Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

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JUL 23 1996

To: All Regional Managers

From: David Zirnhelt
Minister

Re: Interior Appraisal Manual

I hereby approve the new *Interior Appraisal Manual* and attach a copy of it for your use. This manual is effective August 1, 1996, and applies to all interior stumpage appraisals.

Amendments of revisions to this manual require my further approval.

David Zirnhelt
Minister

Attachment: (1)

cc: Bill Howard, Director, Revenue Branch
All Subscribers, *Interior Appraisal Manual*

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BRITISH COLUMBIA Ministry of Forests

MANUAL REVISION TRANSMITTAL

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MANUAL TITLE
Interior Appraisal Manual

REVISION No.	**ISSUE DATE**
New	August, 1996

MANUAL CO-ORDINATOR
Judy Laton
Revenue Branch

AUTHORIZATION (Name, Title)
W. Howard
Director, Revenue Branch

Please make the following changes to your copy of the above Ministry manual. Please insert the following specified pages and **file this notice** immediately after the Amendments Tab.

ACTION (Remove/Insert)	(VOL.) CHAPTER-SECTION-SUBJECT TABLE OF CONTENTS	PAGE(S)	COMMENTS
INSERT	Title Page		Before Amendments Tab
INSERT	Minister's Letter, Manual Transmittal and Highlights		After Amendments Tab
INSERT	Parameters (upon receipt)		After Parameters Tab. (mailed out each quarter)
INSERT	Table of Contents	i - iv	After Table of Contents Tab
INSERT	Chapter 1	1 - 8	After Chapter 1 Tab
INSERT	Chapter 2	1 - 14	After Chapter 2 Tab
INSERT	Chapter 3	1 - 8	After Chapter 3 Tab
INSERT	Chapter 4	1 - 57	After Chapter 4 Tab
INSERT	Chapter 5	1 - 8	After Chapter 5 Tab
INSERT	Chapter 6	1 - 14	After Chapter 6 Tab
INSERT	Appendices	A1 - A7	After Appendices Tab
INSERT	Index	I1 - I4	After Index Tab
INSERT	Data Sheet	1	Contact Regional Revenue staff

New Interior Appraisal Manual Highlights.

The new *Interior Appraisal Manual* includes clarification to policy and updating of the cost base to July 1, 1994. By section the changes are as follows.

Chapter 1	New language to clarify policy.
Section 2.2 (1)	Interior Appraisal Data Sheet, defined as 'data sheet'.
Section 2.2 (2)	New paragraph for the reappraisal time schedule.
Section 2.2 (2)	New language to clarify policy.
Section 2.3	New language to clarify policy.
Section 2.3 1	Change of reference from *Forest Act,* Part 10 to *Forest Practices Code of British Columbia,* Part 5, Division 1 through 3 and relevant regulations.
Section 2.3 2	New language to clarify policy.
Section 2.4	New language to clarify policy.
Section 2.4 (3)	New section on regional managers rates.
Section 2.5	Expanded definition of sawmill.
Section 3.1	Expanded definition of Lumber AMVs.
Section 3.3	Burned timber definition.
Section 3.3	Zonal LRF tables updated.
Section 4.1	New language to clarify policy.
Section 4.1.1	Timber harvested in domestic watersheds removed as a specified operation. Specified operation must be required to be considered for cost estimate.

Section 4.2	New language to clarify policy.
Section 4.3.3	Development costs on private land.
Section 4.3.8	This definition moved to Section 4.3.3 subsection 15.
Section 4.3.2.1 & 2	Fort Nelson District stands alone, Winter roads also known as "Snow Roads".
Section 4.3.2.3	New subgrade equations, new winter road cost table, $/km cost for Fort Nelson.
Section 4.3.2.4	New tables for Culvert and Bridge costs.
Section 4.3.2.5	New equations for additional stabilizing material, note that cost estimates for stabilizing material is not allowable for winter roads or in Fort Nelson District.
Section 4.3.2.6	New language to clarify policy, new costs for cattle guards, wing and remedial fences.
Section 4.3.3	Definitions for Access management and Deactivation transferred from section 4.3.1.
Section 4.4.1 & 2	New language to clarify policy.
Section 4.4.9	Proration of 'Distance to Support Centre' defined.
Section 4.4.3	New costs for Helicopter and Horse logging, new equations for ground skidding, overhead cable yarding and small volume additive.
Section 4.4.4	New language to clarify policy.
Section 4.4.5	New language to clarify policy.
Section 4.5.1	New language to clarify policy.
Section 4.5.2	New equations for highway, off-highway and secondary hauling.
Section 4.5.3	New equations and cost estimates for water transportation.
Section 4.5.4	New equations and cost estimates for special transportation systems, Babine Lake (North) added.
Section 4.6	Add 'inter-licensee road use charges' to list of items included in Road Maintenance, new costs.

Section 4.7	New language to clarify policy.
Section 4.8.1	Overhead groupings changed to district based, new cost estimates, Archaeological surveys added to the included list.
Section 4.8.2	New cost estimates for isolated cutting authorities.
Section 4.10	New cost estimates for silviculture.
Section 4.11	New Manufacturing cost estimates.
Section 4.12	New Trend factors.
Chapter 5	New language to clarify policy.
Chapter 6	New language to clarify policy.
Appendices	New equipment and labour rates.
	Glossary.

[redacted]

Interior Appraisal Manual
Effective August 1, 1996

Cost Base
Woods: July 1, 1994
Manufacturing: July 1, 1994

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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, excluding 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" is defined as:

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

1.3.1 Cutting Authority Area

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

1. may be harvested under a cutting authority, and
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 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 and redetermine stumpage rates through 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, authorized by the Regional Managers, for the purpose of varying stumpage rates through stumpage adjustments under Section 1.6.

1.5 Comparative Value Timber Pricing

Comparative Value Pricing (CVP), subject to a minimum stumpage rate, is the basis for determining stumpage rates. Sections 2.1, (2.) (3.) and (4.) provide the methods that are used for specific products and extraordinary situations.

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

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

2. Estimate the least total cost necessary to harvest the timber and realize the estimated selling price (see Chapter 4).

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

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

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

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

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

6. Determine the upset stumpage rate by adding any development and silviculture levies (see Section 6.6) to the reserve stumpage rate.

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

One stumpage rate is determined for all appraised timber in each cutting authority area with the exception of miscellaneous stumpage rates under Section 6.7.

The average stumpage rate for the interior 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, stumpage rates are adjusted quarterly on January 1, April 1, July 1, and October 1 of each year subject to Section 6.5.

Each quarter the adjusted stumpage rates reflect changes in estimated selling prices (as authorized in this manual since the previous adjustment), and the recalculated operating cost based on the appropriate trend factors shown in Section 4.12. 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 Procedures 2

2.1 Types of Determination

Stumpage rates are determined by one of the following methods:

1. An appraisal or reappraisal under Chapters 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 developed by regional revenue staff, and approved by the Regional Manager or Regional Manager's designate.

2.2 Time Schedule - Initial Appraisals and Reappraisals

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

1. For each new cutting authority, the licensee must include with the application to the District Manager a completed Interior Appraisal Data Sheet (data sheet) and appropriate support information. When the data is received the District Manager will proceed as in Subsection 3 of this section.

2. For a reappraisal the licensee will provide all data, subject to Section 2.3, (3.), which must be received by the District Manager at least 45 days prior to the anniversary of the cutting authority term (effective date). If the licensee fails to provide all data, then the District Manager may contact the licensee by the due date (45 days prior to effective date) for reappraisal data and request that data known to have changed since the previous appraisal be submitted within 15 days. If the data is not received within 15 days, use the best data available at the district office 30 days prior to the effective date.

3. The District Manager or designate reviews the available data and if in agreement with the submission, signs the data sheet and advises the licensee. If no data was submitted for reappraisal, then advising the licensee is not required and Subsections 4 and 5 of this section do not apply.

4. The District Manager or the licensee may request a meeting to discuss the data sheet and support information.

5. At the meeting, the licensee may clarify data previously submitted. The District Manager may revise the data sheet as a result of the meeting.

6. The licensee is advised by the District Manager of changes, if any, made to the data sheet.

7. The data sheet is then sent to the Regional Office by the District Manager as part of the appraisal package.

8. The licensee and District Manager are advised by the regional revenue staff of any further changes made to the data sheet.

9. The licensee is notified, by letter or facsimile transmission, of the stumpage rate and the summary of appraisal information used in determining the stumpage rate.

10. The licensee may advise the issuing Regional Office, verbally or in writing, of any objection to the information contained in the stumpage advisory notice that could be resolved without an administrative review or appeal. The receipt of an objection will be acknowledged verbally or in writing by the Forest Officer. At this point the objection is not considered an administrative review or appeal under the *Forest Act*.

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-appraisal. Except in the case of "sudden and severe damage" as explained below, a reappraisal is based upon a complete reassessment of a cutting authority and assumes the cutting authority being reappraised has been returned to its original condition prior to development or harvesting. If there are changes to the cutting authority the operating cost data must be revised to reflect those changes, unless a reappraisal is exempted under Section 2.3.3.

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 to the appraised timber, 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 Practices Code of British Columbia Act,* Part 5, Division 1 through 3 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

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

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

b. the amendment requires a Specified Operation or different logging method (see Sections 4.1.1 and 4.4.1), that equals or exceeds 10 percent of the cutting authority volumes; the entire curise must be recompiled and the stumpage rate redetermined, or

c. the amendment requires 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 written 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 authority began.

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

a. timber from the cutting authority area is expected to be scaled under the cutting authority during the next year, and

b. there is at least 2000 m^3 of merchantable timber remaining on the cutting authority area.

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

These reappraisals are made in accordance with the Interior appraisal manual in effect on the anniversary date. 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. Mathematical Error

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

      i. in the case of appraisals and reappraisals, to the appropriate Regional Manager, and

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

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

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

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

   e. if the Regional Manager or Director, Revenue Branch, decides that an error has been made, then the following shall occur:

      i. the Regional Manager or the Director, Revenue Branch, shall notify the person who sent the Notice of the decision and the reasons for it,

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

      iii. the cutting authority or authorities under which the error was made shall be reappraised to correct the error unless the cutting authority, the appraisal manual or the application in tender for a timber sale licence, specified that the stumpage rate is fixed, and

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

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

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

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

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

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

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

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

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

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

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

Omission of data by the licensee on an approved data sheet 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

   A licensee may elect to have a fixed stumpage rate for a timber sale licence under the Small Business Forest Enterprise Program. Where the fixed election is made, the stumpage rate remains fixed for the term and all extensions.

   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

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

   The election of an annual stumpage rate applies as follows:

   a. All *new* woodlot cutting permits will be offered an irrevocable election 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 have an opportunity to make an irrevocable election at the cutting permit's anniversary date,

   c. Woodlot cutting permits that 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 regardless of volume and the new stumpage rate will apply until the expiry date. A reappraisal is 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 any woodlot cutting permits that have elected a quarterly stumpage rate adjustment. They will continue to adjust the stumpage rate quarterly and be subject to annual reappraisal regardless of the volume remaining.

Amendments to cutting authorities with the annual stumpage adjustment option would be subject to reappraisal at the time of the amendment (as defined in Section 2.3, (2.). The new stumpage rate would not be adjusted until the cutting permit's anniversary date or expiry, whichever occurs first.

3. Regional Manager's Rates

   If a stumpage rate was determined under Section 2.1, (4.) and the term of the cutting authority is extended, the Regional Manager may either leave the stumpage rate unchanged 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. District Average Value Index

   If the stumpage rate was determined under Section 2.1, (3.) and the term of the cutting authority is extended, the Regional Manager or District Manager may either leave the stumpage rate unchanged 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.

   Cutting authorities that have been reappraised using the District Average Value Index method must be reappraised upon extension after three years.

5. 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 specify miscellaneous stumpage rates in their cutting authority document.

6. 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 Subsection 5. of this section 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 the list 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 nearest 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. A sawmill is considered capable of producing lumber and chips unless it has been damaged by fire or a destructive force of nature. A damaged sawmill will not be considered a location for a point of appraisal if it has not been repaired within three months of the damage. It will be considered a location for a point of appraisal on the first day it is capable of producing lumber and chips.

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 except scaling (see Section 4.8) are deemed to be part of the manufacturing cost estimate.

Points of Appraisal

Northern Interior (Zone 5) (If volume per tree is less than 0.20 m^3/tree, use Zone 15)

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

Skeena (Zone 6) (If volume per tree is less than 0.20 m^3/tree, use Zone 16)

Terrace

Southern Interior (Zone 7) (If volume per tree is less than 0.20 m^3/tree, use Zone 17)

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

Southern Cariboo (Zone 8) (If volume per tree is less than 0.20 m^3/tree, use Zone 18)

100 Mile House	Chasm	Lillooet	Williams Lake

Fort Nelson - Peace (Zone 9) (If volume per tree is less than 0.20 m^3/tree, use 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.

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 ($/m^3) (see Chapter 4)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, *Specification: Calculating Stumpage Rates for Interior Appraisals*, approved by the Director, Revenue Branch.

Interior Selling Prices 3

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

3.1 Lumber Average Market Values (AMVs)

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

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

The total net sales value for each species is reported in Canadian dollars, f.o.b. mill, after all applicable freight charges, actual sales expenses incurred, cash discounts, duty and entry charges and leased rail car costs have been deducted from the selling price..

1. Small Log AMVs

   Small log AMVs are based on 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 m^3. Cutting authorities meeting this criteria will use lumber AMVs listed under 'AMVs for Small Logs' which is included in the quarterly stumpage parameters published by Revenue Branch.

   The selection of a Small Log AMV zone (Zones 15, 16, 17, 18 and 19) will only affect AMVs and will be made at the time of appraisal or reappraisal. Lumber Recovery Factors 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 less than 10 feet (approx. 3.25 m) 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.

3.1.1 Application of Lumber Average Market Values

Application of the Small Log, 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 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 $/m^3$ 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.

Burned Timber

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

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

where

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

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

The LRFs are determined from the following formulas and tables:

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

Zone	Species	LRF Update Add-Ons	Combined Product Recovery Factors
Northern Interior (Zone 5) & Skeena (Zone 6)	Lodgepole Pine	68	422
	Spruce	69	422
	Balsam	65	422
	Douglas Fir	28	422
	Larch	26	422
	Cedar	23	422
	Hemlock	25	422
	White pine	25	422
Southern Interior (Zone 7)	Lodgepole Pine	70	409
	Spruce	74	409
	Balsam	66	409
	Douglas Fir	29	409
	Larch	29	409
	Cedar	25	409
	Hemlock	26	409
	White Pine	28	409
	Yellow Pine	30	409

Southern Cariboo (Zone 8)	Lodgepole Pine	51	416
	Spruce	52	416
	Balsam	48	416
	Douglas Fir	13	416
	Larch	12	416
	Cedar	9	416
	Hemlock	10	416
	White pine	12	416
	Yellow pine	13	416

Fort Nelson-Peace (Zone 9)	Lodgepole Pine	53	416
	Spruce	52	416
	Balsam	45	416

Example: Zone 5 Lodgepole Pine	Cruise LRF		Update Add-on		Appraisal LRF
All Logs	180	+	68		248

2. Chip Yield Derivation

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

3. Chip Yield Factors

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

4. Determination of Stud Log Percent

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

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

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

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

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

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

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

5. Shipping Differential

The Shipping Differential for the following points of appraisal are:

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

6. Manufacturing Cost Differential

$2.95/m³
Fort Nelson

7. Calculation of Total Species Selling Price

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

   b. Lumber SP = Lumber AMV * Appraisal LRF,

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

   d. Total Species SP = (b) + (c) - D

Where	SP	=	Selling Price in $\$/m^3$
	AMV	=	The Lumber Average Market Value (of the appropriate species in the appropriate zone)
	Appraisal LRF	=	The LRF for all logs from Section 3.3.1
	Chip Value	=	The Chip Average Market Value (of the appropriate species for the appropriate point of appraisal)
	Chip Yield	=	The Chip Yield for all logs from Section 3.3.2
	D	=	The Differentials for the appropriate points of appraisal from Section 3.3.5 and 3.3.6.

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. The estimate of transportation costs must be based on the method of transportation to the point of appraisal which will produce the least total cost estimate, unless that particular method of transportation is not permitted under the cutting authority.

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

1. Any destination referred to in the cutting authority.

2. Any document other than the cutting authority.

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

The phase cost estimates are complete and reflect average conditions, operating practices, and phase accounting allocations experienced in the survey data. Because of this averaging, no additions to or subtractions from these estimates are made to reflect operation-specific conditions are permitted. The cost estimates have an effective cost base date of July 1, 1994.

4.1.1 Specified Operations

In addition to the logging methods and phase costs that are covered by this manual, there are specified operations which require special cost estimating. 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 phase cost estimates in this manual are combined with the specified operation cost estimate to determine the total operating cost. Where appropriate, specified operations are weighted according to the applicable net cruise volume.

Specified Operations shall be recognised only when the treatment is required within the Silvicultural Prescription or Cutting Authority Document as dictated by site conditions. Where a specific treatment is not required based on these conditions the conventional cost estimate shall apply.

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

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)

* 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 by the licensee with the appropriate **Interior Appraisal Data Sheet** to the District Manager.

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

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

4.3 Development

Development costs are estimated for the following development works; 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:

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

2. If the development works occur on a Main Service Road. A Main Service Road is defined as a main access road to the operation, necessary to maintain and supply the day-to-day harvesting activities of the cutting authority being appraised. To qualify, 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. 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 ($/m^3) 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:

$$\text{Crown share} = \text{Total Estimated Cost (\$)} * \frac{\text{Appraised Timber Volume}}{\text{Total Timber Volume}}$$

Where:

Crown share ($)	=	dollar amount to be allocated to stumpage-bearing timber in the cutting authority being appraised.
Total Estimated Cost ($)	=	dollar amount of the total development cost estimate.
Appraised Timber Volume (m^3)	=	volume of 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 included in the appraisal of a tributary cutting authority, subject to Section 4.3.1, (5.).

Development cost estimates are allocated according to the outline below (See also *Appendix III*).

The estimated development costs are allocated as follows:

1. Appraised timber areas on Crown lands.

   a. For development providing access to appraised timber only, total estimated costs are included in the appraisal,

   b. For development providing access to non-appraised timber only, total estimated costs are not included in the appraisal, and

   c. For development in appraised timber areas providing access to both appraised and non-appraised timber all estimated costs are prorated between appraised and non-appraised timber. The appraised timber portion is then included in the appraisal.

2. For full appraisals on Timber Licence (TL) cutting authorities.

   a. New development will be allocated as in Section 4.3.1, (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 that 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, (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. multiplying the average $/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. Private Land.

   When a new or reconstructed road or structure on private land is required for Crown timber extraction, the estimated cost of the road or structure will be included in the appraisal of the next tributory cutting authority according to the procedures of Section 4.3.1 and the following guidelines:

   a. For development providing access to appraised timber only, the total estimated costs are included in the appraisal,

   b. For development providing access to non-appraised timber only, estimate costs are not included in any appraisal,

c. For development on private land providing access to both non-appraised and appraised timber total estimated costs are prorated between non-appraised and appraised timber (Section 4.3.1). The Crown allocation is included in the appraisal.

4. Existing Roads and Structures

The costs of previously constructed roads that have been included in appraisals of Crown timber, roads previously constructed to develop non-appraised timber and roads previously 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

Where the new development cost estimates exceeds $\$4.00/m^3$, 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 will not otherwise be revisited,

e. The term of the agreement must not exceed the terms of the cutting authorities, and

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), or
- major resurfacing, which means resurfacing sections of more than 0.3 km in length that were initially surfaced, but have deteriorated due to long term wear and tear, or
- major reconstruction, which means restoring at least 0.1 km of road (per occurrence) that requires complete rebuilding of the subgrade.

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

Reconstruction and replacement cost estimates are 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). Cost estimates for reconstruction are not to exceed the tabular costs for new construction under similar conditions.

Where bridge materials are re-used, the cost estimate will include dismantling, transportation and installation at the new site, but will exclude initial materials purchased and initial delivery costs.

Costs may not be recognized if the licensee has been negligent or has not followed approved plans or standards as defined under the Forest Practices code and regulations.

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 vehicle access.

   An access management cost estimate will be determined by a detailed engineered estimate.

   The access management required in the cutting authority must be based on a formal Access Management Plan or forest development 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.

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 subgrade construction variables are recognized:

1. Section length: (L)

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

2. Road Type:

   - 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. They do not include any roads built on a Forest Service right-of-way (i.e., addendum roads). An operational road exists within a cut block 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 and include roads which are located completely within the cutblock.

   - Winter Roads: (WINTER) - also known as snow roads, 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. They must be reconstructed if logging is not completed in a single winter logging season. This road type includes operational and block road categories. Winter Roads with a side slope over 15 percent are considered Block Roads. Stabilizing costs are not applicable.

   - Fort Nelson Roads: - (FN) - applies to all roads constructed in the Fort Nelson Forest District. Stabilizing costs are not applicable to Forest Nelson Roads.

3. Uphill Side Slope: (SLOPE %)

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

4. Percent Rock: (ROCK %)

   Rock includes bed rock and large boulders, and may be rippable or may require drilling and blasting. The Rock percent rock is determined as follows:

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

   Where:

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

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

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

5. Soil Moisture (WET):

   In the equation, wet is restricted to soil moisture regimes 'sub-hygric, hygric, sub-hydric or hydric', and to CWH, MH, ICH, SBS, and ESSF Biogeoclimatic Zones. For the purpose of appraisals any other biogeoclimatic zones and any other soil moisture regimes do not have 'WET roads'.

6. Region:

   Cariboo Forest Region (CA)

   Kamloops Forest Region (KA)

   Nelson Forest Region (NE)

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

   Prince Rupert Forest Region (PR)

   Peace (PE) (includes Fort St. John, and Dawson Creek Forest Districts)

4.3.2.3 Subgrade Cost Estimate

For each operational and block road the subgrade cost estimate is determined from the formula:

$/km = CONSTANT + (223 * ROCK%) + (a * SLOPE%) + (b * WET) + (-2062 * CA) + (3112 * NE) + (-1405 * PR) + (c * OP)

Where:

CA = 1 if Cariboo Forest Region, otherwise CA = 0.

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

PR = 1 if Prince Rupert Forest Region, otherwise PR = 0.

	Biogeoclimatic Zone							
	CWH	MH	ICH	IDF	SBPS	SBS	ESSF	Other
CONSTANT	19663	19663	8233	4297	4297	7416	8289	4297
a	556	556	290	290	290	70	198	290
b	2863	2863	2863	0	0	2863	2863	0

	Region					
	CA	PE	KA	NE	PG	PR
c	5284	17056	0	0	6607	8103

Where:

OP = 1 if an Operational Road, otherwise = 0

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

For the above equations, the following limits apply:

- if SLOPE% exceeds 50%, 50% is used in the equation, and
- if ROCK% exceeds 50%, 50% is used in the equation.

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	3800
6-10	4600
11-15	5200

Slopes over 15 percent are considered block roads (see Section 4.3.2.2, (2)).

Fort Nelson District Roads

The total cost estimate for Fort Nelson Forest District roads is 8,100 $/km.

No cost estimate for additional stabilizing material is allowed either in the Fort Nelson Forest District or for Winter Roads.

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 m to 1.8 m in diameter are determined from the following table. Detailed engineering cost estimates are required for metal 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

Equivalent Round Diameter (m)	1.0	1.2	1.4	1.6	1.8
X-Section Area (m^2)	0.78	1.13	1.54	2.00	2.54
Length (m)					
9	900	1322	1934	2547	3160
10	1049	1730	2411	3092	3772
11	1390	2138	2887	3636	4385
12	1730	2547	3364	4181	4998
13	2070	2955	3840	4725	5610
14	2411	3364	4317	5270	6223
15	2751	3772	4793	5815	6836
16	3092	4181	5270	6359	7448
17	3432	4589	5746	6904	8061
18	3772	4998	6223	7448	8674
19	4113	5406	6700	7993	9286
20	4453	5815	7176	8538	9899
21	4793	6223	7653	9082	10512
22	5134	6631	8129	9627	11124
23	5474	7040	8606	10171	11737
24	5815	7448	9082	10716	12350
25	6155	7857	9559	11261	12962
26	6495	8265	10035	11805	13575
27	6836	8674	10512	12350	14188
28	7176	9082	10988	12894	14800
29	7516	9491	11465	13439	15413
30	7857	9899	11941	13984	16026

2. Log Bridges

Cost estimates are made for log bridges where their necessity is substantiated by field data. Cost estimates for non-log bridges, where required, are made as detailed engineering cost 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. Input data within table boundaries is rounded to fit; no interpolation or adjustment 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	5.4	9.7	13.1	16.5	19.8
5	6.1	10.5	13.9	17.2	20.6
6	6.9	11.2	14.6	18.0	21.3
7	7.6	12.0	15.4	18.7	22.1
8	8.4	12.8	16.1	19.5	22.8
9	9.1	13.5	16.9	20.2	23.6
10	9.9	14.3	17.6	21.0	24.4
11	10.6	15.0	18.4	21.7	25.1
12	11.4	15.8	19.1	22.5	25.9
13	12.1	16.5	19.9	23.2	26.6
14	12.9	17.3	20.6	24.0	27.4
15	13.7	18.0	21.4	24.8	28.1

4.3.2.5 Additional Stabilizing Material

Road stabilization is the placement of gravel or broken rock on the road subgrade to provide stable support and a running surface for logging equipment using the road. Where stabilizing material developed during the subgrade or ditch construction is insufficient, a cost estimate for additional stabilizing material to be trucked in from selected borrow pits may be included in the appraisal.

Unit Cost Estimate

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

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

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

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

$$\$/km = CONSTANT + (73 * SLOPE\%) + (a * OP) + (3448 * QROCK) + (-2056 * NE) + (2696 * PR)$$

Where:

Biogeoclimatic Zone

	CWH	MH	SBS	Other
CONSTANT	16457	16457	5311	8005

Region

	CA	PE	KA	NE	PG	PR
a	0	0	2638	0	3795	3680

For the above equations:

QROCK	=	1 if road is stabilized with quarried rock that requires drilling and blasting. Otherwise QROCK = 0.
OP	=	1 if an Operational Road. Otherwise OP = 0.
NE	=	1 if Nelson Forest Region. Otherwise NE = 0.
PR	=	1 if Prince Rupert Forest Region. Otherwise PR = 0.

For the above equations the following limit applies:

If SLOPE % exceeds 50 percent, 50 percent is used in the calculation.
Also see Detailed Engineered Costs Section 4.3.3, (3.).

No cost estimate for additional stabilizing material is allowed either in the Fort Nelson Forest District, or for any Winter Roads.

4.3.2.6 Cattle Guards, Remedial Fences and Pipeline Crossings

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

1. Cattle Guards	$3,100 each
2. Wing Fences	$ 465 per 100 m
3. Remedial Fences	$ 465 per 100 m - as defined in *Appendix IV-Glossary*

All costs include materials, transportation and installation.

When a pipeline crossing is necessary a cost estimate is made by using the detailed engineering 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 Engineering Cost Estimates

Where the tabular cost estimating procedures of this manual cannot be used due to their physical limitations, the cost of a project shall be estimated by preparing a detailed engineering cost estimate.

Where specific development projects involve detailed engineering cost estimates, based on approval road layout and design plans, the District Manager shall be advised of project details no later than 60 days before the start of work on the project, or according to the lead time requirements outlined in Section 2.2.

For appraisal purposes, the estimated development 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, are considered for detailed engineering cost estimates:

Where actual or estimated costs are for the time of appraisal, these costs must be back-trended to July 1, 1994 to match the cost base of this manual.

1. New construction and upgrading of Forest Service roads that meet the criteria and conditions provided in the Main Access Roads policy.

2. Road construction on uphill side slopes greater than 50 percent, or when rock percent exceeds 50 percent, or terrain class 4 and 5.

3. Road construction on uphill terrain with two or more gullies over 10 m deep at centreline in a 0.3 km section.

4. End haul construction (of roads and landings) requiring removal of excavated material to a spoil area, or roadfill located more than 300 m away.

5. Overland construction to provide a roadbed by trucking in material for extensive filling.

6. Non-log 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. Crib back-fills and all site preparation and protection features such as rip rap are to be included, as well as material and equipment supply and delivery

7. Structural maintenance of bridges.

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

9. Upgrade of roads and pertinent structures. Road upgrade resulting in a change in the standard of the road and structure where the licensee is not obligated to carry out road maintenance.

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. Access management (as defined in Section 4.3.1, (7.)).

15. Deactivation of roads

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

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

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.

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

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

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

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

Costs that may be included in the detailed engineered cost 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 Coordinator (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 detailed engineering cost estimates may be apportioned to two or more licensee's tributary cutting authorities, as described under Section 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, rehabilitation and reconstruction (excluding end haul)
- back spar trail construction and rehabilitation
- skid trail construction and rehabilitation
- accommodation (for non-isolated cutting authorities)
- fuel and equipment moving costs
- spur roads for ground skidding of less than 100 m (see Section 4.3.2.2.)
- contractor overhead and profit
- tree marking
- three metre knockdown
- lop & scatter
- landing burning (includes fireguards)
- roadside debris piling and disposal
- crew transportation
- mistletoe control
- block road rehabilitation (includes grass seeding)
- pheromone treatment
- slashing

4.4.1 Logging Methods

Certain logging methods are recognized only when constrained by the cutting authority document.

Any change in the following methods affecting at least 10 percent of the cutting authority volume, is cause for reappraisal (see Section 2.3.2.b). These changes must be required by the cutting authority document, logging plan or silviculture prescription.

- 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 on all compiled cruise plots segregated by logging method where applicable (see Section 4.4.5).

1. Biogeoclimatic Zone

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

2. Volume per Tree (VOLTREE)

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

3. Volume per Hectare (VOLHA)

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

4. Percent Defect (DEFECT%)

   Percent defect is the estimate of decay, waste and breakage (DWB) percent of that coniferous gross 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:

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

6. Slope (SLOPE%)

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

7. Percent Sensitive Site (SS%)

   Sensitive site ground skidding is only recognized where such treatment is specifically identified in the silviculture prescription, logging plan or cutting authority documents and the required net cruise volume equals or exceeds 1 percent of the total net cruise volume (see *Appendix IV)*.

   The percent sensitive site is calculated as the sensitive site area times the average volume per hectare for that area divided by the total area ground skidded times the average volume per hectare for that area.

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 one way distance to support centre is the distance over continuous road access from the geographic centre of the cutting authority to the main post office (or other location designated by the Regional Appraisal Coordinator) in a community from the following list. Where there is more than one block in the cutting authority, the weighted average distance to support centre must be calculated using the individual distances and the individual block volumes. Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre. The following is a list of communities by Forest Region.

Prince Rupert

Burns Lake	Kitwanga	Smithers	Terrace
Houston	New Hazelton	Stewart	
Kitimat			

Kamloops

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

Prince George

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

Nelson

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

Cariboo

100 Mile House	Quesnel	Williams Lake

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

4.4.3 Tree-to-Truck Cost Estimate

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

1. Helicopter Logging

   It is the policy of the Ministry of Forests to 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 is required to be logged by helicopter.

   Two variations of the method are recognized:

   a. Clear Cut $/m^3 = 64.56

      Clear Cut is defined as volume removal of 90 percent or greater of the total net cruise volume.

   b. Partial Cut $/m^3 = 68.05

      Partial cut is defined as volume removal of less than 90 percent of the total net cruise volume.

2. Horse Logging

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

   $$\$/m^3 = 26.13$$

3. Ground Skidding

   Variations recognized within the method are:

   a. Clear Cut

      Clear Cut is defined as the removal of 100 percent of the total net cruise volume.

   b. Partial Cut

      Partial cut is defined as the removal of less than 100 percent of the total net cruise volume.

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:

$$\$/m = 2.61 - 13.063 * VOLTREE$$

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

$$\$/m^3 = CONSTANT + 3.34 * SS\%/100 + 4.24 * SLOPE\%/100 - 5.41 * VOLHA/1000 + 0.70 * VOLHA/VOLTREE/1000 + 0.43 * GVOL + 3.61 * BD\%/100 + 2.85 * DPCUT2 - 2.76 * PCUT2/100 + 0.67 * SUPP2/100 + 1.26 * SUPP3/100$$

Where CONSTANT =

	Biogeoclimatic Zone				
Region/District	CWH/MH	BWBS	SBPS	SBS	All Other
Nelson	0	15.91	0	0	17.18
All Other	17.10	14.83	14.64	14.66	16.10

For the above equation the following definitions apply:

- 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,
- GVOL = gross volume per tree (m^3) computed as VOLTREE / (1-DEFECT % / 100),
- DPCUT2 = 1 if partial cut percent is greater than 0 and less than 100 otherwise DPCUT2=0,
- PCUT2 = percent volume removed in a partial cut (EXCEPT: if partial cut %>=90% and <100%, PCUT2=90; if partial cut%=100%, PCUT2=0).

4. Overhead Cable Logging

Overhead cable logging cost estimates will be recognized when required in the cutting authority document. The method 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 method are:

a. Clear Cut

Clear Cut is defined as removal of 100 percent of the net cruise volume

b. Partial Cut

Partial cut is defined as the removal of less than 100 percent of the total net cruise volume.

When the volume per tree is less than 0.20 m^3, 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:

$$\$/m^3 = 2.61 - 13.063 * VOLTREE$$

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

$\$/m^3$= CONSTANT + 4.58 * SLOPE%/100 - 2.01 * VOLHA/VOLTREE/1000 - 2.12 * GVOL + 0.20 * GVOLSQR + 2.08 * BD%/100 + 2.28 * CDPCUT + 0.70 * SUPP2/100

Where:

CONSTANT =

	Biogeoclimatic Zone	
Region	SBS	All Other
Fort Nelson/Peace	29.33	32.68
Kamloops	24.32	27.67
All Others	25.69	29.04

For the above equation, the following definitions apply:

- 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,
- GVOL = Gross volume per tree (m^3) computed as VOLTREE / (1 - DEFECT%/100),
- GVOLSQR = GVOL squared,
- if partial percent cut is greater than 0 then CDPCUT = 1, else CDPCUT = 0,
- 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 is collected as specified by the Forest Service Cruising Manual. The additional costs incurred to harvest blowdown timber are recognized in the Tree-to-Truck ground skidding and overhead cable logging equations (Sections 4.4, (3), 4.4, (4)).

The following additive is determined for all cable and ground skidding harvesting methods and is added to the Tree to Truck cost estimate.

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

Where: DT is the Damaged Timber percent

$$DT = HFD + DUS$$

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

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

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

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

4.4.5 Prorating Tree-to-Truck Cost Estimates

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

The variables for each required harvesting method must be based on a cruise compilation of only those plots located within the area to be harvested by the method.

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

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

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

$$+ \frac{\left({}^{Cost}\text{OC(P)}\right)\left({}^{V}\text{OC(P)}\right)}{(\text{TNCV})} + \frac{\left({}^{Cost}\text{GS(C)}\right)\left({}^{V}\text{GS(C)}\right)}{(\text{TNCV})} + \frac{\left({}^{Cost}\text{GS(P)}\right)\left({}^{V}\text{GS(P)}\right)}{(\text{TNCV})} \$/\text{m}^3$$

Where:

Cost	=	cost estimate ($/m^3) including any damaged timber additive
V	=	volume (m^3) 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 (m^3)

4.5 Log Transportation

The log transportation phase covers all aspects of log movement from the place of initial loading to the point of appraisal, including truck haul, rail, water and other specialized transportation.

4.5.1 Truck Haul Variables

For appraisal purposes, the following variables are recognized:

1. Weighted Average Cycle Time (CT): the estimated time in hours (rounded to the nearest 0.1 hour) from the center of cutting authority area to the point of appraisal or the appraisal place of unloading (water or rail transport).

   To determine weighted average cycle time:

   a. establish the geographical center point of each cut block and project this point to the nearest road for measurement purposes,

   b. from this center point, determine the cycle time to the nearest junction serving all cut blocks,

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

   d. determine the cycle time from the junction to the point of appraisal or the first place of unloading and add this to the average weighted cycle time.

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

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

Unavoidable delays are periods when the truck is on the job but not operating due to unpredictable delays such as; tightening binder chains, minor repairs made by driver, checking and adjusting brakes, minor delays prior to loading and unloading, refuelling, etc. Unavoidable delay time does not include any breakdown which requires shop repair, the services of a skilled mechanic, or a spilled load of logs.

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 on the licensee's particular method.

Highway hauling is assumed when loaded logging trucks must travel in part over roads administered under the Highway Act, without truck-to-truck transfer, to the point of appraisal, or on roads administered under the Highway (Industrial) Act where prolonged known road restrictions prevent the use of oversize loads, or in all instances where the volume per tree (Section 4.4.2) is less than 0.20 m^3.

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

4.5.2 Truck Haul Cost Estimates

4.5.2.1 Primary Haul

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

1. Highway Haul

   For all highway haul equations if the CT is greater than 0 then the minimum is $1.06/m³.

   $/m³ = CONSTANT + (1.78 * CT) - (1.04 * CE /100) + (2.55 * HE /100) + (0.21 * FI /100) + (1.27 * LA /100) - (0.74 * SP /100) - (1.38 * WH /100)

   Where:

	CA	FNP	KA	NE	PG	PR
CONSTANT	0.53	0.96	0.32	0.32	0.84	0.32

   If:

   CT = 0 then $/m³ = 0.

2. Off-Highway Haul

For all off-highway haul equations if CT is greater than 0 then the minimum is $0.38/m^3$.

$\$/m^3 = CONSTANT + (1.65 * CT) - (0.034 * (CT)^2) - (0.55 * CE /100) - (0.99 * SP /100)$

Where:

	CA	FNP	KA	NE	PG	PR
CONSTANT	0.42	0.11	0.11	0.11	0.25	-0.25

If:

CT = 0 then $\$/m^3 = 0$.

Where: CA is Cariboo Region

FNP is Fort Nelson, Fort St. John and Dawson Creek Districts

KA is Kamloops Region

NE is Nelson Region

PG is Prince George region *less* FNP

PR is Prince Rupert region

BA	= Balsam	LO	= Lodgepole Pine
CE	= Cedar	SP	= Spruce
FI	= Douglas Fir	WH	= White Pine
HE	= Hemlock	YE	= Yellow Pine
LA	= Larch		

For both equations.

4.5.2.2 Secondary Haul

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

$$\$/m^3 = 1.803 * CT$$

CT for the secondary haul is determined using the method described in Section 4.5.1,(1).

4.5.3 Water Transportation Cost Estimate

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

1. Dump and Boom:

   Arrow, Kinbasket, Ootsa, Revelstoke 1880 and Williston Lakes: $2.32/m³

   All Other Lakes: $1.37/m³

2. Tow:

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

   $$\$/m^3 = 0.8036 + 0.0039 * d$$

   All other Lakes:

   $$\$/m^3 = 0.5078 + 0.0103 * d$$

   Where; d = one-way tow distance in kilometres

3. Dewater and Reload:

Quesnel Lake	$4.71/m³
All Other Lakes	$1.77/m³

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

4. Williston Lake, Dewater only: $1.18/m³

   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: $5.46/m³

      All Other Railways: $2.51/m³

2. 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

Origin	Cost Estimate ($/m³)	Point of Appraisal
Leo Creek	15.51	Fort St. James
Lovell	15.91	Fort St. James
Bear Lake	16.37	Fort St. James
Minaret Creek	16.51	Fort St. James
Niteal	15.23	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): $1.25/m³
   b. Babine Lake (North): $1.82/m³
   c. Kinbasket Lake: $4.14/m³
   d. Revelstoke 1880 Lake: $3.08/m³
   e. Williston Lake: $3.47/m³
   f. Ootsa Lake (Tahtsa Road) $2.44/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.

   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: $0.45/m³

   Kinbasket Lake: $3.82/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: $1.54/m³

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

   b. Hansard Low Water Bridge *: $0.37/m³

   c. Williston Lake Dry Dump *: $3.24/m³

      * Applicable to winter logged volume estimate only.

4.6 Road Maintenance

Where the licensee is obliged to carry out 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/wearing surface replacement
- ditching
- winter road reconstruction
- road use charges paid to other licensees
- 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

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

For a management unit, other than Timber Supply Areas or Tree Farm Licence (for example Woodlot Licences), the routine road maintenance cost estimate is $\$1.51/m^3$.

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

Routine Road Maintenance Cost Estimates

Region	TFL	TSA	Supply Block	$/m3
Prince Rupert		Bulkley 3	All	1.78
		Cassiar 4	All	1.74
		Cranberry 42	All	1.74
		Kalum 10	All	1.74
		Kispiox 12	All	1.23
		Lakes 14	All	1.03
		Morice 20	All	1.54
		Nass 43	All	1.74
	1			1.74
	41			1.74

Region	TFL	TSA	Supply Block	$/m3
Kamloops		Kamloops 11	1	2.14
		Kamloops 11	2, 3, 4	0.99
		Lillooet 15	All	2.21
		Merritt 18	All	1.21
		Okanagan 22	1, 2, 3	1.39
		Okanagan 22	4, 5	1.38
		Okanagan 22	6, 7, 8, 9	2.28
	15			1.39
	18			2.14
	33			2.28
	35			0.99
	49			1.38

Region	TFL	TSA	Supply Block	$/m3
Prince George		Dawson Creek 41	All	1.65
		Fort Nelson 8	All	2.38
		Fort St. John 40	All	1.76
		Mackenzie 16	All	2.28
		Prince George 24	G, H	1.79
		Prince George 24	E, F, I	1.11
		Prince George 24	D	1.15
		Prince George 24	A, B, C	1.14
		Robson Valley 17	All	2.86
	48			1.65
	30			1.79
	53			1.79
	42			1.14

Region	TFL	TSA	Supply Block	$/m3
Nelson		Arrow 1	All	2.64
		Boundary 2	All	1.84
		Cranbrook 5	All	1.94
		Golden 7	All	3.15
		Invermere 9	All	1.43
		Kootenay Lake 13	All	1.67
		Revelstoke 27	All	3.08
	3			2.64
	23			2.64
	8			1.84
	13			1.94
	14			1.43
	55			3.08
	56			3.08

Region	TFL	TSA		Supply Block	$/m3
Cariboo		Quesnel	26	A, B, C, D	0.48
		Quesnel	26	E, F, G, H, I	1.17
		Williams Lake	29	A, B, C, D, E, I	0.73
		Williams Lake	29	F, G, H, J,	0.91
		Williams Lake	29	K, L	0.98
		Williams Lake	29	M, N	1.35
		100 Mile House	23	All	1.09
	5				0.48
	52				1.17

4.7 Road and Land Use Charges

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

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

b. receive written approval of the road or land use charge from the Regional Manager.

1. Charges as a Share of Road Maintenance

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

2. Charges Other Than for Road Maintenance

   There are three main categories of road status:

   a. Forest Service Roads

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

   b. Permitted Roads

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

   c. Other Roads

      Road use charges for roads on Indian Reserves or on private land owned by an arm's length third party and not subject to a lease held by the licensee, 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.

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

3. Other Land Use Charges

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

4.8 Administration and Other Costs

4.8.1 Overhead

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

Overhead costs include:

- Office Operations,
- Scaling,
- Engineering, (road layout, survey and design)
- Cruising,
- Environmental Protection,
- Archaeological surveys,
- 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 detailed engineered costs.

Cost estimates for each group of forest districts are shown in the following table:

Group 1	**Group 2**	**Group 3**	**Group 4**
Bulkley Cassiar Kalum Kispiox	Dawson Creek Fort Nelson Fort St. John	100 Mile House Chilcotin Williams Lake	Fort St. James Lakes Mackenzie Morice Prince George Quesnel Vanderhoof
$5.99/m^3	**$5.41/m^3**	**$4.82/m^3**	**$3.96/m^3**

Group 5	**Group 6**	**Group 7**
Kamloops Merritt Penticton Vernon	Arrow Clearwater Golden Horsefly Kootenay Lake Revelstoke Robson Valley Salmon Arm	Boundary Cranbrook Invermere Lillooet
$5.07/m^3	**$7.04/m^3**	**$7.23/m^3**

4.8.2 Isolated Cutting Authority Areas

An isolated cutting authority area has no continuous road access to the nearest support centre (listed in Section 4.4.2, (9). Continuous road access includes public ferry service, private daily ferry and daily barge service. The exception is where there is continuous road access, but the route is not routinely used to transport people, equipment or supplies to the cutting authority area.

For isolated cutting authorities not serviced by camps the isolation cost estimate covers, the costs of moving people, equipment and supplies to and across the non-road portions of the route to the camp (or cutting authority area 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 a 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: $7.30/m^3
2. Niteal Rail: $8.11/m^3
3. Quesnel Lake: $5.47/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 Practices Regulation (B.C. Reg. 42/94).

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

Forest District Groupings

Group 1	**Group 2**	**Group 3**	**Group 4**
Bulkley Cassiar Kalum Kispiox	Dawson Creek Fort Nelson Fort St. John	100 Mile House Chilcotin Williams Lake	Fort St. James Lakes Mackenzie Morice Prince George Quesnel Vanderhoof

Group 5	**Group 6**	**Group 7**
Kamloops Merritt Penticton Vernon	Arrow Clearwater Golden Horsefly Kootenay Lake Revelstoke Robson Valley Salmon Arm	Boundary Cranbrook Invermere Lillooet

Treatment Regime 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	2752	2972	2076	2103	1968	2628	2737
B	2263	2411	1697	1771	1645	2188	2168
C	1690	1626	1025	1186		1431	1456
D		1445	733	1024	894	1245	1337
E			1304	1463	1350	1777	1573
F	1709	1895		1408		1742	
G			538	746	597	752	973
H	1938	2444	1788	1704	1612	1979	2140
I		1638	1281	1201	1133	1299	1340
J	368		161	266			
K					64		75
L							
M	1467	1836	1062	1238	1007	1284	1653

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 the portion of the land on which the licensee is required to establish a free-growing crop of trees, as specified in the *Forest Practices Code of British Columbia 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 applicant's agreement.

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

Individual areas of non-commercial brush (NCBR) of 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 included in the applicable treatment regime(s) used to calculate the basic silviculture cost estimate and the deciduous volume is included in the total net merchantable volume for the calculation of silviculture cost estimates.

Each treatment regime cost estimate is determined as follows:

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

Where:

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

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

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

Where:

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

R = 1 for treatment regime G in all cases.

The Basic Silviculture Cost Estimate is determined as follows:

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

Each portion, by area, of a cutting authority that requires less than 90 percent 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).

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 all phases of manufacturing beginning with the dewatering of logs or unloading of logging trucks at the mill log yard, (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 actual costs to the licensee, including wages, benefits, overtime, depreciation, fuel, supplies, repair, maintenance, applicable licences, insurance, etc. from a representative sample of Interior operations.

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

The estimates have an effective cost base date of July 1, 1994.

Untrended Manufacturing Cost Estimates ($/m³) 1994 Cost Survey Base		
	Species	**Manufacturing cost ($/m³) 0% Decay**
Northern Interior (Zone 5) & Skeena (Zone 6)	LO	32.27
	SP	27.65
	BA	32.51
	FI, LA, WH, YE	40.67
	CE	38.53
	HE	35.61
Southern Interior (Zone 7)	LO	38.74
	SP	32.51
	BA	38.58
	FI, LA, WH, YE	48.01
	CE	46.82
	HE	45.07
Southern Cariboo (Zone 8)	LO	30.96
	SP	26.26
	BA	31.20
	FI, LA, WH, YE	38.13
	CE	33.44
	HE	32.73
Fort Nelson/Peace (Zone 9)	LO	31.07
	SP	26.49
	BA	30.57

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

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

Manufacturing cost ($/m^3) = decay% * 0.1581 + base value from table.

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. Cost trend factors are applied at the appraisal effective date and at the date of each stumpage adjustment.

For trend factors applicable prior to July 1, 1996, refer to the August 1, 1995 *Interior Appraisal Manual.*

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

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.400	1.270
October 1 to December 31, 1996	1.470	1.280
January 1 to March 31, 1997	1.480	1.290
April 1 to June 30, 1997	1.490	1.300
July 1 to September 30, 1997	1.500	1.310

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

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.400	1.210
October 1 to December 31, 1996	1.470	1.220
January 1 to March 31, 1997	1.480	1.230
April 1 to June 30, 1997	1.490	1.240
July 1 to September 30, 1997	1.500	1.250

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

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.360	1.210
October 1 to December 31, 1996	1.430	1.220
January 1 to March 31, 1997	1.440	1.230
April 1 to June 30, 1997	1.450	1.240
July 1 to September 30, 1997	1.460	1.250

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

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.340	1.150
October 1 to December 31, 1996	1.410	1.160
January 1 to March 31, 1997	1.420	1.170
April 1 to June 30, 1997	1.430	1.180
July 1 to September 30, 1997	1.440	1.190

Appraisal Effective Dates From October 1, 1994 to July 31, 1995

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.300	1.128
October 1 to December 31, 1996	1.370	1.138
January 1 to March 31, 1997	1.380	1.148
April 1 to June 30, 1997	1.390	1.158
July 1 to September 30, 1997	1.400	1.168

Appraisal Effective Dates From August 1, 1995 to July 31, 1996

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
July 1 to September 30, 1996	1.200	1.090
October 1 to December 31, 1996	1.270	1.100
January 1 to March 31, 1997	1.280	1.110
April 1 to June 30, 1997	1.290	1.120
July 1 to September 30, 1997	1.300	1.130

Appraisal Effective Dates On or After August 1, 1996

Appraisal Effective Date or Stumpage Adjustment Date	Trend Factor	
	Logging and Silviculture	Manufacturing
August 1 to September 30, 1996	1.140	1.080
October 1 to December 31, 1996	1.150	1.090
January 1 to March 31, 1997	1.160	1.100
April 1 to June 30, 1997	1.170	1.110
July 1 to September 30, 1997	1.180	1.120

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 tied to the estimated Value Index of the stand to be harvested. The Value Index is defined as the Selling Price less the Operating Cost, both of which are estimates expected for an average operator in that stand. The formula to be used is:

$$VI = SP - OC$$

Where:

VI	=	Value Index for the cutting authority.
SP	=	estimated stand Selling Price determined in accordance with Chapter 3.
OC	=	estimated Operating Cost applicable to the timber being appraised, and determined in accordance with Chapter 4.

5.3 Mean Value Index

The Interior Mean Value Index is the benchmark against which individual stands of timber are compared. The Interior Mean Value Index is recalculated and published by Revenue Branch at the time of each quarterly stumpage adjustment and becomes an integral part of this manual.

5.4 Market Value Indexing

At the times specified in Section 1.6, target 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. (1986 = 100) adjusted back to the base of 1981 = 100.

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	**New Statistics Canada Index based on index values for the months of:**
January 1	Preceding August, September, October
April 1	Preceding November, December, January
July 1	Preceding February, March, April
October 1	Preceding May, June, July

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

5.6 Calculation of Stumpage Rate

5.6.1 Calculation of Indicated Stumpage Rate

The Indicated Stumpage Rate for a cutting authority is defined as:

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

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 m^3, 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, (4).

   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 m³ to 5 000 m³ except Right-of-Way cutting authorities (see Section 6.3)

   An indicated stumpage rate is determined on the basis of full appraisal data. The data may be site-specific or the data may be obtained from comparable cutting authorities, as determined by the Regional Manager.

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

   These cutting authorities are cruised if specified by the Regional Manager in accordance with Section 4.2 of this manual.

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

3. Low Volume Additive

   All fully appraised cutting authorities are eligible for a low volume additive.

The additive is:

$$\$/m^3 = 1.5400 - 0.000308 * V$$

"V" = the lesser of the cutting authority net cruise volume or the licence's Allowable Annual Cut of Crown Timber (if applicable) and must be less than or equal to 5 000 m^3.

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 m^3

   The indicated stumpage rate is derived according to Section 6.2.1.

2. Total Volume of 2 000 m^3 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 m^3, 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.

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 timber sales licenses issued under the *Forest Act,* Section 18, except:
  - those issued under Section 18 (1)(b) or 18 (1)(c), and
  - those having an AAC of more than 10 000 m^3.

Fixed/Adjustable Stumpage Rates for SBFEP Cutting Authorities

The adjustable stumpage 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 or adjustable 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 at the April 30, 1994 level until April 30, 1996 on timber marks issued under that licence if:

- the timber sale licence was advertised or awarded prior to May 1, 1994,
- the timber mark was issued prior to May 1, 1994, and
- the election to fix rates was made before July 1, 1994.

The above timber marks with rates fixed until April 30, 1996 will be reappraised effective May 1, 1996. All subsequent reappraisals for those timber marks will be as per Section 2.3.

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 m^3.

   A basic silviculture levy may be added to the Reserve Stumpage Rate. The levy is $0.00/$m^3$ if no Crown expenditures are anticipated for basic silviculture, or the District Manager may set the levy at $0.00/$m^3$ 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 $0.00/$m^3$ if no Crown expenditures are anticipated for road construction and other services, or the District Manager may set the levy at $0.00/$m^3$ 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 approved by the Regional Manager (trended at the time of the appraisal).

The amount of any levy may be re-determined at reappraisal 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 from all sources of Crown timber when scaled:

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 grades 3, 4, 5 and 6)	$0.50/m^3
All Species (except Cedar)	Fence Rails, Mining Timbers, Fence Posts	$1.20/m^3
All Species	Pickets & Palings, Mine Cribbing, Car Stakes, Round Stakes & Sticks, Rails (Split), Lagging (Split), Orchard Props	$1.20/m^3
All Species	Christmas Tree: under 3m 3-5 m over 5 m	$0.20/each $1.00/each $1.50/each
All Species	Logs salvaged below the high water levels of the Mica, Arrow, Revelstoke, W.A.C. Bennett Dam Flood Basins and the Slocan, Kootenay, Mineral, Babine and Ootsa Lakes.	$0.25/m³
All Species	Trees classified as "Dead Potential" on Cruise-based cutting authorities	$0.25/m³

Forest District Specific

Description	District	Reserve Stumpage Rate
Gross area cleared for seismic lines, gas or oil well sites and right-of-way to well sites	Cranbrook Dawson Creek Ft. Nelson Ft. St. John	$1,147/ha $579/ha $579/ha $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 began 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 sawlogs scaled in the indicated forest regions on and after April 1, 1996.

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	36.80	28.40	20.90
Spruce	40.70	32.90	20.00
Balsam	20.60	17.20	17.60
Cedar	18.30	14.70	22.00
Hemlock	19.90	16.00	19.40
Cypress	37.30	29.10	20.20
White pine	20.10	17.10	24.90
Yellow pine	20.10	17.10	21.30
Larch	20.10	17.10	20.90
Lodgepole pine	13.00	10.10	18.20
Other conifers	20.10	17.10	20.20
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 1 Equipment and Labour Rates

(Cost Base July 1, 1994)

MACHINE DESCRIPTION	*TYPICAL MODEL*	*$/HOUR*
Bulldozer	Cat D-9N, Fiat Allis FD30B	169.25
Bulldozer	Cat D-8, TD25, Komatsu D155A-1	159.25
Bulldozer	Cat D-7, TD20, Komatsu D85	130.25
Bulldozer	Cat D-6, TD15, Komatsu D65	111.50
Rock Drill (includes labour)	All	163.88
Grader	Cat 14G, Komatsu GD705,725	97.50
Front End Loader (Gravel)	Cat 980B, Komatsu WA470-1	119.00
Front End Loader (Logs)	Cat 980C, Komatsu WA500-1	129.00
Heel Boom Loader	All Cable	164.78
Heel Boom Loader	All Hydraulic	161.11
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 235C, Hitachi EX400.	205.15
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 235B, Hitachi UH171 etc.	169.40
Hydraulic Excavator inc. Brush Guard & Thumb	Rate Factor: 27.4 - 37.0 Cat 229	149.60
Hydraulic Excavator inc. Brush Guard & Thumb	Cat 225, Hitachi EX270, UH09	137.23
Hydraulic Excavator inc. Brush Guard	JD 690A, Hitachi EX150, etc.	93.19
Gradall	54,100 - 62,300 kg - m	136.00
Logging Truck (Highway)	All Triaxle	86.50
Logging Truck (Off Highway)	All	150.91
Self Loading Log Truck	Highway log truck + 4.5 t deck crane	98.80
Gravel Truck	9.9 m^3 +	71.50
Gravel Truck Articulated	20 - 30 tonne	109.82
Lowbed	36 tonne	78.00
Lowbed	150 tonne	150.91
Concrete Mix Truck	6 m^3	82.00
Concrete Vibrator (labour not included)	5 m^3	3.88
Concrete Mixer (labour not included)	.17 m^3	6.13
Crane - Truck mounted	18 tonne	85.00
Soft Track Skidder	KMC 200	112.00
Rubber Tired Skidder	Clark 668	76.75
Vibrator Compactor	Clark 668 + 2.7 - 3.6 tonne roller	88.45
Tractor and Grid roller	Clark 668 + grid roller	88.55
Labourer		25.96
Roadman		26.17
Crib/Culvert Maker, Powderman		27.49
Landingman		27.85
Rockdriller & Powderman (for load & blast only)		5987
Bridgeman		32.74
Powersaw (labour not included)	All	4.25
Faller, including powersaw cost		50.77

Notes:

Rates based on 1994 logging cost surveys, Province of British Columbia Hydro and Power Authority and B. C. Rail. Equipment Rental Rate Guide (1994-95) (rates based on a 3 year old machine), and IWA agreement rates including payroll loading.

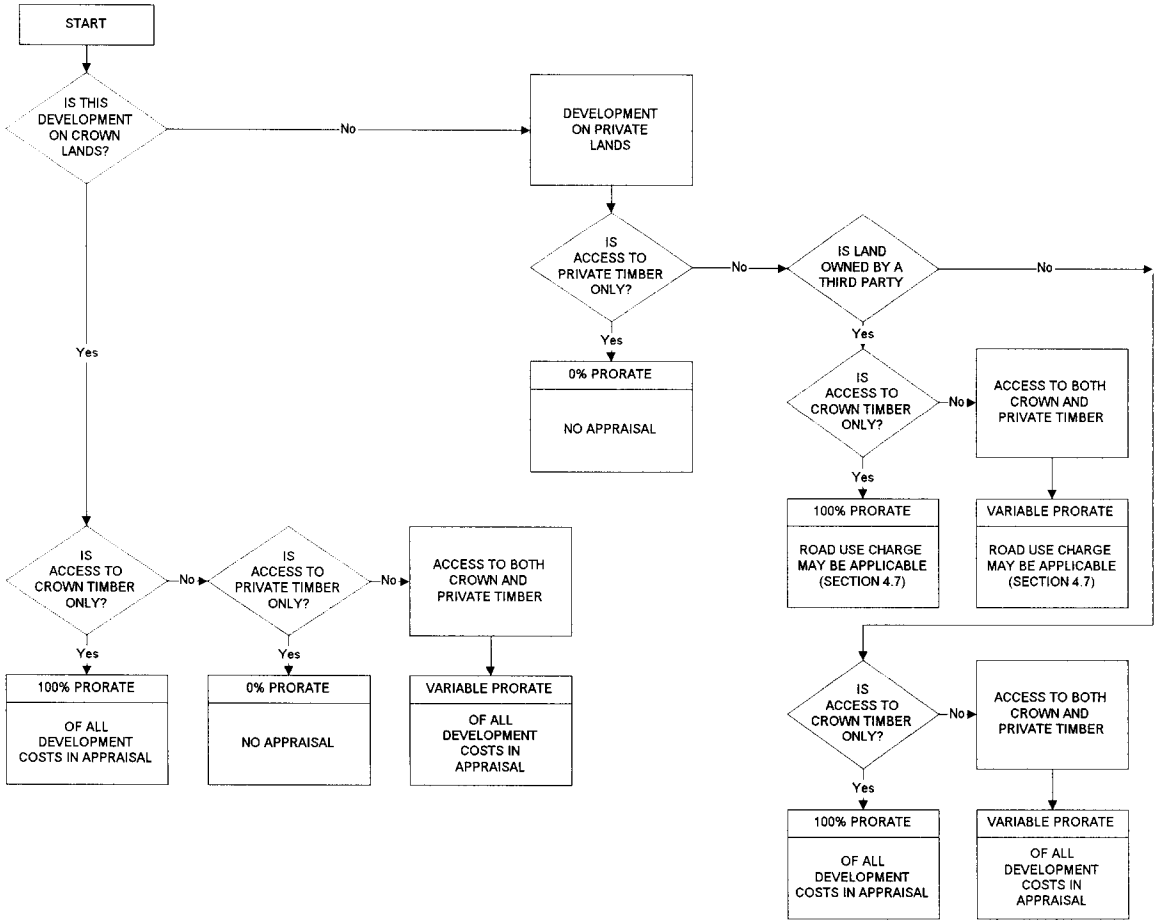
- The above rates will be used for all engineered estimates made under this manual.
- The rates include labour, crew transportation, supervision and camp and cookhouse where applicable. No additions are required.
- Use of equipment rates not listed in this appendix must be approved by the Regional Appraisal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

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

Appendix IV: Glossary

Blanket salvage permits	Cutting permits issued over a broad area composed of small patches or single trees for salvage logging and created to facilitate the expeditious extraction of damaged timber.
CA	Cutting Authority
Commercial Thinning	Partial cutting of immature stands where the timber is sold or utilized.
Deactivation	Measures taken to stabilize roads, landings and logging trails during periods of inactivity. Includes the control of drainage, the removal of sidecast and the restablishment of vegetation for permanent deactivation. Defined in the Forest Practices Code.
Destumping	The uprooting and/or removal of stumps for the purpose of root disease control. Stumps may or may not be piled and burned.
End Haul	The removal of excavated material from a road or landing right of way to a separate area to avoid side-casting on steep and/or sensitive sites.
LP	Logging Plan
Ocean Tow	Towing of log booms in the marine section of the Kalum District. The cost estimate is based on the sheltered water tow equation from the *Coast Appraisal Manual*.
Pushover Logging	Felling trees by pushing them over to expose the root ball for root disease control purposes. The root ball may or may not be piled and burned.
Remedial Fencing	A fence that is required to remedy or reduce the impact of timber harvesting activities on range management. Remedial fencing will be required most frequently in instances where harvesting and road construction has removed a natural barrier so as to negatively affect livestock distribution.
Salvage Logging	The harvesting of timber damaged by fire, insects or blowdown.

Sensitive Site Skidding	A ground based skidding process where extra care is required to not damage the site or where special processes are required to meet the biological needs for the site. The treatment must be specifically required in the silviculture plan, logging plan or cutting authority. The use of this option in the tree to truck phase cost estimates is dictated by the site conditions.
Single tree harvest	Harvesting of individual trees which may or may not be damaged usually requiring construction of access to the tree site. Removal may be by helicopter.
Skyline Logging	Use of a skyline logging system, cable yarding over 300m average horizontal yarding distance or requiring intermediate supports.
SP	Silviculture Prescription
Swinging	Recognized as the secondary method of skidding or yarding which is required under the cutting authority in order for the logs to reach the landing. This may be combined with any primary skidding or yarding method.
Trap Trees	Trees as individuals or in small scattered clumps, standing or down, used to attract and entrap destructive insect pests. May be of two types: a) "conventional" are healthy uninfested trees felled prior to the beetle flight period and left to absorb insects, must be removed or treated after catching beetles. b) "lethal" used in inaccessible areas. Lethal trees are treated with insecticide.

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