



Alberni Valley Community Forest  
Corporation

## **SCHEDULE A2 – SERVICES FOR MULTIPHASE ENGINEERING, SILVICULTURE AND TIMBER DEVELOPMENT**

Attachment to the Agreement with \_\_\_\_\_ for Total Chance Plan and multi-phase engineering, silviculture and timber development within the Taylor Operating Areas of the Alberni Valley Community Forest.

### **SCOPE:**

- To fully develop up to **45,000 m<sup>3</sup>** in Cutting Permit(s) ready for approval and harvesting.
- Final packages must be completed concurrently and final scheduled works submitted by no later than **September 21, 2015**.
- New cutblocks may be introduced into the work-plan as planning evolves and conditions and priorities change.
- In some cases the contractor may be required to complete works started by another contractor and rework existing road or block layout.
- The AVCFC reserves the right to use other contractors or its own employees to develop other harvest blocks in the general area encompassed by this contract.

### **OBJECTIVES:**

The Contract objectives are to completely develop harvest blocks including engineering, all field marking, collection of ecological information, timber cruising, mapping, production of Site Plans, and electronic submissions. As required, documents will be signed and sealed by a Registered Professional Forester. All harvest systems must be considered in light of the reconnaissance findings, FSP, and higher level plans. The systems proposed shall be selected in consultation with the AVCFC Representative.

### **1. QUALIFICATIONS**

- 1.1 The proponent must provide the qualifications of all personnel and/or subcontractors proposed to carry out work under the Contract. If there are any changes to this list it is the responsibility of the proponent to notify the AVCFC of those changes. It is also the responsibility of the proponent to check the qualifications of personnel or subcontractors before and after award of any Contracts with the AVCFC.

### **2. WORK PLAN**

- 2.1 The Contractor shall designate a Project Manager for liaison with the AVCFC Representative and other agencies for the term of the contract. The Project Manager shall attend and participate in a Work Progress Plan meeting with the AVCFC Representative to review contract particulars.
- 2.2 The contractor shall employ experienced and competent personnel for all phases of this contract. Resumes of these personnel shall be provided by the Contractor at the Work Progress Plan Meeting. Personnel changes shall not be made without notification of the AVCFC Representative.
- 2.3 The Contractor shall prepare a Work Progress Plan for each project area including resources to be committed and timing of phases to ensure that milestones are met and the contract completed within the time frames approved by the AVCFC Representative.

- 2.4 The Contractor shall provide the telephone and facsimile numbers and e-mail address of the Project Manager and a back-up.
- 2.5 The AVCFC shall provide, on a loan basis, all available materials, plans and map requested by the Contractor unless of a confidential nature. The proponent should refer to the AVCF website for available documents: [www.communityforest.ca](http://www.communityforest.ca)
- 2.6 The Digital Use Agreement (Schedule E), shall be accepted and initialled by Contractor and presented at the Work Progress Plan Meeting. A format for submitting all electronic or digital information will be agreed to at the Work Progress Plan Meeting.
- 2.7 Proof of insurance shall be presented to show compliance with Schedule D.
- 2.8 Prior to commencement of the Work under the Contract, the Contractor must ensure that all of the Contractor's meet the following requirement of SAFE Certification Requirements (Schedule H).
- 2.9 Prior to the start of work, the Contractor and their designated Project Manager will attend a pre-work to review all requirements and conditions pertaining to the contract with the AVCFC Representative. Unless otherwise approved, fieldwork must commence **within 10 days** of award of contract.

A Work Plan will be developed by the AVCFC Representative to schedule the cutblocks to be developed. The order and dates in which blocks are to be completed must be adhered to and will not be amended unless authorized by the AVCFC Representative.

**All work must be completed to the satisfaction of the AVCFC Representative prior to starting the next cut block. Working ahead of the work schedule will not be allowed unless authorized by the AVCFC Representative. The contractor will be expected to be able to add resources to the contract if the schedule is not being met.**

- 2.10 The Contractor will designate a project supervisor to act on his or her behalf when the Contractor is absent from the project. No operations will be conducted unless under the direct and continuous supervision of the Contractor or his designated project supervisor.
- 2.11 New cutblocks may be introduced into the work plan by the AVCFC Representative as planning evolves and conditions and priorities change. New cutblocks introduced into the contract are not a "change in conditions" as set out in the contract, but rather are considered to be within the scope of work covered by this contract.
- 2.12 Work will be completed for payment as per the Schedule B of the contract (\$/m<sup>3</sup> or alternate rates which would be pre-approved by the AVCFC Representative). Inspection by the AVCFC Representative will be made upon completion of each project. Receipt of invoices will be accepted after successful completion of a project. Invoices are to be submitted in a format acceptable to the AVCFC and as outlined in Schedule B of the contract. A 10% holdback will be taken for each invoice payment made by the AVCFC and will be returned upon completion of the contract term. Holdbacks shall be returned to the Contractor at the end of each term of the Agreement, subject to any liens or claims against it.

### **3. STANDARDS OF PERFORMANCE**

- 3.1 All works and services shall be conducted according to all relevant Legislation i.e. Acts and Regulations and utilizing related Guidebooks.
- 3.2 The Contractor shall make Contract Specifications/Standards available to all staff.
- 3.3 Every work site shall have a contractor representative able to receive communications about the contract.
- 3.4 All questions, concerns, problems, delays and difficulties associated with this contract, are to be documented in writing and forwarded to the AVCFC Representative.
- 3.5 All phases shall be completed and submitted to the AVCFC Representative in accordance with the approved Work Progress Plan.
- 3.6 Unless otherwise approved, all digital submissions must be as agreed to under Section 2.6 Schedule A2.
- 3.7 Submit all original field cards, working maps, electronic files, supporting background information and rationales and notes upon successful completion of each project. Such information shall become the property of the AVCFC.
- 3.8 Mapping and field marking standards as per BCTS Timber Marking Standards. Some variation from BCTS standards may be requested and amended at the Progress Plan Meeting(s). One example may be the elimination of tree blazing.
- 3.9 All electronic information, whether on disk or transmitted by other means, must be scanned for computer viruses prior to submission. If a virus is detected in any submission that submission shall be rejected and a \$200.00 charge shall be deducted from the contract price.
- 3.10 The Contractor shall only utilize personnel identified in the tender submission, for providing the Services, unless otherwise approved by the AVCFC Representative.

### **4. INSPECTION AND ACCEPTANCE**

- 4.1 Request for Inspection and Acceptance  
The Contractor's designated Project Manager/Field Supervisor must review all Preliminary, Draft and Final Submissions prior to submission, to ensure compliance with Contract Schedules and AVCFC Representative instructions.
- 4.2 The Contractor shall, upon completing all Work within a project area and/or phase, promptly request that the AVCFC inspect and determine the acceptability of the Work. The request must be in writing and confirmation that works have been completed as per contract and legal requirements and signed off by the designated Project Manager.
- 4.3 Inspection by the AVCFC  
The AVCFC shall, following receipt of the Contractor's request for inspection and acceptance, promptly inspect and determine the acceptability of the Work performed in the Payment Area. Work shall be inspected in accordance with the Contract Documents. The AVCFC is not obliged to make any determination of acceptability before receiving the written request.
- 4.4 The Contractor may observe inspections while they are underway. This will be at the contractor's own expense.
- 4.5 The AVCFC may provide the Contractor with a copy of inspection results.

- 4.6 The AVCFC reserves the right to inspect, at all times during the Term, any Work performed.
- 4.7 Inspections are conducted by the AVCFC in order to determine compliance with the provisions of this Agreement and to provide the basis for calculating the payment due. These inspections are conducted for the sole benefit of the AVCFC, and do not release the Contractor from the responsibility of providing quality control measures to assure that the Work strictly complies with this Agreement.
- 4.8 Re-Inspection  
If the Contractor requests a re-inspection of the Work, the AVCFC shall perform the re-inspection at a time mutually agreed to by the Parties, but in any event no later than ten (10) Work Days after receiving the request.
- 4.9 The results of the re-inspection shall be used to determine payment and shall be final and binding.
- 4.10 Actual Damages or Liquidated Damages for Non-compliance  
If, in the opinion of the AVCFC, the Contractor fails to observe, perform, or comply with any provision in this Agreement, the AVCFC, may at its sole discretion:  
(a) permit the Work to continue, giving the Contractor a time limit for compliance, rectification, or both; OR  
(b) suspend all or part of the operation of this Agreement including payments in whole or part to the Contractor, giving the Contractor a time limit for compliance, rectification, or both.
- 4.11 Where the AVCFC has set a time limit for compliance, rectification, or both and, in the opinion of the AVCFC, the Contractor fails to meet the time limit, the AVCFC, may employ whatever means necessary to rectify the non-compliance, which may include performance of the obligations on the Contractor's behalf, and the Contractor shall, on demand, pay the AVCFC an amount equal to the costs reasonably incurred by the AVCFC in rectifying the non-compliance.

The AVCFC may demand payment of the following as liquidated damages where the contractor has been given notification to rectify unsatisfactory or incomplete works.

- 4.12 Liquidated Damages for Late Completion  
Should the Contractor fail to complete the Work on or before the completion date specified in the contract and/or Work Progress Plan, but is subsequently completed, the Contractor shall pay to the AVCFC, **\$500.00/day** as agreed liquidated damages for every day for which the completion is after the specified completion date. Payment of such damages shall not limit any other remedy available to the AVCFC. It is understood that no bonus payments for early completion will apply under this Agreement.

## **5. PRELIMINARY ENGINEERING, SILVICULTURE AND TIMBER DEVELOPMENT (TD) (Phase 2)**

### Intention:

The intention of the TD (Phase 2) is for the contractor to review the identified area for timber quality, viability and access. The contractor will need to identify both the initial and second pass opportunities during this phase to ensure the access and boundaries will facilitate both entries. Once the area is determined to be viable the contractor will need to determine what professional assessments will be required in the final engineering. This will include and not limit the area identified but also the adjacent areas that will be impacted by the initial harvest. Included in the (phase 1) will be the review of the intended access to the timber sale which will identify all road sections both new and existing.

The Contractor shall:

- 5.1 Preliminary TD entails:
- Office review
  - Cutblock boundary location- flagged (traversing not required)
  - Road P-line recce/location- flagged (traversing not required)
  - Deflection and Tie lines as required
  - Identify harvesting considerations (aerial / grapple vs ground, steep slopes, hazards, rockfall etc)
  - Identify stand attributes (species composition, volume etc)
  - Identify resource features (wildlife, Red Listed Species, trails, rock outcrops, gullies, Karsts etc)
  - Identify forest health issues (Fir Bark Beetle, root rot etc)
  - Determine assessments required (terrain, windthrow, gully, Archaeological Survey, Root Rot Survey)
  - Riparian assessments (complete)
  - Establishment of viewpoints for VIA where required. (known or proposed)
  - Preliminary engineering report
  - AVCFC office review and approval

- 5.2 According to the Work Progress Plan, conduct a thorough office review of all relevant plans (operational and higher level), reports, surveys, maps, fish distribution data, agency comments, constraints etc., for each block. A copy of the plan must be submitted to the AVCFC Representative prior to the start of field works.

This information shall be utilized in all phases of this contract.

- 5.3 Classify and map all streams, lakes, wetlands, non-classified drainages (NCD) and non classified wetlands (NCW) within and adjacent (i.e. within the RMA distance) to the proposed cutblock or road right of way boundary. Measurements confirming stream classifications shall be recorded on field cards and the locations of measurements mapped. The contractor shall classify all streams as per the AVCFC Forest Stewardship Plan (FSP) and as detailed in the Stream Classification Guide Datasheets and Small Wetland & Amphibian Assessment Card or equivalent.
- 5.4 The Prescribing Forester shall walk the entire area and produce a draft ecological classification map. (Note the Prescribing Forester must not delegate this work) For each eco-type site series identified, a minimum of one sample plot with soil pit shall be established. Recommendations for level and type of retention shall be presented with approximate locations sketch mapped.
- 5.5 The Prescribing Forester shall review and identify strategies for addressing stand level biodiversity including potential wildlife tree retention areas (WTRA) and wildlife tree retention as per the FSP. Target levels shall be consistent with the approved FSP.

It is the intention of the AVCFC to demonstrate a variety of silviculture systems. The prescribing Forester shall meet with the AVCFC Representative to discuss these options and expectations.

- 5.6 Find, record and map all resource features (e.g. wildlife, red listed species, trails, dens, nests, karst, old growth trees / snags, recreation features, etc.) within or adjacent to the cutblock area.
- 5.7 Find, record, and identify all Invasive Plant Species and report as per the FSP requirement.
- 5.8 Establish a sufficient number of GPS ties (minimum 3 ties) to accurately map locations of all reconnaissance and p-lines and control points.

- 5.9 Identify all required assessments (e.g. Archaeological Impact Assessment, Fish Stream Inventory, Visual Impact Assessments, terrain stability, windthrow, cave / karst, root disease, forest health, etc).
- 5.10 Engineer and map on 1:5000 base the preliminary cutblock road locations, falling boundary locations and harvest systems.
- 5.11 Boundary, Roads, Deflection Lines, and Harvesting Considerations  
When establishing preliminary boundaries the following timber volume criteria shall be used:
- For clearcut and clearcuts with reserves, the minimum timber volume for inclusion to be  $350\text{m}^3/\text{ha}$ .
  - For selection silviculture systems, the minimum timber volumes for inclusion are  $50\text{m}^3/\text{ha}$ .
  - Final decision for inclusion to be made by the AVCFC Representative based on market conditions, value and other considerations.
  - When establishing preliminary roads and boundaries, sufficient number of GPS and map ties (minimum 3 ties) should be taken to accurately map preliminary road and boundary. If GPS is unavailable, the acceptable alternative tie points will be significant features on the air photos.
  - All access options are to be explored. Consideration to protection of soils, water bodies, visual quality, heritage resources and other resource values, the location and design of all roads shall be such that the combined costs of construction, log hauling, site degradation, and site deactivation are minimized, while maximizing the development of merchantable timber. Indication of alternate routes reviewed must be submitted with the phase 1 report.
  - Roads and boundaries to be flagged (traversing not required) as per Section 3.8.
  - Identify all road sections that will have the following criteria: grades >18% favourable, >10% adverse, thru cuts, end haul sections, adverse switch backs, engineered fills, overland sections and any unique road building anticipated in the Phase 2 engineering.
  - Where old roads are to be used, provide information on upgrades required and assessments needed. All upgrade surveys required must be identified for approval by the AVCFC Representative prior to Phase 2.
  - For existing structures and all creek crossings to be identified and all structures noted for further assessment in Phase 2.
  - Identify bridge or large culvert crossings that will require a site plan (e.g. culverts >2000mm or bridges exceeding 5.9m in length+)
  - Stratify area by proposed silvicultural system (Note Harvest System must be approved by the AVCFC Representative for each sale prior to phase 2 proceeding).
  - Describe soil texture for each harvest area and any limitations
  - Determine where ground based, cable (grapple, hi-lead, and skyline) or helicopters are to be used and suggest whether seasonal constraints to harvest are applicable. Identify service landings and drop sites.
  - For cable harvesting ensure tailholds exist when establishing boundaries e.g. need 2 feet diameter stumps or sufficient backspar trees.

- For Ground based operations identify all slopes >35%  
Stratify slopes > 60% and indicate areas of instability (“pistol butting”, soil creep, slide tracts) identify all required terrain stability field assessments, soil erosion field assessments and road stability prescriptions for all proposed roads within, or above, areas of unstable or potentially unstable terrain (P or U polygons), moderate to high likelihood of landslides (Class IV or V polygons), high erosion potential (H polygons), slopes greater than 60%, or having indicators of slope instability.
  - Identify any Hazards present and appropriate measures to mitigate
  - Identify presence and location of gullies
  - Identify green-up issues
  - Identify the need for legal survey
- 5.12 Stand Attributes – **Note:** A Cruise for Appraisal purposes is NOT required as the AVCFC stumpage system is Tabular Rate.
- Estimate volume / hectare (through cruise or other agreed method)
  - Estimate species composition (%)
  - Determine average age of leading species
  - Estimate Average diameter and height (and range) of all species
  - Identify stand history if obvious
  - Identify type stratum
- 5.13 Resource Features
- Within or adjacent to the cutblock area record and map resource features such as wildlife signs, trails, dens, nests, red listed species and other species at risk, karst, caves, old growth trees / snags, recreation features, rock outcroppings, potential wildlife tree patches.
  - Presence of heritage resources-Culturally Modified Trees (CMT) or unique natural features.
  - Adjacency to existing roads, hydro or fiber optic lines, gas or oil pipelines, private property (or other known tenure), “non greened up” forest land.
- 5.14 Forest Health
- Identify the presence of root rot, Douglas fir bark beetle, dwarf mistletoe etc. and an estimate of % affected area, with approximate locations.
  - Identify windthrow and determine species, duration on the ground, direction of lean, catastrophic or endemic.
- 5.15 Invasive Plant Species
- Identify the presence of Invasive Plant Species as per the FSP requirements.
- 5.16 Assessments
- Identify and/or recommend assessments to be completed such as visual impact assessments (VIA), terrain stability, gully, windthrow, root disease, cave/karst, CMT or archaeological.
  - Establish viewpoints for VIA.
- 5.17 Riparian Assessment
- Streams and Non Classified Drainage’s will be traversed and documented as per the FSP and FPPR and Stream Classification Guidelines & Datasheets that are found within influence of the cutting areas or roads. Streams and/or NCD’s within 50 meters, but outside of the block boundary, shall be traversed & mapped.

- Stream, NCD's, lakes, wetlands, estuaries, fisheries sensitive zones, vernal pools of ecological significance will be traversed and classified and mapped as required. Traverse notes (Stream Data sheets) will include location of potential gully instability, slide scars on gully walls, stepped scarps, tension cracks, soil creep, debris piles, multiple stream channels, barriers/obstructions, known downstream uses or concerns, and note mineral vs. bedrock controlled banks on streams. All stations will be marked on as per Section 3.8 of this schedule.
- If the stream channel is within the block or the influence of the block (50m) and meets the definition of a gully, a qualified professional must carry out a gully and/or terrain assessment.

#### 5.18 Preliminary TD Report and Map

- For each cutblock a written report is required which summarizes the field data collected. Based on the data the report should make recommendations on assessments required and rationalize the location of proposed roads and boundaries and describe harvest chance as per the stand attributes. The report should identify the silviculture system and recommended harvest systems and constraints, and must also identify all applicable results and strategies and how they apply to the proposed block(s) and road(s). The report shall include copies of field notes.
- The TD Report should include a map, 1:5000 scale, showing riparian classifications, ecological classification, streams, water bodies, existing and proposed boundary, second pass opportunities if applicable and road locations (both new and upgrade road systems, resource features, different harvesting systems, gullies, sensitive areas, adjacent land features, root rot areas, major crossings, timber types, and windthrow areas. In addition to the preliminary block map a 1:20 000 scale FSP (Operational Plan) /block comparison map is required. The proposed block is to be located and mapped as accurate as possible to compare to existing map polygons.
- The contractor is responsible for identifying and mapping all CMT's or archaeological features found. The First Nations (F.N.) whose Traditional Territory may be impacted is to be contacted by the Contractor's Project Manager for the purpose of participating in an on-site review. The cost of a F.N. representative attending the review will be borne by the AVCFC.

The AVCFC may offer additional archaeological assessment work to the F.N. outside of this contract. The contractor will not be responsible for this additional work but may be asked to modify blocks as a result of assessment findings.

Any other traditional use information that is held by the AVCFC or a First Nation may be shared with the Contractor through a Confidentiality Agreement if necessary to carry out works under the contract. Traditional use information of a sensitive nature may not be shared with the Contractor and the reasons for exclusion of some works or areas may not be supplied.

- The Project Manager and Site Plan Forester shall meet with the AVCFC Representative for review and approval of the Preliminary TD Development Report, before commencing any subsequent work. At this time all extra works identified beyond the standard engineering requirements of the contract will be reviewed and approved prior to any further works are completed. This includes all anticipated day rate works for any identified Professional or Technical activities.

***AVCFC must review and approve the Preliminary TD Report before the contractor is allowed to start Phase 2- Final Cutblock and Road Engineering.***



## 6. FINAL ENGINEERING, SILVICULTURE AND TIMBER DEVELOPMENT (TD) (Phase 3)

### Intention

The intention of the Phase 3 is to complete the final engineering of the blocks and roads and all required assessments as per the details from section 6.1 to and including section 12. of this contract. All field marking will be as per Section 3.8 of this Schedule.

6.1 Final Cutblock and Road Engineering entails:

- Final road location, traverse, and design
- Bridge Crossing & Large Culverts Site Plans
- Block boundary traversing, blazing, and painting
- Completion of Assessments- gully, terrain, windthrow, root rot, visual, fish resources
- Silviculture Site Plans and Road Site Plans
- Cruising
- CMT and/or archaeological assessments completed by Contractor or First Nation

6.2 A Road Site Plan must be prepared for any new road construction for which timber harvesting related to the road's construction is required and that is not covered by a Block Site Plan

6.3 With due consideration to protection of soils, water bodies, visual quality, heritage resources and other resource values, the location and design of all roads shall be such that the combined costs of construction, log hauling, site degradation, and site deactivation are minimised, while maximising the development of merchantable timber. The latest versions of the BCIT Manual for Roads and Transportation (Volumes I and II), FERIC Log Bridge Construction Handbook, Forest Road Regulations, Forest Road Engineering Guidebook and the Forest Service Bridge Design and Construction Manual should be consulted.

6.4 Road construction is recognized as a major cause of mass wasting and stream sedimentation. Accordingly, the amount of road built shall be minimized and road construction avoided through unstable areas. If it is deemed necessary to traverse unstable slopes or other areas sensitive to road construction, a qualified registered professional shall be consulted and site-specific construction techniques shall be proposed. Environmental impacts will be minimized.

6.5 Locate roads and landings away from streams, gully headwalls, slide areas, unstable slopes and marshes while utilizing benches, ridge tops and flatter slopes as much as possible.

6.6 **"All areas of Terrain Class III, (with a High Hazard Rating) Class IV, Class V and Gully or potential gully, must have an appropriate Professional Field Review and approval of the Final Road and Block Boundary"**. (Any road sections with slope > 50% and any slope within a proposed cut block > 60%).

## 7. ROAD TRAVERSING

### 7.1 Scope of Work

The work shall include a P-line route survey; a roadway design including plans, profiles, cross sections and earthwork (mass haul) estimates; and L-line marking will only proceed after AVCFC Representative approval. Note L line will only be established for Permanent Roads as all Temporary roads will be permanently de-activated and will only require P-line surveys. The work shall also include site plans for crossing of all Class S1 to S4 Streams; crossings of any streams draining directly into Class S1 to S4 streams; and all crossings where volume per second flow during the 100 year flood will exceed 6 cubic metres per second or greater or meet the requirements for large culverts or bridges.

## 7.2 General Conditions

Road locations and landings are to be conspicuously marked with "winter grade" flagging tape and blazes highlighted with paint as per Section 3.8.

The Contractor shall carry out the survey and design work according to the specifications provided herein and shall submit outlining information contained herein.

## 7.3 Minimum Road Specifications

For an off-highway logging truck (unless approved by the AVCFC Representative):

### *Dimensions:*

- permanent road width is 5 meters
- temporary road width is 5 meters

### *Favourable:*

- Sustained favourable grade not to exceed 18%. (any road plans with grades > than 18% must have a risk assessment as per Worksafe Regulations and Guidelines)
- Maximum allowable grade in pitches not longer than 200 meters is 24%.

### *Adverse:*

- Sustained adverse grade not to exceed 10%.
- Maximum allowable on momentum grade not longer than 100 meters is 14%.
- Not to be used as a starting grade from landings or loadouts.

### *Switchbacks:*

- All adverse switchbacks will need AVCFC Representative approval.
- Grade not to exceed 8%.
- A switchback constitutes the travel from the beginning of the curve (BC) to the end of the curve (EC) plus one truck length along each tangent there from.

### *Alignment:*

- Average design speed, 30 kilometres per hour.
- Minimum radius of curves, 65 meters in control section.
- Minimum radius of switchback curves, 18 meters.

### *Turnouts:*

- Usable length to be not less than 30 meters including 5 meters of taper at either end.
- To be intervisible.
- There shall be not less than 4 turnouts per kilometre; curve widening can be used as Turnouts or incorporate landings bridges etc.
- Total road width of turnout to be 9 meters (including width of running surface)

### *Widening:*

- All curves to be widened to allow for side tracking of truck trailer units, including lowbeds.
- Use the Forest Road Engineering Guidebook for road width requirement on various curve radius.

### *Culverts:*

- Q100, calculations will be done for all stream and NCD crossings.
- Permanent / temporary culverts to be placed as required.
- Cross drains to be placed at grade breaks or on grades:  
>8% not over 100 meters apart, and  
0% to 8% not over 150 meters apart

- Minimum culvert size will be 600 millimetres diameter, unless otherwise specified, or a 0.75 x1.5 meter width wooden culvert (Cw/Cy/Fdc for permanent structures and other species acceptable for temporary structures). Culverts to be installed with protective rock armouring at inlets and outlets and should be indicated on the applicable Plans. The Forest Road Engineering Guidebook is to be used to determine culvert sizing and installation requirements.

*Right-of-way clearing Boundaries:*

- Minimum-clearing width shall be 3 meters beyond the top of the cuts and toe of the fills unless otherwise specified. Note all R/W clearing widths will need to be determined on a site by site basis and approved by the AVCFC Representative.

7.4 Survey Specifications

- a) *Reconnaissance*. Traverse of the proposed route at a minimum of Survey level 1 standards.
  - Provide a photo line of the intended route for approval by the AVCFC Representative.
  - Provide a 1:20,000 map of the proposed route for approval by the AVCFC Representative.
  - Transfer to air photos of the proposed route.
  - Indicate all improvements or crossings, e.g. pipelines, hydro, railway that may be in conflict with the proposed route.
- b) *Preliminary Line (P-line)* -Survey Level 2 - **All roads either new/reconstructed**  
Plan/profiles and plotted cross sections will be completed for the P-line. The plan/profile will be drawn to a scale of 1:2000 horizontally and 1:200 vertically.

Following the approved reconnaissance, a series of turning points (TPs) (compass shots will suffice) are to be set along the P-line to establish the best horizontal and vertical alignment. The dimensions of all TPs will be not less than 2 centimetres in diameter/width and not less than 1 meter in height. The TPs are to be intervisible and marked in continuous horizontal chainage; the TPs so marked shall be left upright and securely placed in the ground or on solid rock. Ribbon marks are permissible if approved by an AVCFC Representative.

Should a transit be utilized, turning hubs will be driven into the native ground and marked with a 0.3 meter length guard stake. Brushing of P-line location is required to ensure there is a clear compass and chain shot between stations and to allow easy foot access.

The relative precision of the P-line survey will be not less than 1:200. Vertical error will be not greater than 1-meter vertical in 1000 meters of distance.

Cross sections must be taken at all traverse stations, along all proposed culvert centerlines and at all ground breaks greater than 0.5 meters along the center line, at intervals of not more than 30 meters (or 15m apart or in rock sections) and shall be perpendicular to the back tangent. The cross sections shall extend from the P-line tangent at least 25 meters on each side of line or as required to accommodate the roadway design. Ground breaks on the cross section profile will be recorded to the nearest 0.1-meter in distance and nearest slope percentage.

All stream and NCD locations (whether they be “in block” streams, streams intersecting roads and adjacent to a block) will be assessed as per the Q100 procedure (as per the Forest Road Engineering Guidebook - Stream Culvert Discharge Design). Streams, wetlands, lakes and fish sensitive areas will be assessed using the Riparian Management Guidebook. Stream dimensions are to be recorded in field notes.

Final classification of all streams will be done by the prescribing forester.

Identify all drainage structures requiring professional design (i.e. 2000 millimetres or greater in diameter or with discharges of 6 cubic meters per second or greater Q100 or structures exceeding 5.9m).

P-line reference trees will be established at 300-meter intervals. Benchmarks shall be set in areas of large cuts, fills, bridge or large culvert crossings. Two benchmarks are required for each major stream crossing with one benchmark on each side of the crossing. The reference trees will be established outside the proposed clearing width on the uphill side. Such trees will have an internal angle of not less than 60 degrees and not more than 120 degrees, to the mean road tangent direction. Reference trees will have aluminum tags affixed with staples on each of four corners showing the P-line chainage, elevation, bearing and horizontal distances from the tree to the station.

There will be a minimum 1 GPS tie per 400m or 1 photo tie and each photo tie will be common with either the preceding or following photo in the flight line.

Soils will be categorized by recording data from natural sources (e.g. uprooted stumps) and shallow pits. More extensive testing requiring test holes may be required as determined by recce.

Soils will be catalogued and their location shown on the plan profile in the following types:

- Solid rock
- Rippable rock or hardpan
- Soil types as per the Forest Road Engineering Guidebook
- Sources of surfacing material or quarry rock
- All property monuments within 150 meters of the P-line will be found, traversed and tied to the P-line. It should be noted, if no evidence of monuments were found in field. Particular emphasis to be placed on the location of private property monuments.

#### 7.5 Location Line and Design

Plan/profiles and plotted cross sections will be completed for the L-line. The plan/profile will be drawn to a scale of 1:2000 horizontally and 1:200 vertically.

. L-line stations are to be marked in meters and be sequential in distance.

**Final L-line location in the field will be located within 1 meter of design location for Permanent Roads Only.**

#### 7.6 Plans will include:

- North arrow with magnetic declination shown
- Preliminary line traverse (P-line)
- Accumulated chainage and TP number at every fifth TP
- Overlap between plans of 150 meter
- Change equations
- Reference points plotted and labelled
- Existing roads complete with road name
- Existing structures (bridges, culverts, buildings, fences, etc.)
- Existing services and utilities including but not restricted to telephone, power, gas, oil, sewer and water lines
- Percent side slope and direction
- Terrain features and direction (rock outcrops, creeks, rivers, swamps, wetlands, wet areas vernal pools, and comments from terrain reports etc.)
- Show all Riparian Reserve and Management Zones (RRZs & RMZs) that fall within 25m each side of centerline.
- Designed L-line complete with curves
- curve information including radius (R)
- accumulated L-line chainage at beginning (BC) and end of curves (EC)

- Bearing of the L-line tangents shown on the plan to the nearest 30 seconds
- Kilometre stations on the L-line
- 100 meters of existing road alignment from junction or extension of existing roads
- Clearing boundaries
- Title block indicating: road name, kilometre, date of survey, and scale (horizontal and vertical)
- Special notes indicating: land district, road class, survey class and design class; datum of elevation
- A key map shall be included on the first drawing of the set to a scale of 1:50,000
- No curves are required where the angle of intersection is less than or equal to 5 degrees
- all legal boundaries and plan numbers
- all monuments found and tied
- Location of existing heli spot /pads (if applicable)
- Location of all potential pits, spoil sites and end haul sections

7.7 Profiles will include:

- Chainage and elevation equations
- Description of soils
- Terrain features (creeks, rivers, swamps, wet areas, etc.)
- Show all Riparian Reserve and Management Zones (RRZs & RMZs) that fall within 25m each side of centerline.
- Penetration depths at swamps and wet areas to solid ground if possible
- Grade lines complete with grades (adverse or negative)
- Grade breaks at grade changes of 2% or less
- Vertical curves at grade changes greater than 2%
- Turnout locations and dimensions
- Design notes (extra ditching, lateral ditching, road widening, forest cover, etc.)
- Culvert locations with recommended diameter, length and skew
- Kilometre stations
- Primary excavation and primary embankment volumes summarized in bank cubic meters at each station.
- Secondary embankment (gravel) volumes summarized in bank cubic meters at 200-meter intervals
- Waste and borrow locations and quantities in bank cubic meters
- Scale H = 1:2000 V=1:200
- 100 meters of existing road grade and horizontal alignment at junction
- Balance points and direction of material movement
- Show position of cut and fill slope changes
- - Location of all potential pits, spoil sites and end haul sections
- Show areas of overland construction (and volumes)

7.8 Cross Sections:

- All cross sections taken in the field will be plotted at a scale of 1:100 to 1:500 and will show the full stabilized subgrade template as a solid line, unstable subgrade width as dashed lines and cut and fill slopes as determined by material stratum. Cross sections do not show Crown.

7.9 Road Design Specifications

- Road Eng. 4.0 or better is the accepted road design software.
- Cut and fill slopes shall be designed according to soil types as shown in the "Road Cut slopes and Fill slopes" section of the Forest Road Engineering Guidebook.
- All excavation quantities are to be shown in cubic meters.
- The Contractor will submit a table of volumes, expansion and compaction factors, sidecast and local mass calculations of embankment and excavation accompanied by the mass graph of the calculated volumes showing proposed movements and balance lines.

#### 7.10 Roadway Design Approvals

- The final design will be one which the AVCFC Representative has approved as being the most economical with respect to firstly minimizing rock quantities balanced and secondly OM quantities by horizontal and vertical alignment changes within the Minimum Road Specifications.

**P-Line / L-line chainage indicated in the Road Design MUST match what is found on the ground for a given station.**

#### 7.11 Bridge and Major Culvert Site Plan Specifications

##### **General**

- All bridges fabricated for AVCFC projects and FSRs must have a unique structure number identifier label on the as-fabricated bridge. The unique structure number identifier should also appear on the associated original signed and sealed design and as-constructed documentation.
- Please ensure that structural bridge designs that are produced for the AVCFC conform to the foregoing and that signed and sealed design drawings provided to the AVCFC for each project contain the unique structure number identifiers for each specific bridge project.

##### **Site Conditions**

- Site conditions should be such that the ground surfaces and any existing structures within the limits of survey are clearly visible (i.e. snow free).

##### **Survey Accuracy**

- The site survey(s) will be conducted with a theodolite/transit or total station with a relative precision not less than 0.1 percent horizontally and 0.33 Percent vertically.
- Field referencing and benchmarks will be established with a relative precision not less than 0.1 Percent horizontally and 0.33 percent vertically.

##### **Limits of Survey**

- Extend the site plan in the following directions:
  - upstream to show any bend which may influence the current pattern at the site, either at normal stage or in flood (generally, assume a distance up to seven (7) stream widths or to the second bend, minimum of 20 meters);
  - downstream three (3) stream widths, or to the limit of possible location changes; or to show all creek cross-sections, minimum 20 meters;
  - back from each bank to cover potential overflow channels, or to well above the high water mark;
  - along the existing or proposed road location a minimum of 50 m back from each existing or proposed abutment, or far enough to show approach problems. The surveyed area must be large enough to cover possible bridge and road location changes.
  - establish a control traverse to gather site information and tie to the road P-line.

##### **Field Referencing**

###### References Points

Establish two (2) reference points at each site to allow for relocation and control surveys. The references will consist of a ground hub and a reference back site in a tree or a reference ground hub back site, on tangent with a transit hub, on each side to the stream crossing. Both reference hub and back site will be placed out of the right-of-way to avoid disturbance.

### Bench Marks

Establish at least two (2) benchmarks, away from any potential disturbance, to be placed on firm fixed objects that will not be disturbed, one on each stream bank. Preferably place the benchmarks where they will be visible from both proposed bridge abutments and within 1500 mm above high water level. Where elevations have not been established, use reference elevation datum of 100.000 m and note as "assumed datum of 100 m". Generally install 200-mm spikes in the side of a blazed, live tree (greater than 50-mm diameter), using the head as a benchmark and placed below Stump Ht (30cm).

### Construction Reference Stakes

Establish a minimum of two (2) pairs of offset construction reference stakes to the existing center line or P-line at each site; to allow for establishment of the location of the proposed bridge center line with horizontal measurement. One (1) pair on each side of the crossing, right and left of the center line, away from potential disturbance and preferably outside the right-of-way. Where possible, stakes should be placed at approximately the same elevation as the road surface to allow for level, tape measurement.

### **Data Collection**

- Present Water Level (PWL): Collect spot elevations every 15-m along both sides of stream to an accuracy sufficient to determine stream surface slopes.
- High Water Level (HWL): Collect spot elevations where evidence is clear; note evidence.
- Stream flow pattern: use floats dropped at several points across the stream to collect relative flow velocities. Note measured velocities; signs of bank erosion (overhanging trees and roots, vertical banks, areas where present channel differs from that in older air photos).
- Site features: note sloughs, abandoned channels, overflow channels, sand or gravel bars, bed rock, boulder areas, log jams, debris accumulations, fords, vegetation boundaries, trails, ice-jam areas or other significant features.
- Note descriptions and boundaries of soil and rock types as seen on the surface, including stream bed substrate, particularly where exposed rock may affect bridge structure or abutment location. Note any test hole locations and their logs.

For existing bridge structures within the limits of survey obtain:

- a) Spot elevations for each corner of the existing deck and/or edges of existing traveled road surface;
  - b) Spot elevations for the upper corners of the existing abutments;
  - c) Spot elevations showing the perimeter of the abutments where they contact the ground surface and outline the edges of the existing bridge;
  - d) Outline of the outside perimeter of the existing structure.
- Other existing features:
    - a) Structures such as: buildings, fences, and roads, driveways and gates;
    - b) Utilities such as: power poles with numbers of, height of, and direction of wires; gas lines with any surface markings and structures;
    - c) Right-of-way markings such as: Forest Service Road, pipeline, gas line, easement, railway and power line R/W pins.
  - Descriptive photographs shall be taken to show the bridge-crossing site. At minimum, photographs of each stream bank from the opposite stream bank and from the upstream and downstream of the proposed or existing bridge site shall be taken. Where difficult and convoluted ground or soil conditions occur, additional photographs shall be taken at the time of the data collection detailing conditions.

- In addition to collecting sufficient data points for production of the site plan drawing, carry out the following profiles and cross-sections:
  - a) For proposed crossings, take a center line profile, including soundings where appropriate, of the expected crossing line and include approach alignment (a minimum of 50 m each side or adequate distance to resolve any approach or alignment problems), high water line, present water line, wetted perimeter, top of banks and other topographic features.
  - b) If the downstream reach is uniform, take one other section about three to five stream widths (minimum 15 meters) below centerline and the same upstream. If flow is non-uniform, take two or more sections below centerline at points of change, and do the same upstream.
  - c) Where a bridge structure exists, cross sections shall be taken, parallel to the centerline, along the upstream and downstream edge of the bridge to show stream bed and ground lines adjacent to the abutments.

**Plan Details:**

Using a preferred scale of 1:200, plot the following information on the plan drawing:

- The designation, location, and description of reference points and the bench marks, including elevation and datum;
- Contours: the contour interval shall be 0.5 m; this may have to change on rock cliffs; make a conspicuous warning note if two intervals are used on the same plan; show all cross-sections and points read; extend contours across the stream bed where possible particularly at the proposed crossing location and at possible sites for a work bridge or ford; accuracy should permit interpolation to a 0.3 m error on rock, around existing bridge structure components and along the stream banks;
- PWL and date of data collection; show spot elevations every 15 m along both sides of stream to an accuracy sufficient to determine stream surface slopes;
- HWL; show spot elevations where evidence is clear and if possible join with a dashed line; describe evidence
- Existing bridge structures show:
  - a) Spot elevations for each corner of the existing deck (indicate "deck");
  - b) Spot elevations for the upper corners of the existing abutments (indicate as "top abut" or "top crib");
  - c) Spot elevations showing the perimeter of the abutments where they contact the ground surface; and
  - d) Outline of the perimeter of the existing structure;
- Show and label significant features from data collection such as sloughs, abandoned channels, overflow channels, sand or gravel bars, boulder areas, log jams, debris accumulations, fords, vegetation boundaries, cabins, trails, ice-jam areas or other significant features. Provide descriptive notes to describe such features;
- Show and describe boundaries of soil and rock types as seen on the surface, including the streambed, particularly where exposed rock may affect bridge structure or abutment location. Show test hole locations and their logs;
- Existing structures, utilities and rights-of way;
- Vegetation boundaries and types;
- Location of stream cross-sections taken;
- Land status and right-of-way boundaries, where known;
- Control traverse;
- North arrow and magnetic declination;
- Key map showing location of bridge site, direction and distance to town, ;
- Legend of symbols and lines;
- Scales;



- Title Block showing: bridge structure number, FSR or forest road name, kilometre location, stream name, who completed the survey, who completed the drawing, date of survey, and drawing number.

### **Profile/Cross Section Drawings**

Show the following information:

#### Profile/Cross Sections

- a) Creek Cross sections: 1:200 scale horizontal and vertical  
 Road Centerline: Profile: 1:200 scale horizontal and vertical on existing/proposed bridge centerline.  
 Detail Bridge centerline Profile: 1:100 scale horizontal and vertical (detail of previous extending 10m each side of bridge).  
 Creek Centerline Profile: 1:200 scale horizontal and vertical.
- b) Show the ground and stream bed elevations along the existing or proposed road and bridge centerline.
- c) Extend the center line ground profile at least 50 m beyond either end of existing or proposed bridge along the existing or proposed road center line. A stationing of 00+000 used at the beginning of and at the town side of the survey.
- d) Where a bridge structure exists, on the same drawing, using distinct line types, show the streambed and banks along the upstream and downstream edge of the bridge (where possible); show ground lines adjacent to the abutments.
- e) Show the present water level and right bank/left bank.
- f) Show high water level.

Stream bed/surface water profile - using a scale of 1:200 horizontal and 1:200 vertical.

- g) Show the profile of the stream bed and water surface for the length of the site plan including streambed gradient.

#### 7.12 Miscellaneous

- a) Or crossings of pipelines, hydro lines, railways, highway junctions or crossings, are all covered by standard instructions by each agency and other specific instructions provided by AVCFC or MFLNRO.
- b) The terminus of all roads is to be tied to a falling corner established on the cutting boundary, unless otherwise authorized by the AVCFC Representative.
- c) All favourable road gradients > 18% must be indicated on the Plan and Profiles and also marked on the Harvest Guide Map and Road Construction map and noted as a Hazard. Note the Standard Operating Procedures for Layout and Design for Hauling on steep grades must be followed and specific road construction techniques may be required for these sections. (refer to Feric Descent Guideline Tables).

## **8.0 CUT BLOCK ENGINEERING**

### 8.1 Harvesting Systems

- a) General

All field marking will be completed as per Section 3.8 of this Schedule.

The objective of harvesting system selection and layout is to provide a safe, productive and efficient harvesting plan according to standard coast logging methods. This requires a sound working knowledge of equipment and personnel limitations by the engineer. Boundary locations, landings and deflection lines are to be conspicuously marked with "winter grade" flagging tape and paint, and with metal tags where required.

All cutblocks must be established with reference to a legal survey post; a line located with GPS, or with a traverse tape, compass and clinometer must be run from the survey post to the point of commencement, which is a clearly identifiable point on the legal status clearance boundary of the tenure.

Where it is impractical to tie the boundary to a legal survey or an identifiable GPS location, the triangulation of a recognizable topographic feature (e.g.-junction of river and creek, junction of two creeks, road junction, bridge, etc.) from the aerial photographs to the base map will be acceptable for tying in the point of commencement and the nearest legal surveyor a GPS location as per Schedule A-1.

After the Contractor has initial recce of the planning unit, the AVCFC Representative shall approve the harvesting method to be utilized before final engineering of the setting.

Harvesting boundary location must be done in the following manner on the entire perimeter of the harvesting area(s):

- Each block edge must be given a windthrow hazard and risk rating. Windthrow Cards (FS712-1, FS712-2, and FS712-3) are to be completed for edges with moderate to high hazard or risk. The completed assessment will consist of the cards and a corresponding map showing applicable treatment strategies and is to be submitted with the SP.
- Complete Gully Assessments for all gullies within or adjacent to the TD blocks. These assessments are to be completed by a qualified professional. Gully Assessment cards (FS197A, FS197B, FS197C) must be included with the final package.
- Traverse notes will include: station, slope distances, percents lope, fore sight and back sight azimuth bearings
- Closed traverse with linear error of 1% or less for all cutblocks or GPS traverse to the standards acceptable to the AVCFC Representative.
- Tight-chain traverse with fore sights and back sights
- Traverse to be photo-tied and tied to square blazed trees
- Marking should be established at such a frequency to enable them to be clearly visible from painted tree to painted tree.
- Falling corners shall be approximately at 100-meter intervals along the cutting boundary line or where there are major changes of direction and denoted as tie points.

b) Stream Management

- For each NCD, stream, wetland and lake in or adjacent to the harvest area, the classification of the above must be determined by an RPF as per the FSP and FPPR. Appropriate field cards completed with an attached map indicating stream reach and disposition as per the Stream Classification Guidelines and Stream data sheets, and or Small Wetland Assessment field cards. All streams must meet the requirements of the FSP and all appropriate strategies for Riparian Reserve and Management must be approved by an AVCFC Representative.
- For each stream, wetland and lake:
  - The Riparian Reserve Zone must be identified on the ground with ribbon as per Section 3.8 and labelled as such; field marked as the harvesting boundary, if applicable;
  - A description of the purpose and extent of any removal or modification of trees that the person proposes to carry out in the Riparian Reserve Zone;
  - The Riparian Management Zone must be field marked with ribbon as per Section 3.8 and labelled as such, when there is a proposed removal or modification of trees within the zone and a description of the residual basal area or stems per hectare to be retained. If any stems are to be retained these must be identified either by the leave trees marked conspicuously (painted at DBH and below stump height <30 cm) or the cut trees.
- RMA infringement areas are to be identified (where projected road locations infringe upon the RMA of streams).

c) Deflection Line Requirements

Cable Yarding

After the Contractor has conducted initial recce of the planning unit, the AVCFC Representative shall approve the harvesting method to be utilized before final engineering of the setting. This may be one or more methods based upon the following general guidelines:

- i) Stationary Spar; (Prior Approval from AVCFC Representative only)
  - At least 3 deflection lines evenly, Hip-chained traversed, spaced per 180o, (e.g. 6 per full circle landing)
  - Grade breaks on ground profile greater than 10% must be shown
  - Obstacles to yarding (rock bluffs, draws must be shown)
  - Deflection line will be run beyond yarding limit (usually to slope change)
  - Deflection lines will be prefix numbered by landing, e.g. 6-1, 6-2, 6-3 etc. from landing #6
  - Areas under 6% deflection or where there are obstacles to yarding should have more deflection lines run in order to map notate the difficult area accurately.
  - Ground lead or conditions outside of the above must have AVCFC Representative approval.
  
- ii) Mobile Spar - same as above except:
  - Deflection lines hip chained traversed will be run to show best yarder location and yarding direction. (Note that yarder is mobile)
  - Deflection lines must intersect roads, splitline or setting boundary at a maximum interval of 50 meters
  - Deflection lines will be labelled numerically, e.g. G-1, G-2, G-3 etc.
  - Areas under 6% deflection or where there are obstacles to yarding should have more deflection lines run in order to map notate the difficult area accurately.
  - Intermediate supports may be used but actual support trees in the field must be located, described and marked. AVCFC approval is required for this option.
  - Use of mobile backspar is at the discretion of AVCFC Representative.
  - Ground lead or conditions outside of the above must have AVCFC Representative approval.

The following standards shall apply:

Deflection line profiles shall be plotted:

- At a scale of 1:2 000 horizontal and vertical
- Showing areas of ground lead
- Showing creek and road crossings
- On plain paper. Plotting of the deflection line profiles on graph paper is acceptable providing the graph paper is of the type where the graph paper lines are not visible when photocopied

Deflection line profiles shall not be drafted using free hand text.

- Landing and road locations numbered and referenced to appropriate landings and deflection profiles, (for stationary yarder).
- Deflection lines shall be numbered and referenced to appropriate landings and deflection profiles. Deflection lines will indicate best estimated yarding pattern for cable yarding and identify appropriate tail holds or back rigging details. Trial deflection lines which do not indicate yarding pattern shall not be drafted on map
- Maximum line spacing is 50m
- Dispersed leave will be taken into account

Where deflection is a problem applicable load analysis for each deflection line must be submitted as per AVCFC Representative request. The load analysis must specify

- Yarder make
- Tower type *E.G. SWING BOOM*
- Tower height
- Carriage weight, if applicable
- Cable diameters, weight per meter, span weight and length of span for the:
  - Skyline
  - Mainline
  - Haulback
  - Slackpulling
  - Guylines
- Full suspension payload
- Dragging payload
- Haulback tension
- Mainline tension
- Carriage to ground clearance

Simple third point deflection should be 6% where use of chokers are recommended e.g. high lead and 8% to 10% for grapple yarding (to reflect the weight/sag associated with the grapple.) 8% deflection should be used for short grapple yarding (<100m) and 10% for longer grapple yarding (200meters +).

All data is to be in metric units of measure.

The load analysis is to be calculated at a maximum interval of 50 meters, at all grade breaks, and at all critical points. All software and calculation methods must be approved at the pre-work conference.

d) Cutting Boundary Traverse

The cutting boundary is to be measured using GPS or when not possible with a controlled traverse to an accuracy of one percent.

A printout of the closing error, or calculation is to be submitted with the final harvesting report.

Falling corners or stations shall be established on average every 100 meters along the cutting boundary.

e) Confirmation of Areas that cannot be developed

Field notes of proposed road locations and harvest techniques considered must be submitted.

Deflection lines shall be established to confirm the area cannot be developed, and must be submitted with the final submission.

Field plots of deflection lines are acceptable.

## 9. FIELD DATA

9.1 The field data for items listed below is to be submitted in a digital format as per Appendix 2.

- a) Boundary traverse data.
- b) Road traverse, and road, plans, profile and cross-sections (Road Engineering Design Program format)
- c) Deflection line ground profile data and load analysis data.

## 10. SILVICULTURE SITE PLANS

- 10.1 The Site Plan (SP) is to be prepared in accordance with the Forest and Range Practices Act and associated regulations (and other relevant legislation), the Alberni Valley Community Forest - Forest Stewardship Plan, and as directed by the AVCFC Representative. All SP's will be entered into an electronic file agreed to by the AVCFC.
- 10.2 Prior to the start of each SP and Road SP the Prescribing Forester shall discuss with the AVCFC Representative the specifics related to the Prescription (i.e. Standard Units to be created/mapped, permanent/temporary access, road widths, landing sizes, dispersed NP etc.).
- 10.3 Each SP and Road SP and related professional documents must be signed; dated and sealed by a Professional Forester registered in the province of British Columbia.
- 10.4 The following will be submitted upon completion:
  - Signed hardcopy SP and a copy digitally (disk or CD)
  - SP Supporting Document including Stream Data Sheet (a summary of the field data cards)
  - Site Plan Checklist
  - Completed field/plot cards (FS 711A&B or FS39A&B)
- 10.5 The Site Plan map must be submitted in a digital format as per Appendix 2.
- 10.6 In the riparian management strategy section of the SP, do NOT use AHC (or "assess for hand cleaning") as a stream management prescription option. Rather use one of the three following options: MC - "machine clean", HC - "hand clean" or NC – "no cleaning required".
- 10.7 Plot cards (FS711A&B or FS39A&B or other field notes) must be completed and submitted.
- 10.8 The original reports, worksheets and field cards from all assessments that support the SP (e.g. gully, riparian, windthrow, VIA, AIA, etc.) shall be submitted.
- 10.9 The Contractor shall ensure that all elements of the SP are clearly marked and discernible in the field, in accordance with the field marking standards in Section 3.0.

## 11. CRUISING STANDARDS

- 11.1 All phases of the cruise must meet the most recent MFLNRO Cruising Procedures and Cruise Compilation, (Provincial Cruising Manual), Operational Cruising Requirements in the Coast Forest Region and appropriate Coastal Cruising Supervisors Task Force Information letters. Note that for each block cruised the blocks will be cruised with the standard method with the accompanying compilation.

Cruising is not required for Appraisal purposes but is required for payments under this contract as well as operational and planning needs.
- 11.2 Cruising is required for each cut block: Variable Plot Prism shall be used. All phases of the cruise must meet the standards outlined in section 11.1.
- 11.3 Cruising shall not commence until the AVCFC Representative approves the Cruise Plan. Cruise Plans must meet the minimum standard as per the above standards. Each individual block will be construed as the cutting authority.
- 11.4 Cruise plot identification is to be recorded with orange and blue colored flagging tape as described in Section 3.8 of this Schedule and the cruising manual.
- 11.5 Full measure and count plots are to be established in the field. The plot identification is to be clearly noted on the plot center ribbon. The following information must be recorded and field procedures followed and as per the Cruising Manual:

- Tally all live and dead potential trees by species and diameter class as per cruising manual.
  - Record most severe slope relative to plot center within the harvest area.
  - Borderline trees must be measured
- 11.6 Quality control – it is the Contractor’s responsibility to ensure that all of the above conditions are adhered to and that there are no data omissions prior to compilation. Omissions or failure to pass a check cruise will necessitate a rework scenario, at the Contractor’s expense.
- 11.7 The Contractor is required to submit a cruise compilation as per the manual and Coast Forest Region Requirements:
- Compilation will separate volumes by block, by type, by harvest method, “in-block” vs. R/W volume, by cutting permit, by silviculture system, cut and leave volumes.
  - Compilations will use the appropriate loss factors depending on where the block(s) are located.
  - Compilation will be submitted in .pdf and .dat format.
  - Compilation will be submitted to meet the Coast Forest Region Operational Cruising Requirements for CGNF and Standard Cruises.
  - Compilations will be made available to the AVCFC in a digital format or as requested by the AVCFC.

## **12. ROOT ROT SURVEYS**

- 12.1 Where determined by a Forester that the incident of root rot is low in a second growth forest, the area of root disease may be mapped based on a walk through. Where a Forester determines a high level of root disease incidence, the area is to be surveyed using the "Line Transect Survey" method as per the Root Disease Management Guidebook.
- 12.2 A POC (point of commencement) must be established on the ground with a tag on a tree or a tie to a permanent photo tie. The survey should extend one tree length beyond the proposed cutblock boundary or at least to the nearest logical cut-off, i.e. large stream, road, rock bluff. Use minimal flagging that does not conflict with boundaries (orange) and roads (pink) and streams (yellow).
- 12.3 Root Rot areas are to be mapped at 1:5000 scale. The map is to show POC and survey transect lines, proposed block boundaries and roads. Individual pathogens and infection areas are to be clearly mapped and rated as very high, high, mod, and low. Infected areas should be mapped with a 10-meter buffer

## **13. TD Electronic Data Management, Format and Delivery**

- 13.1 The AVCF maintains it’s own digital filing structure and GIS database and therefore requires that digital documents, maps and GIS data submission is consistent with the standards set in Appendix 2 .  
The Contractor shall produce all FINAL project documents in digital pdf format and supply them on a CD or DVD in the file structure set out in Appendix 2

## 14. FINAL TD PACKAGE SUBMISSION

**Intention: This phase is to compile a complete TD package which is the summary of all information gathered in the field combined to produce a Cutting Permit document ready for submission to MFLNRO as well as both digital and original field data packaged for storage and future referral.**

### 14.1 Harvest Plan Maps:

A Harvest Plan Map will be included in all Tender packages. Naming convention requires that the map is labelled "Harvest Plan Map." The intent is to supply a map that clearly shows all requirements that apply to the road building and harvesting phases of the TD (A harvest plan template is included with the package for all final map formats to be followed). Site Plan details applicable to the above phases should be included on the map and may require an additional back page to include all data,

The Harvest Plan map is to be created digitally. Scanned maps are not acceptable.

The map should be created on a contour base map to show the general topography of the block. This base would generally be at a 1:5000 scale.

To allow adequate space for all text and spatial information, maps should be based on an 11 X 17 inch size but can be printed at 8.5 X 11 inch size for the Tender Package but must stay readable.

**The Harvest Plan Map** must be composed of the following elements:

- Title block
- Legend
- Spatial data (Map)
- Text box containing field marking codes specific to the block
- Text box detailing stream treatments and special harvesting techniques
- The Title Block includes the following elements:
  - Title of map must include, unique block identifier, FSP# etc, that reflects the marking that is in the field. Title should also AVCFC Name and any logos supplied.
  - Scale bar and north arrow
  - Latitude and longitude (or UTM Coordinates) of block center point. This can be included in the header or as an inset text box pointing to the specific location on the map
  - Geographic location of block
  - Map production date and revision date ( if revised)
  - Safety concerns that are applicable (rubble, steep slopes, avalanche etc)
  - Indicator for slopes >35% in block and all road sections with grades >18% favourable and .10% adverse
  - Map sheet reference number
  - Declination
- The spatial data must show the following items:
  - Cut block, wildlife tree patches and reserve patch boundaries. Reserve tree locations where possible.
  - Falling corners
  - Streams, wetlands and lakes identified as per stream prescription table, reach breaks, designated crossings
  - Proposed road labelling including junction and end stations, road name and number, existing roads and permanent and temporary access
  - Existing roads, permanent and temporary access must be differentiated in the legend
  - Recreation trails and structures
  - Gullies, rock, slides, terrain features, hydro or gas lines, private property, iron pins from legal survey, windthrow and any other applicable feature
  - Bridges, culverts and stream crossings
  - Gravel pits or quarries
  - Areas requiring special harvest techniques (e.g. tree crown modification, backspar trail, puncheon machine free zones etc)

- Yarding direction, split lines, designate harvesting methods (ground, cable, aerial)
- Adjacent resource features that may be impacted by harvesting
- The field marking section must list in a tabular format, all ribbon and paint marking colours, specific to the block that may be encountered on the cut block with a description of how each colour is applied.

#### **Road and Road Re-Construction Maps:**

Applicable title and legend according to the Harvest Plan Map criteria but indicating appropriate attributes noted below:

- Scale to be 1:5000
- Proposed road and stations with road names as per AVCFC Representative requirements
- Existing road
- Reconstruction road and stations
- Delineate road R/W widths
- Road grades: favourable >18%, adverse > 10% & adverse switchbacks
- Proposed bridges and culverts indicating size and cmp/wood/permanent/temporary
- Existing bridges and culverts indicating size and cmp/wood/permanent/temporary
- Identify overlanding road sections
- Partial & of full end haul, engineered fills (colour fill to highlight sections)
- Pullouts, landings,
- Stream, swamp, wetland, lakes and NCD's include RMA's
- Identify any road sections encroaching on the RMA as per the site plan requirement
- Block boundaries and Falling Corners
- Gas line, hydro lines, parks, private land & recreational areas
- Quarry, gravel pits
- Legal lines, iron pin locations
- Reference trees
- Contour lines
- Tree crown modification

#### **Cruise Maps:**

Final cruise maps required for this Contract shall conform to the Ministry of Forests' Cruising Manual and as per the following standards:

- Scale to be 1:5 000
- Tenure
- Forest region and district
- Scale used
- Timber Supply Area
- North arrow and declination
- Cut block(s) must be identified as mature or immature,
- Plots must be numbered (measure and count identified), and Types, area and summary, see Section 7.3, Card Type C, timber type label codes
- Existing and proposed roads
- Adjacent logging and burn history
- Inventory region and compartment number
- UTM grid
- Forest Inventory Zone, and PSYU
- Plots used in the compilation are to be clearly indicated and numbered on the map as to their field locations
- Locations of baselines (when used), boundary tie lines, points of commencement and actual strip line location with direction of travel must be indicated
- Timber type lines
- Contour lines are recommended and must be indicated in such a fashion that they are clearly legible and indicative of local topographic features. Note if 1:5000 contour base maps are not provided the contour lines must be generated by field note data.



- Physiographic features must be shown
- Legal survey features must be shown
- Forest and non-forest type boundaries must be clearly indicated
- Status clearance boundaries and cutting boundaries must be shown
- Any other features of significance with respect to the timber (i.e., windfall areas, fire areas, insect or disease infestations, fish-bearing streams) and contour logging considerations must also be shown

**Site Plan Maps:**

Applicable Title and legend as per the Harvesting Map criteria but indicating the appropriate attributes noted below

- SP(s) and Road SP(s) will include an accompanying 1:5,000 map(s). The map must include as appropriate:
  - Cutblock boundaries
  - Elevation contours
  - Ecological associations
  - Standard units
  - Wildlife tree patches
  - Retention areas
  - The total area under prescription (TAUP)
  - All watercourses/bodies (NCD's/streams/ wetlands/lakes/wetlands) by riparian class showing riparian reserve zones (RRZ's)
  - Roads, landings location of gravel and rock pits
  - Biogeoclimatic Ecosystem Classification
  - Stream crossings, machine stream crossings, machine free zones, non-productive (NP) areas or any other pertinent features relating to the management of the development area
  - Maps are to be prepared in accordance with Ministry of Forests Cartographic Standards and meet all requirements of the relevant Acts above
  - Standard units must be identified using numbers (1, 2, 3, etc.). All non-harvest reserves, wildlife tree patches, and retention areas within the cutblock will be included in the TAUP

**Detailed Location Map:**

Applicable Title and legend as per the Harvesting Map criteria but indicating the appropriate attributes noted below:

- Scale 1:20,000 – 1:50,000
- Text box indicating detailed travel instructions from the nearest community starting at the Post Office or other known starting point (i.e. Hwy and town junction)
- Location of cutblock and associated blocks and roads
- Road status and Road Radio Channels
- Latitude and longitude for center of cutblock
- Location of cutblock and associated blocks and roads

14.2 A Final TD Package shall be submitted both in paper and digitally as per Section 13 of this Schedule and Schedule E and will include the following:

- Cover Page
- Table of Contents
- Final Submission Checklist (Appendix 1)
- Deflection Line and Payload and Tensions Report, where required.
- Timber Cruise Plan Map(s) (1:5000)
- Timber Cruise Compilation
- Boundary Stream and Road Traverse Field Note Printouts and assessment cards
- Signed and sealed Site Plan and Road Site Plan Documents
- Completed site plan checklist
- Site Plan Map(s) (1:5000)
- Harvest Plan Maps (1:5000)

- Road and or Road Re-Construction Maps (1:5000)
  - Deflection Line Profile Map (1:2000)
  - Assessment Maps; VIA, Terrain, Riparian, Root Rot... (1:5000)
  - Detailed Location Map (1:20,000– 1:50,000)
  - Reports from all required assessments with the appropriate maps
  - Road Design Data per Forest Road Engineering Guidebook, June 2002
  - Site Plan Surveys with Bridge and Major culvert designs
- 14.3 All original field notes will be systematically organized into large envelopes and submitted upon project completion or as required for AVCFC field review.
- 14.4 All digital files (mapping and designs) will be systematically organized and submitted on Compact Disk and/or electronically submitted (with associated Text File, Level and Plot Driver Information) upon approval of paper copies submitted. Format of digital data to be submitted as per Section 13 of this Schedule.
- 14.5 The medium for digital data delivery is on a recordable Compact Disk (CD).
- 14.6 A Submission Package Checklist will be completed for all submissions as per Appendix 1.

## **15. STANDARDS OF PERFORMANCE**

- 15.1 All works and services shall be conducted according to all relevant Legislation i.e. Acts and Regulations and utilizing related Guidebooks.
- 15.2 The Contractor shall make Contract Specifications/Standards available to all staff.
- 15.3 Every worksite shall have a contractors' Representative able to receive communications about the contract.
- 15.4 All questions, concerns, problems, delays and difficulties associated with this contract, are to be documented in writing and forwarded to the AVCFC Representative.
- 15.5 The Contractor shall provide at least five working days notice prior to any required field review.
- 15.6 All phases shall be completed and submitted to the AVCFC Representative in accordance with the approved Work Progress Plan.
- 15.7 The Contractor's designated Project Manager/Field Engineer must review all Preliminary, Draft and Final Submissions prior to submission, to ensure compliance with Contract Schedules and AVCFC Representative instructions.
- 15.8 Unless otherwise approved, all digital submissions must be in PDF format as well as in a format that can be read by Microsoft Word 2007, Excel 2007, RoadEng 4.0 and / or Arcview 3.2, and will meet all requirements of Section 13 of this Schedule.
- 15.9 Submit all original field cards, working maps, electronic files, and notes upon completion of each phase. Such information shall become the property of the AVCFC.
- 15.10 Mapping and field marking standards are identified in Section 3.8 of this Schedule.
- 15.11 All electronic information, whether on disk or transmitted by other means, must be scanned for computer viruses prior to submission. If a virus is detected in any submission that submission shall be rejected and a \$200.00 charge shall be deducted from the contract price.
- 15.12 The Contractor or his designated representative is encouraged to observe inspections while they are underway, but the Contractor's absence from such inspections shall in no way invalidate them.

15.13 The Contractor shall only utilize personnel identified in the tender submission, for providing the Services, unless otherwise approved by the AVCFC Representative.

**16. MISCELLANEOUS**

16.1 The AVCFC reserves the right to award contract works to other contractors for the area covered in this contract.