter logging is prescribed in the cutting authority as the method of harvesting. Only partial cut and clear-cut logging variables are recognized. The cost estimates are applied to the volume of timber which the licensor requires to be logged by helicopter.

Two variations of the system are recognized:

- a. Clear Cut $\$/\text{m}^3 = 60.58$

Clear Cut is defined as volume removal of 90 percent or greater.

- b. Partial Cut $\$/\text{m}^3 = 66.04$

The cost estimates are applied to the volume of timber which is required by the cutting authority document to be harvested by a method that results in 1 to 89% of the merchantable volume to be removed from the site.

2. Horse Logging

No variables are recognized for this system. The cost estimates are applied to the volume of timber which the licensor requires to be skidded by horse(s).

$$\$/\text{m}^3 = 22.50$$

3. Ground Skidding

Variations recognized within the system are:

- a. Clear Cut

Clear Cut is defined as volume removal of 90 percent or greater.

- b. Partial Cut

The cost estimates are applied to the volume of timber which is required by the cutting authority document to be harvested by a method that results in 1 to 89% of the merchantable volume to be removed from the site.

When the volume per tree is less than 0.20 m^3 , a cost additive will apply to the Ground Skidding Tree-to-Truck cost estimates in all Forest Regions. The cost additive is determined as follows:

$$$/\text{m} = 2.00 - 7.45 * \text{VOLTREE}$$

The tree-to-truck cost estimate is determined from the formula for the appropriate Biogeoclimatic Zone as follows:

$$\begin{aligned} \$/\text{m}^3 = & \text{CONSTANT} + (3.06 * \text{SS\%/100}) + (5.00 * \text{SLOPE\%/100}) \\ & - (2.92 * \text{VOLHA/1000}) + (1.57 * \text{DEFECT\%/100}) + (2.69 * \text{BD\%/100}) \\ & + (1.47 * \text{DSEL}) - (1.57 * \text{PCUT\%/100}) + (0.33 * \text{SUPP2/100}) \\ & + (1.06 * \text{SUPP3/100}) \end{aligned}$$

Where CONSTANT =

Region/District	Biogeoclimatic Zone				
	CWH	MH	SBPS	SBS	All Other
Cariboo	18.28	18.28	14.05	14.45	15.39
Fort Nelson, Fort St. John, and Dawson Creek	N/A	N/A	12.71	13.11	14.05
Nelson	N/A	N/A	N/A	N/A	15.91
Other	17.60	17.60	13.37	13.77	14.71

For the above equation:

- if DS is less than or equal to 50 km, then SUPP2 = 0,
- if DS is greater than 50 km and less than or equal to 150 km, then SUPP2 = DS-50,
- if DS is greater than 150 km, then SUPP2 = 100,
- if DS is less than or equal to 150 km, then SUPP3 = 0,
- if DS is greater than 150 km, then SUPP3 = DS -150,
- if BD % is less than or equal to 15, then BD % = 0,
- DSEL = 1 if percent partial cut is greater than zero but less than 90%. Otherwise DSEL = 0,

- PCUT % is volume removed in a partial cut (if partial cut % $\geq 90\%$, PCUT = 0),
- SS % is percent of total volume removed by Sensitive Site Skidding.

4. Overhead Cable Logging

This system is recognized when required in the cutting authority document. The cost estimates are applied to the volume of timber which the licensor requires to be yarded by overhead cable logging systems. The system includes both stationary (spar) and mobile (grapple) yarders but variations in machine size, spar/boom height, winch line capacity and yarding technique are not recognized.

Variations recognized within the system are:

a. Clear Cut

Clear Cut is defined as 100 percent volume removal.

b. Partial Cut

The cost estimates are applied to the volume of timber which is required by the cutting authority document to be harvested by a method that results in 1 to 99% of the merchantable volume to be removed from the site.

When the volume per tree is less than 0.20 m³, a cost additive will apply to the Overhead Cable Logging Tree-to-Truck cost estimates in all forest regions. The cost additive is determined as follows:

$$$/\text{m}^3 = 2.00 - 7.45 * \text{VOLTREE}$$

The tree-to-truck cost estimate is determined from the formula for the appropriate biogeoclimatic zone as follows:

$$\begin{aligned}
 \$/\text{m}^3 = & \text{CONSTANT} + (2.93 * \text{SLOPE}/100) - 4.11 * (\text{VOLHA}/\text{VOLTREE}/1000) \\
 & - (2.43 * \text{GVOL}) + (0.23 * \text{GVOLSQR}) + (2.10 * \text{BD}\%/100) \\
 & + (5.06 * \text{DSEL}) + (2.10 * \text{SUPP2}/100)
 \end{aligned}$$

Where CONSTANT =

Region	Biogeoclimatic Zone			
	CWH	MH	SBS	Other
Kamloops	N/A	N/A	25.79	27.59
Other	30.21	30.21	26.75	28.55

For the above equation:

- if DS is less than or equal to 50 km, then SUPP2 = 0,
- if DS is greater than 50 km but less than or equal to 150 km, then SUPP2 = DS-50,
- if DS is greater than 150 km, then SUPP2 = 100,
- DSEL = 1 if percent partial cut is greater than zero. Otherwise DSEL = 0,
- GVOL = 'Gross' volume per tree (m³) computed as VOLTREE / (1 - DEFECT%/100),
- GVOLSQR = GVOL squared, and
- if BD% is less than or equal to 15, then BD% = 0.

4.4.4 Tree-to-Truck Additive for Damaged Timber

The following cost estimate additives are recognized for heavy fire damage (HFD), and dead useless snags (DUS). The data are collected as specified by the Forest Service Cruising Procedures and Cruise Compilation Manual. The additional costs incurred to harvest blowdown timber are recognized in the Tree-to-Truck ground skidding equations (Section 4.4.2.7).

The following additive is determined for overhead cable, ground skidding (clear-cut) and ground skidding (partial cut) and is added to the TTT cost estimate.

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

Where: DT% is the Damaged Timber percent (%)

$$DT\% = HFD\% + DUS\%$$

Where: DT% is less than 15%, DT = 15

DT% is more than 100%, DT = 100

Determination of Percent (%):

$$1. \text{ HFD\%} = \frac{\text{Conifer HFD Volume (m}^3\text{)} * 100}{\text{Total Net Conifer Volume (m}^3\text{)}}$$

$$2. \text{ DUS\%} = \frac{\text{Conifer DUS Snags / ha} * 100}{\text{Net Merchantable Conifer Stems / ha} + \text{Conifer DUS Snags / ha}}$$

4.4.5 Prorating Tree-to-Truck Cost Estimates

Where ground skidding (clear-cut) is not feasible on part of the area and ground skidding (partial cut), helicopter logging, horse logging or overhead cable logging is required, a proration of more than one system is necessary.

The variables for each required system must be based on a cruise compilation of only those plots located within the area to be harvested by the system. Plots located in areas requiring helicopter logging or horse logging are excluded from the cruise compilations used in the determination of tree-to-truck variables for other logging systems.

The additive for damaged timber is also determined separately for each applicable system.

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:

$$\begin{aligned} & \frac{(\text{Cost Heli(C)})(\text{V Heli(C)})}{(\text{TNCV})} + \frac{(\text{Cost Heli(P)})(\text{V Heli(P)})}{(\text{TNCV})} + \frac{(\text{Cost Horse})(\text{V Horse})}{(\text{TNCV})} + \frac{(\text{Cost OC(C)})(\text{V OC(C)})}{(\text{TNCV})} \\ & + \frac{(\text{Cost OC(P)})(\text{V OC(P)})}{(\text{TNCV})} + \frac{(\text{Cost GS(C)})(\text{V GS(C)})}{(\text{TNCV})} + \frac{(\text{Cost GS(P)})(\text{V GS(P)})}{(\text{TNCV})} \end{aligned}$$

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

OC (C)= overhead cable logging (clear-cut)

OC(P) = overhead cable logging (partial cut)

GS(C) = ground skidding (clear-cut)

GS(P) = ground skidding (partial cut)

TNCV = Total Net Cruise Volume (m³)

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.

4.5.1 Truck Haul Variables

For appraisal purposes, the following variables are recognized:

1. **Weighted Average Cycle Time (T):** this is estimated in hours (rounded to the nearest one tenth of an hour) from the cutting authority to the point of appraisal or the appraisal place of unloading (water or rail transport).

The weighted average cycle time is determined by:

- a. establishing the geographical centre point of each cut block or cutting area and projecting this point to the nearest road for measurement purposes;
- b. from this point, determining the cycle time to the nearest junction serving all cut blocks or cutting areas;
- c. weighting the cycle time for each cut block by the volume (if available) on the cut block and determining the average cycle time to the junction. If the cut block volume is not available, the cut block area is used for weighting the cycle time;
- d. Determining the cycle time from the junction to the point of appraisal or the first place of unloading and adding this to the average weighted cycle time to the junction as outlined previously.

The cycle consists of load, haul, weigh, unload, return time, and unavoidable delays or idle time. 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.

The cycle time from an existing nearby cutting authority may be used as the basis for new cutting authority if the Appraisal Coordinator considers the existing cycle time to be representative of the factors affecting both.

Note: 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).

Definitions

- a. Unavoidable delays: those 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/adjusting brakes, minor delays prior to loading/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;

- b. Load, weigh and unload: those periods when those activities are observed;
- c. Haul and return: those periods when the truck is in motion transporting logs to the destination or returning empty;
- d. Species Percent (species code in equation) where:

BA	=	Balsam	SP	=	Spruce
CE	=	Cedar	WH	=	White Pine
HE	=	Hemlock	YE	=	Yellow Pine
LO	=	Lodgepole Pine			

2. 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 upon the licensee's particular method.

Definitions

- a. **Highway** hauling is assumed when loaded logging trucks must travel over roads administered under the Highway Act and its pertinent Regulations, 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 (Section 4.4.2) is less than 0.20 m³.
- b. **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 recognized water/special transportation systems where prolonged known restrictions (e.g., bridge load limit, narrow road, through rock cut, etc.) do not prevent the use of oversize loads.

4.5.2 Truck Haul Cost Estimates

4.5.2.1 Primary Haul

The primary or initial truck haul cost estimate is determined from the formula for the appropriate Forest Region and/or District.

For all highway haul equations the minimum is \$1.91/m³, if T is greater than 0.

For all off-highway haul equations the minimum is \$1.48/m³, if T is greater than 0.

Highway $\$/\text{m}^3 = \text{CONSTANT} + (1.73 * T) - (1.37 * \text{CE}/100) + (2.48 * \text{HE}/100) + (0.24 * \text{FI}/100) - (0.90 * \text{SP}/100) - (1.45 * \text{WH}/100)$

Where CONSTANT =

P. Rupert	P. George except FNPeace	FNPeace	Cariboo	Nelson	Kamloops
0.20	0.72	1.02	0.37	0.37	0.18

Off-Highway $\$/\text{m}^3 = \text{CONSTANT} + (1.33 * T) - (0.64 * \text{CE}/100) - (0.67 * \text{SP}/100)$

Where CONSTANT =

P. Rupert	P. George except FNPeace	FNPeace	Cariboo	Nelson	Kamloops
0.50	0.80	0.15	1.08	0.80	0.37

T = Weighted average Cycle time, if T = 0 then $\$/\text{m}^3 = 0$.

4.5.2.2 Secondary or Re-Haul

This cost estimate is made when logs must be truck hauled between the dewater and reload site to the next appraised point of unloading.

$$\$/\text{m}^3 = 2.2661 * T$$

Where: T is the weighted average cycle time for the secondary haul using the method described in Subsection 4.5.1.1.

4.5.3 Water Transportation

A cost estimate is made when logs must be transported by water between the cutting authority and the point of appraisal. The estimate includes the costs of strapping logs on the truck, dumping, booming, developing and operating dumping and booming grounds, and towing.

1. Dump and Boom:

Arrow, Kinbasket, Ootsa, Revelstoke 1880 and Williston Lakes: \$2.26/m³

All Other Lakes: \$1.55/m³

2. Tow:

Arrow, Kinbasket, Ootsa, Revelstoke 1880 and Williston Lakes:

$$$/m^3 = 0.6991 + 0.0051 * d$$

All other Lakes:

$$$/m^3 = 0.4380 + 0.0105 * d$$

Where d = one-way tow distance in kilometres

3. Dewater and Reload:

Quesnel Lake \$4.23/m³

All Other Lakes \$1.31/m³

Only considered if the mill infeed is not located on the same lake.

4. Dewater only: \$1.31/m³

Recognized only for Williston Lake. For other dewatering, the costs are included in 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

B.C. Rail - Dease Lake Extension: \$5.02/m³

All Other Railways: \$2.23/m³

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.

B.C. Rail Log Transportation

<u>Origin</u>	<u>Cost Estimate (\$/m³)</u>	<u>Point of Appraisal</u>
Leo Creek	13.82	Fort St. James
Lovell	14.71	Fort St. James
Bear Lake	15.73	Fort St. James
Minaret Creek	16.05	Fort St. James
Niteal	12.56	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:

- a. Babine Lake (South): \$1.56/m³
- b. Kinbasket Lake: \$3.05/m³
- c. Revelstoke 1880 Lake: \$3.11/m³
- d. Williston Lake: \$3.33/m³

For any other location, the cost estimate is determined by the Director, Revenue Branch.

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.

- a. 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:

Ootsa Lake: \$0.48/m³

Kinbasket Lake: \$1.62/m³

For any other location the cost estimate is determined by the Director, Revenue Branch.

4. Other Systems

The cost estimate for other systems are:

- a. Arrow Dam Log Transfer: \$1.61/m³

This includes raft dismantle and rebuild, and all related on-site costs.

- b. Hansard Low Water Bridge *: \$0.33/m³
- c. Williston Lake Dry Dump *: \$2.81/m³

* Applicable to winter logged volume estimate only.

4.6 Road Maintenance

Routine road maintenance includes, but is not limited to, the following:

- grading
- snowplowing and freezing in
- 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
- ditching
- winter road reconstruction
- seasonal erosion control
- roadside treatments
- sign maintenance
- dust control
- brushing
- minor flood and storm damage repair
- slough removal
- water bar construction
- road ripping
- final erosion control
- cross ditch construction
- grass seeding

Routine road maintenance also includes minor repairs to roads due to slides, erosion and flood damage, and all road use charges paid to other licensees.

The cost estimate for all routine maintenance carried out on logging operations depend on the geographic location of the cutting authority. Cost estimates do not apply where there is less than one kilometre of road to be maintained.

For a management unit other than a Timber Supply Area or Tree Farm Licence (primarily Woodlot Licences), the routine road maintenance cost estimate is **\$1.26/m³**.

The geographic location is recognized by Forest Region, Timber Supply Area and Block, and Tree Farm Licence as follows.

Routine Road Maintenance Cost Estimates

<u>Region</u>	<u>TSA #</u>	<u>Name</u>	<u>Timber Supply Block etc.</u>	<u>\$/m³</u>
<u>Prince Rupert</u>	3	Bulkley	All	1.36
	4	Cassiar	All	1.51
	42	Cranberry	All	1.51
	10	Kalum	All	1.51
	12	Kispiox	All	0.99
	14	Lakes	All	0.89
	20	Morice	All	1.29
	43	Nass	All	1.51
		TFLs 1, 41		1.51

<u>Region</u>	<u>TSA #</u>	<u>Name</u>	<u>Timber Supply Block etc.</u>	<u>\$/m3</u>
<u>Kamloops</u>	11	Kamloops	1	1.56
	11	Kamloops	2, 3, 4	1.04
	15	Lillooet	All	2.29
	18	Merritt	All	1.08
	22	Okanagan	1, 2, 3	1.26
	22	Okanagan	4, 5	1.05
	22	Okanagan	6, 7, 8, 9	1.73
		TFL 15		1.26
		TFL 18		1.56
		TFL 33		1.73
		TFL 35		1.04
		TFL 49		1.05
<u>Prince George</u>	41	Dawson Creek	All	1.28
	8	Fort Nelson	All	2.91
	40	Fort St. John	All	1.39
	16	Mackenzie	All	2.08
	24	Prince George	G, H	1.45
	24	Prince George	E, F, I	0.91
	24	Prince George	D	1.03
	24	Prince George	A, B, C	1.02
	17	Robson Valley	All	1.64
	41	TFL 48		1.28
	24	TFLs 30,53		1.45
	24	TFL 42		1.02
<u>Nelson</u>	1	Arrow	All	2.28
	2	Boundary	All	1.22
	5	Cranbrook	All	1.53
	7	Golden	All	2.39
	9	Invermere	All	1.25
	13	Kootenay Lake	All	1.43
	27	Revelstoke	All	2.41
		TFL 3, 23		2.28
		TFL 8		1.22
		TFL 13		1.53
		TFL 14		1.25
		TFLs 55, 56		2.41

<u>Region</u>	<u>TSA #</u>	<u>Name</u>	<u>Timber Supply Block etc.</u>	<u>\$/m3</u>
<u>Cariboo</u>	26	Quesnel	A, B, C, D	0.44
	26	Quesnel	E, F, G, H, I	0.93
	29	Williams Lake	A, B, C, D, E, I	0.68
	29	Williams Lake	F, G, H, J, P	0.66
	29	Williams Lake	K, L	0.85
	29	Williams Lake	M, N	1.25
	23	100 Mile House	All	0.88
		TFL 5		0.44
		TFL 52		0.93

4.7 Road and Land Use Charges

1. Charges as a Share of Road Maintenance

No recognition is made of such charges. The routine road maintenance cost estimate, Section 4.6, has been developed inclusive of inter-licensee charges. The road maintenance cost estimate 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 categories of road status under the Forest Act.

a. Forest Service Roads

A road that is declared, determined, built, maintained or modified by the Ministry, as defined in the Forest Act. No road use charges will be considered in appraisals;

b. Operations Roads

Roads built on Crown land, authorized by road permit or letter of consent under the former Act, and deemed to be owned by the holder of the permit or letter until it expires, or until the holder declares non-ownership, as detailed in the *Forest Act*, Section 95. No road use charges will be considered in appraisals;

c. Other Roads

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

- i. the Crown is legally incapable of acquiring a right-of-way or road; or
- ii. an existing road on non-Crown land is required only for short term timber extraction.

The charges recognized must be reasonable, must not exceed compensation that might be determined under the *Forest Act*, Section 94, and must be proven through the presentation of auditable documents.

3. Other Land Use Charges

Foreshore leases, camp areas and dryland sorts are treated in the same manner as operations roads. Only non-governmental short term land use charges will be considered in appraisals.

Prior to a stumpage appraisal cost estimate (referred to in Section 4.7) being used in any appraisal, the licensee must:

- a. submit a "Request for Approval of a Road Use Charge" form with the appraisal data sheet; and
- b. receive written approval of the road or land use charge from the Regional Manager.

4.8 Administration and Other Costs

4.8.1 Overhead

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

Overhead costs include:

- Office Operations,
- Scaling,
- Engineering,
- Cruising,
- Environmental Protection,
- Waste and Residue surveys,
- Right-of-way easements,
- Foreshore and other land leases, and
- Consultants fees where they are not specific to a project eligible for engineered costs.

Any costs that will be reimbursed through Section 88 of the *Forest Act* are excluded.

Cost estimates for each point of appraisal are shown in the following table:

Group A \$4.90/m³	Group B \$4.15/m³	Group C \$3.85/m³	Group D \$3.46/m³
Carnaby	Chetwynd	Chasm	Bear Lake
Hazelton	Fort Nelson	100 Mile House	Burns Lake
Kitwanga	Fort St. John	Williams Lake	Clear Lake
Smithers	Taylor		Engen
Terrace			Fort St. James
			Fraser Lake
			Houston
			Isle Pierre
			Mackenzie
			Prince George
			Quesnel
			Strathnaver
			Upper Fraser
			Vanderhoof
Group E \$4.33/m³	Group F \$5.81/m³	Group G \$5.72/m³	
Armstrong	Adams Lake	Boston Bar	
Kamloops	Canoe	Canal Flats	
Kelowna	Castlegar	Cranbrook	
Lavington	Craigellachie	Creston	
Louis Creek	Donald	Elko	
Merritt	Lumby	Galloway	
Okanagan Falls	McBride	Grand Forks	
Princeton	Park Siding	Lillooet	
Squamish	Revelstoke	Lytton	
Westbank	Slocan	Midway	
	Thrums	Radium	
	Valemount		
	Vavenby		
	Ymir		

4.8.2 Isolated Cutting Authorities

An isolated cutting authority is defined as one that has no continuous road access from the nearest support centre (listed in Section 4.4.2.8) to the centre of the cutting authority.

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. Continuous road access includes public ferry service or private daily ferry or daily barge service.

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 camp (or cutting authority where there is no camp) whether by crew boat, periodic barge service, air, or rail. Also covered are the depreciation, maintenance and operating costs of any camp facilities and the non-recoverable costs incurred for cookhouse, family quarters, bunk houses, shop, office and other pertinent buildings.

For isolated cutting authorities serviced by camps, 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 at the following locations are:

1. Williston Lake: $\$7.17/\text{m}^3$
2. Niteal Rail: $\$5.09/\text{m}^3$
3. Quesnel Lake: $\$5.00/\text{m}^3$

For any other locations, the cost estimate is determined by the Director, Revenue Branch.

4.9 Post-Logging Treatment Costs

Post-logging costs are those which are incurred after logging because of treatments specified in the cutting authority. All post-logging requirements are included in the tree-to-truck phase.

4.10 Basic Silviculture Cost Estimate

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

Basic silviculture treatment regime(s) cost estimates include all treatment costs that are required to achieve the free-growing stocking standards, as referred to in the Silviculture Regulation (B.C. Reg. 147/88).

The following table lists the treatment regimes and associated cost estimates (\$/ha) for each Group of Forest Districts.

Forest District Groupings

<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
Kispiox	Dawson Creek	100 Mile House	Vanderhoof
Kalum	Fort Nelson	Chilcotin	Morice
Cassiar	Fort St. John	Williams Lake	Fort St. James
Bulkley			Lakes
			Mackenzie
			Quesnel
			Prince George
<u>Group 5</u>	<u>Group 6</u>	<u>Group 7</u>	
Vernon	Golden	Invermere	
Penticton	Arrow	Cranbrook	
Merritt	Horsefly	Boundary	
Kamloops	Salmon Arm	Lillooet	
	Robson Valley		
	Revelstoke		
	Kootenay Lake		
	Clearwater		

Treatment Regimes Cost Estimates Table

Regime	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
	\$/ha	\$/ha	\$/ha	\$/ha	\$/ha	\$/ha	\$/ha
A	2227	2411	2369	2062	1860	2623	2538
B	1826	1998	1909	1717	1536	2182	2032
C	1402	1348	1157	1266		1400	1377
D		1185	797	1269	879	1181	1281
E			1486	1450	1170	1792	1488
F	1413	1601		1377		1763	
G			620		636	718	928
H	1659	2045	2141	1743	1474	2067	1968
I		1446	1537	1232	1024	1394	
J	308		202	307			
K					45	69	69
L							
M	1137	1461	1367	1270	927	1287	1458

Note: All Regimes assume a combination of manual and chemical brushing and weeding (i.e., a blended cost estimate).

Where stump removal for root disease control is required, a cost estimate may be determined as a specified operation as described in Section 4.1.1.

The area requiring basic silviculture treatment includes only that portion of the land on which the licensee is required to establish a free-growing crop of trees, as specified in the Forest Act. Basic silviculture treatment may not be required on some cutting authorities (e.g., right-of-way, licence-to-cut (gravel pit)).

Basic silviculture cost estimates will not be included in the appraisal where this intent has been specified in the licence document, cutting authority or by applicants agreement.

If available, the net area to be reforested is to be taken from the "Pre-Harvest Silviculture Prescription" (PHSP); otherwise the best information at hand (i.e., cruise area with appropriate net down factors) will be used.

Individual areas of non-commercial cover (NCBR) less than four hectares, growing on productive forest land are included in the applicable treatment regime(s) used to calculate the basic silviculture cost estimate. Subject to approval by the District Manager, these areas are eligible for a cost estimate of 1.2 times the applicable treatment regime(s) cost. Individual areas of NCBR greater than 4 ha in size must not be included in the appraisal.

In the case of mixed stands where utilization of deciduous timber is mandatory, the deciduous area is also eligible for a silviculture cost estimate and the deciduous volume is included in the total net merchantable volume.

The cost estimate for each treatment regime is determined as follows:

Treatment Regime cost estimate (\$) =

treatment regime cost (\$/ha) * [net area to be reforested - (NCBR) + (NCBR * 1.2)]* R

Each area portion of a cutting authority that requires less than 90% volume removal must have one or more separate treatment regime cost estimates. (i.e., partial cut areas and clear-cut areas may not be combined)

R = volume removal factor and is calculated for each treatment regime area.

NCBR = individual areas of non-commercial brush of 4 hectares or less in size.

$$R = \frac{\text{Volume Required to be Harvested}}{\text{Total Net Merchantable Volume}}$$

Where the entire volume is required to be harvested (i.e., clear-cut) then R = 1.

For treatment regime G (partial cutting) R is always = 1.

The Basic Silviculture Cost Estimate is determined as follows:

$$\$ / m^3 = \frac{\text{Summation of Treatment Regime Cost Estimates}}{\text{Total Net Cruise Volume}(m^3)}$$

4.11 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 phases of manufacturing beginning with the dewatering of logs or unloading of logging trucks at the mill log yard, either land or water (or satellite log yards), and ending when the lumber and chips have been loaded on rail cars or trucks for transport to market.

The survey collects experienced costs to the licensee, including wages, benefits, overtime, depreciation, fuel, supplies, repair and 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 to reflect operation-specific conditions are permitted.

The estimates have an effective cost base date of July 1, 1993.

Untrended Manufacturing Cost Estimates (\$/m³)**1993 Cost Survey Base**

	Species	Manufacturing cost (\$/m ³) 0% Decay
<u>Northern Interior</u> (Zone 5) & <u>Skeena (Zone 6)</u>	SP	25.24
	LO	28.03
	BA	28.53
	FI, LA, WH, YE	34.58
	CE	32.53
	HE	30.48
<u>Southern Interior</u> (Zone 7)	SP	28.49
	LO	31.97
	BA	32.48
	FI, LA, WH, YE	39.26
	CE	37.81
	HE	36.72
<u>Southern Cariboo</u> (Zone 8)	SP	23.93
	LO	26.68
	BA	27.08
	FI, LA, WH, YE	32.32
	CE	28.96
	HE	27.90
<u>Fort Nelson/Peace</u> (Zone 9)	SP	24.96
	LO	27.91
	BA	27.75

To derive the manufacturing cost for decay % from 1 to 50, use the above table values as follows:

Manufacturing cost (\$/m³) = decay% * 0.1321 + base value from table.

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

For a list of points of appraisal by zone, refer to Section 2.5.

4.12 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. The cost trend for manufacturing is based on a 3% per annum rate.

The cost trend factor is applied to the logging, silviculture and manufacturing cost estimates at the appraisal effective date and at the date of each stumpage adjustment.

For trend factors applicable prior to July 1, 1995, refer to the October 1, 1994 *Interior Appraisal Manual*.

Appraisal Effective Dates From January 1, 1990 to May 31, 1992 Inclusive

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
July 1 to September 30, 1995	1.300	1.240
October 1 to December 31, 1995	1.370	1.248
January 1 to March 31, 1996	1.380	1.255
April 1 to June 30, 1996	1.390	1.263
July 1 to September 30, 1996	1.400	1.270

Appraisal Effective Dates From June 1, 1992 to October 31, 1992 Inclusive

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
July 1 to September 30, 1995	1.300	1.180
October 1 to December 31, 1995	1.370	1.188
January 1 to March 31, 1996	1.380	1.195
April 1 to June 30, 1996	1.390	1.203
July 1 to September 30, 1996	1.400	1.210

Appraisal Effective Dates From November 1, 1992 to September 30, 1993 Inclusive

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
July 1 to September 30, 1995	1.260	1.180
October 1 to December 31, 1995	1.330	1.188
January 1 to March 31, 1996	1.340	1.195
April 1 to June 30, 1996	1.350	1.203
July 1 to September 30, 1996	1.360	1.210

Appraisal Effective Dates From October 1, 1993 to September 30, 1994

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
July 1 to September 30, 1995	1.240	1.120
October 1 to December 31, 1995	1.310	1.128
January 1 to March 31, 1996	1.320	1.135
April 1 to June 30, 1996	1.330	1.143
July 1 to September 30, 1996	1.340	1.150

Appraisal Effective Dates On or After October 1, 1994

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
July 1 to September 30, 1995	1.200	1.098
October 1 to December 31, 1995	1.270	1.105
January 1 to March 31, 1996	1.280	1.113
April 1 to June 30, 1996	1.290	1.120
July 1 to September 30, 1996	1.300	1.128

Appraisal Effective Dates On or After August 1, 1995

<u>Appraisal Effective Date or Stumpage Adjustment Date</u>	<u>Trend Factor</u>	
	<u>Logging and Silviculture</u>	<u>Manufacturing</u>
August 1 to September 30, 1995	1.160	1.060
October 1 to December 31, 1995	1.170	1.068
January 1 to March 31, 1996	1.180	1.075
April 1 to June 30, 1996	1.190	1.083
July 1 to September 30, 1996	1.200	1.090

Stumpage Rate Determination

5

5.1 Indicated Stumpage Rate

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 keyed 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 Mean Value Index

The Interior Mean Value Index (MVI) 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. When distributed it becomes an integral part of this manual.

The MVI does not include appraisals from timber licences.

5.4 Market Value Indexing

At the times specified in Section 1.6, stumpage rates are adjusted upwards or downwards to reflect changes in the value of softwood lumber as indicated by the Statistics Canada British Columbia Softwood Lumber Index (INDEX) for the Interior number D693600.

New Interior Target Rate Calculation

1. If the INDEX is less than or equal to 161 then,
$$TR = \frac{INDEX}{139.0} * 8.59$$
2. If the INDEX is greater than 161, but less than or equal to 186 then,
$$TR = 9.95 + \left[\frac{(INDEX - 161)}{25} * 9.35 \right]$$
3. If the INDEX is greater than 186 then,
$$TR = 19.30 + \left[\frac{(INDEX - 186)}{49} * 6.74 \right]$$

Where: TR = New Target Rate (\$/m³)

Quarterly Stumpage Rate Adjustment Date

January 1
April 1
July 1
October 1

New Statistics Canada Index based on index values for the months of:

Preceding August, September, October
Preceding November, December, January
Preceding February, March, April
Preceding May, June, July

The applicable Statistics Canada Index is published by Revenue Branch at the time of each quarterly stumpage adjustment. When distributed it becomes an integral part of this manual.

5.5 Base Rate

The Interior Base Rate is redetermined and published by Revenue Branch at the time of each quarterly stumpage rate adjustment. When distributed it 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:

$$IR = BR + (VI - MVI)$$

Where:

- IR = Indicated Stumpage Rate
- BR = Interior Base Rate as defined in Section 5.5
- VI = Value Index for the cutting authority as defined in Section 5.2.
- MVI = 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.

For each cutting authority area that contains timber licence volume, the Reserve Stumpage Rate is determined by selecting the greater of:

- the indicated stumpage rate adjusted according to Table 5-1 (Section 84 of the *Forest Act*), or
- the prescribed minimum stumpage rate.

Table 5-1 Timber Licence Stumpage Rate Adjustment Schedule

Time Period	Percentage of ^① Stumpage Rate
on and after April 1, 1995 to and including March 31, 1996	60
on and after April 1, 1996 to and including March 31, 1997	67
on and after April 1, 1997 to and including March 31, 1998	73
on and after April 1, 1998 to and including March 31, 1999	80
on and after April 1, 1999 to and including March 31, 2000	87
on and after April 1, 2000 to and including March 31, 2001	93
on and after April 1, 2001	100

- ① The percentage of stumpage rate opposite the time period will be applied to appraisals, reappraisals and stumpage adjustments that fall within the time period.

5.6.4 Upset Stumpage Rate

The Upset Stumpage Rate is the total of the Reserve Stumpage Rate plus any silviculture and development levies which may be charged as defined in Section 6.6.

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 Value Indexes by District and Species

A new table of Average Value Indexes by District and Species is prepared at the time of each quarterly stumpage adjustment and becomes an integral part of this manual at that time. This table may be used by the Forest Officer to determine the Value Index for cutting authorities of less than 2 000 m³, as explained in Section 6.2.

6.2 Cutting Authorities With 5 000 m³ or Less Volume

1. Total Coniferous Volume of less than 2 000 m³

An indicated stumpage rate may be determined by estimating the species volumes, prorating the appropriate Average Value Indexes by District and Species according to those volumes, and then using the resulting stand value index in the stumpage rate formula as described under Section 5.6. For cutting authorities where the licensee is not required to establish a free growing crop of trees, the Value Indexes must be adjusted by adding a basic silviculture cost estimate. (District Average Value Indexes are based on full appraisals of areas requiring basic silviculture.) The total stumpage rate is fixed for the term. For extensions of the cutting authority see Section 2.4 (3).

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.) The total stumpage rate is adjustable for the term of the cutting authority, except as provided in Section 6.5.

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

2. Total Coniferous Volume of 2 000 to 5 000 m³

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 determined by the Regional Manager.

Each appraisal is made as described in Chapters 3 and 4.

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 6.5.

3. Low Volume Additive

All replaceable and non-replaceable fully appraised cutting authorities are eligible for a low volume additive.

The additive is:

$$$/m^3 = 1.250 - 0.00025 * V$$

V must be less than or equal to 5 000 m³.

"V" = the lesser of the cutting authority net cruise volume or the licence's Allowable Annual Cut of Crown Timber (if applicable).

6.3 Right-of-Way Cutting Authorities

A right-of-way cutting authority is defined as any cutting authority issued for the sole purpose of harvesting right-of-way timber, including but not limited to road permits, right-of-way cutting permits, timber sale licences, and licences-to-cut.

Right-of-way cutting authorities are appraised under one of the following scenarios.

1. Total Volume of Less Than 2 000 m³

The indicated stumpage rate is derived according to Section 6.2.1.

2. Total Volume of 2 000 m³ or Greater

A full appraisal is required. Species distribution, total volume and most phase costs are determined either from site-specific cruise data or from a fully appraised cutting authority of the same inventory type and similar site conditions.

A cost estimate for development is included in the appraisal, and should be borrowed from the representative cutting authority as defined above.

Log haul cycle time may be determined from site specific data or the cycle time from a nearby representative cutting authority as defined above.

The costs of roads constructed under right-of-way cutting authorities are recognized in the appraisal of a tributary cutting authority (i.e., the roads are deemed to be non-existing for the purposes of appraising the tributary cutting authority.)

Basic silviculture estimates are not included in the appraisal of right-of-way cutting authorities.

6.4 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 stumpage value is over \$3,000 or volume exceeds 300 m³, a full cost estimate appraisal is completed upon an "as is, where is" basis.

If the timber volume is being sold competitively, the timber may be priced according to the procedures in Section 6.2.1.

6.5 Small Business Forest Enterprise Program (SBFEP) Sales

For appraisal purposes, the SBFEP includes:

- All Timber Sale Licenses issued under the *Forest Act*, Sections 16 and 16.1.
- All TSL's issued under the *Forest Act*, Section 18, except:
 1. those issued under Section 18 (1)(b) or 18 (1)(c), and
 2. those having an AAC of more than 10 000 m³.

Fixed/Adjustable Stumpage Rates for SBFEP Cutting Authorities

The adjustable rate option can be provided to a licensee only if the upset rate has been determined by means of a full appraisal. The data for the full appraisal may be site-specific or may be obtained from one or more comparable cutting authorities. Once a selection has been made, it remains in effect for the term and all extensions. If the District Average Value Index method is used, the upset and hence the total stumpage rate must be fixed for the term of the cutting authority and all extensions. The only exceptions are if a reappraisal is done under Section 2.3 (1) Sudden and Severe Damage or Section 2.3 (5) Minister's Direction.

During the term of the cutting authority and all extensions, 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.

Section 16 Timber Sale Licences (prior to May 1, 1994)

A licensee who holds a timber sale licence issued under Section 16 of the *Forest Act* that was advertised or awarded prior to May 1, 1994 may have elected to have the stumpage rate on that licence fixed at the April 30, 1994 level for the term and all extensions. The election must have been made prior to July 1, 1994.

Section 16.1 Timber Sale Licences (prior to May 1, 1994)

For a timber sale licence issued under Section 16.1 of the *Forest Act*, the licensee may have elected to have the stumpage rate fixed on a timber mark issued under the licence if:

- the timber sale licence was advertised or awarded prior to May 1, 1994, and
- the timber mark was issued prior to May 1, 1994.

This option was available only until June 30, 1994 and if chosen, the stumpage rate was fixed at the April 30, 1994 level until April 30, 1996.

6.6 Levies

1. Basic Silviculture Levy:

A basic silviculture cost estimate is made for every cutting authority that will require basic silviculture, including those with a volume of less than 2 000 m³.

A basic silviculture levy may be added to the Reserve Stumpage Rate. The levy is \$0.00/m³ if no Crown expenditures are anticipated for basic silviculture, or the District Manager may set the levy at \$0.00/m³ if the sale is offered under the *Forest Act*, Section 16, and the District Manager is satisfied that there will be competition for the sale. Otherwise the silviculture levy is equal to the appraisal estimate of basic silviculture costs (trended at the time of the appraisal).

2. Development Levy:

A development levy may be added to the Reserve Stumpage Rate. The levy is \$0.00/m³ if no Crown expenditures are anticipated for road construction and other services, or the District Manager may set the levy at \$0.00/m³ if the sale is offered under the *Forest Act*, Section 16, and the District Manager is satisfied that there will be competition for the sale. Otherwise, the development levy is equal to the appraisal cost estimate of road construction and other extraordinary services provided by the Crown as determined by the Regional Manager (trended at the time of the appraisal).

The amount of any levy may be redetermined at reappraisals only.

6.7 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.

6.7.1 Special Forest Products and Other Miscellaneous Rates

Table 6-1 is to be used for determining stumpage rates for the specified products when scaled:

1. before July 1, 1995 - all non-appraised timber licence cutting authorities must use Table 6-2 for all products.
2. on and after July 1, 1995 - all sources of Crown timber, including all timber licences will use Table 6-1 for the products specified.

Table 6-1 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 Lumber Reject)	\$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	\$0.20/each
	3-5 m	\$1.00/each
	over 5 m	\$1.50/each
All Species	Logs salvaged below the high water levels of the Mica, Arrow, Revelstoke, W.A.C. Bennett Dam Flood Basins and the Slocan, Kootenay, Mineral, Babine and Ootsa Lakes.	\$0.25/m ³
All Species	Trees classified as "Dead Potential" on Cruise-based cutting authorities	\$0.25/m ³

Forest District Specific

Description	District	Reserve Stumpage Rate
Gross area cleared for	Cranbrook	\$1,147/ha
seismic lines, gas or oil	Dawson Creek	\$579/ha
well sites and right-of-	Ft. Nelson	\$579/ha
way to well sites	Ft. St. John	\$579/ha

6.7.2 Miscellaneous Stumpage Rates for Timber Licences

The stumpage rates in Table 6-2 apply only to timber licence cutting authorities that are not appraised and have a cutting authority term that begins before May 1, 1995.

For each species of timber in column 1 of Table 6-2, the stumpage rate immediately opposite that species in columns 2, 3 and 4 respectively, apply to:

- all products scaled in the indicated forest regions before July 1, 1995,
- sawlogs scaled in the indicated forest regions on and after July 1, 1995.

Table 6-2 Miscellaneous Stumpage Rates for Timber Licences

Column 1 Species of timber	Forest Region		
	Column 2 Vancouver except the Mid-Coast and Queen Charlotte forest districts (that part west of the Cascades Mountains) \$/cubic metre	Column 3 Prince Rupert and the Mid-Coast and Queen Charlotte forest districts (that part west of the Cascades Mountains) \$/cubic metre	Column 4 All forest regions and those parts of regions east of the Cascade Mountains \$/cubic metre
Fir	37.10	28.80	21.80
Spruce	38.70	31.30	20.60
Balsam	19.10	15.60	18.10
Cedar	20.50	16.50	24.40
Hemlock	18.10	14.60	20.00
Cypress	43.60	34.50	21.10
White pine	20.30	17.00	27.80
Yellow pine	20.30	17.00	22.20
Larch	20.30	17.00	21.80
Lodgepole pine	10.10	8.90	19.00
Other conifers	20.30	17.00	21.10
All non-conifers	1.00	1.00	0.50
All species Grades 3, 4, 5, and 6	N/A	N/A	0.25
All species Firmwood reject	nil	nil	nil
All species Grade Y	0.25	0.25	N/A

Appendices

Appendix I Equipment and Labour Rates

(Cost Base July 1, 1993)

MACHINE DESCRIPTION	TYPICAL MODELS	\$/HOUR
Bulldozer	Cat D-8, TD25, Komatsu D155A-1	157.75
Bulldozer	Cat D-7, TD20, Komatsu D85	128.75
Bulldozer	Cat D-6, TD15, Komatsu D65	110.00
Rock Drill includes labour	All	168.91
Grader	Cat 14G, Komatsu GD705, 725	96.00
Front End Loader (Gravel)	Cat 966, Komatsu WA470	117.50
Front End Loader (Logs)	Cat 980, Komatsu WA500	127.50
Heel Boom Loader	All Cable	183.76
Heel Boom Loader	All Hydraulic	190.87
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 235C, Hitachi EX400, RF 55.1 - 66.0	203.50
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 235B, Hitachi Uh181 RF 37.1 - 55.0	167.75
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 229, Hitachi EX300 RF 27.4 - 37.0	149.60
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 225, Hitachi EX270 RF 19.8 - 27.3	135.58
Hydraulic Excavator inc. Brush Guard	JD 690A, Hitachi EX150 RF 4.3 - 6.8	91.61
Gradall	54,100 - 62,300 kg - m	134.50
Logging Truck (Highway)	All Triaxle	85.00
Logging Truck (Off Highway)	All	137.17
Self Loading Log Truck	Highway log truck + 4.5 t deck crane	97.30
Gravel Truck	9.9 m ³ +	62.50
Gravel Truck Articulated	20 - 30 tonne	106.04
Lowbed	36 tonne	76.50
Lowbed	150 tonne	137.17
Concrete Mix Truck	6 m ³	80.50
Concrete Vibrator (labour not included)	5 m ³	3.88
Concrete Mixer (labour not included)	.17m ³	6.13
Crane - Truck mounted	18 tonne	83.50
Soft Track Skidder	KMC 200	110.50
Rubber Tired Skidder	Clark 668	75.25
Vibrator Compactor	Clark 668 + 2.7 - 3.6 t roller	86.95
Tractor and Grid roller	Clark 668 + grid roller	87.05
Labourer		24.80
Roadman		25.01
Crib/Culvert Maker, Powderman		26.31
Landingman		26.66
Rockdriller & Powderman (for load & blast only)		57.37
Bridgeman		32.28
Powersaw (labour not included)	All	4.25
Faller, including powersaw coast		49.31

* RF = Rate Factor - see rental rate guide for equipment included.

NOTES

Rates based on 1993 logging cost surveys, Province of British Columbia Hydro and Power Authority and B.C. Rail. Equipment Rental Rate Guide (1991-92-93) (rates based on a 3 year old machine), and IWA agreement rates including payroll loading.

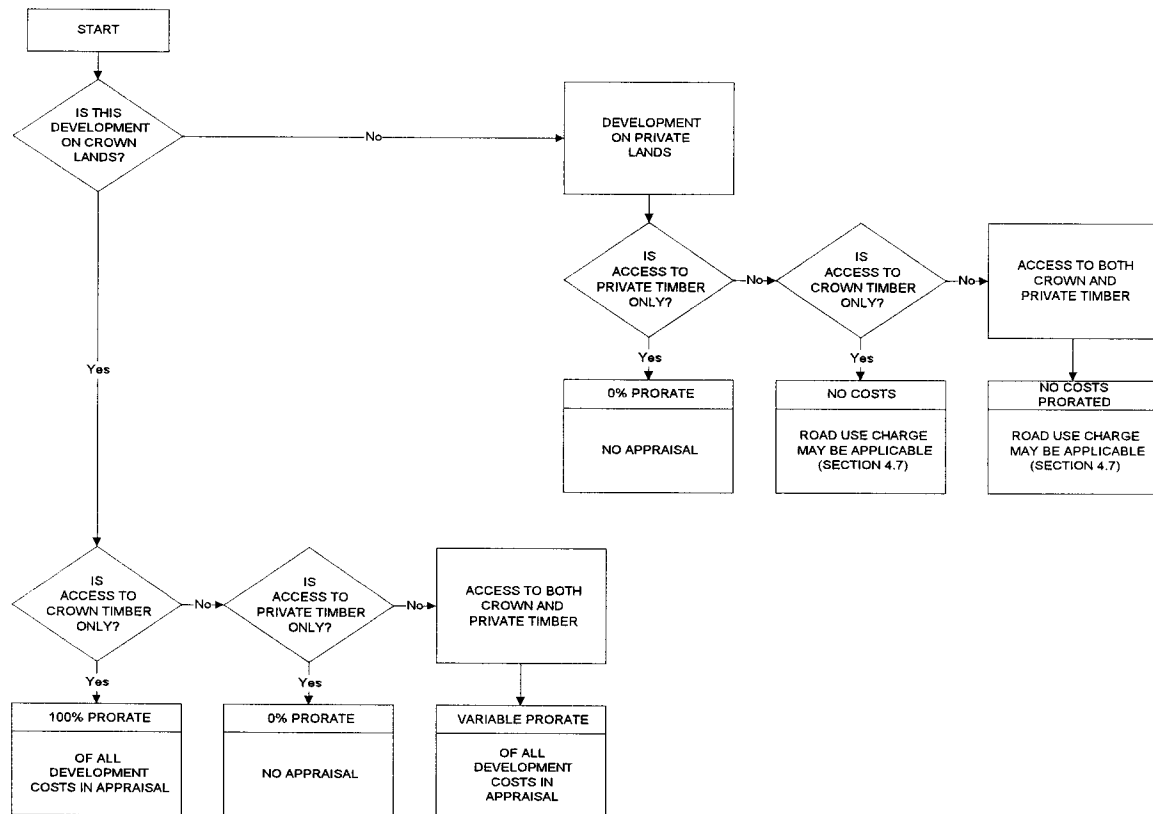
- The above rates will be used for all engineered estimates made under this manual.
- The rates include labour, crew transportation, supervision and camp and cookhouse where applicable. No additions are required.
- Use of equipment rates not listed in this appendix must be approved by the Regional Appraisal Coordinator.

Appendix II Lumber Recovery Factors (board feet/cubic metre)

Species

Log Top Diameter (cm)	Cedar	Hemlock, Cypress, White Pine, Dry Belt Fir	All Others
4.5 - 5.49	91	91	91
5.5 - 6.49	97	102	103
6.5 - 7.49	103	111	113
7.5 - 8.49	108	120	123
8.5 - 9.99	115	129	134
10.0 - 14.9	132	151	158
15.0 - 19.9	156	172	185
20.0 - 24.9	177	187	202
25.0 - 29.9	197	199	217
30.0 - 34.9	215	210	226
35.0 - 39.9	227	217	234
40.0 - 44.9	235	222	240
45.0 - 49.9	238	228	246
50.0 - 54.9	239	233	252
55.0 - 59.9	239	237	258
60.0 - 64.9	237	240	263
65.0 - 69.9	233	241	266
70.0 - 74.9	228	240	267
75.0 - 79.9	223	237	265
80.0 - 84.9	217	234	263
85.0 - 89.9	210	231	261
90.0 - 94.9	201	227	259
95.0 - 99.9	193	224	257
100.0 +	184	221	254

Appendix III 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

Index

A

Adjustable Stumpage Rates, 6-7
Administrative line, 1-3
Allowable Annual Cut, 6-4
Amendments, 2-4
Applicable licences, 4-2
Appraisal Coordinator, 1-5
Appraisal data requirements, 4-4
Area, 4-4
Area of application, 1-3
Arrow Dam log transfer, 4-36

B

Barge/Ferry, 4-35
Basic silviculture, 4-46
Benefits, 4-2, 4-49
Biogeoclimatic zone, 4-14
Blasting, 4-13
Block roads, 4-12
Blowdown, 4-25
Bonus bid, 1-6
Boom, 4-34
Boulders, 4-13
Breakage, 4-4
Bridges, 4-20
Brushing, 4-47

C

Calculation conventions, 2-11
Calculation of species selling price, 3-4
Calculation of total species selling price, 3-7
Camp, 4-34
Cascade Mountains, 1-3

Cattle guards, 4-19
Chip average market values, 3-4
Chip value, 3-7
Chip yield derivation, 3-5
Chip yield factors, 3-5
Chips, 4-49
Clearing, 4-12
Combined product recovery factors, 3-4
Comparative value timber pricing, 1-6
Corduroy, 4-20
Cost estimates, 4-2
Cost trend, 4-51
Cruise compilation, 4-4
Cruise data, 4-4
Culverts, 4-12
Cutting Authority, 1-4
Cutting authority area, 1-4
Cycle time, 4-31

D

Damaged timber, 4-29
Deactivation of roads, 4-21
Dead useless snags, 4-29
Decay, 4-4, 4-50
Deciduous, 4-48
Decked timber, 6-6
Depreciation, 4-2, 4-49
Detailed engineering cost estimates, 4-5
Determination of stud log percent, 3-6
Development Cost Allocation, 0-5
Development costs, 4-5
Dewater, 4-33, 4-49
District Manager, 2-3
Ditch construction, 4-12
Drainage structures, 4-15
Drilling, 4-13
Dump, 4-34

E

Effective date, 4-51
End haul construction, 4-20
Error in appraisal, 2-5
Existing roads, 4-9
Extended road amortization, 4-9

Extension of term, 2-7

F

Fences, 4-19
Fire damage, 4-29
Fixed stumpage rates, 6-7
Forest Act, 1-2
Forest Service Roads, 4-40
Free-growing stocking standards, 4-46
Fuel, 4-2, 4-49
Full appraisal, 2-2

G

Geo-tech fabric, 4-20
Gravel, 4-18
Grubbing, 4-12
Gullies, 4-20

H

Hansard low water bridge, 4-36
Haul method, 4-32
Highway hauling, 4-32

I

Indicated stumpage rate, 1-6
Insurance, 4-2
Interior, 1-3
Interior Appraisal Data Sheet, 2-3
Isolated cutting authorities, 4-25

L

Land use charges, 4-9, 4-40
Landings, 4-12
Log bridges, 4-17
Log transportation, 4-31
Logging, 4-51
Low Volume Additive, 6-3
LRF update add-ons, 3-4
Lumber, 4-49
Lumber average market value (AMV) zones, 3-3
Lumber average market values (AMVs), 3-2
Lumber Recovery Factors, 0-4

M

Main service road, 4-5
Maintenance, 4-2
Manufacturing, 4-51
Manufacturing costs, 1-2, 4-49
Mean value index, 1-6
Method of transportation to be used in determining point of appraisal, 2-10
Minister's direction, 2-6
Miscellaneous stumpage rates, 1-7, 6-10
Moving assistance, 4-2
Multispan bridges, 4-20

N

New development cost, 4-7
Non-commercial cover (NCBR), 4-47

O

Ocean tow, 4-3
Off-highway hauling, 4-32
Operating cost, 1-6
Operational roads, 4-12
Operations roads, 4-40
Order, 2-2
Overhead, 4-2
Overland construction, 4-20
Overtime, 4-2, 4-49

P

Partial Cutting, 4-24, 4-48
Percent rock, 4-13
Percentage of the indicated stumpage rate, 1-6, 5-8
Pipeline crossings, 4-19
Point of appraisal, 2-9, 4-31
Post-logging treatment costs, 4-45
Pre-Harvest Silviculture Prescription, 4-47
Private land, 4-8
Profit and risk margins, 4-2
Prorating, 4-30

R

Railway, 4-35

Railway transportation, 4-35
Random lumber, 3-2
Random lumber AMVs, 3-3
Re-haul, 4-33
Reappraisal, 2-4
Reappraisal at anniversary date, 2-5
Reconstruction, 4-20
Regional Manager, 2-2
Regional revenue staff, 2-2
Reload, 4-33
Repair, 4-2
Required logging systems, 4-23
Retaining walls, 4-21
Right-of-way cutting authorities, 6-5
Right-of-way felling, 4-12
Rip rap, 4-17
Road maintenance, 4-37
Road type, 4-12
Road use charges, 4-40
Roads, 4-5
Rock, 4-13

S

Secondary haul, 4-33
Section length, 4-12
Selling price, 1-6
Shipping differential, 3-6
Side slopes, 4-20
Silviculture, 4-51
Skidder swinging, 4-3
Skyline logging, 4-3
Slope, 4-13
Small Business Forest Enterprise Program, 2-7
Small Business Forest Enterprise Program (SBFEP) Sales, 6-7
Soil moisture, 4-13
Special Forest Products, 6-10
Special structures, 4-21
Special transportation systems, 4-34
Species percent, 4-32
Specified operations, 4-3
Stabilizing material, 4-5, 4-18
Statistics Canada Softwood Lumber Index, 1-8

Stud lumber, 3-2
Stump removal, 4-12
Stumpage adjustments, 1-8
Stumpage determination, 1-5
Subgrade construction, 4-5, 4-12
Sudden and severe damage, 2-4
Supplies, 4-2, 4-49

T

Tabular cost estimates, 4-5
Tally sheets, 4-4
Terms of Reference, 1-2
Timber Supply Area, 4-37
Time schedule, 2-3
Total merchantable, 4-4
Total stumpage rate, 1-6
Tow, 4-34
Treatment regimes, 4-46
Tree Farm Licence, 4-37
Tree-to-truck, 4-23
Tree-to-truck variables, 4-24
Trend factors, 4-51
Tributary cutting authorities, 4-5
Truck haul, 4-31
Truck haul cost estimates, 4-33
Truck to rail transfer, 4-35
Turnout construction, 4-12

U

Unloading, 4-33, 4-49
Upset stumpage rate, 1-6

V

Value Index, 1-6
Value indexes by district and species, 6-2
Volume per hectare, 4-4
Volume per tree, 4-24
Volume removal factor, 4-48

W

Wages, 4-2, 4-49
Waste, 4-4
Water transportation, 4-34
Watershed, 4-3

Weeding, 4-47

Williston Lake dry dump, 4-36

Winter logging, 4-12

Winter road reconstruction, 4-19

Winter roads, 4-12

Woodlot Licences, 4-37