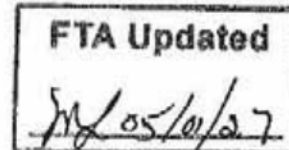




Distribution: RCO C&E/PA RCLARK
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Contact: Monique Lavoie, Resource Services Clerk, SOG, 250-286-9391
Date typed: 2005/01/25 Date last saved:

File: 19620-45/A50650 CP G

January 27, 2005



C Mokko Manufacturing Ltd.
4590 Helen Street
Port Alberni, British Columbia
V9Y 6P5

Dear Licensee:

Attached is your completed copy of Cutting Permit 1 issued in accordance with paragraph 9.01 of Timber Sale Licence A50650. This cutting permit is comprised of the cut blocks listed below:



Mapsheet No.	Exhibit A Map Dated	Block No.	Status	Geographic Location
92F005	January 24, 2005	SL1 & SL1A	Mature	Skull Lake

The permit will expire March 31, 2005.

You will be advised under separate cover of initial stumpage rates, which are to be determined by the Forest Officer in accordance with the stumpage provision conditions in the Cutting Permit document.

Yours truly,

Monique Lavoie
Resource Clerk
Strait of Georgia Business Area

Attachment

Page 1 of 2

• THE GOVERNMENT OF BRITISH COLUMBIA IS AN "EMPLOYMENT EQUITY EMPLOYER" •

Ministry of
Forests

Campbell River
Forest District

370 South Dogwood Street
Campbell River, British Columbia
V9W 6Y7

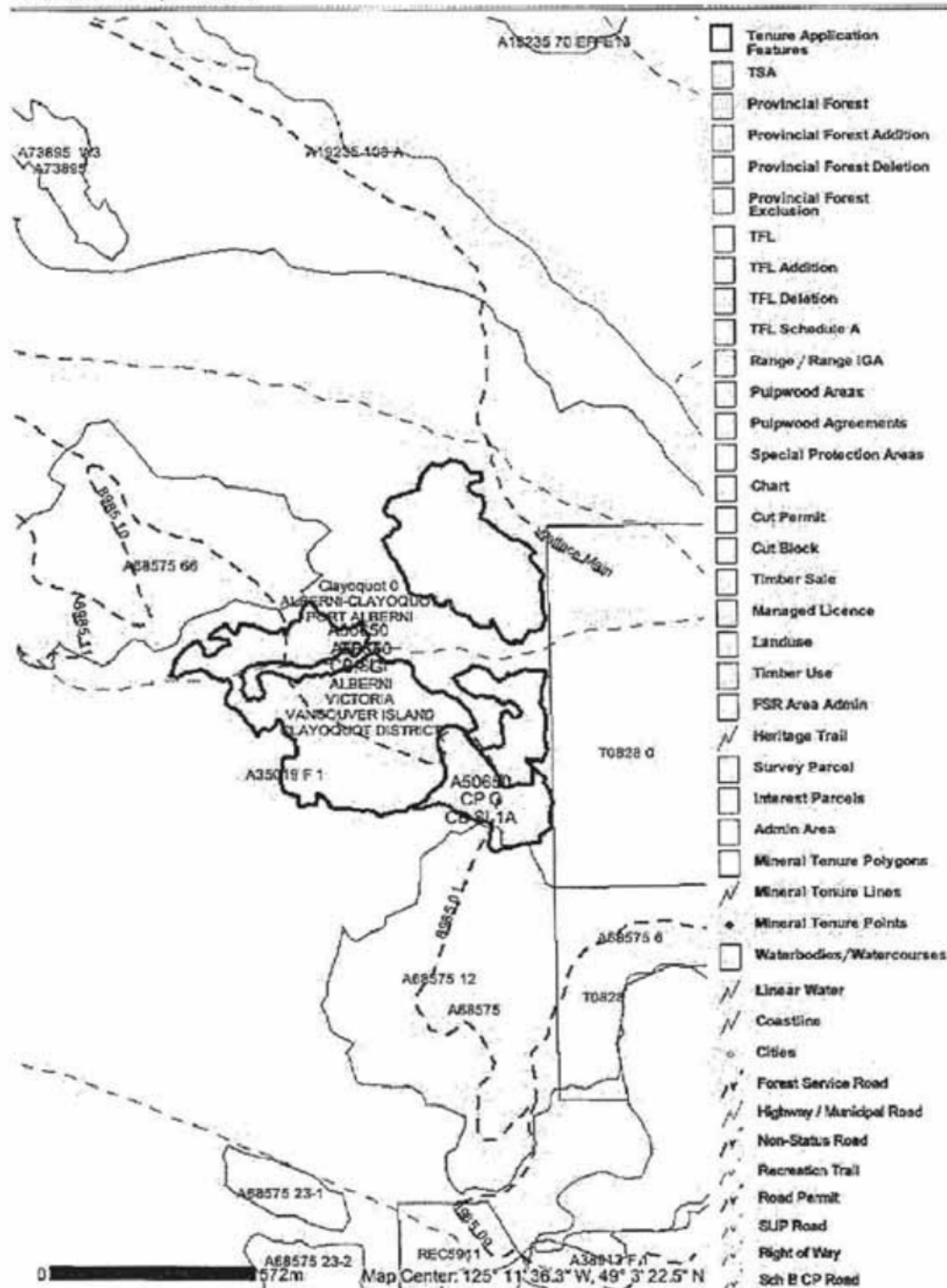
Tel: (250) 286-9300
Fax: (250) 286-9490

pcc: Workers' Compensation Board, Courtenay
Award date: January 4, 2005, Expiry: March 31, 2005

Valuation Section - Appraisals
Coast Forest Region, Nanaimo
- Copy of pages 1 of document attached.

FILE:	A50650 CP 6
FILE Type:	A26 - SB TSL S
Submission Area:	47.6684
Scale:	1:15000
DATUM:	NAD 83
UTM Zone:	NOT AVAILABLE
Description:	Skull Lake
BCGS Reference Maps:	092F005

Submitted By: C MOKKO MANUFACTURING LTD.
Submission Date: 2005-01-24
Submitted To: DSI - South Island Forest District
Revised By:
Revision Date:
Cascades: W



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MINISTRY OF FORESTS



Distribution: RCO GPROPP C&E(DSI) AASHFORD I/TR
Document name: \\CORSAIR\S63033\BCTS\Port Alberni\Sales\Active\A50650 C Mokko Manufacturing
Ltd\CP G SLI & SLIA Skull Lake\A50650_CPG_ext_ltr.doc GP
Contact: Gerry Propp, Resource Clerk, BCTS, SOG, (250) 286-9317
Date typed: 2005/03/17 Date last saved: 2005/03/17 3:48 pm

File: 19620-45/A50650 CPG

March 17, 2005

C Mokko Manufacturing Ltd.
4590 Helen Street
Port Alberni, British Columbia
V9Y 6P5

Dear Licensee:

In reply to your application of February 10, 2005, and pursuant to authority contained in the licence, the term of Timber Sale Licence A50650, Cutting Permit G, is extended terminating on, May 31, 2005. Upon that date all your rights under said licence will cease.



This notice forms an integral part of the licence and should be attached to it.

Yours truly,

Ken Matthews
Deputy District Manager
Strait of Georgia Business Area



bpc: Appraisal Section, Coast Forest Region, Nanaimo

FTA Updated

05/03/17 bp

Ministry of
Forests

BC Timber Sales
Strait of Georgia Business Area

Location:
370 South Dogwood Street
Campbell River, BC V9W 6Y7

Mailing Address:
370 South Dogwood Street
Campbell River, BC V9W 6Y7

Tel: (250) 286-9300
Fax: (250) 286-9420



TIMBER SALE LICENCE NO. A50650
CUTTING PERMIT NO. G



PURSUANT to Timber Sale Licence No. A50650 (the "Licence"), this Cutting Permit is issued to:

C Mokko Manufacturing Ltd.
4590 Helen Street
Port Alberni, British Columbia
V9Y 6P5
(the "Licensee")

1.00 PERMIT AREA AND TERM

- 1.01 Subject to the Licence and the Forestry Legislation,
- (a) the Licensee is authorized to cut and remove Crown timber from the area of land designated for harvest on the map attached as Exhibit "A" to this permit (the cutting authority area), and
 - (b) for the purpose of exercising the rights under this Cutting Permit may enter onto these areas.
- 1.02 The term of this Cutting Permit begins on **January 2, 2005**, and ends on the earlier of **March 31, 2005**, or the date that the Timber Sales Manager gives notice to the Licensee that all contractual and legislative obligations associated with this Cutting Permit have been completed.
- 1.03 Provided the Licence does not prohibit extensions to a Cutting Permit, the Timber Sale Manager may extend the term of this Cutting Permit in accordance with Section 58.1 of the *Forest Act*.

2.00 SPECIAL CONDITIONS AND REQUIREMENTS

- 2.01 The Licensee must comply with the conditions and requirements set out in Schedule "A" to this Cutting Permit.

3.00 TIMBER MARK

- 3.01 The timber mark for timber removed under this Cutting Permit is:

AQ9
00G

- 3.02 If directed to do so by the Timber Sale Manager, the Licensee must erect signs at all exits from the cutting authority area, clearly showing the timber mark(s) referred to in Paragraph 3.01.

4.00 SCALE-BASED STUMPAGE

- 4.01 For the purpose of determining the amount of stumpage payable in respect of timber removed from the cutting authority area, the volume or quantity of timber removed will be determined using information provided in a scale of the timber.
- 4.02 The Licensee must ensure that:
- (a) all timber removed from the cutting authority area is scaled, and
 - (b) the scale of the timber is conducted properly in accordance with the requirements of the *Forest Act* and the regulations made under that Act.
- 4.03 Immediately upon receipt of a notice, statement or invoice issued on behalf of the Crown, the Licensee must pay stumpage under Part 7 of the *Forest Act* at rates determined, redetermined and varied under Section 105 of that Act for all timber removed from the cutting authority area or not removed and identified under Part 6.00 of this Cutting Permit.

5.00 ROADS

- 5.01 Subject to the Licence and the Forestry Legislation, the Licensee may construct or modify roads under the authority of this Cutting Permit on the cutting authority area if the roads are:
- (a) wholly contained within a cut block identified on a forest development plan or a forest development unit in a forest stewardship plan, and
 - (b) not identified on a forest development plan or a forest stewardship plan as providing access to more than one cut block.

6.00 TIMBER HARVESTED AND WASTE ASSESSMENT

- 6.01 The timber described in Schedule "B" is specified as reserved timber and the Licensee must not fell standing timber, and must not buck or remove felled or dead and down timber, as the case may be, of the species and description set out in Schedule "B".
- 6.02 The Licensee must pay to the government waste assessments for merchantable Crown timber, whether standing or felled, that could have been cut and removed under this Cutting Permit, but at the Licensee's discretion is not cut and removed.

- 6.03 The quantity and quality of merchantable Crown timber that could have been cut and removed under this Cutting Permit, but at the Licensee's discretion was not cut and removed, will be determined in accordance with the provisions of the *Provincial Logging Residue and Waste Measurements Procedures Manual*, as amended or replaced from time to time.
- 6.04 The amount of money that the Licensee must pay under a waste assessment will be determined in accordance with the provisions of the *Provincial Logging Residue and Waste Measurements Procedures Manual*, as they are at the time the quantity and quality of merchantable Crown timber is determined.
- 6.05 The Licensee must notify the timber sales manager that primary logging has been completed on a cut block when the primary logging has been completed there.
- 6.06 For the purposes of the timber merchantability specifications for waste assessment as described in Paragraph 6.03 of this Cutting Permit, the stand under this Cutting Permit is classified as **endemic**.

7.00 MISCELLANEOUS

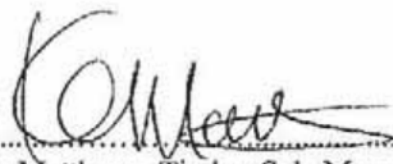
- 7.01 Exhibit "A" and the Schedule(s) are deemed to be part of this Cutting Permit.
- 7.02 As provided in the Licence, this Cutting Permit is deemed to be part of the Licence.
- 7.03 The Licence will govern the interpretation of this Cutting Permit.
- 7.04 The Licensee must notify the Timber Sale Manager in writing when all timber harvest related obligations are complete.

8.00 INTERPRETATION

- 8.01 In this Cutting Permit, unless the context otherwise requires,:
- (a) "Cutting authority area" means the area or areas allocated for the activities pursuant to the Licence and this Cutting Permit and which for greater detail are outlined on the map found in Schedule "B" to this Cutting Permit,
 - (b) "District Manager" means
 - (i) a District Manager appointed under the *Ministry of Forests Act*, for a forest district in which all or part of the cutting authority area is situated, or
 - (ii) any person authorized to exercise a power or fulfill a duty in respect of this Licence,
 - (c) "Extension" means an increase to the term of this Cutting Permit,

- (d) "Forest Development Plan" means a forest development plan referred to in the *Forest Practices Code of BC Act* to which the District Manager has given effect in respect of this Cutting Permit,
- (e) "Forest Stewardship Plan" means a forest stewardship plan referred to in the *Forest and Range Practices Act*, that is prepared by the Timber Sales Manager and approved by the Minister in respect of this Cutting Permit,
- (f) "Forestry Legislation" means:
 - (i) the Forest Act,
 - (ii) the Forest Practices Code of British Columbia Act,
 - (iii) the Forest and Range Practices Act, and
 - (iv) the regulations and standards made under those Acts;
- (g) "Merchantable Crown Timber" means Crown timber that meets or exceeds the timber merchantability specifications described in the *Provincial Logging Residue and Waste Measurements Procedures Manual*, as amended or replaced from time to time.
- (h) "Primary Logging" means felling timber and yarding or forwarding the timber to central landings or road-sides, but does not include removing the timber from these landings or road-sides,
- (i) "Remove" means the removal of timber from the cutting authority area and "Removed" and "Removing" have the corresponding meanings,
- (j) "Timber Sales Manager" means a Timber Sales Manager appointed under the *Ministry of Forests Act*, for a BC Timber Sales business area in which all or part of the cutting authority area is situated,
- (k) "Timber Merchantability Specifications" means merchantability specifications described in the *Provincial Logging Residue and Waste Measurements Procedures Manual*,
- (l) "Waste" means merchantable Crown timber that could have been cut and removed under this Cutting Permit but that the Licensee does not cut and remove, and as defined in the *Provincial Logging Residue and Waste Measurements Procedures Manual* as amended or replaced from time to time.

DATED January 27, 2005


.....
Ken Matthews, Timber Sale Manager
Strait of Georgia Business Area

SCHEDULE "A"

SPECIAL CONDITIONS AND REQUIREMENTS

1.00 ORDERLY CONDITION

The Licensee shall, concurrently with harvesting operations, leave all areas in an orderly and sanitary condition.

2.00 NO MILL ALLOWED

The Licensee must not erect or operate a sawmill or wood processing plant on an area of land referred to in paragraph 1.01 of the Licence.

3.00 HAZARD TREES

- 3.01 The hazard tree felling area surrounding the cutblock boundary(s) identified on the attached map as Exhibit "A", is subject to an exemption from the requirement for a forest development plan as provided under Section 28 (1)(a)(i) of the *Forest Practices Code of British Columbia Act*, for the purposes of hazard tree felling. The hazard tree felling area extends **fifty (50) metres** beyond the cutblock boundary(s).
- 3.02 The Licensee may fell trees outside of the cutblock boundary(s) but within the area described in paragraph 3.01 if the person conducting tree felling or rigging tail hold/anchor trees determines that the tree represents a safety hazard according to Workers' Compensation Board standards.
- 3.03 Trees felled under paragraph 3.02 may be bucked and utilized according to the specifications included in the Licence and/or Cutting Permit.

4.00 CUTBLOCKS

The cutblocks designated for harvest on the Exhibit "A" map attached to this permit are **Block SL 1 and SL 1A**.

For the purposes of Schedule "B"; the following cutblocks or portions of cutblocks defined on the Exhibit "A" map shall be defined as immature: N/A

SCHEDULE "B"

1.00 RESERVED TIMBER

1.01 The following timber is specified as reserved timber:

- (a) In accordance with the Silviculture Prescription or Site Plan in effect for Blocks SL 1 and SL 1a.

BaseLine

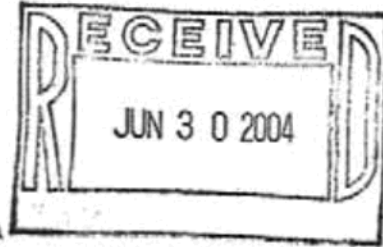
Archaeological Services Ltd.

1150 Cumberland Road Courtenay B.C. V9N 2E6

Phone: (250) 897-3853 Fax: (250) 897-3389

owengrant@shaw.ca

June 28, 2004



Erich Geddert
Coast Forest Management Ltd
2338 South Island Highway
Campbell River, BC
V9W 1C3

Re: AIA Interim Report Block SL1 Permit 2003-289.

Dear Erich,

Please find attached a copy of the above captioned report for your review and records.
Do not hesitate to contact me if you have any questions or concerns.

A handwritten signature in black ink, appearing to read "Owen Grant".

Owen Grant,
Archaeologist

Page 012 to/à Page 016

Withheld pursuant to/removed as

DUPLICATE



**KARST FIELD ASSESSMENT
Block SL1 – Skull Lake Area**

Coast Forest Management Ltd.

for:

Mr. Erich Geddert

by:

Scott Weston, B.Sc., P.Geo.

**MADRONE ENVIRONMENTAL SERVICES LTD.
1081 Canada Avenue, Duncan, BC V9L 1V2**

July 19, 2004

Dossier No. 04.0172

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KARST FIELD ASSESSMENT Block SL1 – Skull Lake Area

1.0 SUMMARY

Twelve areas with karst features are described; these range from *low* to *high* vulnerability. Treatments to mitigate the impacts of logging on these features have been recommended.

Features 2, 5, 6, 8 and 12 are rated as having *high* vulnerability. They include one or more of the following:

- Sinking stream
- Loosing stream
- Possible cave entrance
- Well developed epikarst
- Swallet in sinkhole
- Karst spring

2.0 INTRODUCTION

Madrone Environmental Services Ltd. (Madrone) was retained by Coast Forest Management Ltd. (CFM), to conduct a karst field assessment in the proposed Block SL1 in the Skull Lake area. I conducted a detailed ground inspection of the site on May 21, 2004, accompanied by Erich Geddert of CFM. At the time of the assessment the block boundary and road alignments had been partially laid out and layout was on-going.

Weather conditions on the inspection day were mild with overcast, fog and showers. Access to the area was by helicopter from Port Alberni. A total of eight hours were spent on site assessing the karst features in the block.

2.1 Scope

The objective of this assessment was to provide an overview of karst attributes in the proposed Block SL1 and assign karst vulnerability ratings.

The karst assessment procedures used in this assessment follow the guidelines for karst management as outlined in the Karst Management Handbook for British Columbia¹ and the Karst Inventory Standards and Vulnerability Assessment Procedures for British Columbia²

2.2 Assessment Method

The karst assessment focussed on areas in the block where CFM had found potential karst features during layout, and areas along major creeks in the block.

No systematic search for karst features was conducted throughout the block due to the size of the block and time constraints. Instead, I assessed all areas where high significance features were probable; I identified significant karst terrain and assessed the inherent vulnerability of the karst system. The surface hydrology and its influence on local karst were also assessed. I then identified common karst features that occur throughout the block. The karst area was then stratified into polygons of similar karst attributes and vulnerability. Finally, options to reduce the impacts forest development on karst were provided.

Prior to heading into the bush, I discussed an assessment procedure with CFM. At the time of my inspection, all streams had been traversed in the block, and a substantial reconnaissance of the entire block area had been undertaken by CFM. From speaking with CFM staff, I was able to focus my inspection on specific streams, proposed roads and areas of the block where potential karst features were present or potentially present. This allowed me to identify significant karst features in the block and conclude what features are most likely to occur in the block.

¹ Anonymous. 2003. Karst Management Handbook for British Columbia. BC Ministry of Forests. Victoria, BC. <http://for.gov.bc.ca/hfp/fordev/karst/karstbmp.pdf> Accessed April 2004.

² Resource Inventory Committee, 2003. Karst Inventory Standards and Vulnerability Assessment Procedures for British Columbia. Victoria, BC. <http://srmwww.gov.bc.ca/risc/pubs/earthsci/karst/index.htm> accessed April 2004.



By the end of the day I felt I had observed all possible karst features that would be present in the block. The attributes of these features and appropriate management prescriptions were communicated to CFM in case they came across additional karst features not identified during my assessment.

In addition to observations made during my assessment, I used the following information in preparing this report:

- During the assessment, a 1:5,000-scale topographic map of the area with creeks but no roads or block boundary.
- Following the assessment, a CFM 1:5,000-scale topographic map showing the block, roads, and creeks.
- 1998 laser-copied colour aerial photographs BCC98011-3 and 4 and approximately 1:21,000-scale.

The topographic map was used to prepare the attached sketch map showing the inspection route, karst occurrence and features and associated karst vulnerability ratings. I also referenced the 1:50,000-scale, NTS series map sheet 92 92F3-Effingham River.

All karst features, vulnerability ratings and karst management recommendations related to Block SL1 were discussed in the field with Mr. Geddart.

3.0 PHYSICAL SETTING AND PROPOSED DEVELOPMENT

3.1 Setting

Block SL1 is located approximately 35 km southwest of Port Alberni B.C. The block is situated upslope of Skull Lake, between Effingham and Pipestem Inlets, in Barkley Sound on the west coast of Vancouver Island.

Block SL1 consists of two portions; an approximately 40 ha block predominantly south of Stream 1, and an approximate 10 ha area, located north of Stream 1 (see Figure 1). Both portions of the block are located on predominantly east-facing slopes with irregular topography and several small streams. The elevation in the harvesting area ranges from 80 to 485 m above sea level. The block is surrounded

by logged areas (approximately 10 to 40 years ago) to the north, east, and west, and by timber to the south.

The nearest and most representative Environment Canada weather station for which data is readily available is Ucluelet Kennedy Camp, approximately 29 km southwest of the block at an elevation of 12 m above mean sea level. Records for this station are available for the 26-year period from 1965 to 1990. Mean annual precipitation was 3356 mm, with 64% of that falling during October through March. Mean annual snowfall was 42 cm. Extreme daily precipitation was 185 mm. Annual precipitation is likely to be than this amount in the proposed development area, due to the higher elevation and more rugged topography.

3.2 Bedrock and Surficial Geology

There are two types of bedrock mapped and observed in the vicinity of Wallace Mainline; the sedimentary Quatsino and Parson Bay Formations and the volcanic Karmutsen Formation³.

Karst features in the area are the result of presence of bedrock of the Quatsino Formation. These Upper Triassic aged sedimentary rocks generally overlie the Karmutsen Formation. The rocks consist of limestone, mainly massive to thick bedded calcilutite, varying from 25 to 500 m thick and containing ammonites and other fossils of late Karnian to early Norian age⁴.

The Karmutsen Formation is composed of theleitic volcanic rock. The formation is pillow lava, under pillow breccia and aquagene tuff and finally massive flows with minor interbedded pillow lava, breccia and sedimentary layers. The volcanics exhibit low grade metamorphism⁵. These rocks are generally found in the northwestern portion of the block.

3.3 Proposed Road

The block will be accessed via a network of roads including the existing Skull Lake Mainline and proposed roads SP1, SP2, SP4, SP5, SP6, SP6A, SP210, SP211, SP300, SP310, and SP320.

³ <http://webmap.em.gov.bc.ca/mapplace/minpot/bcgs.cfm>. Accessed March 16, 2004

⁴ <http://webmap.em.gov.bc.ca/mapplace/minpot/bcgs.cfm>. Accessed March 16, 2004

⁵ <http://webmap.em.gov.bc.ca/mapplace/minpot/bcgs.cfm>. Accessed March 16, 2004



I understand that the new roads are designed for short-term use (design life of less than five years).

4.0 OBSERVATIONS AND ASSESSMENT RESULTS

Quatsino limestone was observed as outcrops and karst topography in most areas of the block except the northwest portion of the block along Stream 9 and the upper reaches of Stream 1, and some reaches of Stream 1 downslope of Skull Lake Mainline. In these areas, I observed outcrops of Karmutsen volcanics.

The surficial material throughout the block consists of a mantle of sandy, rubbly, silty to sandy till that ranges from less than 0.1 m deep to 2 m deep in places. Also In places I also observed organic soils in the form of Folisols present as thin veneers, typically over bedrock. Drainage within the harvest area ranges from well drained along steeper gradients with bedrock outcrops, to imperfectly drained on gentle slopes containing organic soils.

The limestone karst features are generally covered by a thin veneer or organic soil or are bare. There are isolated pockets of silty till overlying the limestone in hollows. In general, the epikarst was visible or partly visible throughout most areas of the block, although is only sporadically exposed in places. It generally consisted of grikes and small sinkholes. Occasionally there are large karst ridges as well. Sinking and loosing streams are present along Streams 9 and 1; large sinkholes, significant karst controlled creeks, small cave entrances and well-developed epikarst areas were also found.

The location of the main karst features found are sketched on the attached map. The details of each karst feature are described in Table 1 below. The karst terrain between and around these features is covered by till and organic veneer. There are interspersed grikes and smaller cracks and fissures, but they are located far enough apart that they do not warrant discussion as a significantly developed epikarst. The vulnerability of these areas is considered *low*.

Table 1. Karst Features in Block SL1

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
1	Epikarst	There is poorly developed epikarst along the north side of Stream 9 with minor fissures and grikes. Epikarst is sporadically exposed. Followed Creek 9 from Skull Lake Mainline up to near upper block boundary. Creek is in volcanic bedrock the entire way. Stream 9 appears to be flashy with periodic high bedload movement. Does not appear to be sinking or loosing.	LOW	None for epikarst and none along Stream 9.
2	Loosing Stream	Stream 1 upstream of Skull Lake Mainline is a loosing stream. Headwaters at approximately falling corner 28 (Reach 3) is in a large volcanic bedrock box canyon with substantial flow at time of investigation. Reach 2 is the point where the canyon ends and limestone begins. The stream looses and surface flow ends. However there is no distinct point at which the creek looses. It flows across limestone and disappears over a 10-20m reach of bedrock channel. During high flows the creek does not go subsurface. The creek has very flashy hydrology.	HIGH	The majority of Reach 2 of Stream 1 has been cut out of the block in a riparian management zone with 100% retention. This is an appropriate treatment. Approximately 40-50m of Reach 2 is planned to be clearcut. It is not clear if this area includes the loosing area of the stream. However, this area is planned for helicopter harvest. Fall and yard away from the creek. Remove any slash and debris that is introduced to the channel by logging. Retain non merchantable trees and saplings within 5m of the channel where possible.
3	Loosing stream in alluvial material	Along Stream 6 the creek flows through a narrow box canyon in volcanic bedrock. Approximately 20m upstream from Skull Lake Mainline, the creek goes subsurface in alluvial material. I do not believe this is karst related; rather, the box canyon has been filled in with alluvial material. At high flows I expect there is surface flow here.	LOW	No treatment is warranted.

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
4	Karst ridge/sinkholes	<p>Road SP6 follows along or beside several karst ridges that are up to 4m high and across sink holes that are long linear trenches beside and/or between the ridges.</p> <p>There is a sinkhole between 0 + 134 and 0 + 145. The karst ridges continue to 0 + 221. There is no apparent surface water flow in the area, and the terrain gently sloping. There does not appear to be any connection to the subsurface in the sink holes.</p> <p>The only concern would be for collapse of possible underground cavern ceilings under the weight of the road and equipment on the road.</p> <p>The epikarst in the surrounding area is moderately developed.</p>	MODERATE	<p>No treatment is recommended. In the field we attempted to locate the road along the ridges instead of through the sink holes, but in the end this was not possible and would not have changed the situation significantly.</p> <p>Workers should be made aware that during construction there is potential for collapse of the road.</p> <p>When constructing the road across karst terrain, the road subgrade and road ballast should be constructed with limestone to maintain water chemistry in the karst terrain.</p> <p>When deactivating the road, this section of road should have the surface scarified to increase its permeability.</p>
5	Possible cave entrance	<p>Between approximately falling corner 15 and falling corner 16 and 0 + 320 on Road SP6. The road is located on a flat area. To the west is a large sinkhole/hollow- ~ 20m wide at the top elevation and ~ 5m wide at the bottom elevation of the hole. The hole is 5-6m deep. There are several cracks and fissures in the limestone less than 1m wide. I could not see how far they go to into the subsurface. This is potentially an air exchange site for the subsurface, and an entry/exit point for fauna. The area around the chasm is very open with few trees.</p> <p>The epikarst in the surrounding area is poorly developed.</p>	HIGH	<p>I recommend moving the road 7-8m to the east to be away from the edge of the chasm. I understand this has been done since my assessment.</p> <p>Water from the road should not be directed into the chasm.</p> <p>I understand that road right of way will be cleared, and the area around the chasm will be logged. However since the forest is very open and there are few trees, I do not expect this will have any significant impact on the possible cave entrance.</p> <p>Fall and yard away from the sinkhole. Retain saplings and non merchantable trees within 5m of the edge of the hole.</p> <p>No other treatments are necessary.</p>

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
6	Sinking stream/sinkhole, swallet	Stream 13 flows into a large sinkhole and disappears into a swallet. The sinkhole is near the end of Road SP6. As the creek flows into the sinkhole it is flowing across rubbly, sandy silty till veneer to blanket. The sinkhole is approximately 20m wide and 15m long and 8-10m deep. There is standing timber all around the sinkhole providing cover. Stream 13 has a moderate bedload and sediment transport capacity, and there are recent deposits of sediment in the sinkhole near the swallet entrance. I suspect sediment regularly enters the swallet. The surrounding area has intermittent occurrence of well developed epikarst.	HIGH	<p>This sinkhole should be buffered, and I understand it was cut out of the block following my assessment. Creek 13 will flow undisturbed into the sinkhole which will have a buffer of trees maintained around it.</p> <p>In the field I recommended the road be moved away from the sinkhole, and I understand since then the road has been shortened by approximately 100m, and the road is now located further north from the sinkhole.</p> <p>To ensure the road does not impact the swallet, it is important to ensure that water from the road is not directed into the sinkhole.</p>
7	Sinkhole and possible cave entrance	Sinkhole that is 7-10m wide, 15-20m long and 3-4m deep. There is a 1-2m ² hole to the subsurface that may lead to a cave. There is no water flowing into the hole. There has been deadfall of approximately half of the trees immediately surrounding the hole. The hole is mapped as GPS6. I suspect this sinkhole is representative of what can be expected to be found throughout the block.	MODERATE:	<p>Because there is no water flow into the hole, the significance is diminished. Fall and yard away from the hold. Retain saplings and non merchantable trees within 5m of the edge of the hole.</p> <p>Roads should be routed around such features, and ground based equipment should be kept a minimum 5m from the edge.</p> <p>This prescription should be followed if other sinkholes like this are found in the block.</p>
8	Epikarst	0.6ha area of well developed epikarst marked by GPS7. 2-5m high karst ridges, deep grikes, obvious portals to the subsurface for air and precipitation. No creeks in the area. Logging would be difficult due to the irregular terrain.	HIGH	I understand this area has been removed from the harvest area as a management zone with 100% retention. No other treatment is recommended.

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
9	Epikarst and sinkhole	There is a 10m by 10m sinkhole approximately 25m downslope of the road at GPS9. The surrounding area has moderately to well developed epikarst. This area was identified while walking Road SP5. The road does not cross any significant karst features and requires no grade modifications.	LOW	<p>The road requires no grade changes. Ditch water should not be directed into the large sinkhole. Culverts should be installed accordingly. Road fill should not be allowed to spill into the sinkhole. Fill and yard away from the sinkhole. Retain saplings and non-merchantable trees within 5m of the edge of the hole. Any ground based equipment should be kept a minimum 5m from the edge.</p> <p>Conventional road construction is appropriate. There road surface should be constructed so it is convex and water easily runs off the road rather than been concentrated on the surface and channeled down the road which could lead to sedimentation of the epikarst and higher water input that is normal.</p> <p>When constructing the road across karst terrain, the road subgrade and road ballast should be constructed with limestone to maintain water chemistry in the karst terrain.</p> <p>When deactivating the road, this section of road should have the surface scarified to increase its permeability.</p> <p>If other similar sinkholes are found in the area, the same treatments should be applied.</p>

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
10	Epikarst and sinkhole	<p>This area was identified while walking the location of Road SP4. There is low to moderately well developed epikarst along this road. I did not observe surface water flowing into any karst features.</p> <p>Approximately 10-30% of the epikarst is exposed.</p> <p>Two sinkholes were identified off the road grade. One is 30-40m long, 3-4m wide and 2m deep. It is more of a crevice. The second is at GPS11, and is 15-20m deep, 20-30m wide and long. There is no surface water flowing into either.</p>	LOW	<p>No special treatment is required for either feature. Ditchwater from the road should not be directed into either sinkhole, or other unidentified holes. Fall and yard away from the holes, and retain saplings and non-merchantable timber within 5m of the holes.</p> <p>Conventional road construction is appropriate. There road surface should be constructed so it is convex and water easily runs off the road rather than being concentrated on the surface and channeled down the road which could lead to sedimentation of the epikarst and higher water input that is normal.</p> <p>When constructing the road across karst terrain, the road subgrade and road ballast should be constructed with limestone to maintain water chemistry in the karst terrain.</p> <p>When deactivating the road, this section of road should have the surface scarified to increase its permeability.</p> <p>If other similar sinkholes are found in the area, the same treatments should be applied.</p>
11	Sinkhole and possible cave entrance	The sinkhole feature is at GPS12; it is 15-25m long, 5-7m deep and 10-15m wide. There are two small holes 1-3m ² each at one end that may lead to a cave. There is no surface water flow into the sinkhole or possible cave entrances. There is open forest around the sinkhole.	MODERATE	<p>Fall and yard away from the sinkhole. Retain saplings and non-merchantable timber within 5m of the sinkhole.</p> <p>I understand this area will be helicopter yarded.</p>

Feature Number	Type	Remarks	Karst Vulnerability	Recommended Treatment
12	Sinking stream, swallet, sinkhole, epikarst, karst spring	<p>This is a large area with several identified karst features. Along Stream 1, the creek disappears and reappears in karst terrain during low to moderate flows in several places. At high flows the creek does not appear to disappear but looses instead. In some places there are holes where the creek flows directly to the subsurface. Just outside of the block the creek goes completely underground with no potential for surface flow. At GPS14 there is a large well developed epikarst ridge. There are large grikes and boulder piles.</p> <p>At approximately 150m elevation, just north of falling corner 53, the main creek disappears. There are considerable sized boulders on plentiful large woody debris in the channel indicating high flow at times. There is a high sediment transport in the creek. The water appears to filter through alluvial bedload as it moves to the subsurface.</p> <p>At GPS 16 there is a 10m wide, 15m long and 5-7m deep sink hole with a spring flowing out of the side of the hole. The water flows 2-3m and disappears into a swallet.</p> <p>At GPS18 is a large karst canyon that is 2-3m wide and up to 10m deep and 10m long.</p> <p>Stream 1 reemerges in the channel at approximately the same elevation as falling corner 92. It looses and disappears before it leaves the block.</p>	HIGH	This whole area has been cut out of the block as either a wildlife free patch or management zone with 100% retention. No other treatments are warranted.

5.0 CONCLUSIONS

5.1 Impacts of Harvesting on Karst Features

Over the course of the inspection, I noted 12 areas with karst features, summarized in Table 1. No other features were observed, however other similar features may, and likely are, present.

I do not expect other karst hydrologic features such as sinking or losing streams, swallets or karst springs will be found. However, if they are, a qualified karst assessment professional should be contacted to discuss treatments. If features are similar to those presently identified in the block, no field assessment should be required, provided similar treatments to the ones implemented are applied.

I do expect that epikarst, karst ridges, possible cave entrances and sinkholes will be found elsewhere in the block. If they are, the same treatments as outlined in Table 1 for known sinkholes and cave entrances should be followed.

5.2 Safety Hazard

Sinkholes represent the ancient collapse of the roof of an underground cavity formed in the limestone bedrock. Additional underground cavities may be present. It is possible that the activity of an excavator could precipitate the collapse of a cavity roof, and the excavator could fall into the cavity. Since the natural sinkholes in this general area are between 0.5 and 4 m deep, the consequence of such an event is likely to be, at worst, slight injury to the operator and damage or destruction of the machine.

No such event has occurred in B.C. to my knowledge, although from time to time a cavity has been exposed during excavation for roads. The collapse of cavity roofs creating sinkholes has occurred sporadically over geologic time, and considering that the limestone is over 150 million years old, the chance of collapse at any one time is negligible, although it is increased when excavators are walked over the surface.

The sinkhole hazard is therefore *low*, with a *moderate* consequence. Grade crews should be informed that they will be working in karst terrain and that they may

encounter underground cavities, but that the likelihood of participating in a roof collapse is minimal.

6.0 LIMITATIONS

Examination of karst features was based on visual assessment only. No exploration of underground cavities was undertaken. A systematic inspection of the surface features in Block SL1 was not conducted, instead we relied mainly on surface feature identification by CFM and an informed ground inspection.

The conclusions and recommendations are based on experience in similar logged terrain. The investigation involved a reconnaissance-level inspection including field observation of surface expression and soil exposures in windthrows, road cuts, gullies, and/or shallow soil pits. No other subsurface investigation was done. The recommendations contained in this report pertain only to the road and harvesting plans as indicated at the time of the inspection. Geological conditions, other than those indicated above, may exist on the site. If such conditions are observed, Madrone Environmental Services Ltd. should be contacted so that this report may be reviewed and amended accordingly.

Prepared by:



Scott Weston, M.Sc., P.Geo.

Reviewed by:

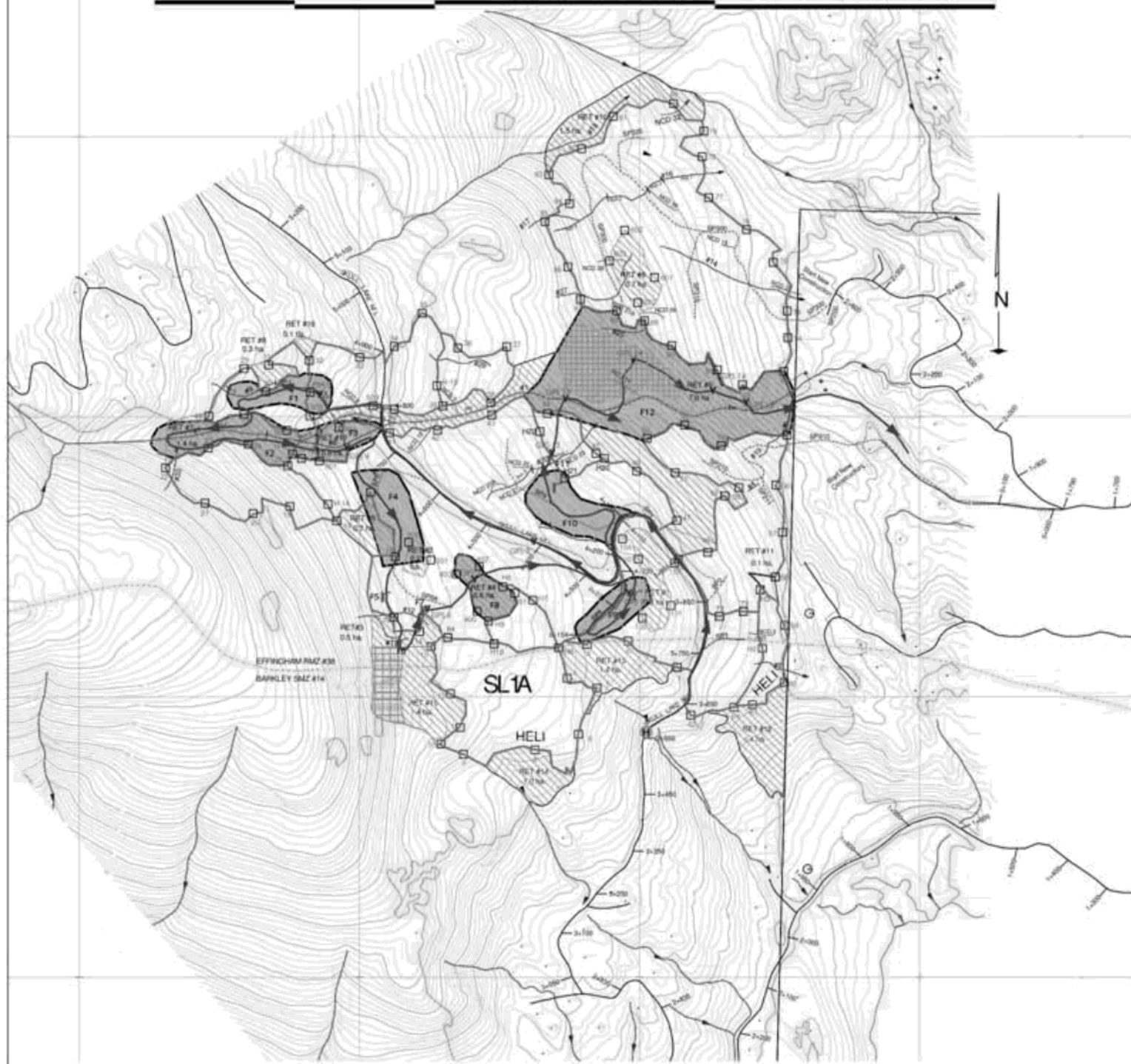


Gordon Butt, M.Sc., P.Ag., P.Geo.



KARST FIELD ASSESSMENT: BLOCK SL1 SKULL LAKE AREA VANCOUVER ISLAND

500 0 500 1000 Meters



LEGEND

- H Helicopter Landing
- Karst Polygon Features
- Karst Point Features
- GPS Points
- Traverse Route (May 21, 2004)

- 100m Index Contour
- SMZ Boundary
- Block Boundary
- Wildlife Tree Patch
- Retention Area
- Creeks
- Existing Roads
- Proposed Roads

CREDITS:

PRODUCED BY: MADRONE ENVIRONMENTAL SERVICES LTD.
CLIENT: COAST FOREST MANAGEMENT LTD.
INSPECTED BY: SCOTT WESTON, M.Sc., P. Geo.
INSPECTION DATE: MAY 21, 2004



Madrone Environmental Services Ltd.
202-2602 Mt Lehman Rd.
Abbotsford, BC V4X 2N3
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Web: www.madrone.ca
Email: info@madrone.ca

Page 034 to/à Page 035

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DUPLICATE

Page 031 to/à Page 062

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August 31, 2004

TSL A50650 – Block SL1 Skull Lake Area
Coast Forest Management Ltd.
2338 South Island Highway
Campbell River, BC
V9W 1C3

Re: Blowdown Hazard Assessment between FC 54 and FC 55

At the request of Bryan Fraser of Coast Forest Management Ltd. (CFM), I have reviewed a section of boundary for blowdown hazard between Falling Corners (FC) 54 and 55 of TSL A50650, Block SL1 in the Skull Lake area. I completed a detailed ground inspection of the area on June 9, 2004, in the company of Mr. Charlton Beggs of CFM. CFM was responsible for the block and road layout. At the time of the assessment the block boundaries were ribboned in and roads, retention patches, and streams were being ribboned and surveyed. Block SL1 is located approximately 35 km southwest of Port Alberni B.C. The block is situated upslope of Skull Lake, between Effingham and Pipestem Inlets, in Barkley Sound on the west coast of Vancouver Island.

The section between FC 54 and 55, approximately 100 m in length, was not entirely walked during the initial investigation, nor was asked to be included in the original report. However, based on the location of the traverse (a portion of the section was visible from the traverse route) and supplemental air photo review, the blowdown hazard for the given section can be reasonably assessed.

Based on airphoto review and field inspection notes, the stand structure along this segment is similar to the section between FC 52 and FC 54, and terrain within Polygon 2¹. The segment between FC 54 and FC 55 is windward facing

¹ Miller, W. 2004. Terrain Stability Field Assessment –TSL A50650 Block SL1 Coast Forest Management Ltd.

to southern quarter winds and is located approximately 50 m south of the S5-classified Stream 1 (direct connectivity to sensitive marine ecosystems approximately 2 km downstream). The surficial material along this section includes scattered colluvium overlying irregular bedrock knobs with intermittent till deposits. The soil is moderately –well drained. The forest along the boundary section has a moderately open canopy and multilevel stand height. Several emergents are viewable from the airphotos. The rooting depth of the trees would likely be less than 40 cm in depth where bedrock is exposed or scattered areas of ponding occur, and between 40 cm and 60cm in depth where thicker pockets of colluvium and/or till are deposited. The dominants are Western redcedar (30-40m in height) with moderate height-to-diameter ratios, and moderate to small crown sizes. The co-dominants are Western Hemlock, ranging from 20 m to 35 m in height. The height-to-diameter ratios are moderate to high with moderate to small crown sizes.

Based on given field inspection notes for similar areas and airphoto review, the segment between FC 54 and FC 55 has a LOW blowdown hazard (no treatments such as pruning or topping are warranted). Consequences of blowdown along this section include loss of timber, introduction of sediment and slash into Stream 1, and potential initiation of a channelized debris flow if large volumes of water and sediment become trapped upstream of a logjam. Scattered blowdown of individual stems is expected along the windward edges, but is not expected to initiate a large slide.

Yours truly,

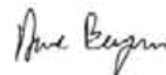
MADRONE ENVIRONMENTAL SERVICES LTD.

Prepared by:



Wanda Miller, B.Sc., G.I.T.

Reviewed by:



Dave Bergman, B.Sc., P.Geo.

NOTICE OF TIMBER SALE LICENCE AWARD

Timber Sale Licence A 50650 CP G Location Skull Lake
 Road Permit number R 11978 Section: 21 Cat 2
 Field Office ☐ Campbell River ☒ Port Alberni ☐ Powell River
 Date of ^{award} Timber sale 05/01/04 Timber Sale expiry date 05/03/31
 Total cruise volume (m3) _____ Competitive volume (m3) _____
 Upset stumpage (\$/m3) _____ Bonus stumpage (\$/m3) _____ Total (\$/m3) _____
 Upset value (\$) _____ Bonus value (\$) _____ Total Value (\$) _____
 or
 Lump Sum Upset (\$) _____ Lump Sum Bonus (\$) _____ Total Value (\$) _____
 Total Deposit: \$ _____
 Successful applicant: C. McKee Manufacturing Ltd
 Address: _____

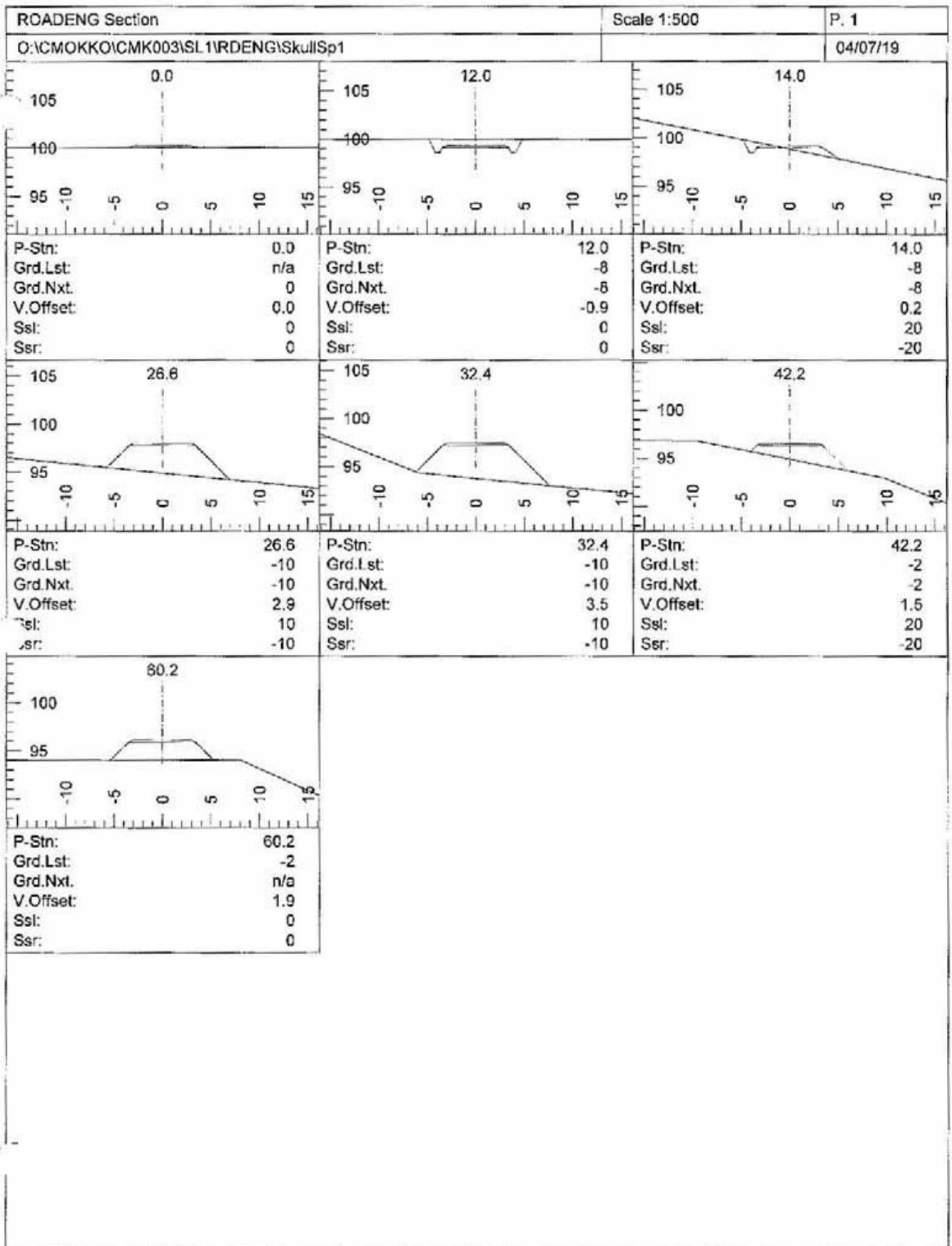
Type of sale (circle all applicable categories): Normal Deciduous Commercial Thinning

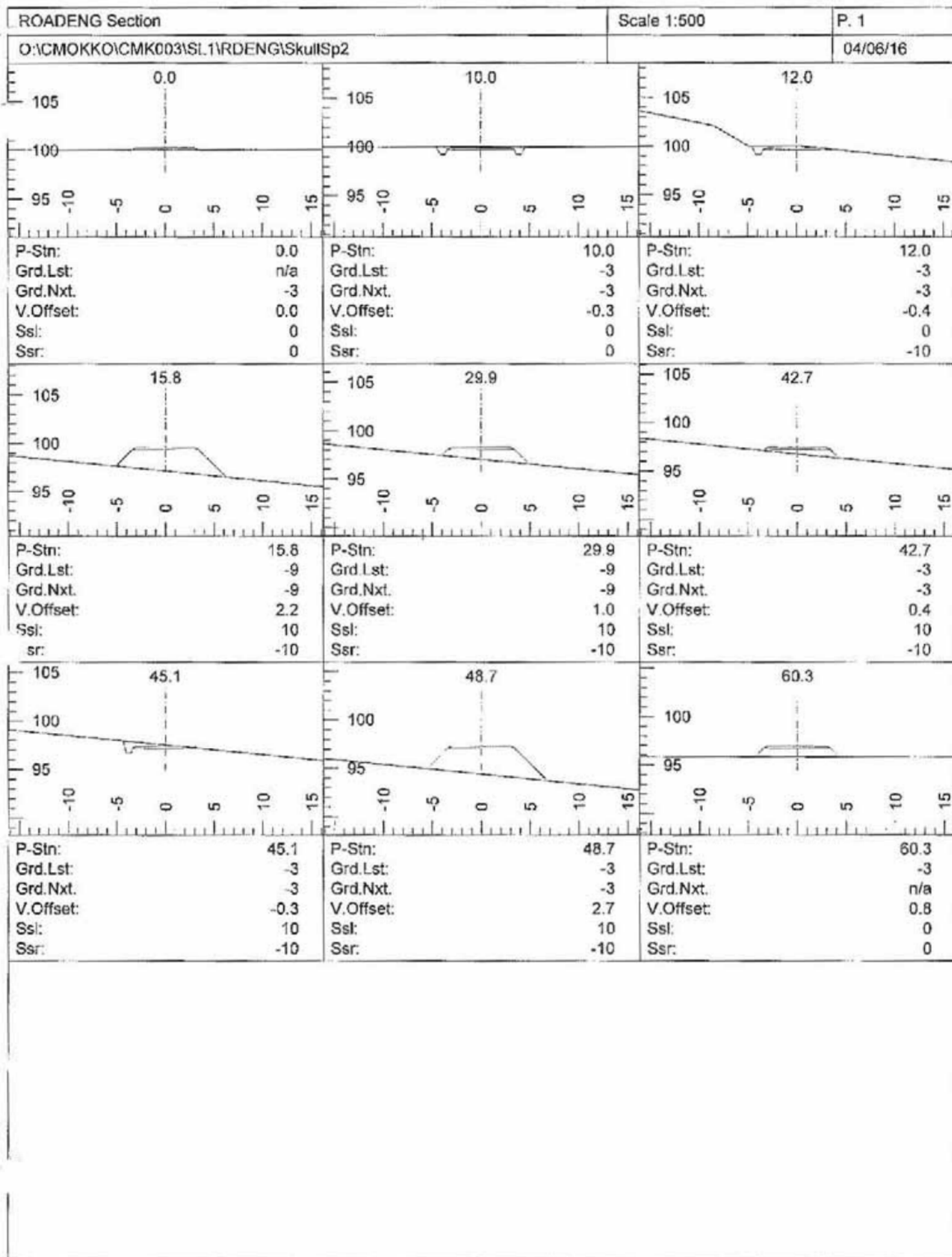
Harvested Horse logging A-Frame Helicopter Windthrow

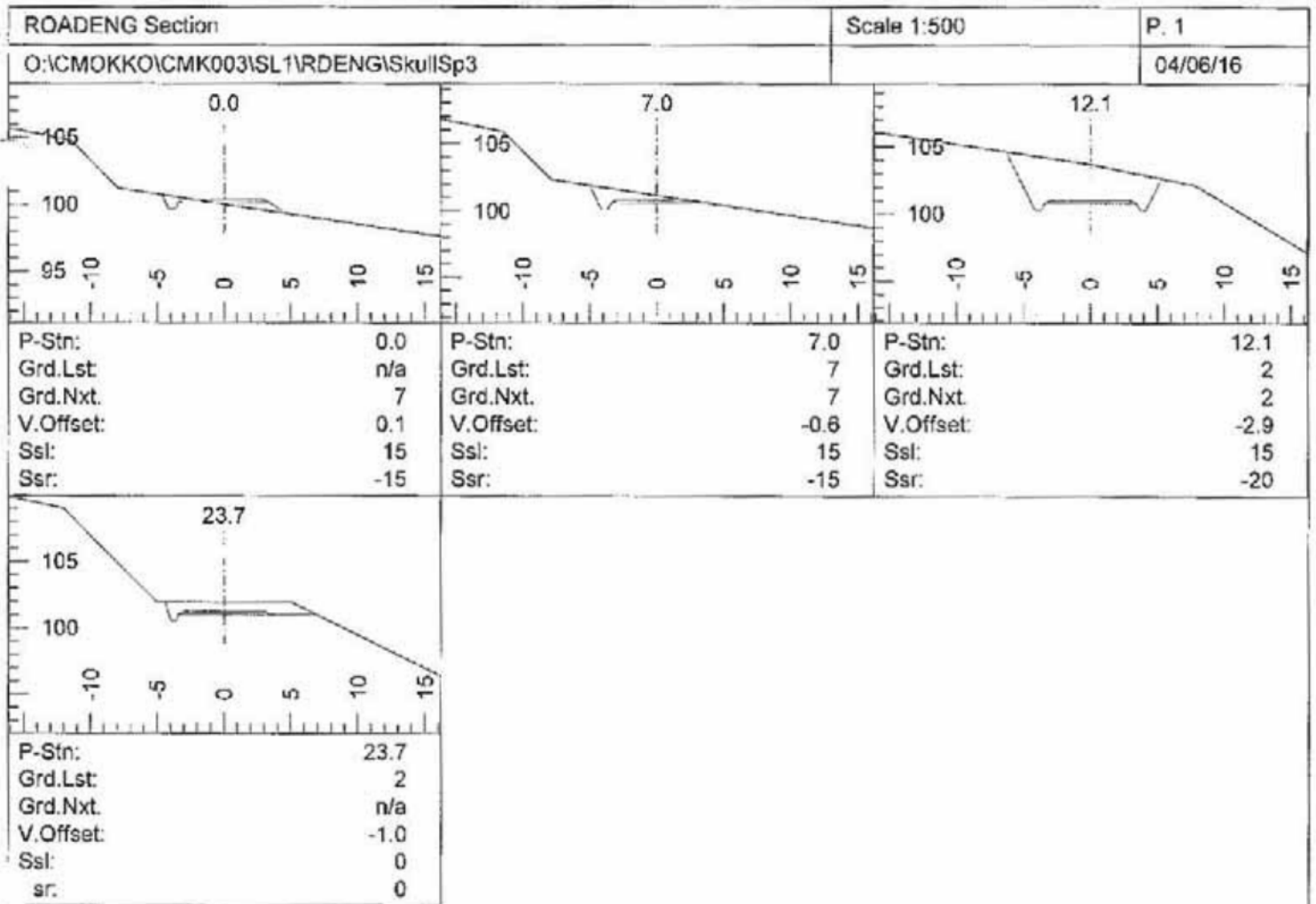
Quota Type: ☒ D- Small Business Apportionment OR ☐ C- Forest Service Reserve

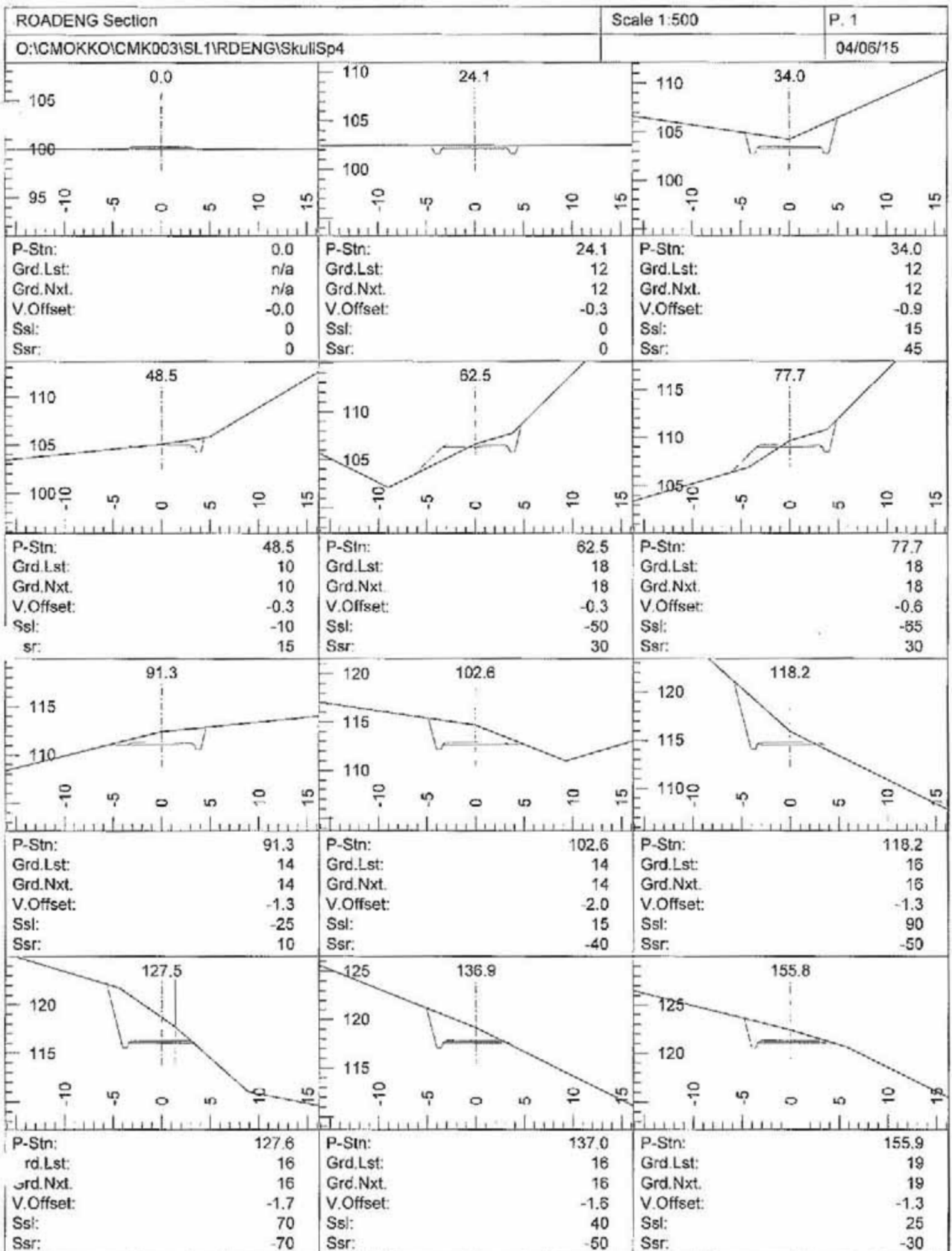
cc: Gerry Propp ☐ Active Tenures & Tracking Ledger ☐ Notice of TSL Binder

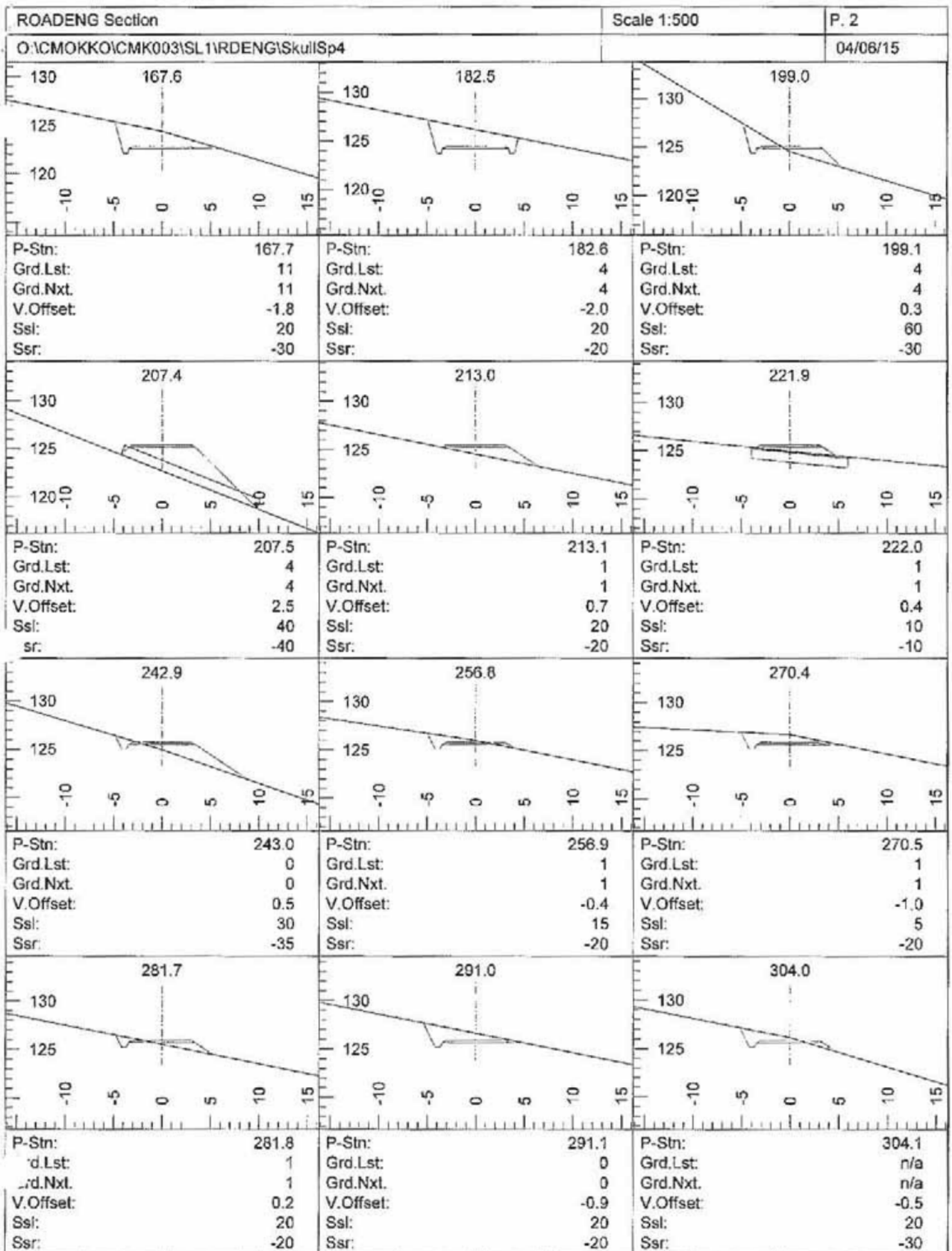
cc: District Scaling Supervisor ☐ CR - James Magee
☒ PA - Bruce Flinn
☐ PR - Ellis Merry

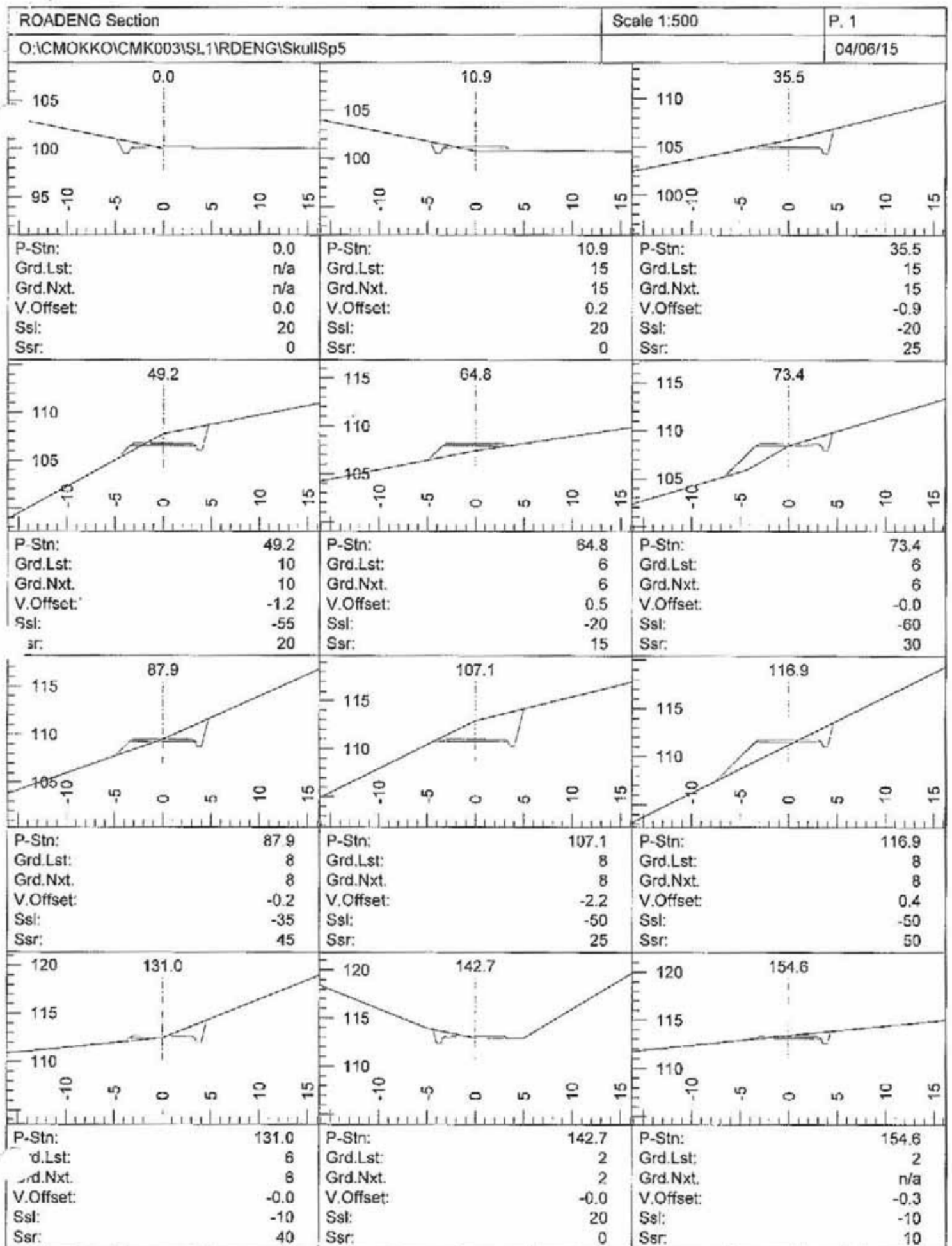


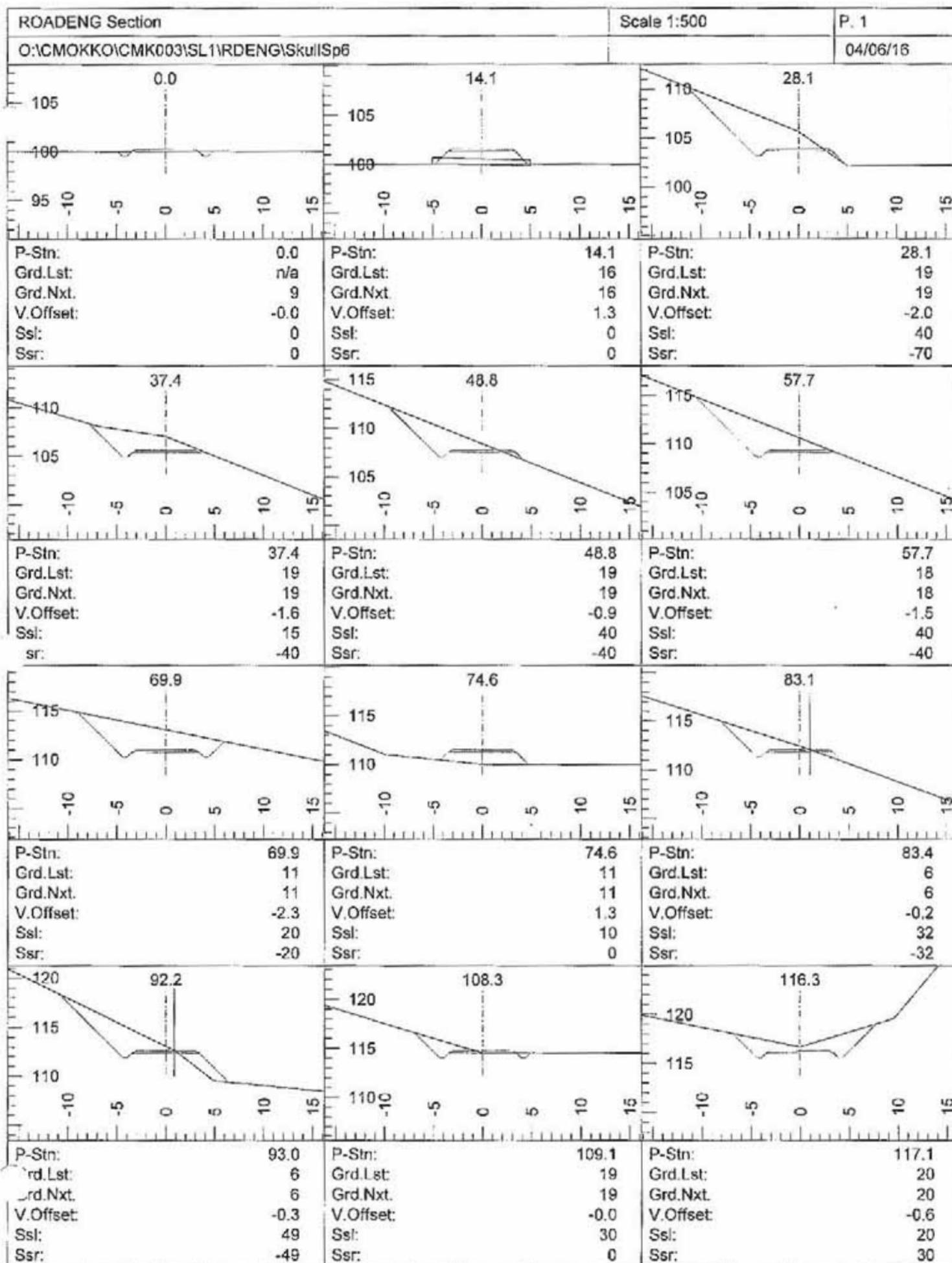


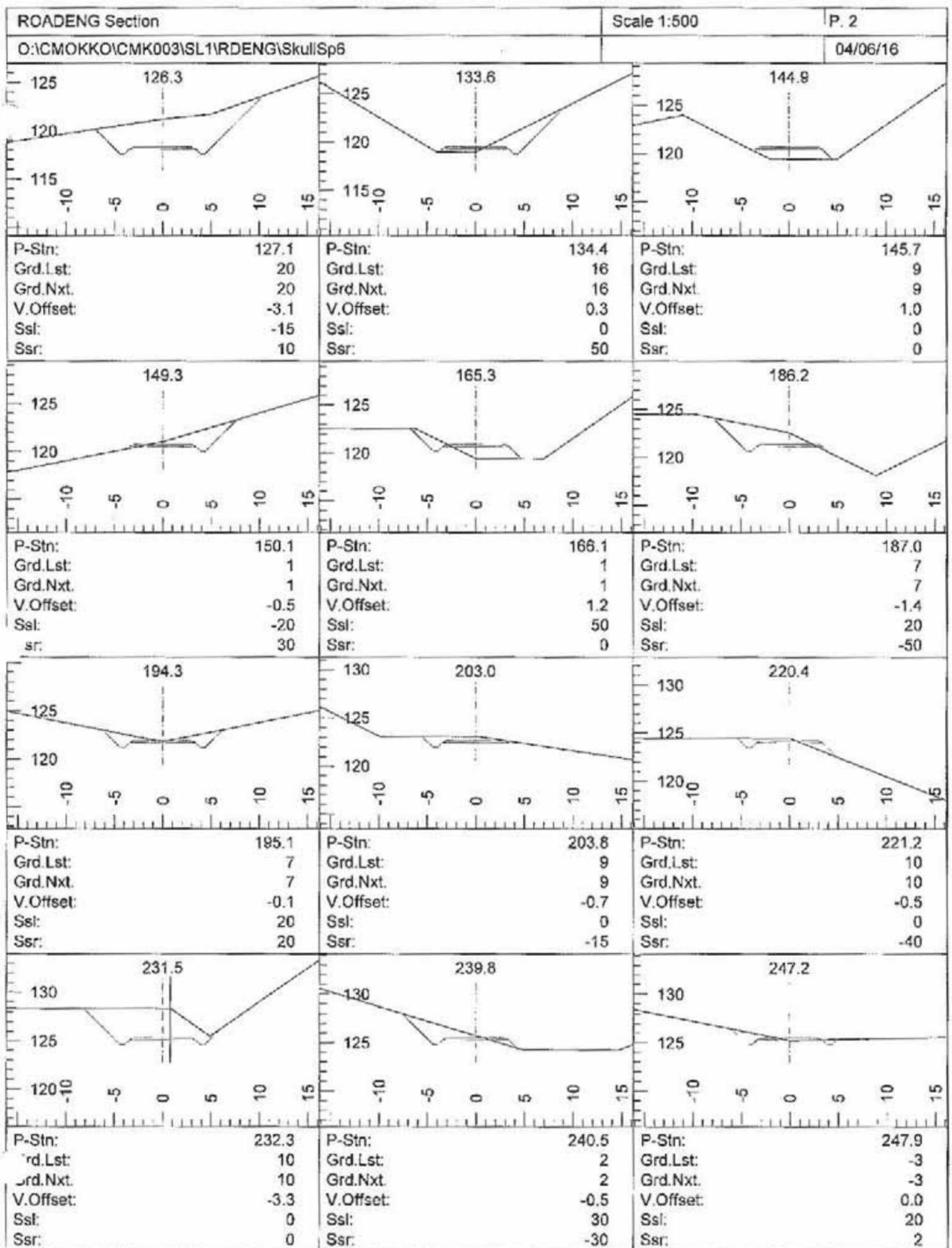


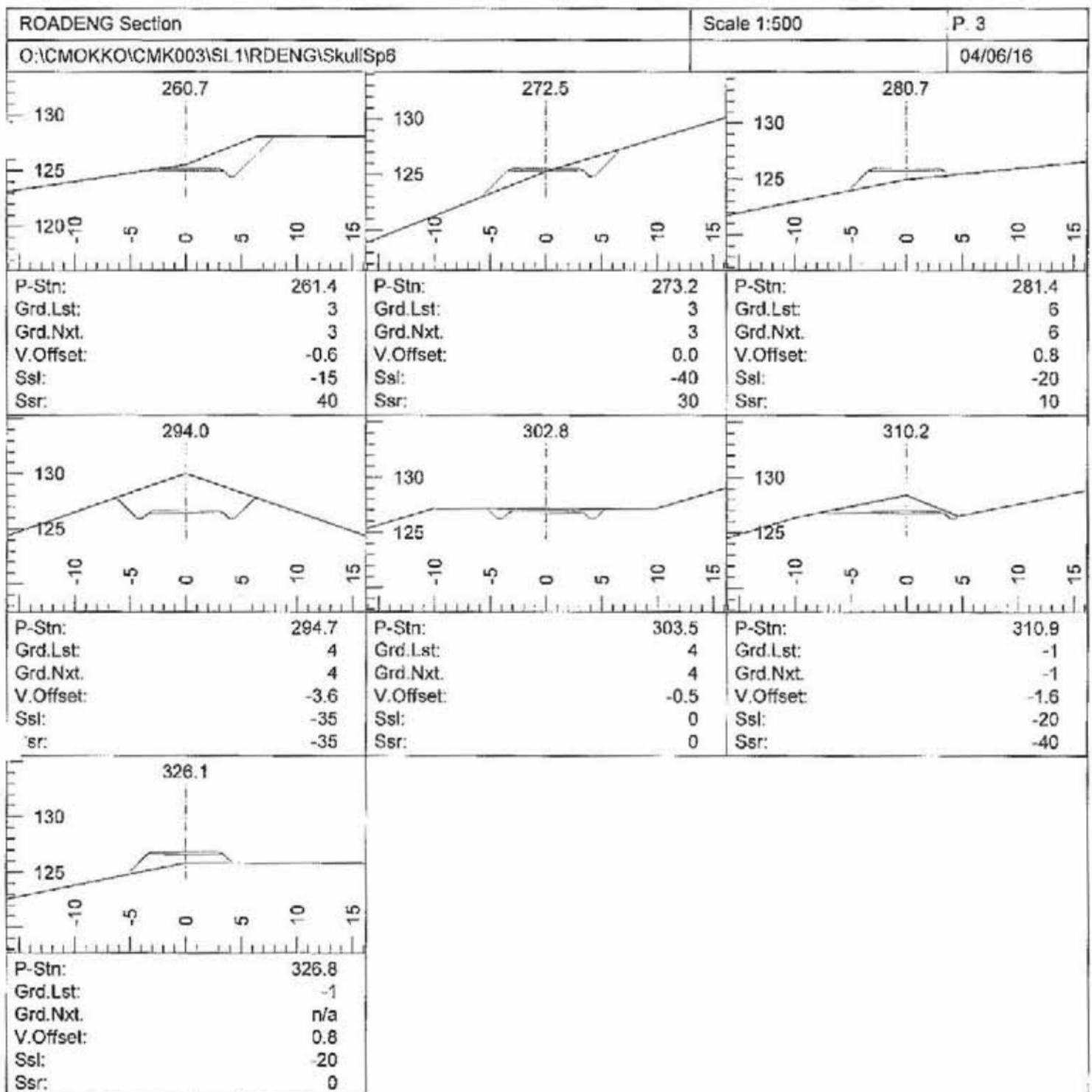


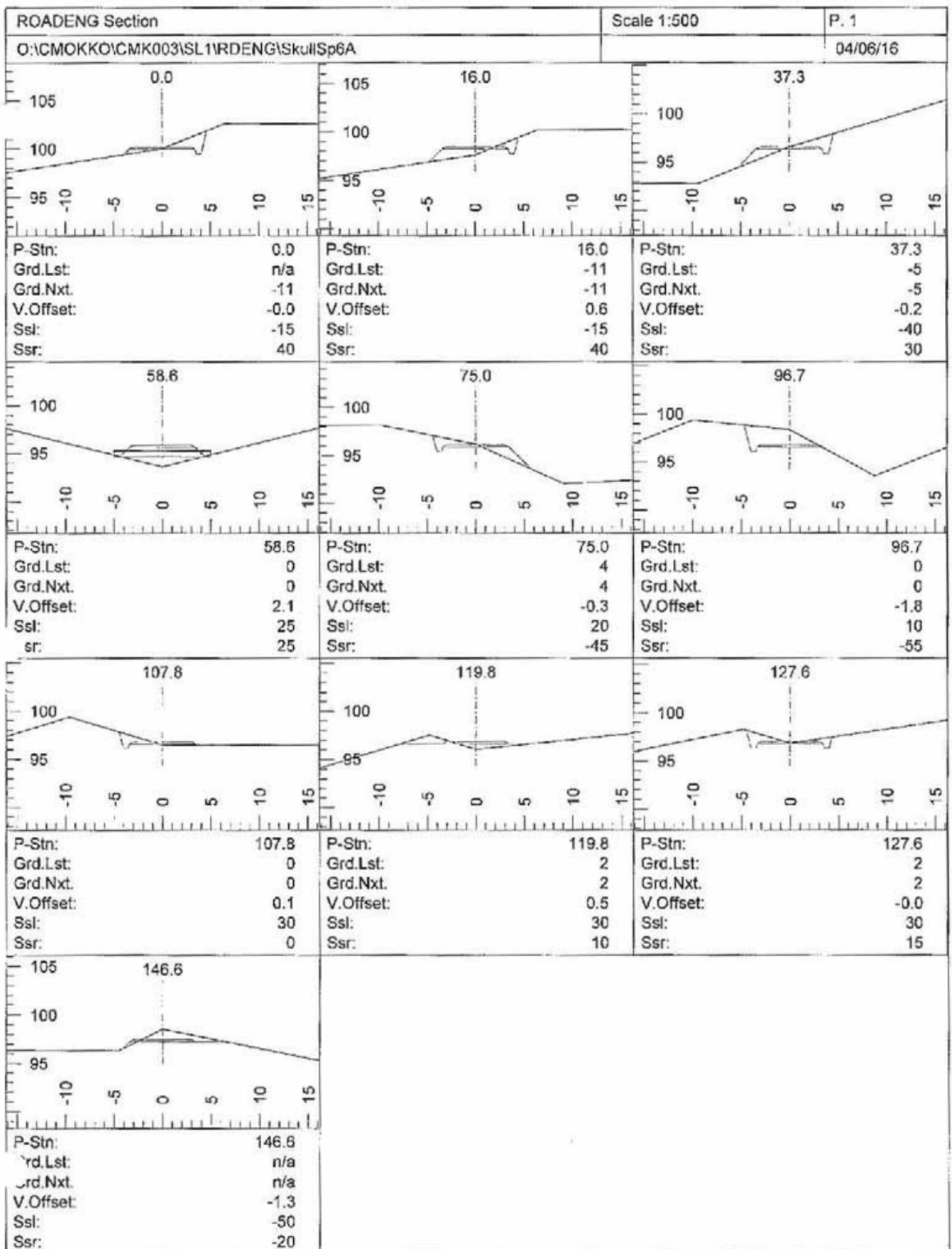


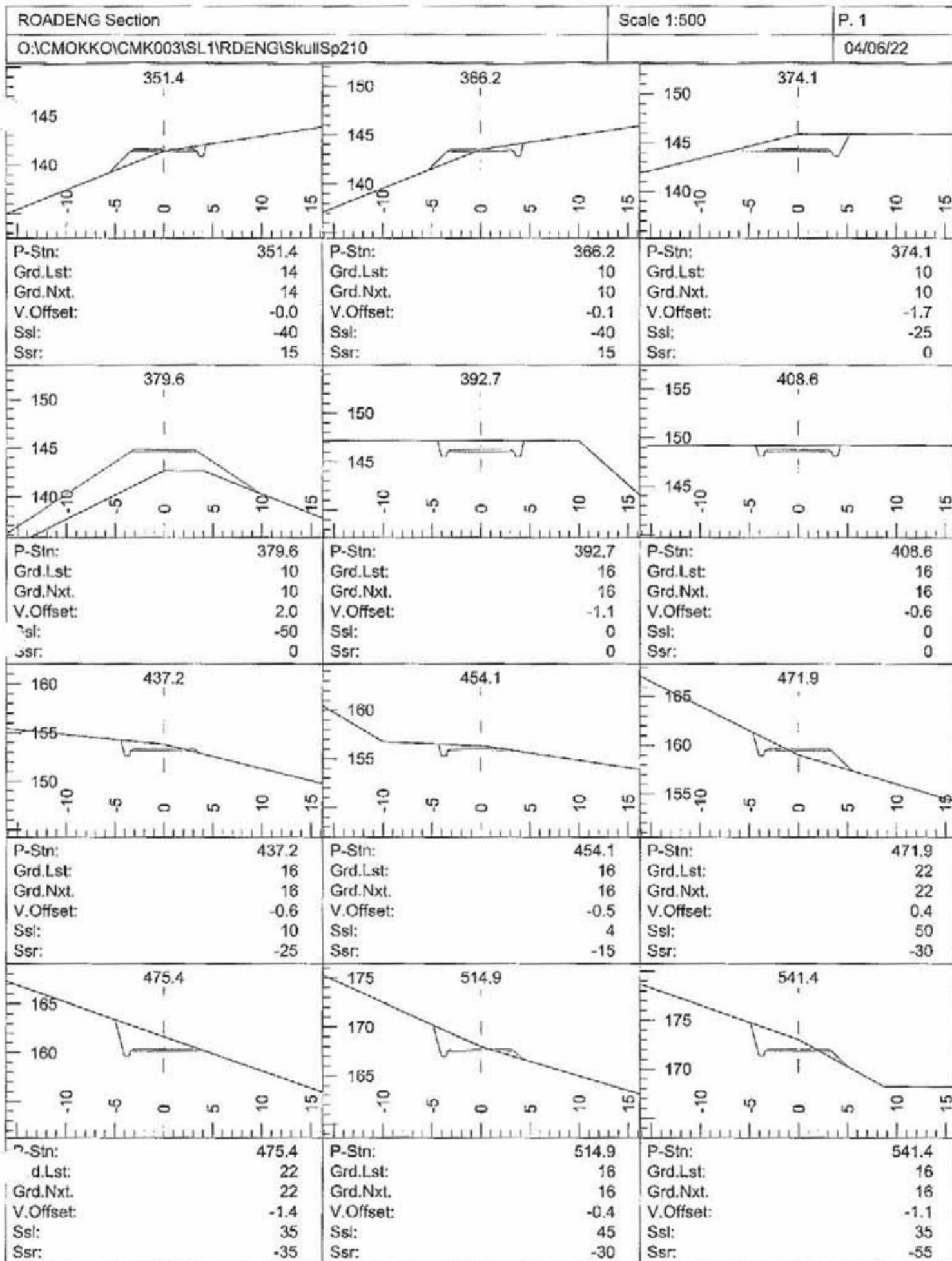


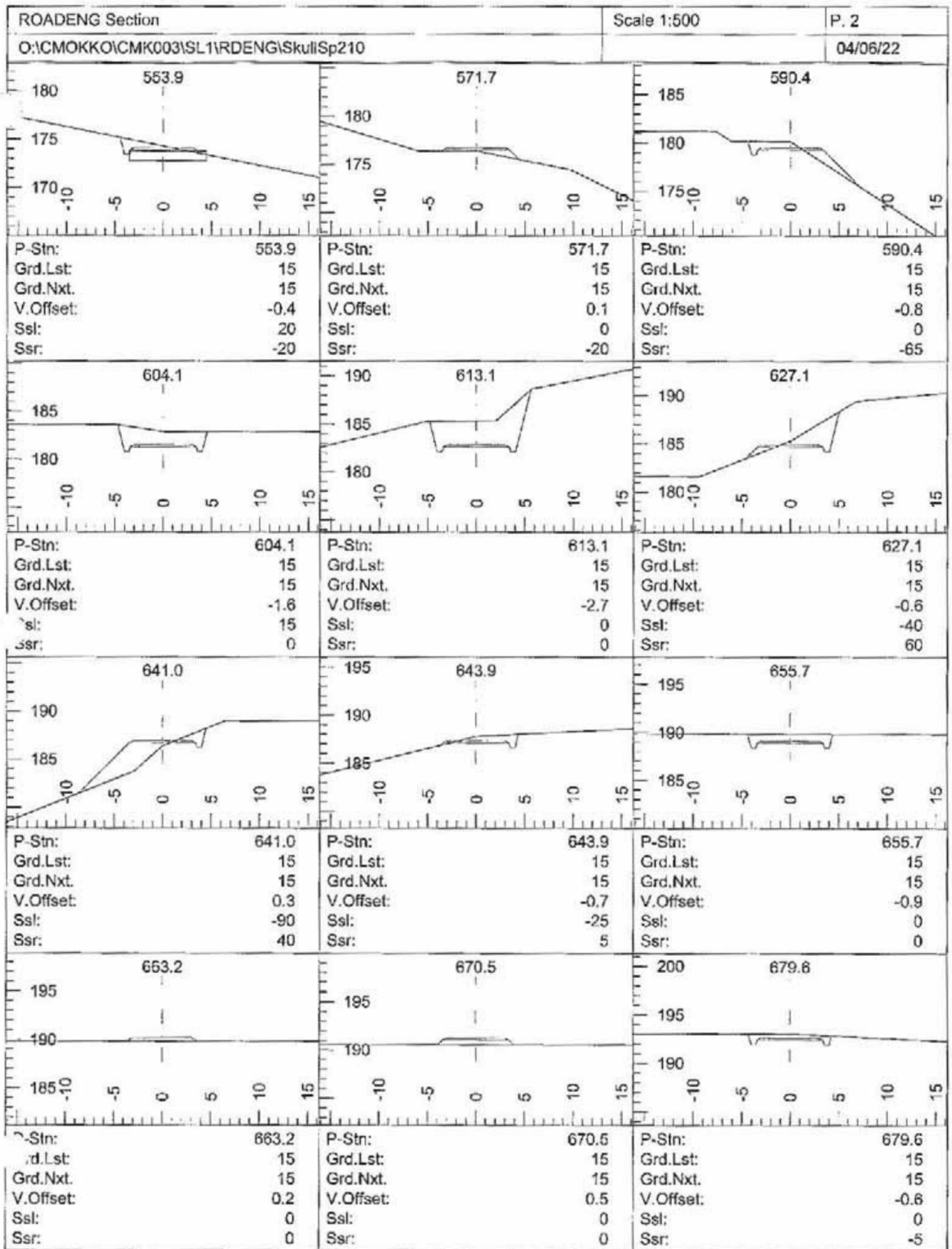


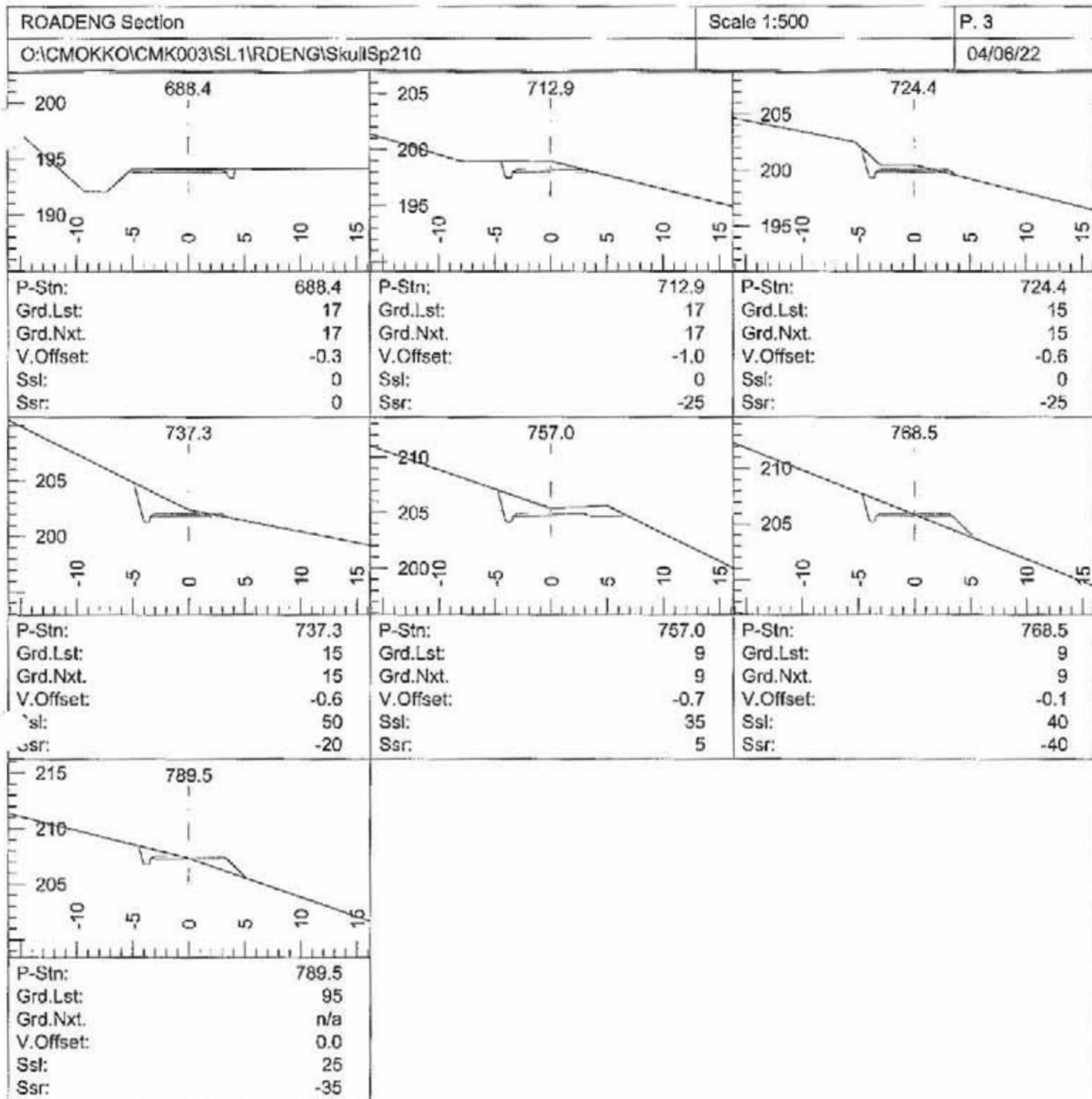


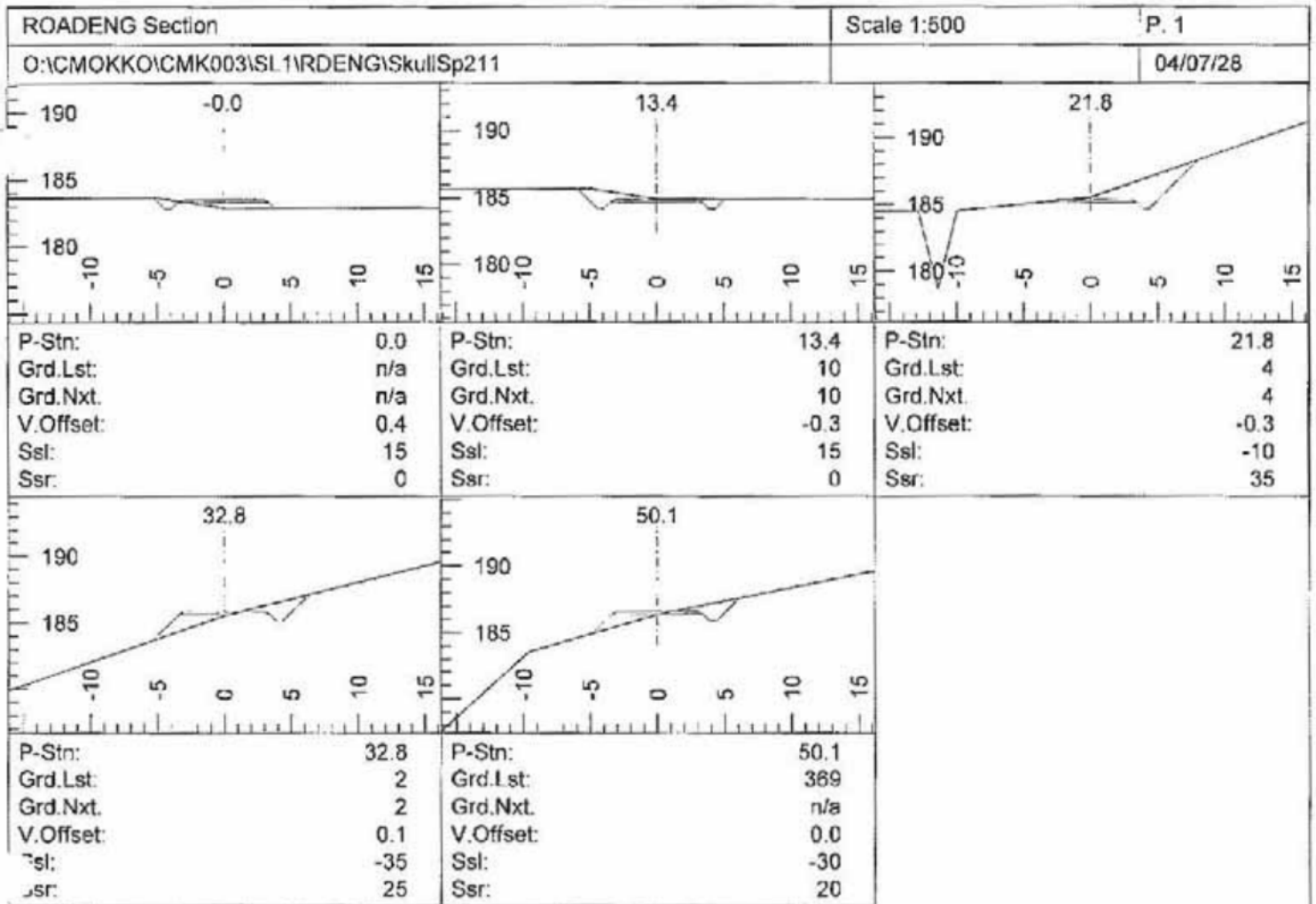


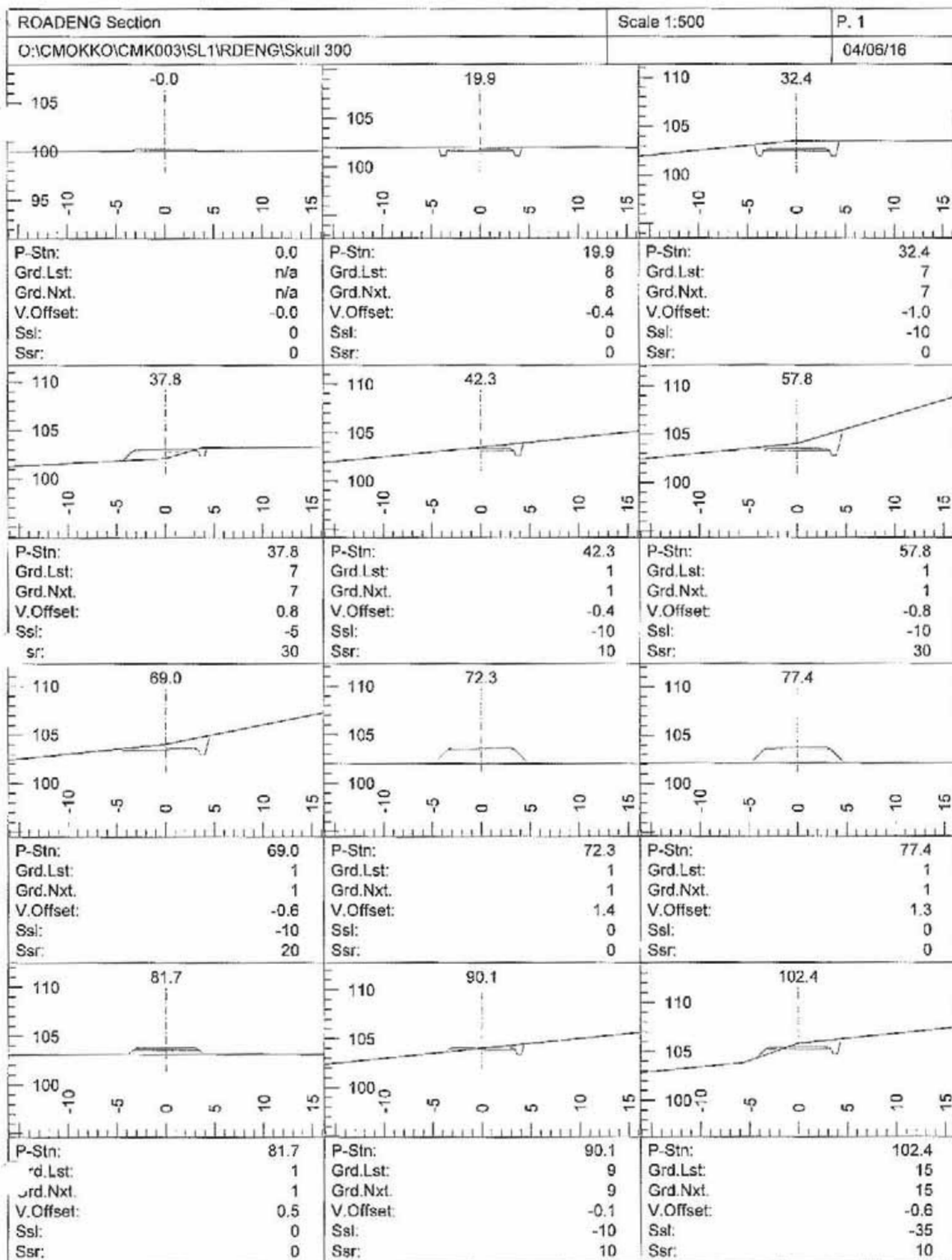


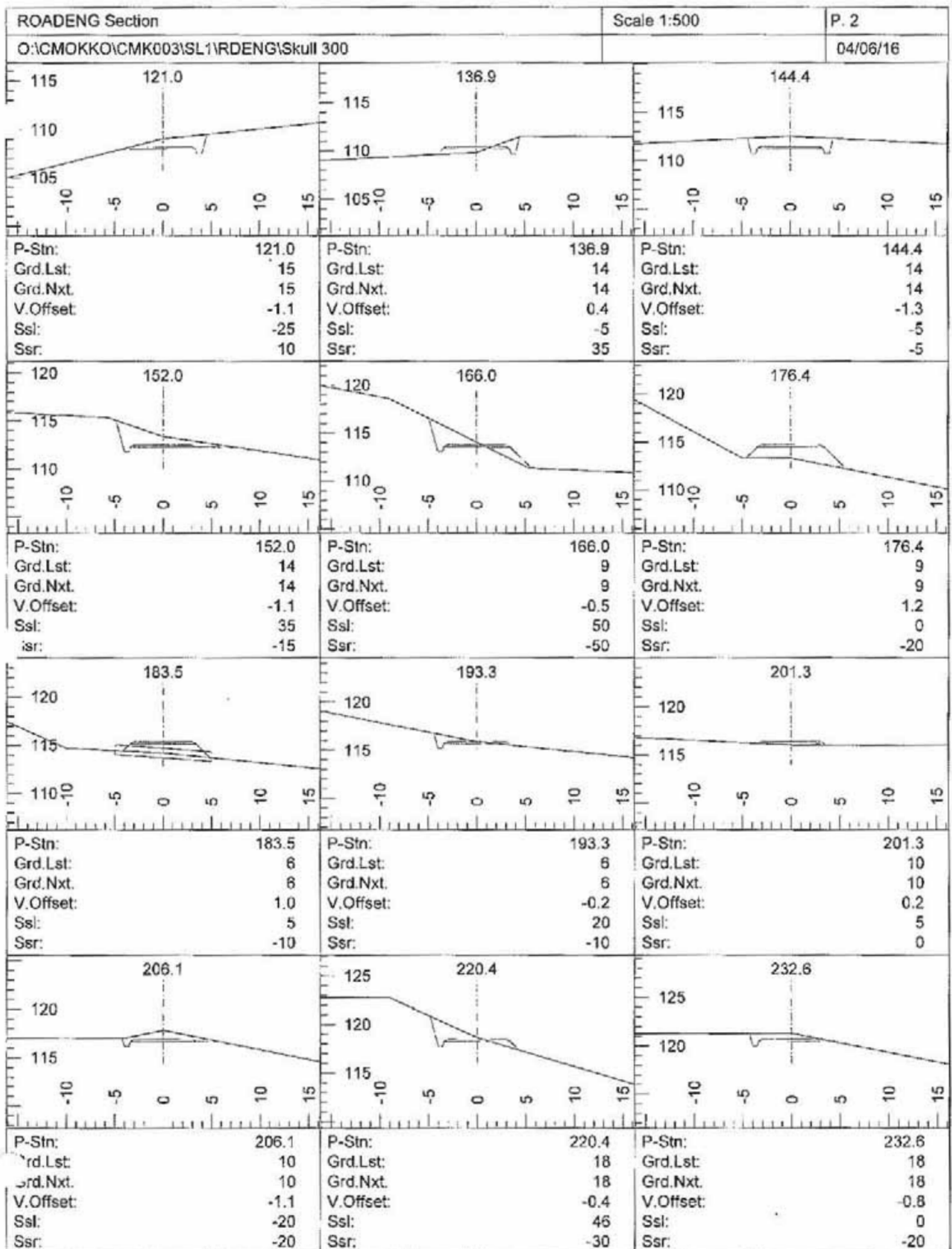


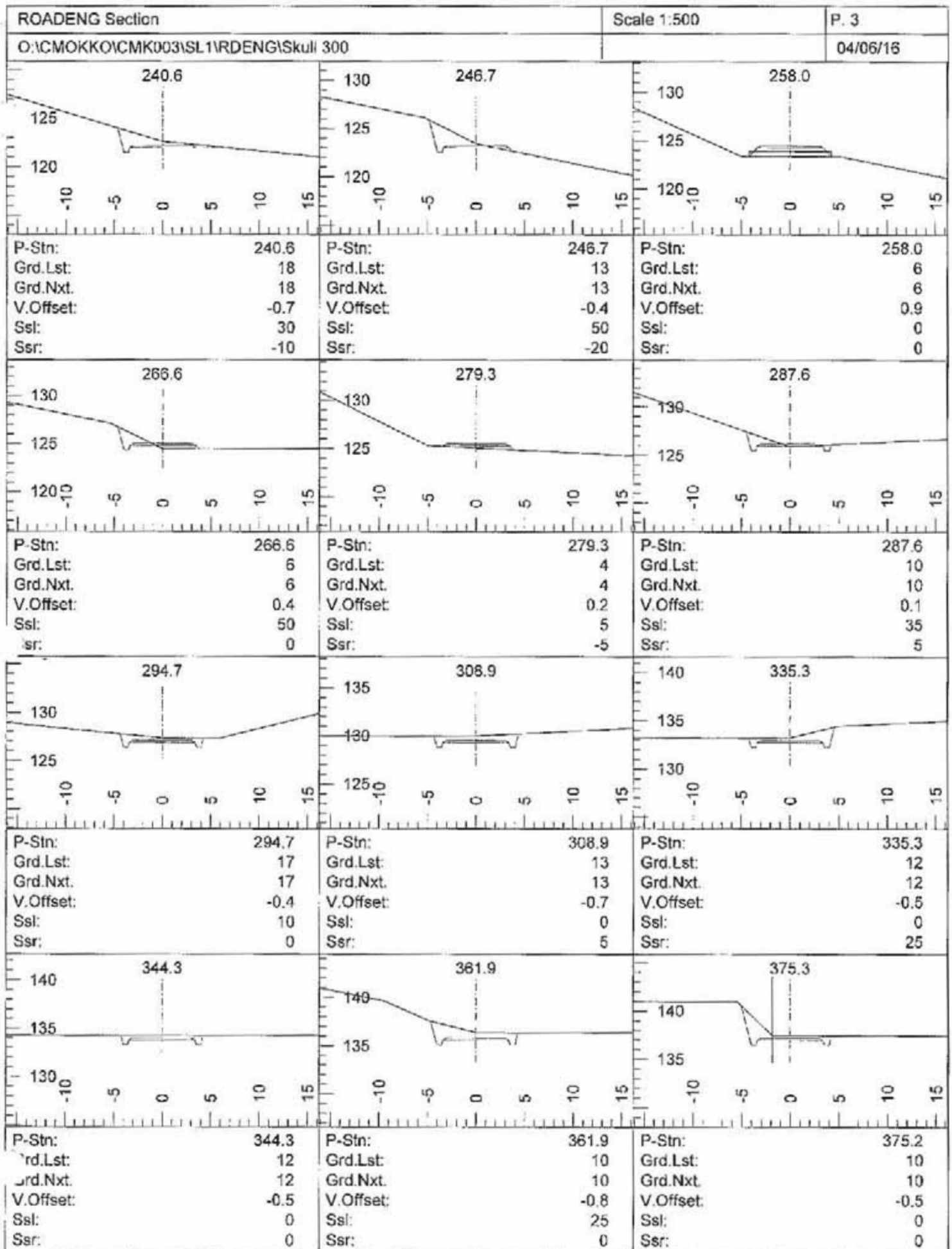


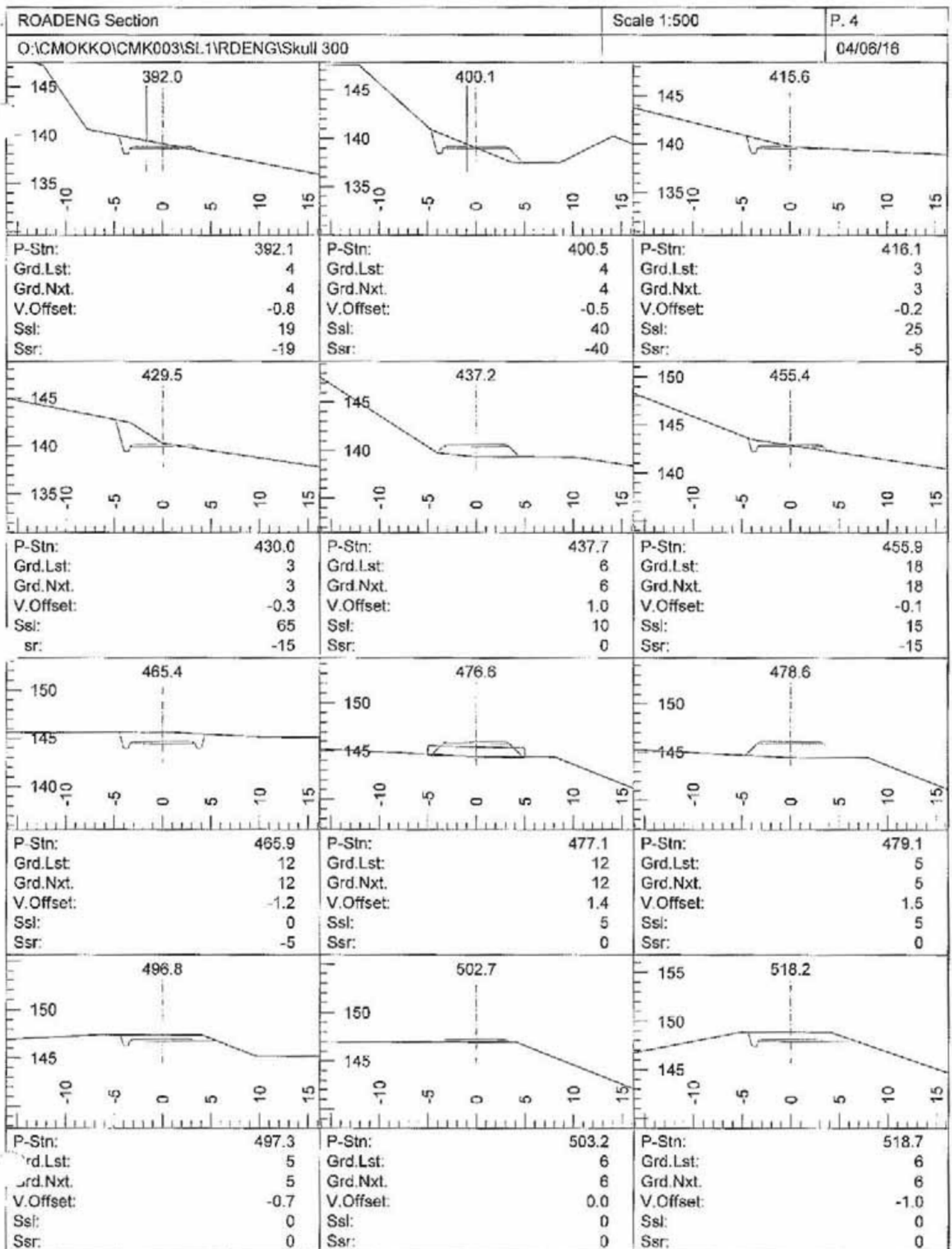


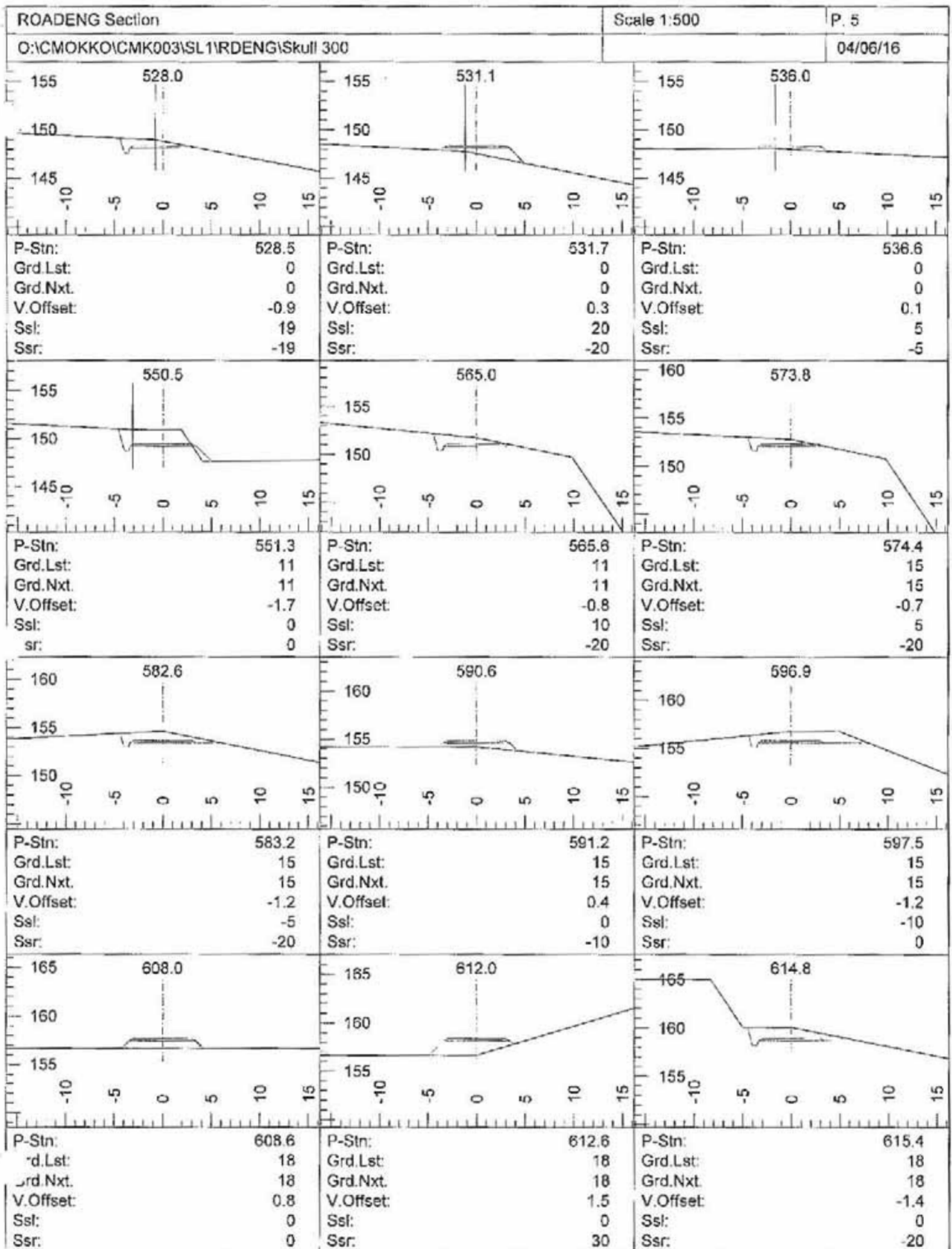


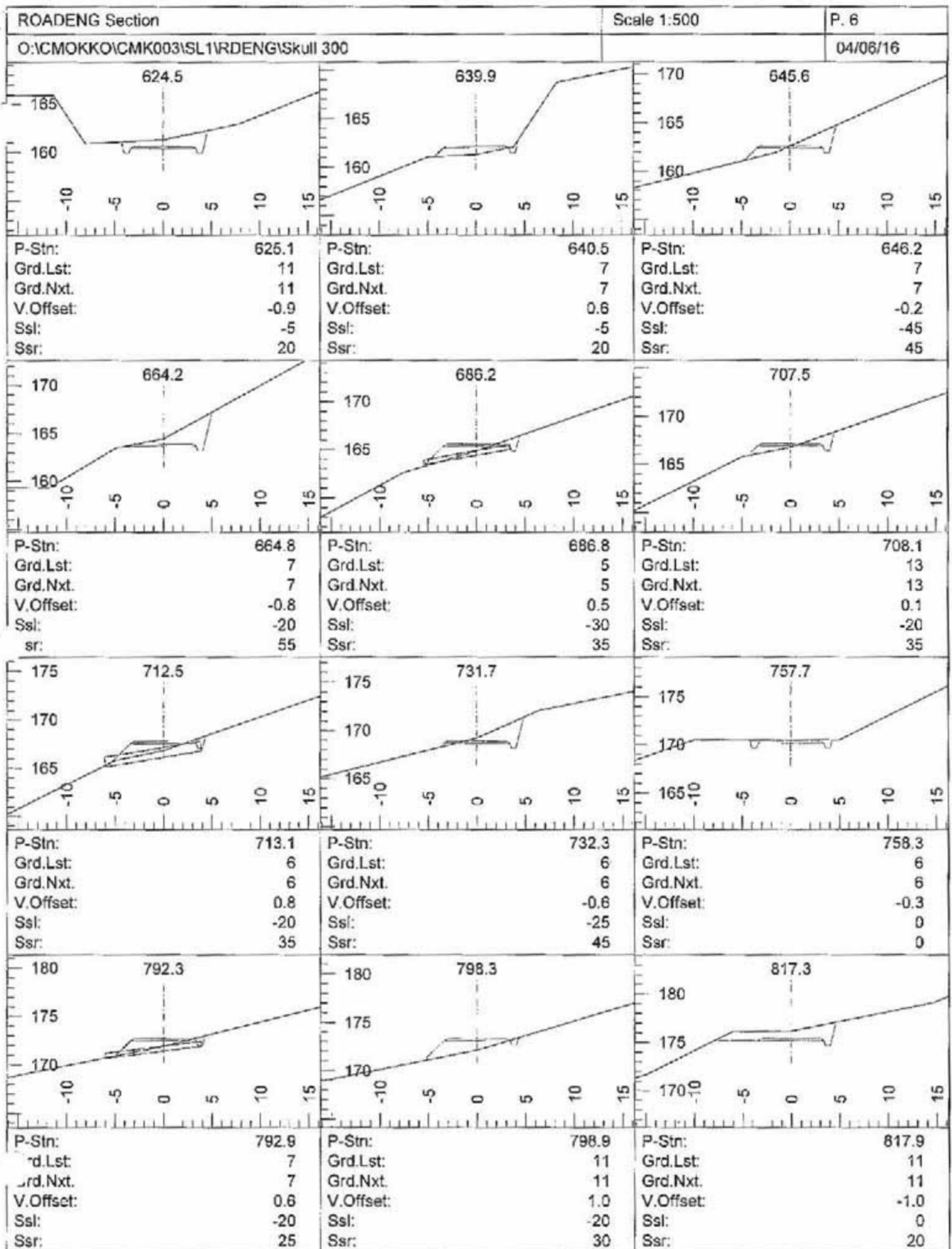


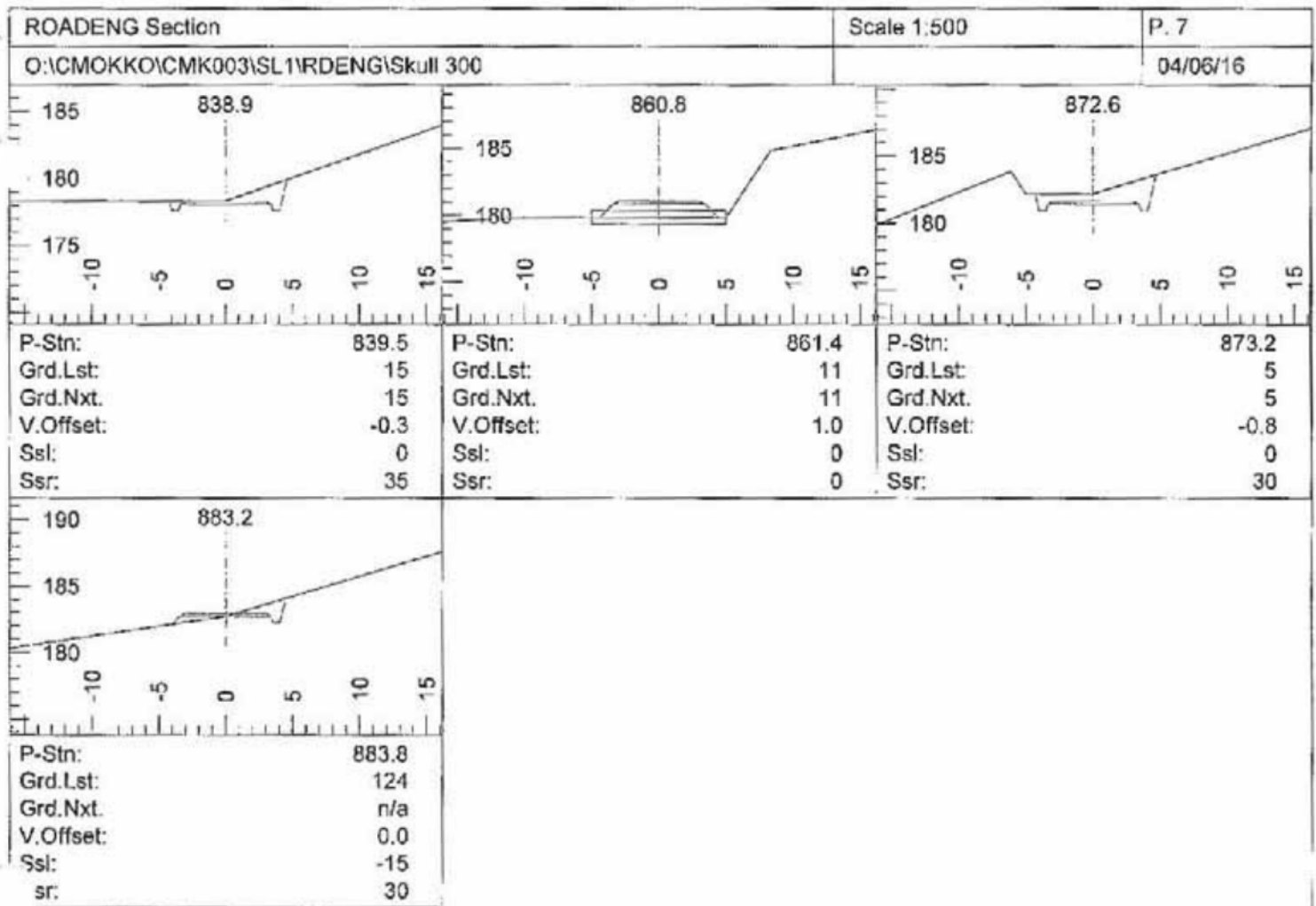


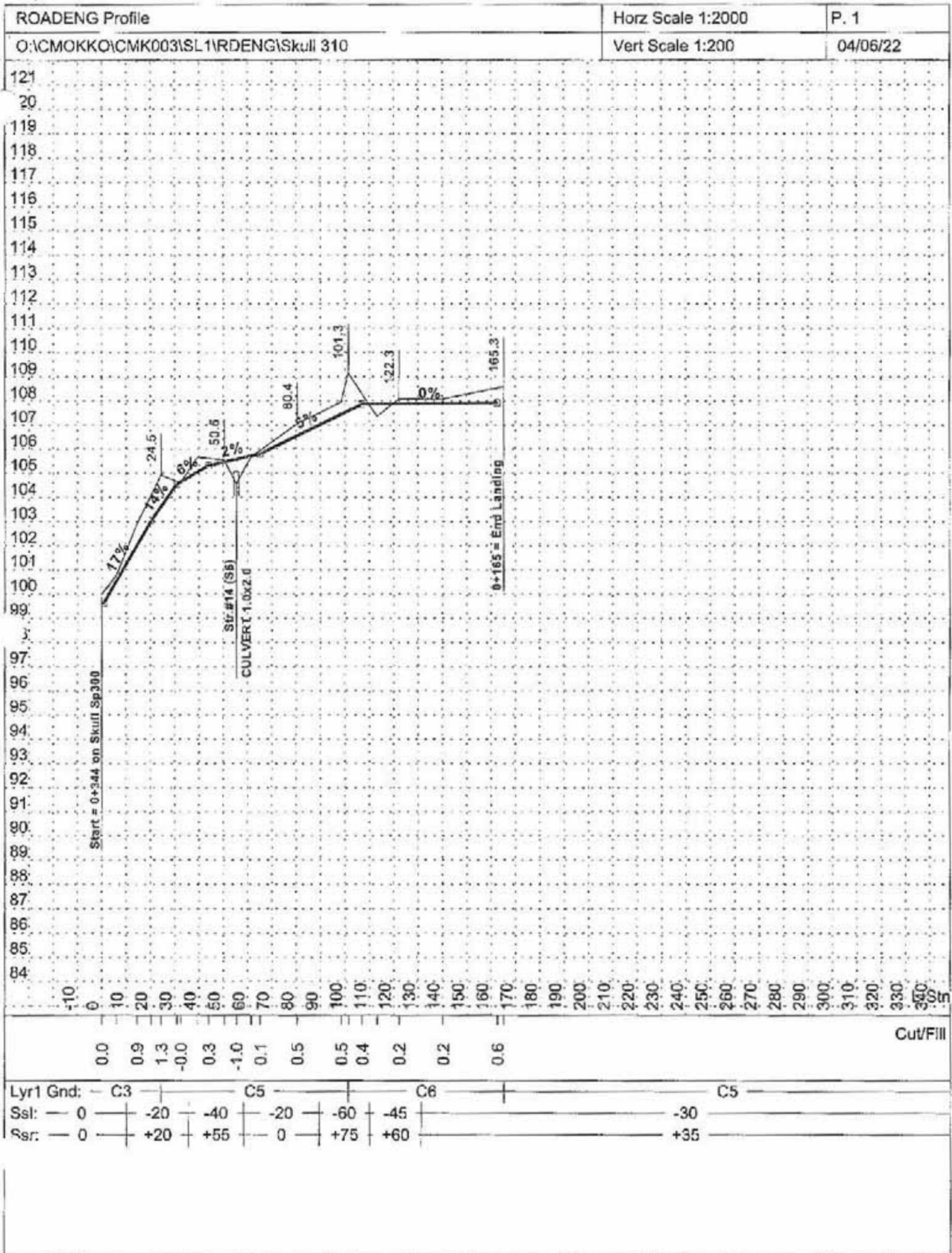


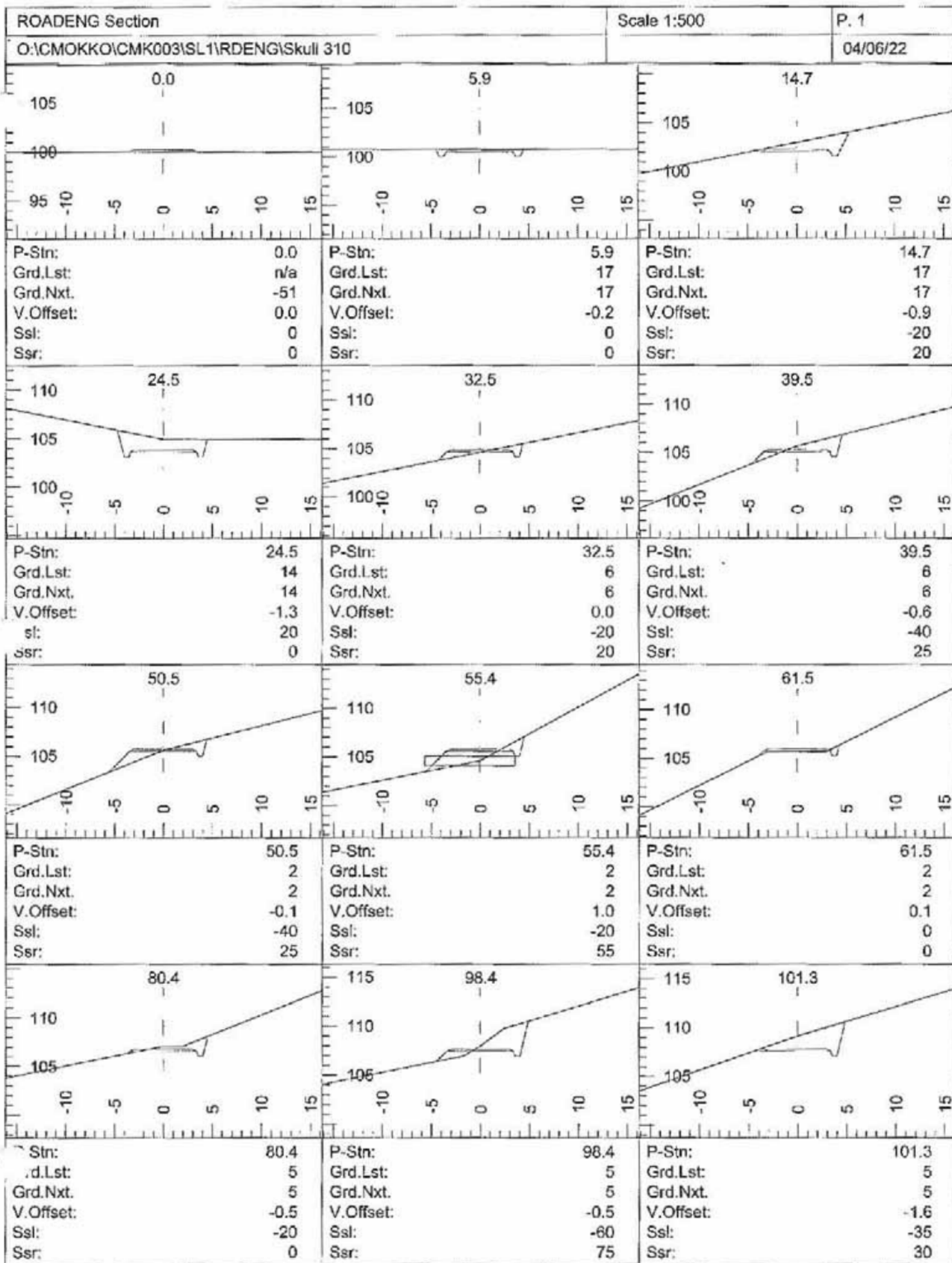


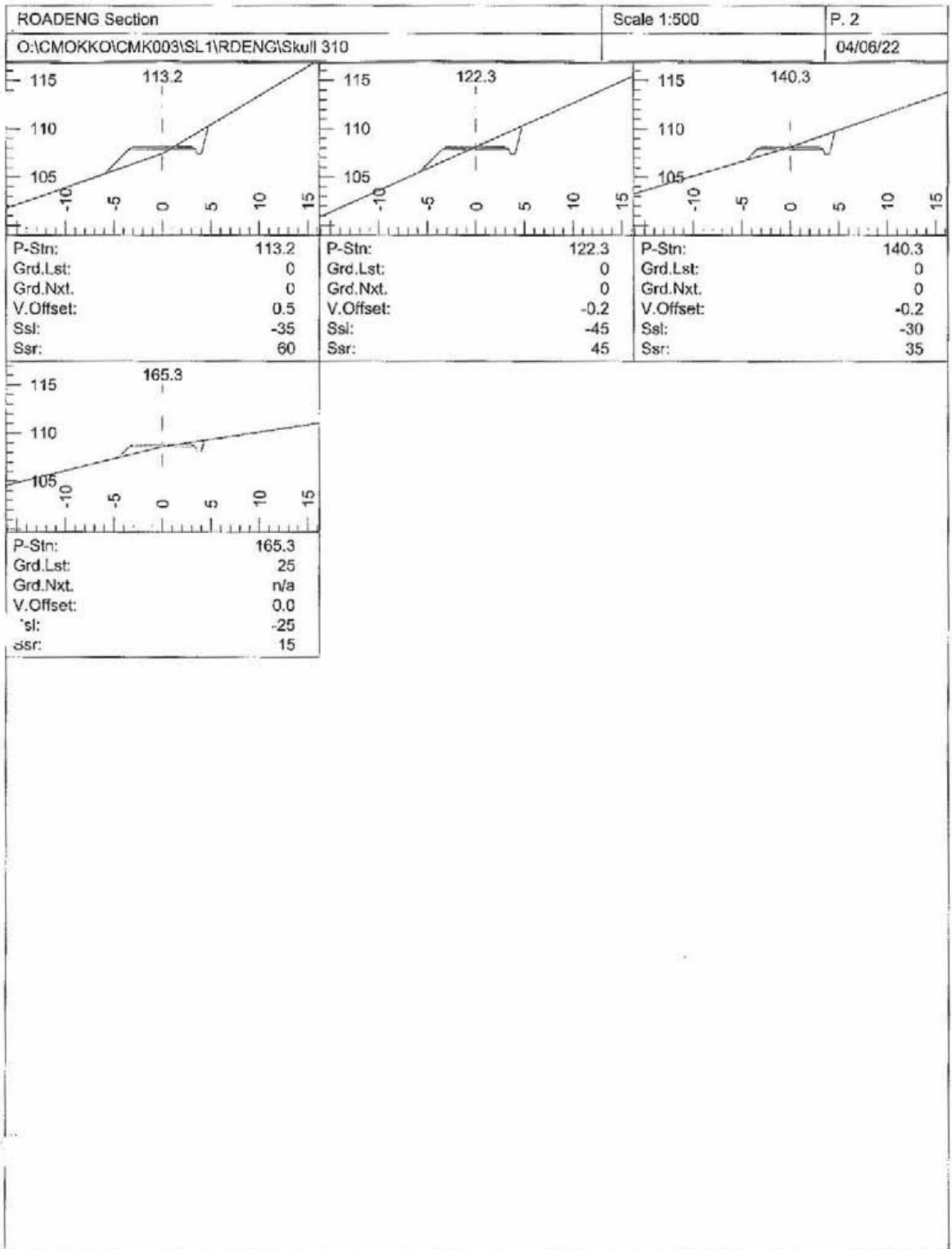


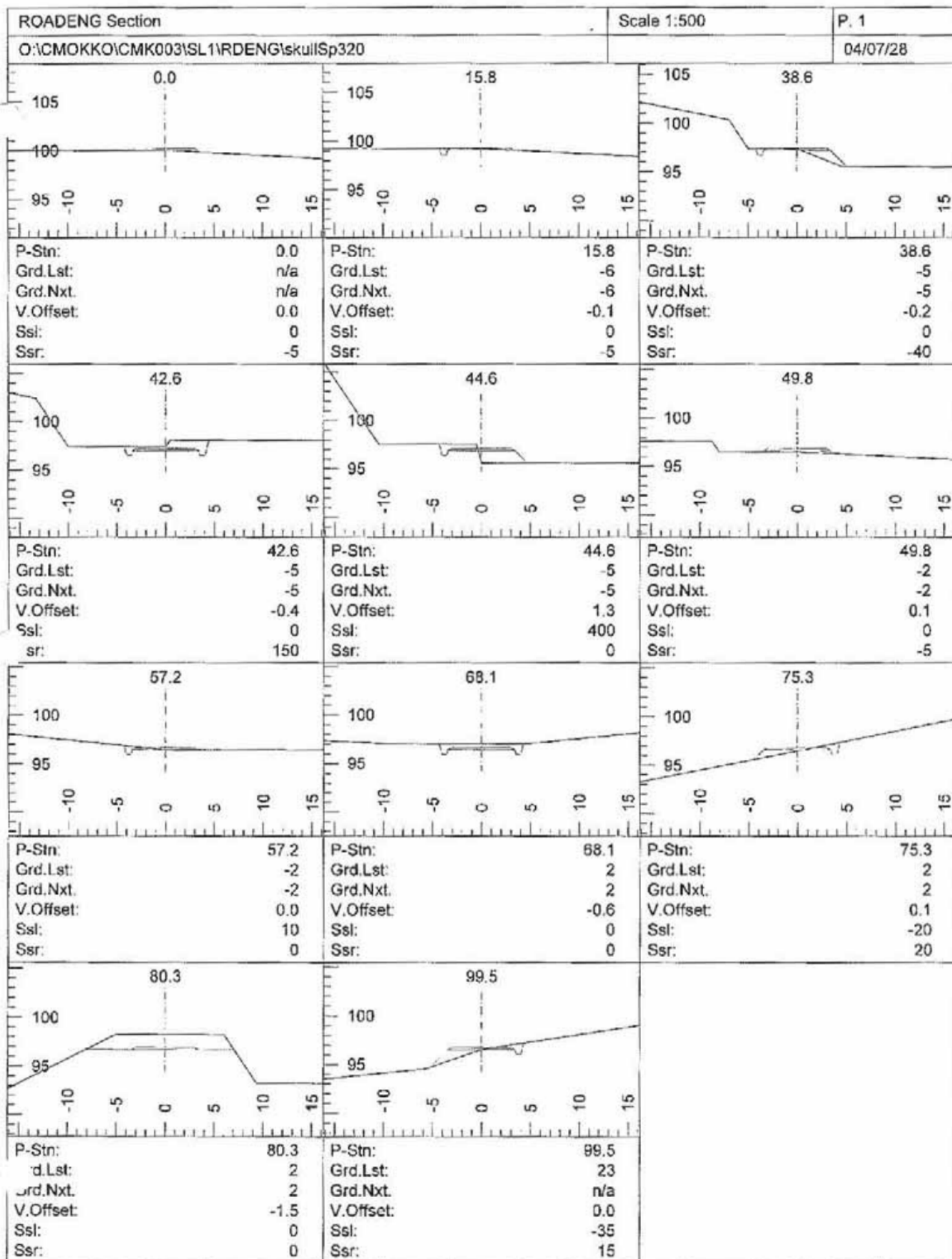


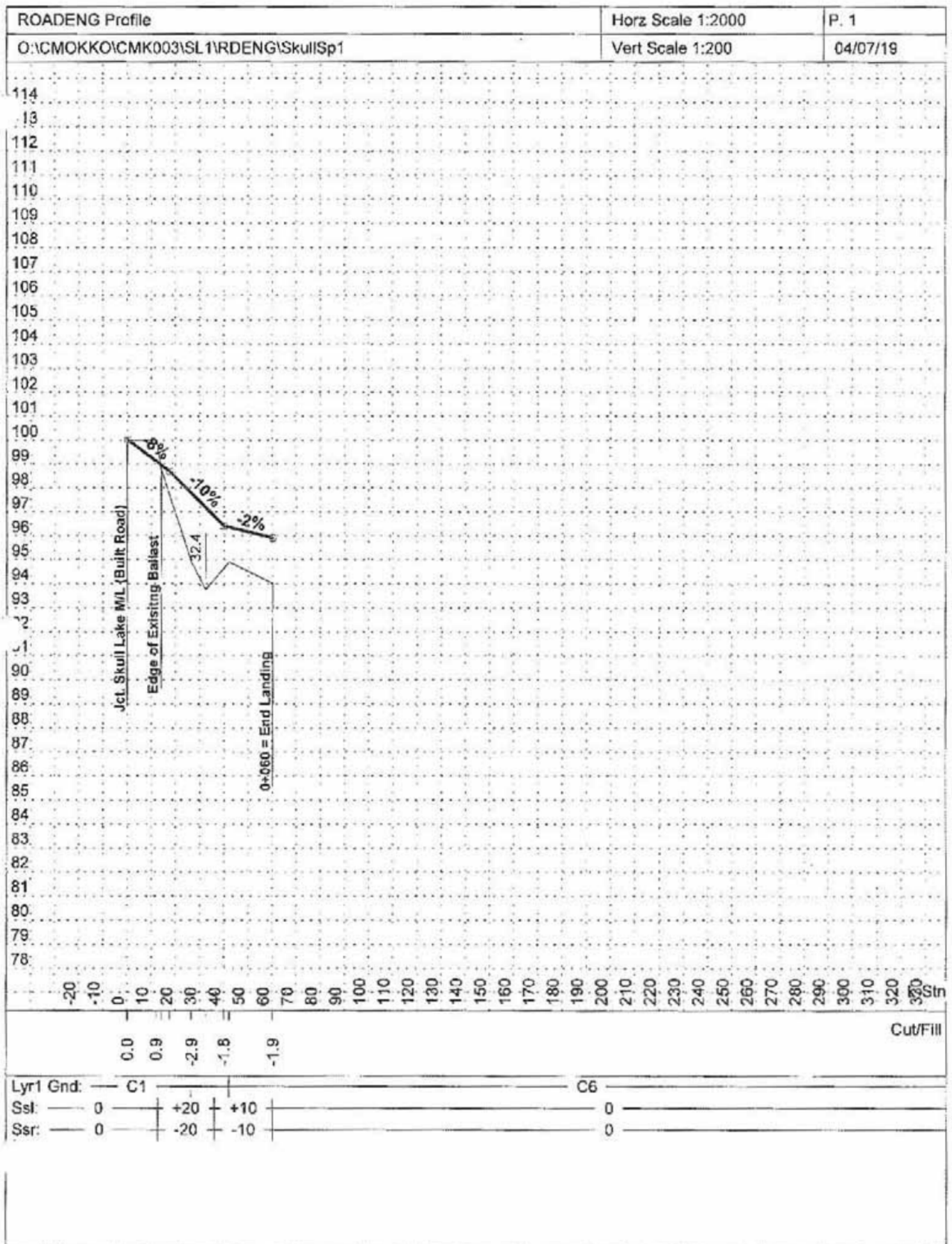


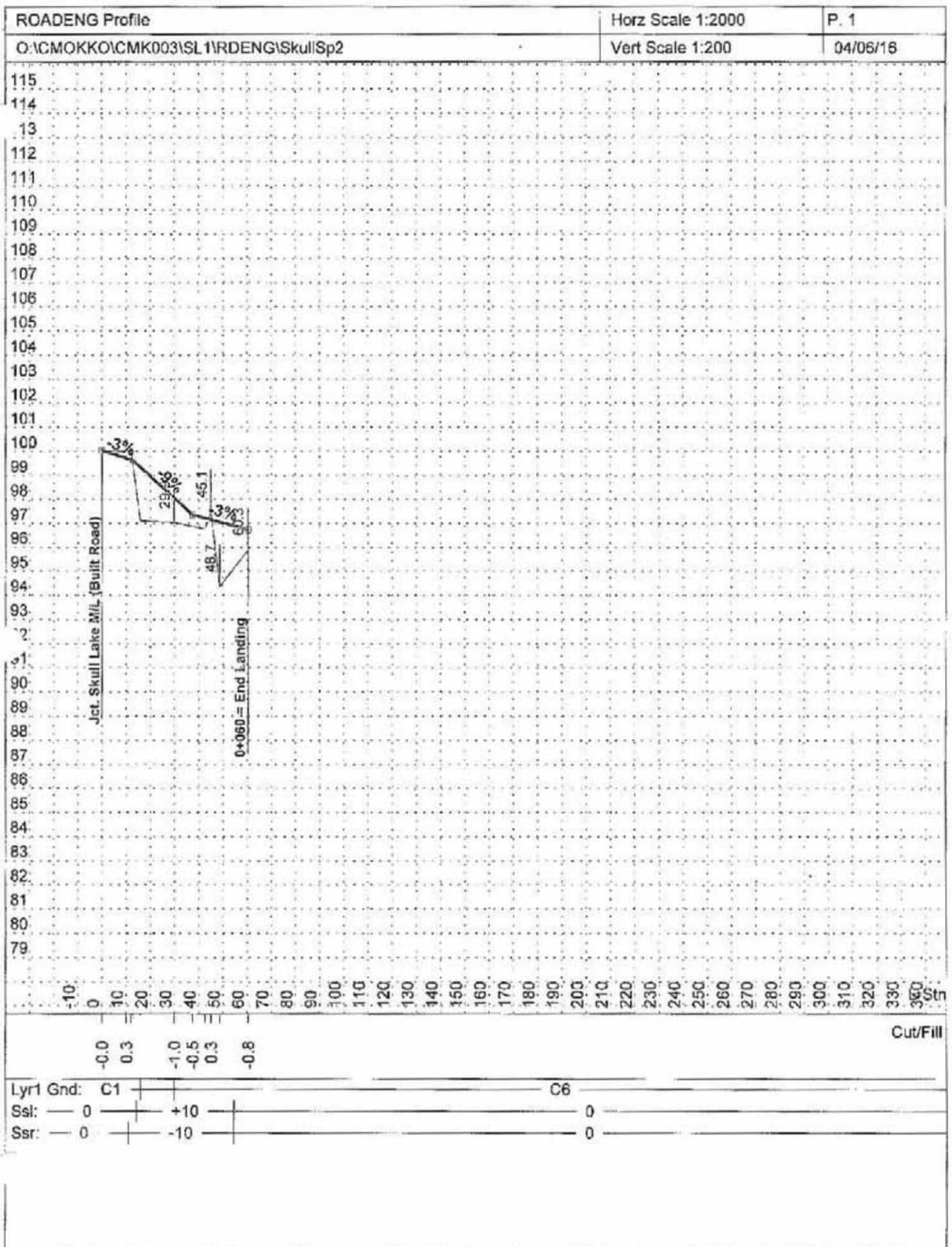










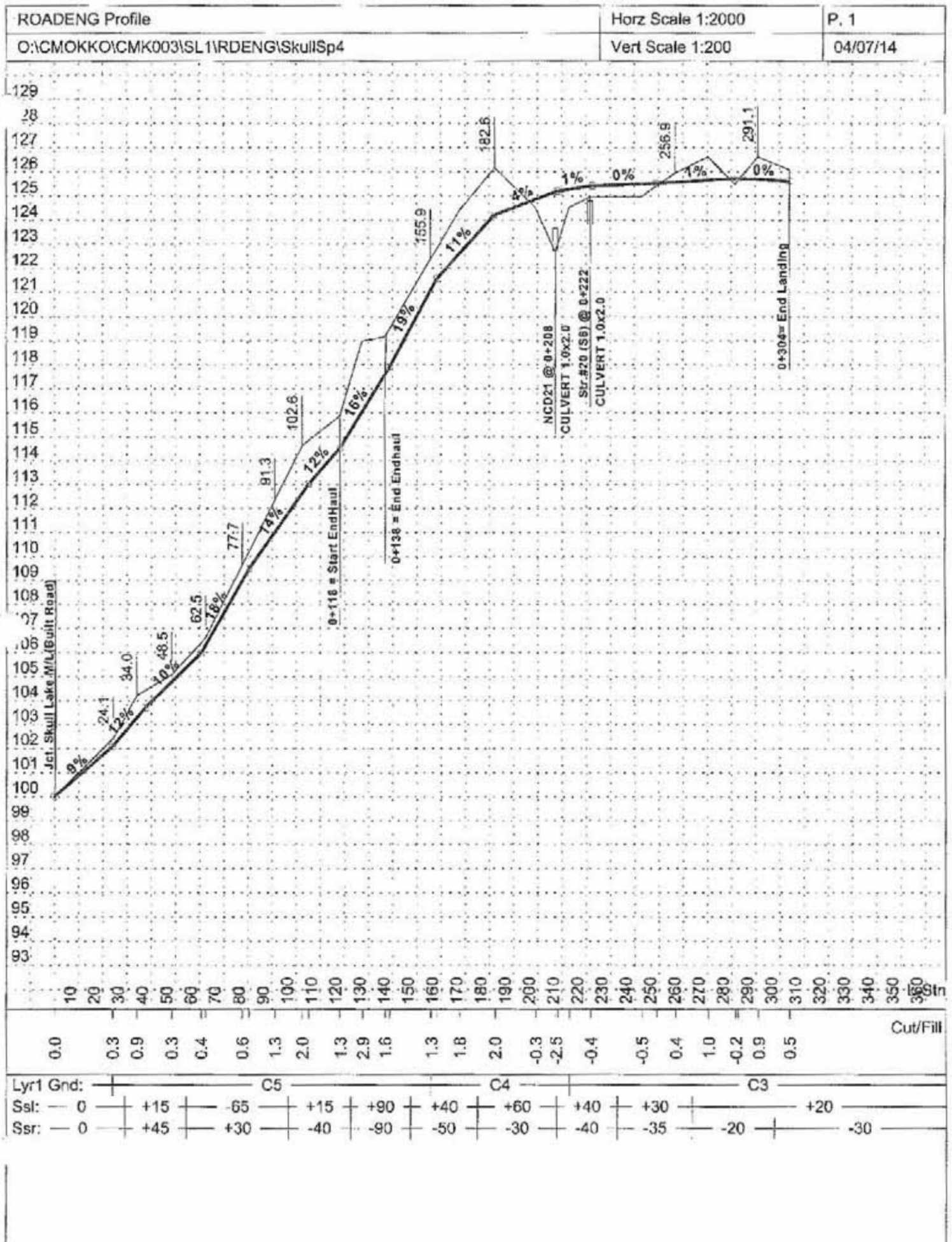


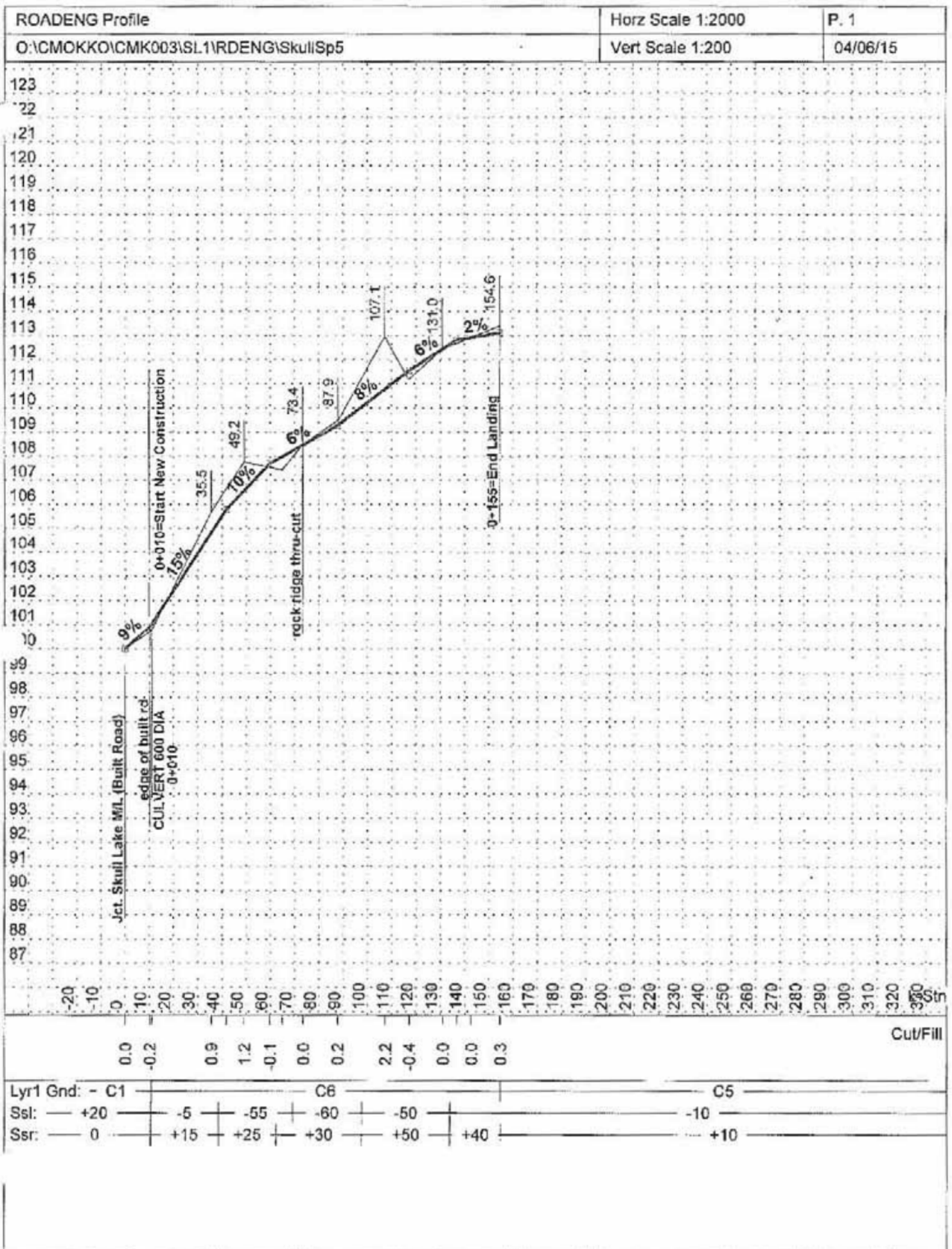


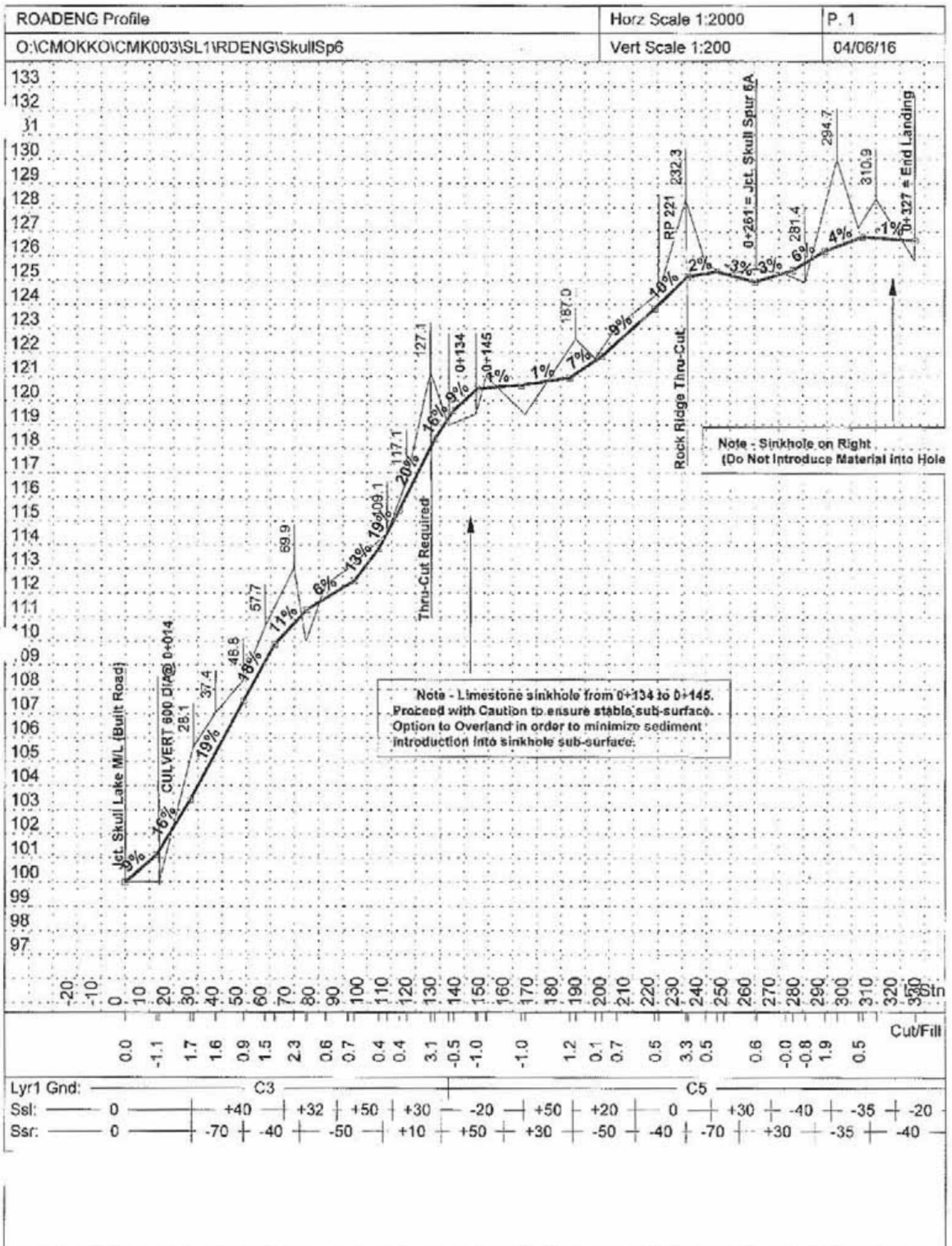
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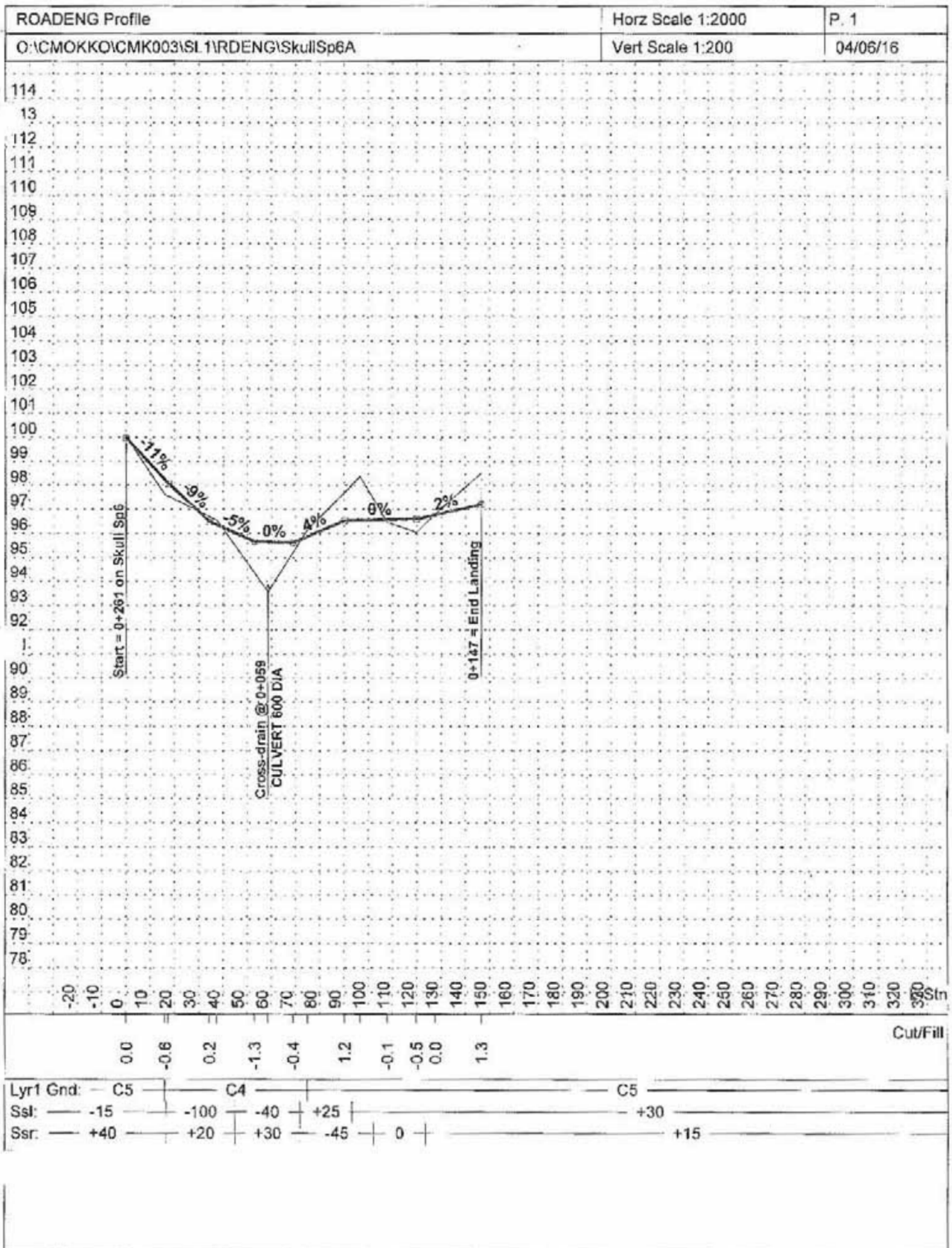
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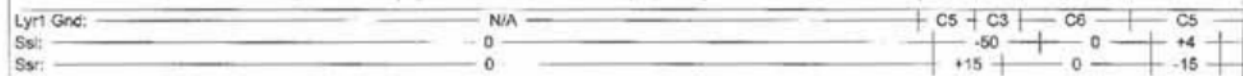
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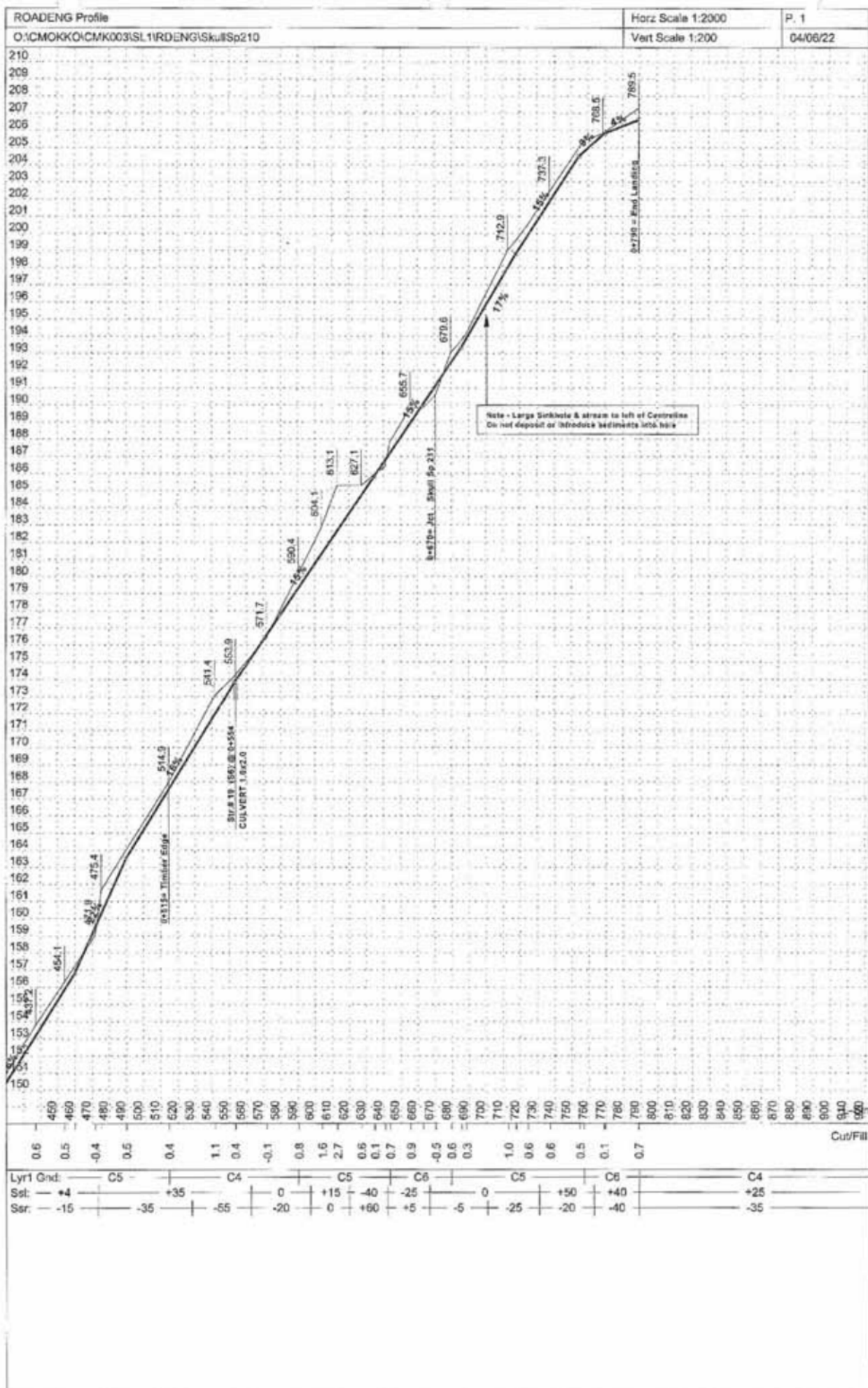




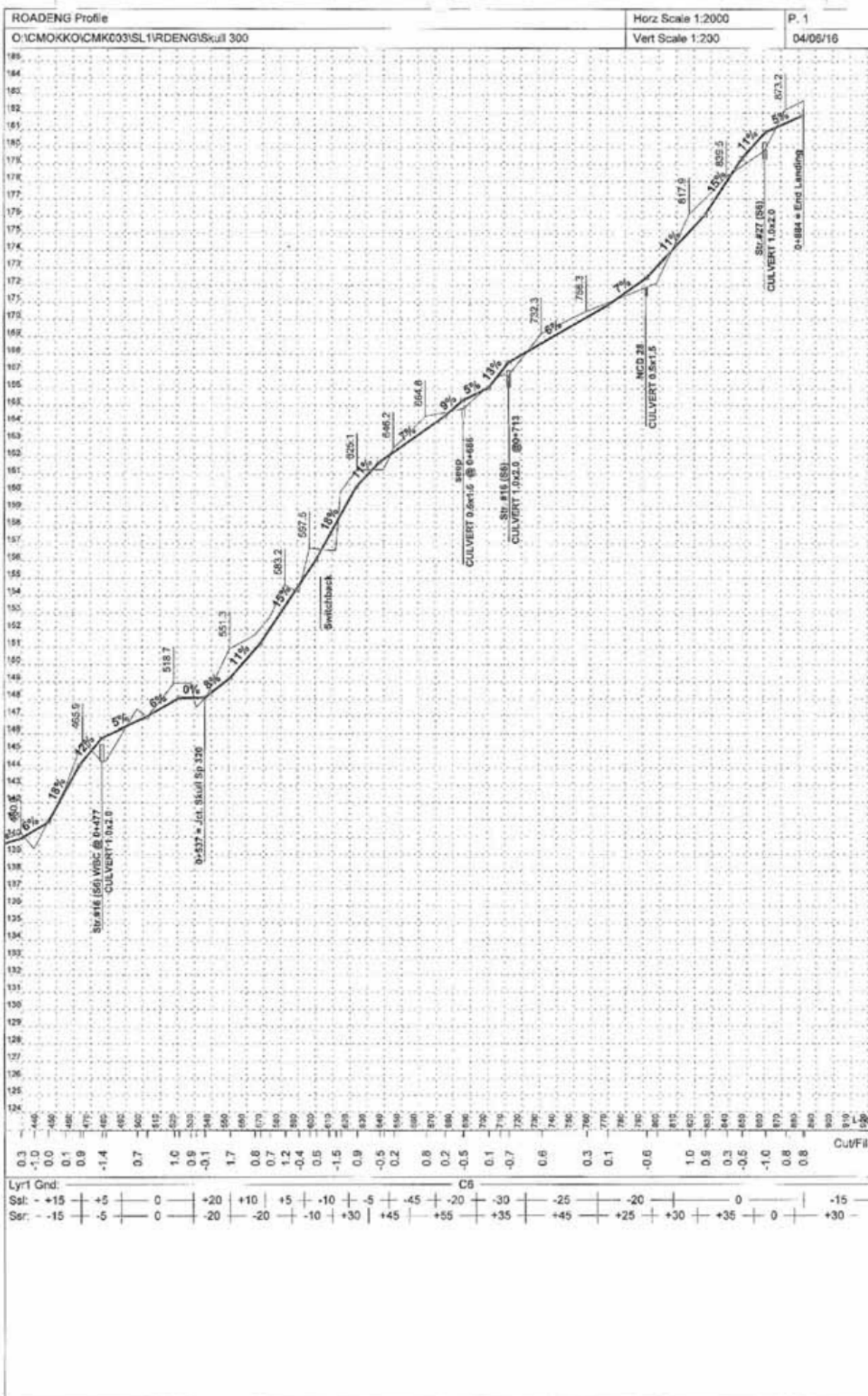


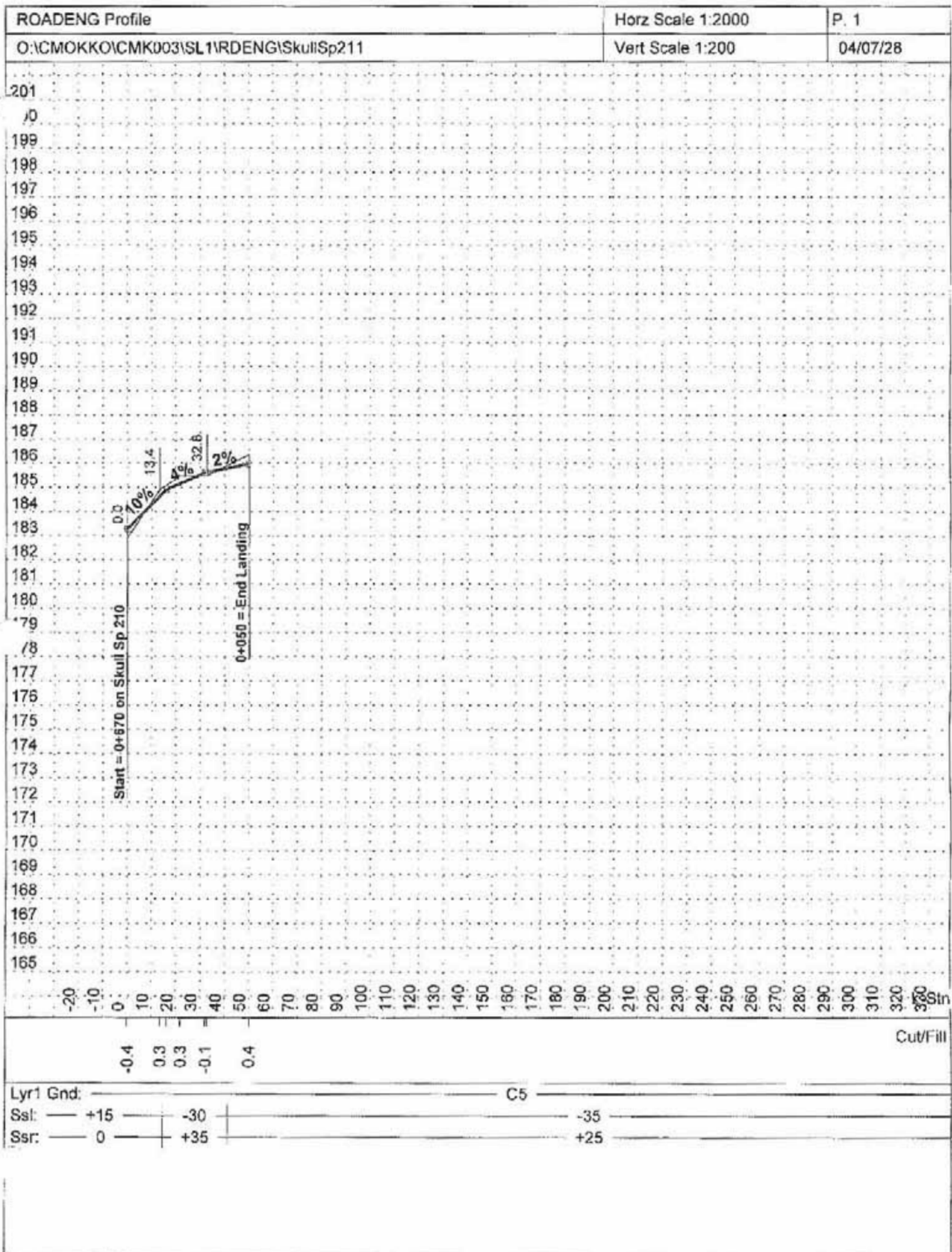


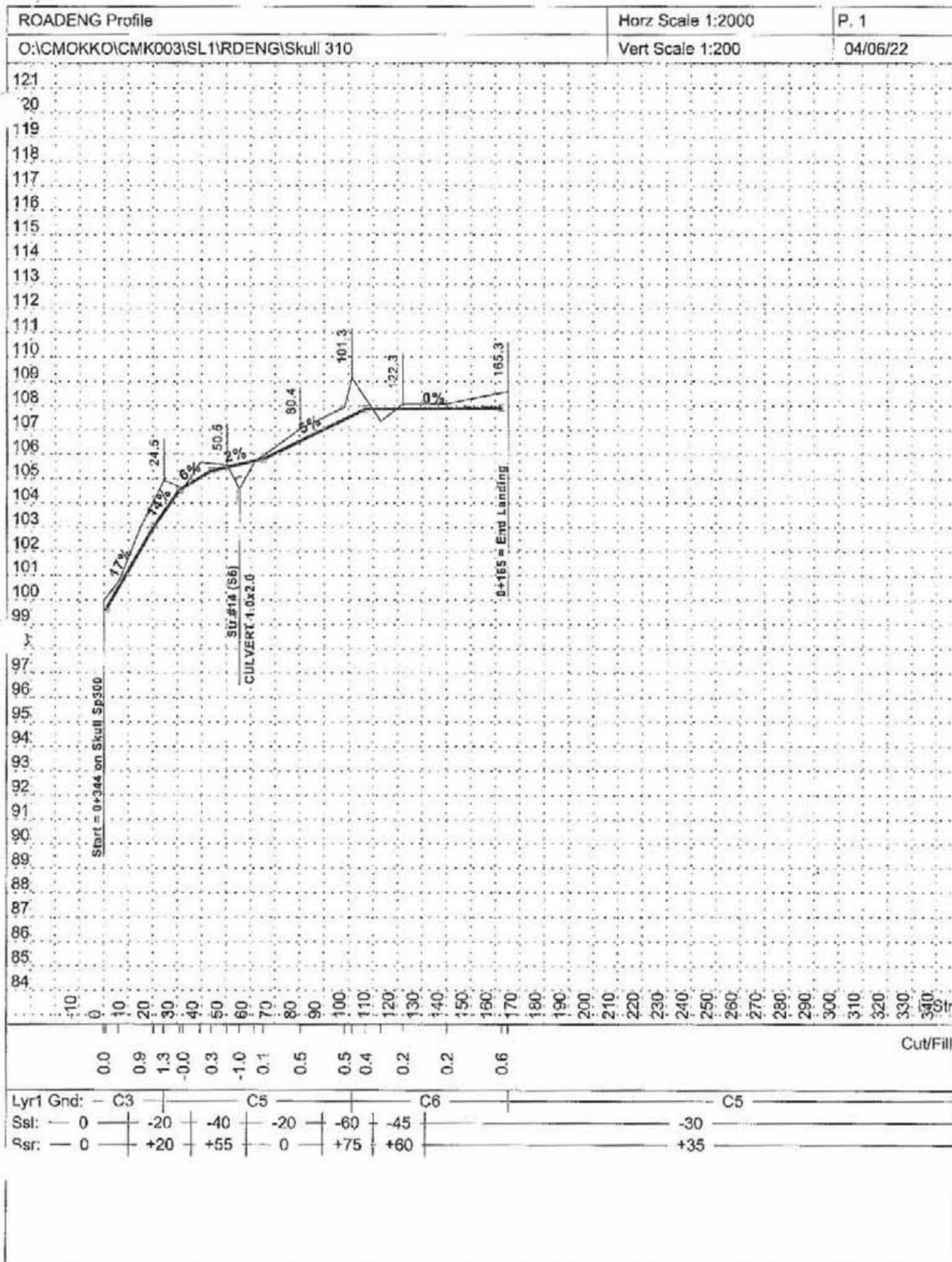


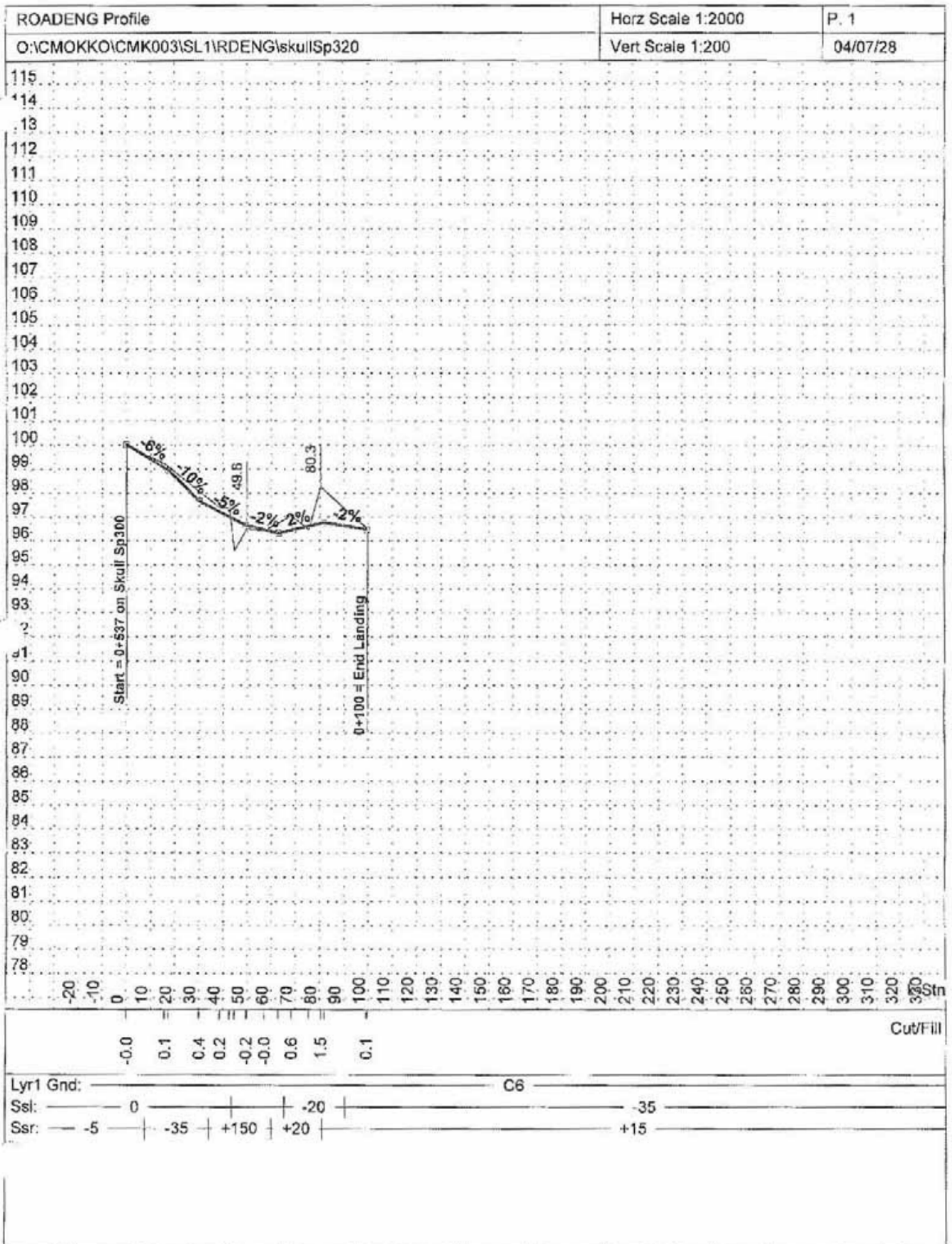














Effingham Inlet

Skull Lake Block SL 1
C. Mokko Manufacturing Ltd.
TSL A50650

VIEWPOINT # 1

UTM 10 NAD83 CO-ORD: 125,1501E 49,0441N

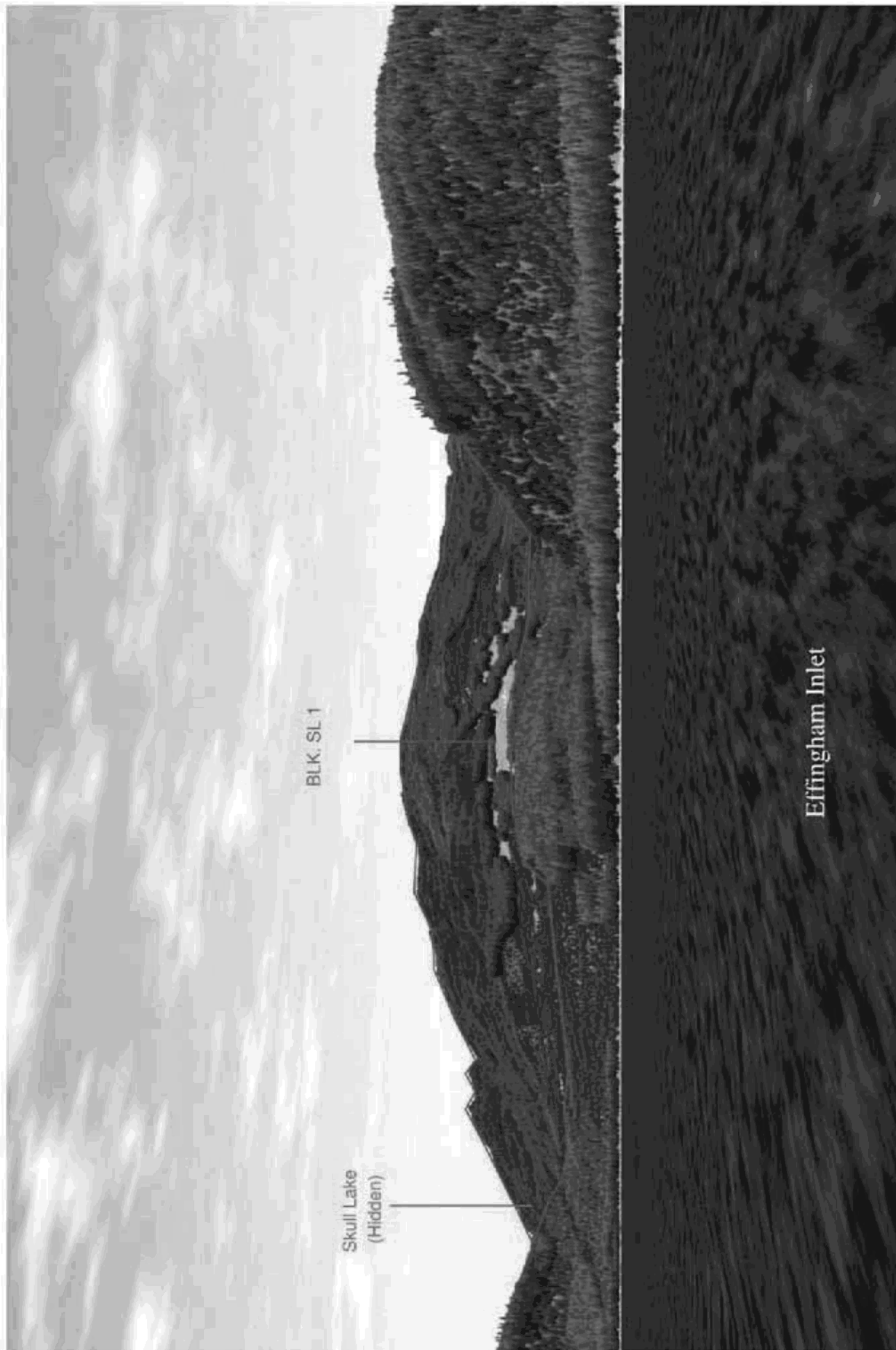
Viewing Azimuth & Height: 290 ° from 2m

Lens Settings: 50mm / 47° view angle



Drawn: BFG

Date: June 21, 2004



Skull Lake Block SL 1
C. Mokko Manufacturing Ltd.
TSL A50650

VIEWPOINT # 2
UTM 10 NAD83 CO-ORD: 125.1487E 49.0501N
Viewing Azimuth & Height: 278 ° from 2m
Lens Settings: 50mm / 47° view angle



Drawn: BFG
Date: June 21, 2004

Stream Assessment Summary

Operation: Skull Lake
Client: CMokko Manufacturing Ltd.
TSL 50650
Block SL1 and SL1A
June 21, 2004

INTRODUCTION

Field surveys were carried out between May 13 and June 6, 2004, by Janis McLean and Ty Beggs of Coast Forest Management Ltd. The area of study is located 1.2km north of the inlet to Pipestem Inlet, 0.5km northwest of Skull Lake, and 1.8km northwest of the Skull Lake dryland sort on Western Vancouver Island. Blocks SL1 and SL1A lie on low to moderately steep slopes with an easterly aspect, at an elevation range of 85-500 meters. This report covers streams in and adjacent to Blocks SL1 and SL1A directly or indirectly draining east and southeast into Effingham Inlet. Objectives of the survey included locating streams accurately by traversing, recording stream features and classifying streams according to the Forest Practices Code.

METHODS

Any streams were located and marked with yellow/black ribbon in the field, tying into falling boundaries wherever possible. In the office, streams were placed on the 1:5000 map. Stream cards are filled out for each stream reach, noting channel stability, amount and sizes of woody debris present and moving (debris transport potential - DTP), and width and gradient for stream classification. The accompanying map identifies streams by reach.

RESULTS

Stream 1 consists of three reaches:

- **Reach 1, Stream Class S5**, is a moderate gradient (35%), 7.5m wide intermittent channel predominantly bedrock with boulder/cobble/gravel. DTP is high, moving large woody debris. Reach 1 flows through a gully. Gully assessment indicates that the debris flow initiation potential is low.
- **Reach 2, Stream Class S5**, is a low gradient (15%), 6.0m wide ephemeral channel of bedrock/boulder/cobble/gravel. DTP is high, moving large woody debris. The ephemeral flow and gradient over 20% downstream preclude fish presence.
- **Reach 3, Stream Class S5**, is a moderate gradient (25%), 5.0m wide intermittent channel of mainly bedrock with scattered boulder/cobble/gravel. Reach 3 flows through a gully. Gully assessment indicates that the debris flow initiation potential is low.

Stream 1 enters the harvest area between FC's 25 and 26, and exits between FC's 500 and 501. Downstream Impact Potential (DIP) is high due to karst features on this stream.

Stream 2, Stream Class S6, is a moderate gradient (25%), 0.6m wide ephemeral channel of mixed bedrock/boulder/cobble/gravel/fines and organics. DTP is low, moving fines. Stream 2 begins inside Block SL1A and exits near FC 60. DIP is high.

Stream 4, Stream Class S6, is a moderate gradient (25%), 1.0m wide perennial channel of boulder/cobble/gravel/fines. DTP is low, moving fines. Stream 4 emerges from underground and disappears underground as part of a karst formation. DIP is high.

Stream 6, Stream Class S6, is a moderately steep gradient (40%), 2.0m wide intermittent channel of mainly bedrock with scattered boulder/cobble/gravel. DTP is moderate, moving small woody debris. Stream 6 is incised for 50 meters of its length. Stream 6 is an overflow channel off Stream 1 and flows into Stream 1 east of the built road. DIP is high.

Stream 9 consists of three reaches:

- **Reach 1, Stream Class S6**, is a moderate gradient (35%), 2.8m wide perennial channel of bedrock/boulder/cobble/gravel. DTP is moderate, moving small woody debris.
- **Reach 2, Stream Class S5**, is a moderately steep gradient (40%), 3.5m wide perennial channel of mainly bedrock with boulder and cobble. DTP is moderate, moving small and medium-sized woody debris
- **Reach 3, Stream Class S6**, is a moderate gradient (35%), 1.2m wide perennial channel of bedrock/boulder/cobble/gravel/fines. DTP is low, moving small woody debris.

Stream 9 enters the block between FC's 28 and 29 and flows into Stream 1. DIP is high.

Stream 11, Stream Class S6, is a moderate gradient (27%), 0.8m wide ephemeral channel of mixed bedrock/boulder/cobble/gravel/fines. DTP is low, moving fines. Stream 11 begins as seepage and ends subsurface. DIP is high.

Stream 12, Stream Class S6, is a moderate gradient (30%), 1.0m wide ephemeral channel of mixed bedrock/boulder/cobble/gravel/fines and organics. DTP is low, moving fines. Stream 12 enters the block near FC 15 and exits near FC 14, flowing subsurface in a karst formation outside of the block at its lower end. DIP is high.

Stream 13, Stream Class S6, is a moderate gradient (35%), 0.6m wide ephemeral channel of mixed bedrock/boulder/cobble/gravel/fines and organics. DTP is low, moving fines. Stream 13 is an overflow channel off Stream 12 and ends subsurface in a karst formation outside of the block at its lower end. DIP is high.

Stream 14, Stream Class S6, is a moderate gradient (22%), 1.0m wide ephemeral channel of mainly bedrock with boulder/cobble/gravel. DTP is low, moving small woody debris. Stream 14 begins inside the block and exits between FC's 74 and 75. DIP is high.

Stream 16 consists of four reaches:

- **Reach 1, Stream Class S6**, is a low gradient (8%), 1.0m wide ephemeral channel of gravel/fines and organics with scattered boulder/cobble. DTP is low, moving fines.
- **Reach 2, Stream Class S6**, is a moderate gradient (30%), 1.2m wide ephemera channel of mainly bedrock with occasional boulder/cobble/gravel. DTP is low, moving small woody debris.
- **Reach 3, Stream Class S6**, is a low gradient (6%), 1.1m wide ephemeral channel of mixed bedrock/boulder/cobble/gravel/fines and organics. DTP is low, moving fines.
- **Reach 4, Stream Class S6**, is a moderately steep gradient (45%), 1.2m wide ephemeral channel of mainly bedrock with boulder/cobble/gravel/fines. DTP is low, moving fines.

Stream 16 begins inside the block near FC 85 and exits between FC's 77 and 78. The ephemeral flow of Reaches 1 and 3, and gradient greater than 20% downstream, preclude fish presence in this stream. DIP is high.

Stream 17, Stream Class S6, is a steep gradient (80%), 1.8m wide ephemeral channel of bedrock/boulder/cobble/gravel. DTP is moderate, moving small woody debris. Stream 17 enters the block near FC85 and flows into Stream 16. DIP is high.

Stream 18, Stream Class S5, is a moderate gradient (25%), 4.5m wide intermittent channel of bedrock/boulder/cobble/gravel. DTP is high, moving large woody debris. Stream 18 flows adjacent to, and outside of the block boundary by FC's 81 and 82. DIP is high.

Stream 19, Stream Class S6, is a moderate gradient (30%), 2.0m wide intermittent channel of bedrock/boulder/cobble/gravel/fines. DTP is low, moving small woody debris. Stream 19 begins inside the block, exits near FC 55 and flows into Stream 1. DIP is high.

Stream 20 consists of two reaches:

- **Reach 1, Stream Class S6**, is a moderate gradient (30%), 2.8m wide ephemeral channel of bedrock/boulder/cobble/gravel/fines and organics. DTP is moderate, moving small and medium-sized woody debris. Reach 1 is incised but not a consistent gully for at least 100m.
- **Reach 2, Stream Class S6**, is a moderate gradient (26%), 1.0m wide ephemeral channel of bedrock/boulder/cobble/gravel/fines and organics. DTP is low, moving fines.

Stream 20 begins inside the block, exits between FC's 44 and 45, and flows into Stream 1. DIP is high.

Stream 25, Stream Class S6, is a moderately steep gradient (42%), 1.5m wide ephemeral channel of boulder/cobble/gravel/fines with occasional bedrock. DTP is low, moving small woody debris. Stream 25 flows outside of, and adjacent to the harvest area near FC's 88 and 89, flowing subsurface into a karst formation.. DIP is high.

Stream 27, Stream Class S6, is a moderate gradient (27%), 1.4m wide ephemeral channel of bedrock/boulder/cobble/gravel/fines. DTP is low, moving fines. Stream 27 enters the block near FC 87, enters a no-harvest retention area east of Spur 300, and flows subsurface into a karst formation. DIP is high.

Stream 29, Stream Class S6, is a moderate gradient (29%), 0.8m wide ephemeral channel of cobble/gravel/fines and organics. DTP is low, moving fines. Stream 29 begins inside the block and dissipates over the surface between FC's 36 and 37. DIP is low.

Stream 33, Stream Class S6, is a moderately steep gradient (45%), 0.5m wide ephemeral channel of mainly gravel/fines with scattered boulder/cobble. DTP is low, moving fines. Stream 33 enters the block briefly and exits near FC 22, and flows north into Stream 1. DIP is high.

NCD-3, NCD-5, NCD-7, NCD-8, NCD-10, NCD-15, NCD-20A, NCD-21, NCD-22, NCD-23, NCD-24, NCD-26, NCD-27A, NCD-28, NCD-30, NCD-31 and NCD-32 are non-classified drainages, being less than 100m in length and/or equal to or greater than 50% organic substrate.

CONCLUSIONS

Stream 1, Stream 9 (Reach 2) and Stream 18 are Stream Class S5.

All other streams are Stream Class S6.

Stream 1 and Stream 18 have high downstream transport potential. Stream 6, Stream 9 (Reaches 1 and 2), and Stream 17 have moderate downstream transport potential. All other stream reaches have low downstream transport potential.

Stream 29 dissipates over the surface at the lower end, indicating a low Downstream Impact Potential. All other streams are either connected to karst formations or flow directly or indirectly to fish habitat downstream; therefore, DIP on these streams is high.

Stream 1 flows through a gully in Reach 1 and Reach 3. Gully assessment indicates that the debris flow initiation potential is low (sidewalls are bedrock controlled).

BaseLine

Archaeological Services Ltd.

1150 Cumberland Road Courtenay B.C. V9N 2E6

Phone: (250) 897-3853 Fax: (250) 897-3389

owengrant@shaw.ca

Archaeological Impact Assessment

Interim Report

	Client	Developer
Contact:	Coast Forest Management Ltd. 2338 South Island Highway Campbell River, BC V9W 1C3 Phone: (250) 923-2542 Fax: (250) 923-2543 Erich Geddert	C Mokko Manufacturing Ltd. 4590 Helen St. Port Alberni B.C. V9Y 6P5 Phone: 1-800-941-9998 Fax: (250) 723-7766 Bob Howie
Development:	Blocks SL1 TSA A50650 BCTS MoF SIFD	
Development type:	Proposed logging and ancillary developments	
First Nations:	Tseshah First Nation 5000 Mission Road Port Alberni, BC V9Y 7L7 Ph: (250) 724-4229 Fax: (250) 724-4245 Lisa Gallic	Toquaht First Nation P.O. Box 759, 1971 Peninsula Rd. Ucluelet, B.C. V0R 3A0 Phone: (250) 726-4230 Fax: (250) 726-4403 Rick Schaeffer (Forestry Manager)
Distributed To:	Steven Acheson (Archaeological Planning and Assessment), Erich Geddert (Coast Forest Management Ltd.), Bob Howie (C Mokko Manufacturing Ltd.), Lisa Gallic (Tseshah) and Rick Schaeffer (Toquaht)	
Project #:	02018	
Heritage Permit #:	2003-289	
Report Author:	Owen Grant	
Report Date:	June 28, 2004	
Forest District/Region:	South Island Forest District (SIFD) Vancouver Forest Region	
Location:	Skull Lake, near Effingham Inlet.	
Elevation:	Approx. 100-425m ASL	
Survey Date:	June 17, 2004	
Survey Conditions:	Sunny and Hot	
Survey Crew:	Owen Grant (Baseline Archaeological Services Ltd.) and Jamie Jensen (Tseshah)	
NTS Map:	92 F/3 Effingham River	
Other Map:	1:10,000 logging plan (attached)	
Archaeological Concerns:	None	

Background Information

Erich Geddert (Coast Forest Management Ltd.) contacted Baseline Archaeological Services Ltd. to conduct an archaeological impact assessment (AIA) of proposed Block SL1 on behalf of C Mokko Manufacturing Ltd. The AIA was requested due to the block's high cedar content and its close proximity to Skull Lake.

Archaeological Planning and Assessment, the Tseshah and Toquaht First Nations were notified of the fieldwork and asked to participate in the survey. This Interim Report will be appended to the Final South Island Forest District Blanket Permit Report due Sept 15, 2004.

Methodology

The archaeological survey consisted of multiple pedestrian traverses through the development area with crew members generally spaced 10-50m apart, depending on visibility. Natural land and water features, boundary and road flagging as well as built roads guided traverses. Development maps were used to identify areas of moderate and high potential for archaeological sites in the field as well as information provided by Coast Forest Management Ltd. Surface and subsurface exposures, such as sparsely vegetated areas, tree bases, root wads, creek banks and rock outcrops were inspected for archaeological material or modifications. Suitable tree stands were examined for cultural modifications. The methodology followed is outlined in the application for Permit 2003-289.

Description

Block SL1 is located above Skull Lake between Pipestem and Effingham Inlets on the west coast of Vancouver Island. The gross harvest area is approximately 50 hectares in size with the forest cover being primarily comprised of cedar, hemlock with occasional firs scattered throughout. The block's hydrology consists of several seasonal streams as well as one larger stream that divides the block's two main pods. All the streams generally flow east draining into Effingham Inlet. An understorey that includes berry bushes, salal, and devil's club covers most of the block. The slope within the block varies from semi-flat to steep and generally has an eastern aspect. The block has several timber leave and/or partial harvest reserves as well as specific areas designated for conventional and aerial harvest. The ground cover consists of various mosses, ferns and other shrubs. The geological terrain throughout this area is known as karst topography and is comprised of semi-dissolved limestone rock outcroppings, limestone with sinkholes, vertical stone shafts, disappearing streams, and springs as well as underground drainage systems, seeps and caves. Previously harvested areas border the development to the south, east and north. A previously constructed road also exists within the block.

Field Potential and Coverage

The in-field potential assessment for the block was low to moderate for CMTs and low for other archaeological site types. The low to moderate potential for CMTs was based on the following variables: the presence of veteran cedar trees throughout the development area in combination with the block being centrally located within the vicinity of Skull Lake, Effingham and Pipestem Inlets. The block was assessed as having overall low potential for CMTs; however some moderate CMT potential was noted in the southeast end of the block near Skull Lake.

The opening was assessed as having low potential for other (non-CMT) archaeological site types. This assessment was based on generally steeply sloping or rocky terrain within the development area as well as its removal from Skull Lake and Effingham Inlet.

Coverage consisted of pedestrian traverses through the block with coverage concentrating on creeks, high cedar concentration areas and those areas closest to Skull Lake and Effingham Inlet.

Results

No archaeological resources were identified during the survey of Block SL1. Numerous scarred cedars trees were noted throughout the development area however these scars were determined to be natural in origin and did not exhibit the diagnostic characteristics of cultural modification.

Impact Assessment

No known archaeological sites will be impacted by the development of Block SL1 as it is currently proposed.

Recommendations

No further archaeological work is recommend for Block SL1 as it is currently designed.

Developers and operators should be aware of the potential of undiscovered archaeological remains in any surveyed or unsurveyed areas which are protected under the *Heritage Conservation Act*. As well, Section 51 of the *Forest Practices Code* requires all development activities in the vicinity of archaeological remains to be halted as not to threaten these remains, and to immediately notify Archaeological Planning and Assessment and the Ministry of Forests District Manager. Directly notifying the Tseshah and Toquaht First Nations would also be recommended.



Figure 1. Location of Study Area.

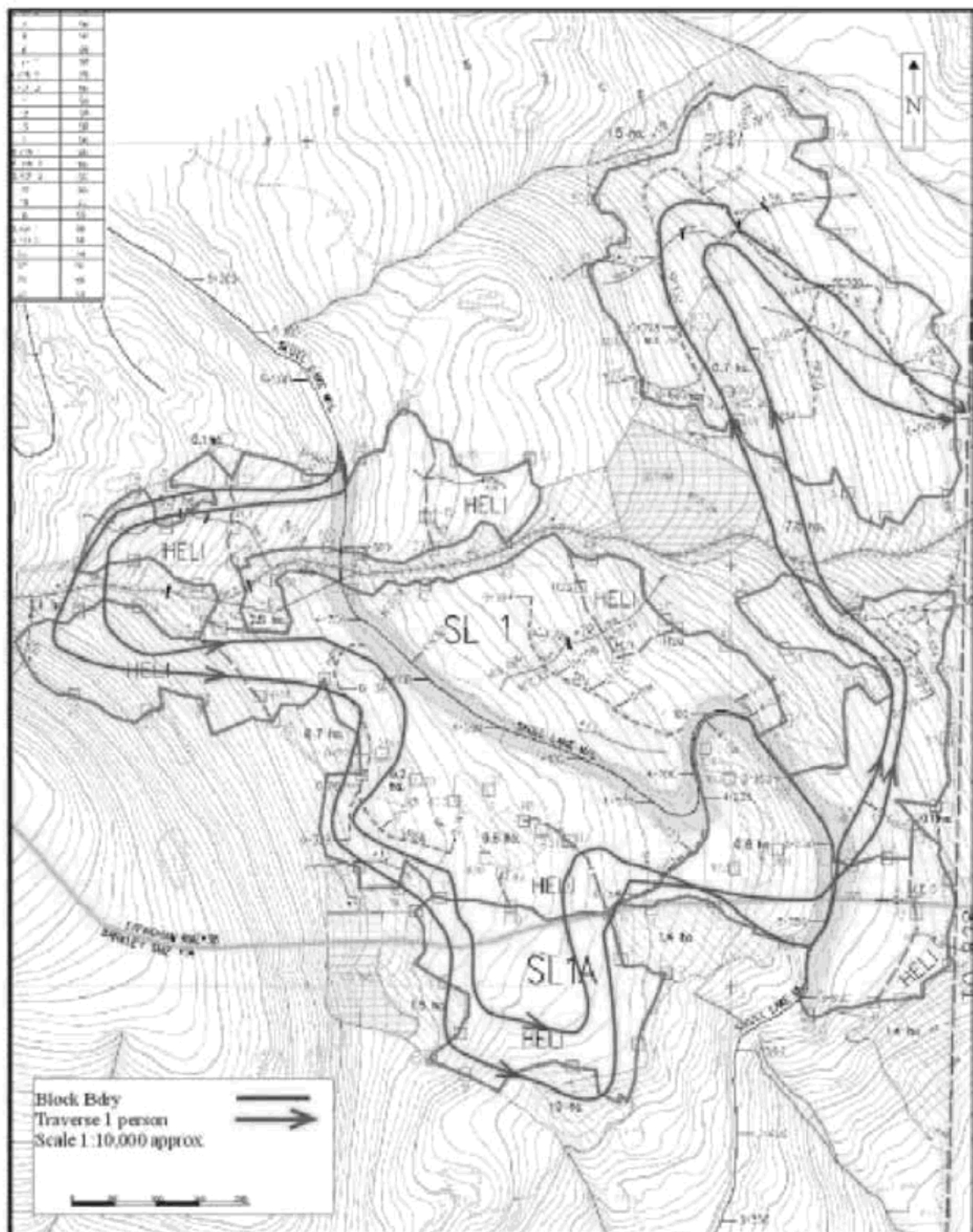
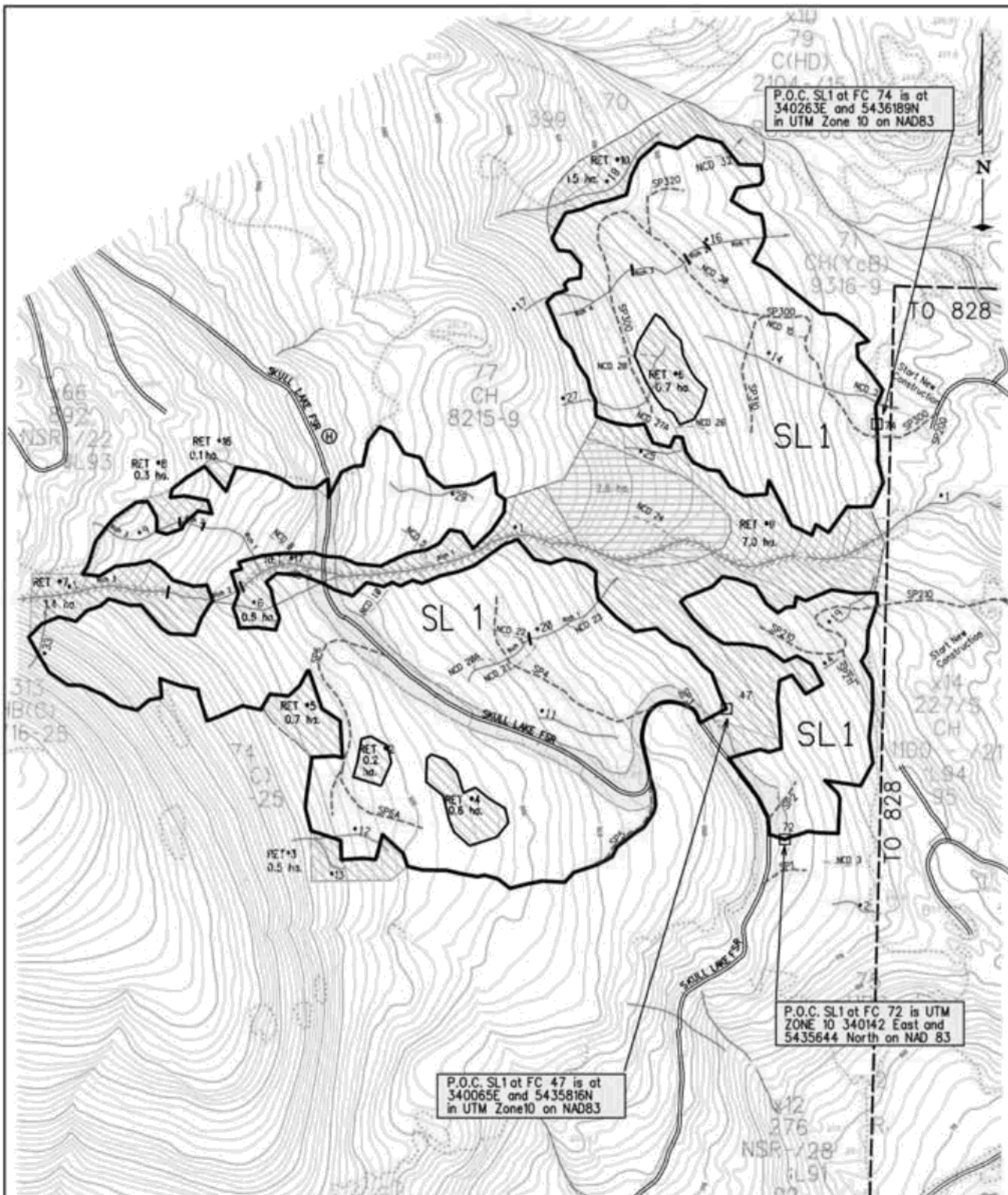


Figure 2. Block SL1 Survey Traverses



C MOKKO MANUFACTURING LIMITED,
4590 HELEN STREET
PORT ALBERNI, BC V9Y 6P5
TEL: (250) 723-8118

CUTTING PERMIT APPLICATION MAP TSL 50650, C.P.F. BLOCK SL1



EXHIBIT 'A'
MAP 1 OF 2

REG:	5
COMPT:	8
LF:	B

POC OF BLOCK (FC72) UNDER APPLICATION
(NAD 83) EASTING: 340142 NORTHING: 5435644
U.T.M. 10 LAT: 49° 03' 10" LONG: 125° 11' 16"

PLANNING CELL: *
REF. MAP: 92F.004
BASE MAP:
FOREST REGION: COAST
FOREST DISTRICT: SOUTH ISLAND
LAND DISTRICT: CLAYOQUOT

DATE: 22 JULY, 2004
DRAWN BY: AT
SCALE: 1:5,000
SHOWN AS:
ORCS: *
MDM ID:
CP:

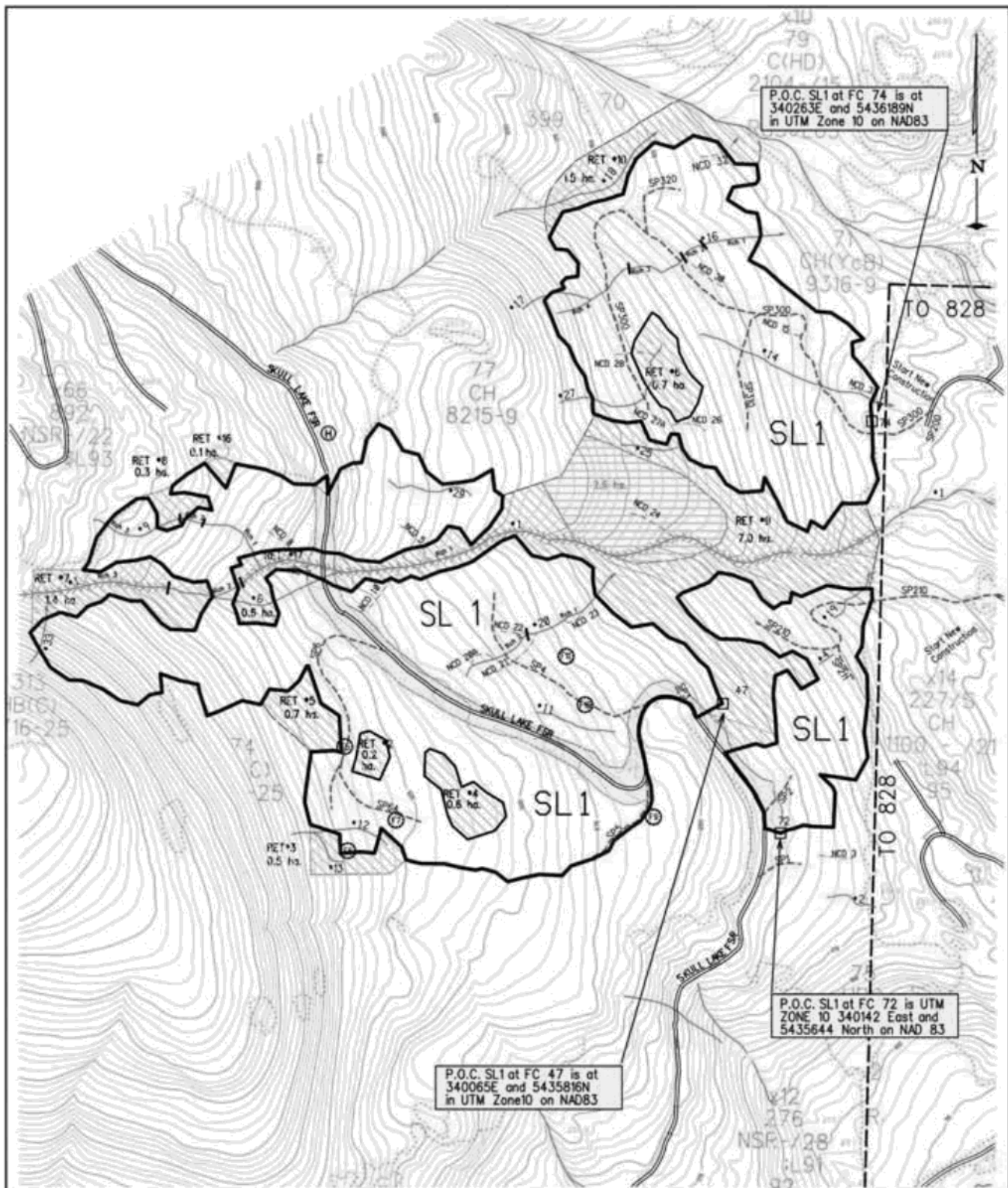
A) HARVEST AREA (OY RET.): 42.9 ha.
Includes 2.6 ha. Harv. R/W
B) PARTIAL CUT (I X RET.): 0.0 ha.
C) NET HARVEST (A-B): 42.9 ha.
D) RESERVES INSIDE SURVEYED BLOCK: 1.5 ha.
E) TOTAL AREA (C+D): 44.4 ha.

WILDLIFE TREE PATCH (WTP)
MANAGEMENT ZONE 100% RETENTION
MANAGEMENT ZONE PARTIAL CUT
HELISPLINE
EXISTING ROADS
LOCATED ROADS

CLASSIFIED FISH STREAM (S1-S4) or F52
CLASSIFIED NON-FISH STREAM (S5-S8)
GRADIENT CLASSIFIED FISH STREAM (S1-S4) or F52
NON-CLASSIFIED DRAINAGE NCD-1
UNCLASSIFIED STREAM

MANAGEMENT UNIT	TIMBER SUPPLY AREA	PULPMWOOD AGREEMENT	CASCADES
TYPE:	NUMBER: ARROWSMITH		EAST:
NUMBER:	BLOCK:		WEST: C
	SUB-C:		

COAST FOREST MANAGEMENT LTD.
FOREST CONSULTANTS
2338 SOUTH ISLAND HIGHWAY
CAMPELL RIVER, BC V9W 1C3
TELEPHONE: (250) 923-2542
FAX: (250) 923-2542



C MOKKO MANUFACTURING LIMITED.
4590 HELEN STREET
PORT ALBERNI, BC V9Y 6P5
TEL.: (250) 723-8118

CUTTING PERMIT APPLICATION MAP

TSL 50650, C.P. F. BLOCK SL1



EXHIBIT 'A'
MAP 1 OF 2

REG.:	5
COMPT.:	8
L:	B

POC OF BLOCK (FC72) UNDER APPLICATION

(NAD 83)	EASTING: 340142	NORTHING: 5435644
U.T.M. 10	LAT: 49° 03' 10"	LONG: 125° 11' 16"

PLANNING CELL: *
REF. MAP: 92F.004
BASE MAP:
FOREST REGION: COAST
FOREST DISTRICT: SOUTH ISLAND
LAND DISTRICT: CLAYOQUOT

DATE: 22 JULY, 2004
DRAWN BY: AT
SCALE: 1:5,000
SHOWN AS:
ORCS: *
MDM ID:
CP: *

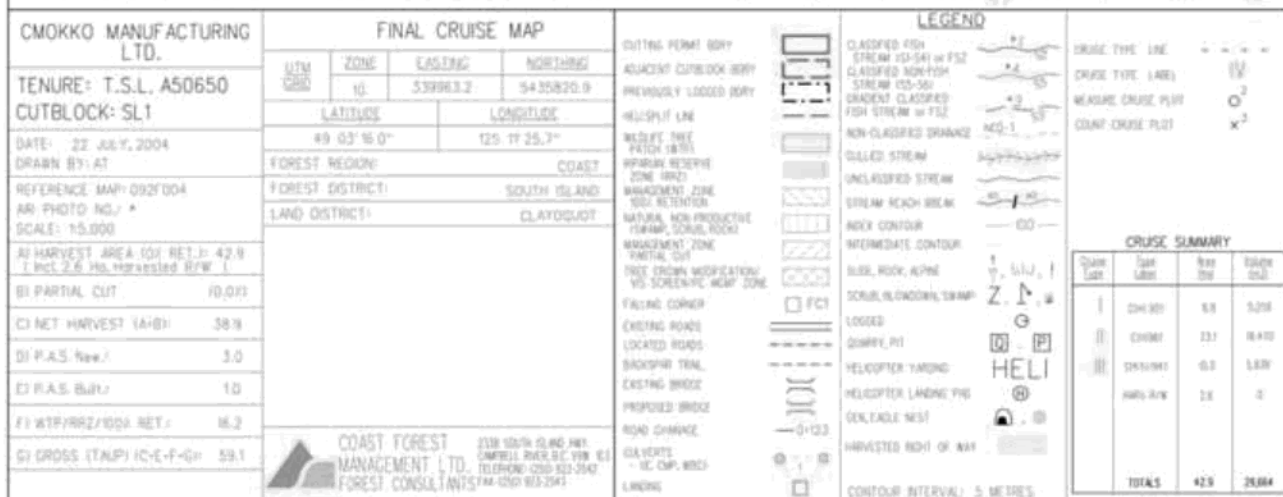
A) HARVEST AREA (O/ RET.):	42.9 ha.
Includes 2.6 ha. Harv. R/W	
B) PARTIAL CUT (X RET.):	0.0 ha.
C) NET HARVEST (A-B):	42.9 ha.
D) RESERVES INSIDE SURVEYED BLOCK:	1.5 ha.
E) TOTAL AREA (C-D):	44.4 ha.

WILDLIFE TREE PATCH (WTP)	CLASSIFIED FISH STREAM (S-54) or FSZ	1
MANAGEMENT ZONE 100% RETENTION	CLASSIFIED NON-FISH STREAM (S-58)	4
MANAGEMENT ZONE PARTIAL CUT	GRADIENT CLASSIFIED FISH STREAM (S-54) or FSZ	
HELISPLINE	NON-CLASSIFIED DRAINAGE	NCD-1
EXISTING ROADS	UNCLASSIFIED STREAM	
LOCATED ROADS		

MANAGEMENT UNIT	TIMBER SUPPLY AREA	PULPWOOD AGREEMENT	CASCADES
TYPE:	NUMBER: ARROWSMITH		EAST:
NUMBER:	BLOCK:		WEST: C
	SUB-C:		

COAST FOREST MANAGEMENT LTD.
FOREST CONSULTANTS

2338 SOUTH ISLAND HIGHWAY
CAMPBELL RIVER, BC V9W 1C3
TELEPHONE: (250) 923-2542
FAX: (250) 923-2542





BC Timber Sales

Strait of Georgia Business Unit

STREAM DATA FOR TSL 50650 – BLOCK SL1

Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Sideslopes (%)
1, rch 1	S5	35	7.5	R70,B20,C5,G5	L	H	70-90+
1, rch 2	S5	15	6.0	R20,B30,C35,G15	M	H	15-25
1, rch 3	S5	25	5.0	R80,B5,C10,G5	L	H	Vertical Rock
4	S6	25	1.0	B20,C50,G20,F10	M	L	10-50
6	S6	40	2.0	R85,B5,C5,G5	L	M	5-110
9, rch 1	S6	35	2.8	R40,B20,C20,G20	M	M	10-15
9, rch 2	S5	65	3.5	R70,B20,C10	L	M	10-35
9, rch 3	S6	35	1.2	R10,B25,C35,G20,F10	M	L	<5
11	S6	27	0.8	R10,B10,C20,G15,F15,O30	M	L	20
12	S6	30	1.0	R10,B40,C20,G10,F10,O10	M	L	<5
13	S6	35	0.6	R10,B10,C20,G20,F20,O20	H	L	<5
14	S6	22	1.0	R60,B20,C10,G10	L	L	10-25
16, rch 1	S6	8	1.0	B5,C5,G40,F35,O15	H	L	<5
16, rch 2	S6	30	1.2	R80,B10,C5,G5	L	L	<5
16, rch 3	S6	6	1.1	R10,B10,C10,G20,F40,O10	H	L	<5
16, rch 4	S6	45	1.2	R65,B10,C5,G10,F10	L	L	<5
17	S6	80	1.8	R50,B30,C15,G5	M	M	<5
18	S5	25	4.5	R10,B50,C30,G10	M	H	<5
19	S6	30	2.0	R20,B25,C15,G30,F10	M	L	<5
20, rch 1	S6	30	2.8	R40,B20,C20,G10,F5,O5	M	M	35-90
20, rch 2	S6	26	1.0	R25,B15,C15,G20,F20,O5	M	L	<5
25	S6	42	1.5	R5,B30,C35,G20,F10	M	L	<5
27	S6	27	1.4	R15,B20,C25,G30,F10	M	L	<5
29	S6	29	0.8	C20,G30,F20,O20	H	L	<5
33	S6	45	0.5	B5,C5,G70,F20	H	L	<5

#5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 and 32 are non-classified drainages as indicated on the 1:5,000 map.

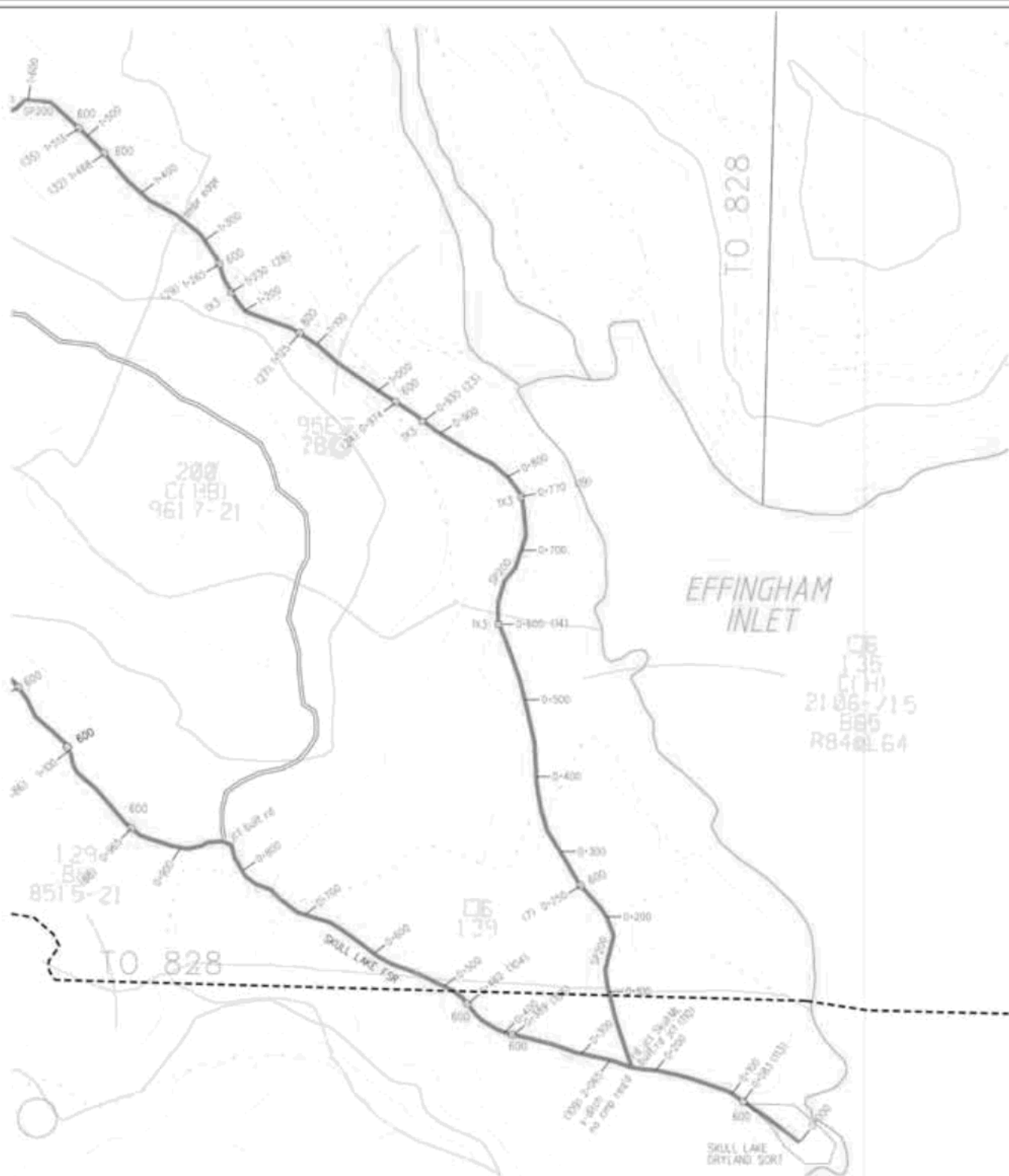
****Debris Transport Potential** is calculated using the methodology from the Gully Assessment Procedure Guidebook.

***LWD Dependency** is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5.

Streambed material: O=organics (decomposed plant and woody material); F=lines (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm); B=boulder (>25cm); R=Bedrock.

RIPARIAN MANAGEMENT STRATEGIES						
Riparian/Lake				Residual values		
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)	DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	AVERAGE BA (m ² /ha)	DENSITY (SPH)
1, rch 1	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
1, rch 2	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS, MC/HC	114 0-20	
1, rch 3	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
4	S6	0	20	FA, YA, RS, NC	0-20	
6	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX (use best available lift), HH, HC (small introduced woody debris)	114 0	
9, rch 1	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX (use best available lift), RS, HC (small introduced woody debris)	114 0-20	
9, rch 2	S5	0	30	Outside harvest area – NHZ Inside harvest area – FX, YV, RS, HC (small & medium-sized woody debris)	114 0-20	
9, rch 3	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
11	S6	0	20	FX, YX, HH, NC	0	
12	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
13	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
14	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
16, rch 1	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
16, rch 2	S6	0	20	FX, YX, HH, NC	0	
16, rch 3	S6	0	20	FX, YX, HH, NC	0	
16, rch 4	S6	0	20	FX, YX, HH, NC	0	
17	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	0	
18	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
19	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
20, rch 1	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS, HC (small & medium-sized introduced woody debris)	114 0-20	
20, rch 2	S6	0	20	FX, YX, HH, NC	0	
25	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
27	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
29	S6	0	20	FX, YX, HH, NC	0	
33	S6	0	20	FX, YX, HH, NC	0	
5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 32	NCD			NCD within the harvest area will be FX and YX. No RMZ is required.	N/A	

Definitions	<p>NCD Non-classified drainage.</p> <p>FA/BL Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.</p> <p>FA Fall Away. Timber is to be felled away.</p> <p>YA Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream. Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.</p> <p>HH 100% Harvested (no retention of saplings).</p> <p>RS Retain Saplings within 5m of the stream channel (non-merchantable).</p> <p>FE Feathered Edge.</p> <p>BPT Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.</p> <p>NHZ No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.</p> <p>FX Fall Across.</p> <p>YX Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.</p> <p>YV Yard Vertically.</p> <p>MFZ Machine Free Zone.</p> <p>MC Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.</p> <p>HC Hand Clean introduced transportable debris.</p> <p>AHC Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.</p> <p>NC No stream cleaning required.</p> <p>Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing).</p> <p>Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code.</p> <p>Reserve zone and management zone widths are provided as slope distances.</p> <p>Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.</p>
E.2 GULLY MANAGEMENT STRATEGIES (COAST)	
Stream 1 (Reaches 1 and 3) flows through a gully. Harvest management strategies are described in Section E.1.	
RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION	
<p>RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY:</p> <p>Janis McLean, ERT</p>	<p>RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY:</p> <p>Bryan Fraser, RPF</p> <p>SIGNATURE: _____</p> <p>DATE: June 28, 2004</p>



C MOKKO MANUFACTURING LTD.

ROAD RECONSTRUCTION MAP (Map 1 of 2) TSL A50650 BLOCK SL1 & SL1A

- | | | |
|----------------------------------|--|-------------|
| — ROAD DOES NOT REQUIRE WORK | Ⓜ HELI PAD | □ LANDING |
| — ROAD REQUIRES WORK | Ⓟ PIT | ● GPS POINT |
| — ENGINEERED ROAD | Ⓠ QUARRY | Ⓡ SLIDE |
| — ROAD STATION (GPS POINT) | | |
| Ⓢ INSTALL CORRUGATED METAL PIPE | CLASSIFIED FISH STREAM (S1-S4) or PSZ | — 1.1 |
| ● REPAIR CORRUGATED METAL PIPE | CLASSIFIED NON-FISH STREAM (S5-S6) | — 1.4 |
| Ⓢ EXISTING CORRUGATED METAL PIPE | GRADIENT CLASSIFIED FISH STREAM or PSZ | — 1.7 |
| — NO WORK REQUIRED | NON-CLASSIFIED DRAINAGE | — NCB-1 |
| Ⓢ INSTALL WOODBOX CULVERT | CULLED STREAM | — 1.1 |
| ● REPAIR WOODBOX CULVERT | UNCLASSIFIED STREAM | — 1.1 |
| Ⓢ EXISTING WOODBOX CULVERT | STREAM BEACH BREAK | — 1.1 |
| — NO WORK REQUIRED | INDEX CONTOUR | — 100 |
| — TENSION CRACK PULLBACK | INTERMEDIATE CONTOUR | |
| — SIDECAST PULLBACK | | |

Scale 10,000





SITE PLAN Supporting Information

B.C. Timber Sales Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO.: SL1	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004	ENGINEERED BY: Colin Benoit/Erich Geddert	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
4.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	13.6	20.2
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU/ STRATA	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
1/A	BEC: CWHvm1 ss01(4 / B) The present stand consists of east facing zonal CH(Y) 941 old growth on moderate (20-40%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₅ , Menzfe ₀₅ , Blecsp ₀₅ , Cornca ₀₁ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is an 11cm Mor. The Bm horizon is a 50cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								9.5
2/B	BEC: CWHvm1 ss05(4 / E) The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₅ , Menzfe ₀₁ , Rubusp ₁₀ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₀₅ , Dryoex ₀₅ , Rubupe ₀₂ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is an 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								6.9
3/C	BEC: CWHvm1 ss07(5 / B) The present stand consists of northeast facing CH 961 old growth on moderately steep to steep (40-70%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₀ , Menzfe ₀₁ , Rubusp ₁₀ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₁₀ , Dryoex ₀₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is an 12cm Mor. The Bm horizon is a 55cm, very well drained, light-brown coloured, SiL with 30% cobble sized coarse fragments. Substrate is karst carbonate.								22.5
TOTAL NET AREA TO BE REFORESTED:									38.9
TOTAL AREA UNDER PRESCRIPTION:									59.1

B.1 RESERVE DESCRIPTION

TLA	There are eight TLAs within the TAUP containing an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. Several of the protect significant karst features.
WTP	Characteristics and Species of the WTP: The WTP contains an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. The ecology of this area is CWHvm1/07. This is mature CwHw(Ba) timber. This area has some downed coarse woody debris and will provide good wildlife habitat now as well as into the future.

C. OBJECTIVES

C.1 MANAGEMENT OBJECTIVES

MANAGEMENT OBJECTIVES STATED IN THE FDP OR HLP(s):

Long Term Management Objectives stated:

Fibre Production: To manage for a species mix of saw and pulp logs, ensuring a continuous and economically viable supply.

Riparian Management: Prevent, or mitigate impacts on stream channel dynamics, aquatic ecosystems, water quality, and the diversity, productivity and sustainability of habitat and vegetation adjacent to riparian areas with reserve zones, or where high wildlife habitat values are present.

Wildlife: Provide habitat for large mammals and other wildlife, and maintain ecosystem processes. Preserve ungulate winter ranges, maintain adequate visual screening of preferred habitats, allow for continuous forage and, through various retention systems and WTPs, incorporate stand level biodiversity goals.

Visual Landscape Management: Manage visual values identified through Visual Landscape Inventory or planning process. VQOs have been established in a higher level plan.

Recreation: Maintain road networks used for recreational activities, and to mitigate visual impacts from cutblock on recreational landscapes.

Biodiversity: Stand level biodiversity objectives are attained through the retention of Riparian Management Areas (RMAs), Wildlife Tree Patches (WTPs), and Timber Leave Areas (TLAs). This cutblock is in the Effingham Landscape Unit with a target level of 6% WTP retention. The cutblock is also in Effingham EFZ 38. Coarse Woody Debris (CWD) will be maintained on site provided it does not impede achieving the free growing stocking standards and does not conflict with coastal utilization standards.

Cultural Heritage Resources: To identify cultural features, including Culturally Modified Trees (CMTs), and develop the necessary strategies to manage the resources.

Forest Health: Limit the spread of pathogens in the regenerating forest and address any wind concerns.

Karst: Maintain the inherent productivity of the site in order to ensure the regeneration of a healthy and vigorous forest crop, maintain key biological components in the immediate area for any significant karst feature identified, maintain the natural flow of water courses and minimize the introduction of sediments or other pollutants into these systems, protect karst features from physical damage.

C.2 CONDITIONS THAT MUST EXIST AFTER HARVEST OR TREATMENT TO ACCOMMODATE FOREST RESOURCES

C.2a WILDLIFE

Minimal evidence of wildlife activity was identified and no bear dens or eagle nests were found in this cutblock.

Prescribed site conditions:

A WTP with an area equal to 6 percent of the net harvest area has been retained for wildlife values. Wildlife for nest cavities, nest platforms, dens, roosts, hunting perches, foraging sites, and display stations during breeding. They may improve the viewscape, become a future source of CWD, and provide structural diversity.

C.2b SENSITIVE AREAS

Prescribed site conditions: N/A

C.2c FISHERIES

17 non-fish bearing streams and 15 non-classified drainages (NCD) are located in or adjacent to the proposed cutblock.

Prescribed site conditions: Harvest operations will comply with the Riparian Management Strategies (E1).

C.2d WATERSHEDS

No CWAPs have been required or completed for this watershed.

Prescribed site conditions:

Normal stream management practices as prescribed in the Riparian Management Plan will adequately protect watershed resources.

C.2e RECREATION

Karst formations are present throughout this block. Madrone Environmental Consultants completed a karst field assessment.

Prescribed site conditions:

Areas with significant karst features having recreational value have been reserved from harvesting. Additionally, harvesting and road construction operations will comply with protective measures as specified in the assessment. Several sinkholes are protected by Fall Away/Yard Away prescriptions. These management zones are mapped on the Harvest Release Map.

C.2f BIOLOGICAL DIVERSITY
See C.2a "WILDLIFE" above. Prescribed site conditions:
C.2g VISUALS
This cutblock is within a non-visible (NV) polygon. However, A VIA indicates that the opening will be visible from Effingham Inlet. Prescribed site conditions: The proposed alteration meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.
C.2h CULTURAL HERITAGE
This cutblock is in the joint traditional territories of the Toquaht and Tseshaht First Nations. Baseline Archaeological Services Ltd. completed an AIA on June 17, 2004 under heritage inspection permit 2003-289. Prescribed site conditions: No heritage resources or examples of historical use have been identified. If unanticipated archaeological remains are found during development, work in the immediate area will cease and the Archaeology Branch and the Toquaht and Tseshaht First Nations will be contacted.
C.2j OTHER RESOURCES
N/A
CONDITIONS NOT APPLICABLE TO THIS PRESCRIPTION
THE FOLLOWING CONDITIONS WERE CONSIDERED, AND FOUND NOT TO BE APPLICABLE TO THIS PRESCRIPTION: N/A

D. ECOLOGICAL INFORMATION AND SITE CHARACTERISTICS

D.1 ECOLOGY AND CRITICAL SITE CONDITIONS							
	BIOGEOCLIMATIC						
SU	STRATUM	ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES	PHASE
1	A	CWH	vm	1		01	
2	B	CWH	vm	1		05	
3	C	CWH	vm	1		07	
SU	CRITICAL SITE CONDITIONS THAT AFFECT THE TIMING OF OPERATIONS, AND HOW THEY AFFECT THE TIMING						
	N/A						

E. MANAGEMENT PRACTICES



BC Timber Sales Strait of Georgia Business Unit STREAM DATA FOR TSL A50650 – BLOCK SL1

Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Sideslopes (%)
1, rch 1	S5	35	7.5	R70,B20,C5,G5	L	H	70-90+
1, rch 2	S5	15	6.0	R20,B30,C35,G15	M	H	15-25
1, rch 3	S5	25	5.0	R80,B5,C10,G5	L	H	Vertical Rock
4	S6	25	1.0	B20,C50,G20,F10	M	L	10-50
6	S6	40	2.0	R85,B5,C5,G5	L	M	5-110
9, rch 1	S6	35	2.8	R40,B20,C20,G20	M	M	10-15
9, rch 2	S5	65	3.5	R70,B20,C10	L	M	10-35
9, rch 3	S6	35	1.2	R10,B25,C35,G20,F10	M	L	<5
11	S6	27	0.8	R10,B10,C20,G15,F15,O30	M	L	20
12	S6	30	1.0	R10,B40,C20,G10,F10,O10	M	L	<5
13	S6	35	0.6	R10,B10,C20,G20,F20,O20	H	L	<5
14	S6	22	1.0	R60,B20,C10,G10	L	L	10-25
16, rch 1	S6	8	1.0	B5,C5,G40,F35,O15	H	L	<5
16, rch 2	S6	30	1.2	R80,B10,C5,G5	L	L	<5
16, rch 3	S6	6	1.1	R10,B10,C10,G20,F40,O10	H	L	<5
16, rch 4	S6	45	1.2	R65,B10,C5,G10,F10	L	L	<5
17	S6	80	1.8	R50,B30,C15,G5	M	M	<5
18	S5	25	4.5	R10,B50,C30,G10	M	H	<5
19	S6	30	2.0	R20,B25,C15,G30,F10	M	L	<5
20, rch 1	S6	30	2.8	R40,B20,C20,G10,F5,O5	M	M	35-90
20, rch 2	S6	26	1.0	R25,B15,C15,G20,F20,O5	M	L	<5
25	S6	42	1.5	R5,B30,C35,G20,F10	M	L	<5
27	S6	27	1.4	R15,B20,C25,G30,F10	M	L	<5
29	S6	29	0.8	C20,G30,F20,O20	H	L	<5
33	S6	45	0.5	B5,C5,G70,F20	H	L	<5

#5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 and 32 are non-classified drainages as indicated on the 1:5,000 map.

**Debris Transport Potential is calculated using the methodology from the Gully Assessment Procedure Guidebook.

*LWD Dependency is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5.

Streambed material: O=organics (decomposed plant and woody material); F=finer (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm);

B=boulder (>25cm); R=Bedrock

RIPARIAN MANAGEMENT STRATEGIES						
Riparian/Lake					Residual values	
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)	DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	AVERAGE BA (m ² /ha)	DENSITY (SPH)
1, rch 1	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
1, rch 2	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS, MC/HC	114 0-20	
1, rch 3	S5	0	30	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
4	S6	0	20	FA, YA, RS, NC	0-20	
6	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX (use best available lift), HH, HC (small introduced woody debris)	114 0	
9, rch 1	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX (use best available lift), RS, HC (small introduced woody debris)	114 0-20	
9, rch 2	S5	0	30	Outside harvest area – NHZ Inside harvest area – FX, YV, RS, HC (small & medium-sized woody debris)	114 0-20	
9, rch 3	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
11	S6	0	20	FX, YX, HH, NC	0	
12	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0	
13	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
14	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0	
16, rch 1	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0	
16, rch 2	S6	0	20	FX, YX, HH, NC	0	
16, rch 3	S6	0	20	FX, YX, HH, NC	0	
16, rch 4	S6	0	20	FX, YX, HH, NC	0	
17	S6	0	20	Outside harvest area - NHZ Inside harvest area – FX, YX, HH, NC	0	
18	S5	0	30	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20	
19	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0	
20, rch 1	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS, HC (small & medium-sized introduced woody debris)	114 0-20	
20, rch 2	S6	0	20	FX, YX, HH, NC	0	
25	S6	0	20	Outside harvest area – NHZ Inside harvest area – FA, YA, RS	114 0-20	
27	S6	0	20	Outside harvest area – NHZ Inside harvest area – FX, YX, HH, NC	114 0	
29	S6	0	20	FX, YX, HH, NC	0	
33	S6	0	20	FX, YX, HH, NC	0	
5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 32	NCD			NCD within the harvest area will be FX and YX. No RMZ is required.	N/A	

Definitions	NCD	Non-classified drainage.
	FA/BL	Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.
	FA	Fall Away. Timber is to be felled away.
	YA	Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream. Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.
	HH	100% Harvested (no retention of saplings).
	RS	Retain Saplings within 5m of the stream channel (non-merchantable).
	FE	Feathered Edge.
	BPT	Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.
	NHZ	No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.
	FX	Fall Across.
	YX	Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.
	YV	Yard Vertically.
	MFZ	Machine Free Zone.
	MC	Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.
	HC	Hand Clean introduced transportable debris.
	AHC	Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.
	NC	No stream cleaning required. Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing). Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code. Reserve zone and management zone widths are provided as slope distances. Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.

E.2 GULLY MANAGEMENT STRATEGIES (COAST)

Stream 1 flows through a gully. Harvest management strategies are described in Section E.1.

RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION

RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY:
Janis McLean, ERT

RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY:
Bryan Fraser, RPF

SIGNATURE:

DATE: December 9, 2004

E. MANAGEMENT PRACTICES (CONT.)

E.3 FOREST HEALTH MANAGEMENT

MEASURES TO REDUCE FOREST HEALTH RISKS

Biotic

The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Abiotic – Wind

A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.

E.4 COARSE WOODY DEBRIS

MEASURES TO ACCOMMODATE CWD OBJECTIVES, INCLUDING VOLUME AND RANGE OF PIECE SIZES, IF ANY

Sound and rotting logs and stumps that provide habitat for plants, animals, and insects and are a source of organic matter for future soil development will be maintained through the retention of trees in the WTP, and the TLA, and the distribution of logging residue across the cutblock. Piling of slash within the setting and/or on the roadside may also contribute to wildlife habitat diversity and variations in CWD distribution. The current allowable limit for post-harvest residue that qualifies as harvestable is 35m³/ha.

E.5 ARCHAEOLOGICAL SITES

MEASURES TO MANAGE AND CONSERVE ARCHAEOLOGICAL SITES

In the event that archaeological resources are encountered, suspend all harvest activities in the immediate vicinity and inform the Ministry of Forests, the Archaeology Branch and appropriate First Nation, as soon as possible, of the location(s) and type of the archaeological resources and the nature of the disturbance.

F. SOIL CONSERVATION

F.1 SITE DISTURBANCE

SU	HAZARD RATINGS <i>(if logging methods other than cable or aerial are proposed)</i>			SOIL CHARACTERISTICS <i>(if temporary access structures are proposed)</i>			
	SOIL COMPACTION	SOIL EROSION	SOIL DISPLACEMENT	DEPTH TO UNFAVOURABLE SUBSOIL (cm)		TYPE OF UNFAVOURABLE SUBSOIL	SEDIMENT DELIVERY RISK (community watershed)
				MIN(cm)	MAX(cm)		
1	H	H	H	30	50	Carbonates	
2	H	H	H	40	60	Carbonates	
3	H	VH	VH	30	55	Carbonates	

GROUND BASED OPERATION LIMITATIONS:

SLOPE INSTABILITY INDICATORS: None

F.2 SOIL DISTURBANCE LIMITS

MAXIMUM PROPORTION OF TOTAL AREA UNDER THE PRESCRIPTION ALLOWED FOR PERMANENT ACCESS:

SU	MAXIMUM ALLOWABLE SOIL DISTURBANCE WITHIN THE NET AREA TO REFOREST (%) per cutblock	MAXIMUM EXTENT TO WHICH SOIL DISTURBANCE LIMITS MAY BE TEMPORARILY EXCEEDED TO CONSTRUCT TEMPORARY ACCESS STRUCTURES (%)
All	5	N/A

MAXIMUM SOIL DISTURBANCE AT ROADSIDE: 25%

MAXIMUM ALLOWABLE TIME TO COMPLETE REHAB (MEASURED FROM COMPLETION OF HARVEST): 1 year

F.4 EXCAVATED AND BLADED TRAILS

SU	MAX ALLOWABLE HEIGHT OF CUTBANKS (m)	AVERAGE HEIGHT OF CUTBANKS (m)	EQUIPMENT TO BE USED (IF OTHER THAN EXCAVATOR)
All	No excavated and bladed trails are to be constructed.	N/A	N/A

G. SILVICULTURAL SYSTEMS

G.1 SILVICULTURAL SYSTEMS

SYSTEM	
Retention	
COMMENTS FOR NON VARIABLE RETENTION CUTBLOCKS	
<p>DESCRIPTION OF POST-HARVEST STAND STRUCTURE and SITE CONDITION</p>	<p>The "retention" system goal of retaining structural elements and forest influences from the pre-harvest stand will be achieved by retaining over a rotation, a minimum of 10% area retention in group tree patches within the cutblock. It is the intent of this prescription that reserves in excess of this 10% area minimum will be available for harvest as visual green-up of the landscape unit allows. The groups will generally be 0.25 hectares or greater. Retention is prescribed in this cutblock as follows:</p> <p>This cutblock consists of three openings within the TAUP. Within these opening there are eight retention patches adjacent to the exterior cutblock boundary and three interior retention patches. The ecology in these patches varies from zonal CWHvm1 01 to richer CWHvm1 05/07.</p> <p>Cruise data indicates that the average codominant height of the harvested stand is 39m. The WTP is similar in age, height, and development to the harvest area. Generally, Cw and Hw are the dominant stems with Hw and minor Ba in codominant layer. Minor amounts of dead and down logs exist. Canopy closure varies from open to broken.</p>
<p>LEAVE TREE SPECIES AND FUNCTION:</p>	<p>A retention silvicultural system retains structural elements from the pre-harvest stand, such as live and dead trees and woody debris, for at least one rotation, to provide structural diversity and forest or residual tree influences over the majority of the cutblock.</p> <p>Forest and residual tree influences, the biophysical effects of forests or individual trees on the environment of the surrounding land, will be retained over the cutblock. The degree, type, and distance of influence will vary widely. Within and adjacent to harvested areas, most forest edge and residual tree influences begin to diminish significantly at distances greater than one tree length from a standing tree, group of trees, or forest edge. The specific objective is to retain forest and/or residual tree influence over more than 50% of the harvest area.</p> <p>The intent of the reserves (TLAs and the WTP) is to maintain lifeboats and enrich reestablished stands with structural features that would otherwise be absent, as well as contributing to meeting the forest influence objective. Stocking in the reserved areas consists of mature Cw.</p> <p>The WTP provides additional wildlife values, and is designated as a long-term reserve. For a description of the WTP refer to section C.2 Wildlife and Biological Diversity.</p>

H. STOCKING REQUIREMENTS

Stocking Requirements

H.1 ASSESSMENT DATES

SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)	
		EARLY	LATE
1	6	11	14
2	3	8	11
3	3	8	11

H.2 STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION

SU	PREFERRED SPECIES			ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)
	SPECIES / MINIMUM HEIGHT (m)			SPECIES / MINIMUM HEIGHT (m)		MIN	MAX	
1	Ba 1.75, Cw 1.5, Hw 3.0					500	1500	10,000
2	Ba 1.75, Cw 1.5, Hw 3.0					500	1500	10,000
3	Ba 2.25, Cw 2.0, Hw 4.0					500	1500	10,000
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	DENSITY (stems/ha)	
1	900	500	400	2.0				150%
2	900	500	400	2.0				150%
3	900	500	400	2.0				150%

COMMENTS:

SU 1/A: ID# 36533 Silv Strat REF # 33
 SU 2/B: ID# 36536 Silv Strat REF # 36
 SU 3/C: ID# 36538 Silv Strat REF # 38

I. ADMINISTRATION

PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser RPF Name (Printed)</p> <p>Date: December 9, 2004 3351</p> <p>RPF No:</p>	<p>RPF Signature and Seal</p>
PRESCRIPTION REFERENCES:	BCTS REPRESENTATIVE SIGNATURE:
<p>LEGEND</p> <p><input checked="" type="checkbox"/> SP ATTACHMENT</p> <p><input checked="" type="checkbox"/> ON FILE</p> <p>N/A NOT APPLICABLE</p> <p><input checked="" type="checkbox"/> 1:5000 SP MAP</p> <p><input checked="" type="checkbox"/> SP FIELD DATA CARDS (e.g.: site and soil classification, forest health evaluations, soil hazard assessment, treatment recommendations, slope instability indicators)</p> <p><input type="checkbox"/> ADDITIONAL SP COMMENTS</p> <p><input type="checkbox"/> COMMENTS FROM REFERRALS</p> <p><input checked="" type="checkbox"/> WINDTHROW ASSESSMENT (July 2004)</p> <p><input type="checkbox"/> NON-DM DIRECTED FOREST HEALTH RECCE/SURVEY</p> <p><input checked="" type="checkbox"/> CMT SURVEY (June 2004).</p> <p><input type="checkbox"/> HABITAT DIVERSITY ASSESSMENT (N/A)</p> <p><input type="checkbox"/> GREEN UP INFORMATION (N/A)</p> <p><input checked="" type="checkbox"/> PERMANENT ACCESS CALCULATION SHEET (June 2004)</p> <p><input type="checkbox"/> GROUND BASED OPERATIONS GUIDELINES</p>	<p>BCTS Representative</p> <p>BCTS Representative (printed)</p> <p>Date: _____</p>
ASSESSMENTS COMPLETED:	
<p><input checked="" type="checkbox"/> VISUAL IMPACT ASSESSMENT (June 2004)</p> <p><input type="checkbox"/> RIPARIAN ASSESSMENT: ENGINEERING TRAVERSE (N/A)</p> <p><input checked="" type="checkbox"/> RIPARIAN ASSESSMENT: FISH ASSESSMENT (May-June 2004)</p> <p><input checked="" type="checkbox"/> TERRAIN STABILITY FIELD ASSESSMENT</p> <p><input checked="" type="checkbox"/> GULLY ASSESSMENT (May 2004)</p> <p><input checked="" type="checkbox"/> ARCHAEOLOGICAL IMPACT ASSESSMENT (June 2004)</p> <p><input checked="" type="checkbox"/> KARST MANAGEMENT REPORT (July 2004)</p>	

SITE PLAN CHECKLIST

Region: Coast

District: South Island

Tenure: TSL A50650

FDP (Year): 2002

Cutblock: SL1

Resource	No	Yes	N/A	Comments
Cutblock Consistent with FDP?		X		
FDP Amendment Submitted?		X		Sec. 42.1 amendment completed 7 July/04
FDP Amendment Approved?			X	
Cutblock in Community Watershed?	X			
Cutblock in RMZ?		X		Effingham RMZ #38
Cutblock in SMZ?	X			
Cutblock in EFZ?		X		
Cutblock Size Exemption Required?		X		The net harvest area is 41.9 ha. No hydrological, wildlife, biodiversity, scenic or recreation values will be significantly impacted by the cutblock.
Adjacent Cutblock Greened-up?			X	
Cutblock Consistent with CWAP?		X		
FEN Infringement?	X			
WHA Infringement?	X			
Wildlife Habitat Measures Required?	X			
Cutblock in Visual Inventory Polygon?	X			This cutblock is within a non-visible (NV) polygon. However, a VIA indicates that the opening will be visible from Effingham Inlet.
VIA Completed?		X		21 June/04
Cutblock Meets VQO?		X		Meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.
Cutblock in Recreation Polygon?	X			Karst features within cutblock offer potential recreational opportunities.
Cutblock Consistent with Recreation Objectives?		X		Significant Karst features are protected in accordance with Karst report completed July/04.
Cutblock within 400m of Park Boundary?	X			
Parks Consultation Completed?			X	
TSFA Completed?		X		July/04
Cutblock Consistent with TSFA?				Terrain has a terrain stability hazard of low or elevated low terrain stability hazard ratings.
Gully Assessments Completed?		X		13 May/04
Windthrow Assessment Completed?		X		July/04. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
CMT Survey Completed?		X		17 June/04
Archaeological Resources Found?	X			No archaeological resources were identified during the survey of Block
AIA Completed?		X		28 June/04
Green Letter Received?			X	No cultural resources identified. No letter required.
Site Deg. Worksheet Completed?		X		30 June/04
Site Deg. < 7.0%?		X		6.7%
50% Forest Influence for Retention System?		X		
Stream Assessments Completed?		X		13 May - 9 June/04
RMP Completed?		X		28 June/04
SP Cards Completed?		X		19 April/04



RPF SIGNATURE

July 13, 2004
DATE



SITE PLAN

BC Timber Sales Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO: SL1	LICENSEE NAME: BC Timber Sales, Strait of Georgia Business Unit
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004	LOCATION: Pipestem Inlet	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
4.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	13.6	20.2
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
1	BEC: CWHvm1 ss01(4 / B) The present stand consists of east facing zonal CH(Y) 941 old growth on moderate (20-40%) slopes. Indicator vegetation consists of Gaulsh ₈₀ , Vaccpa ₁₅ , Menzfe ₀₅ , Blecsp ₀₅ , Cornca ₀₁ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is an 11cm Mor. The Bm horizon is a 50cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								9.5
2	BEC: CWHvm1 ss05(4 / E) The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh ₃₀ , Vaccpa ₁₅ , Menzfe ₀₁ , Rubusp ₀₅ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₀₅ , Dryoex ₀₅ , Rubupe ₀₂ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is a 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								6.9
3	BEC: CWHvm1 ss07(5 / B) The present stand consists of northeast facing CH 961 old growth on moderately steep to steep (40-70%) slopes. Indicator vegetation consists of Gaulsh ₂₅ , Vaccpa ₃₀ , Menzfe ₀₁ , Rubusp ₁₀ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₁₀ , Dryoex ₀₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is a 12cm Mor. The Bm horizon is a 55cm, very well drained, light-brown coloured, SiL with 30% cobble sized coarse fragments. Substrate is karst carbonate.								22.5
TOTAL NET AREA TO BE REFORESTED:								38.9	
TOTAL AREA UNDER PRESCRIPTION:								59.1	

Max. Soil Disturbance Roadside (%)	Max. Temp Soil Dist. Setting (%)	Max. Permanent Access Structure (%)	Coarse Woody Debris Requirement (%)	Wildlife Tree Retention Requirement (%)
25%	5%	7%	35%	6%

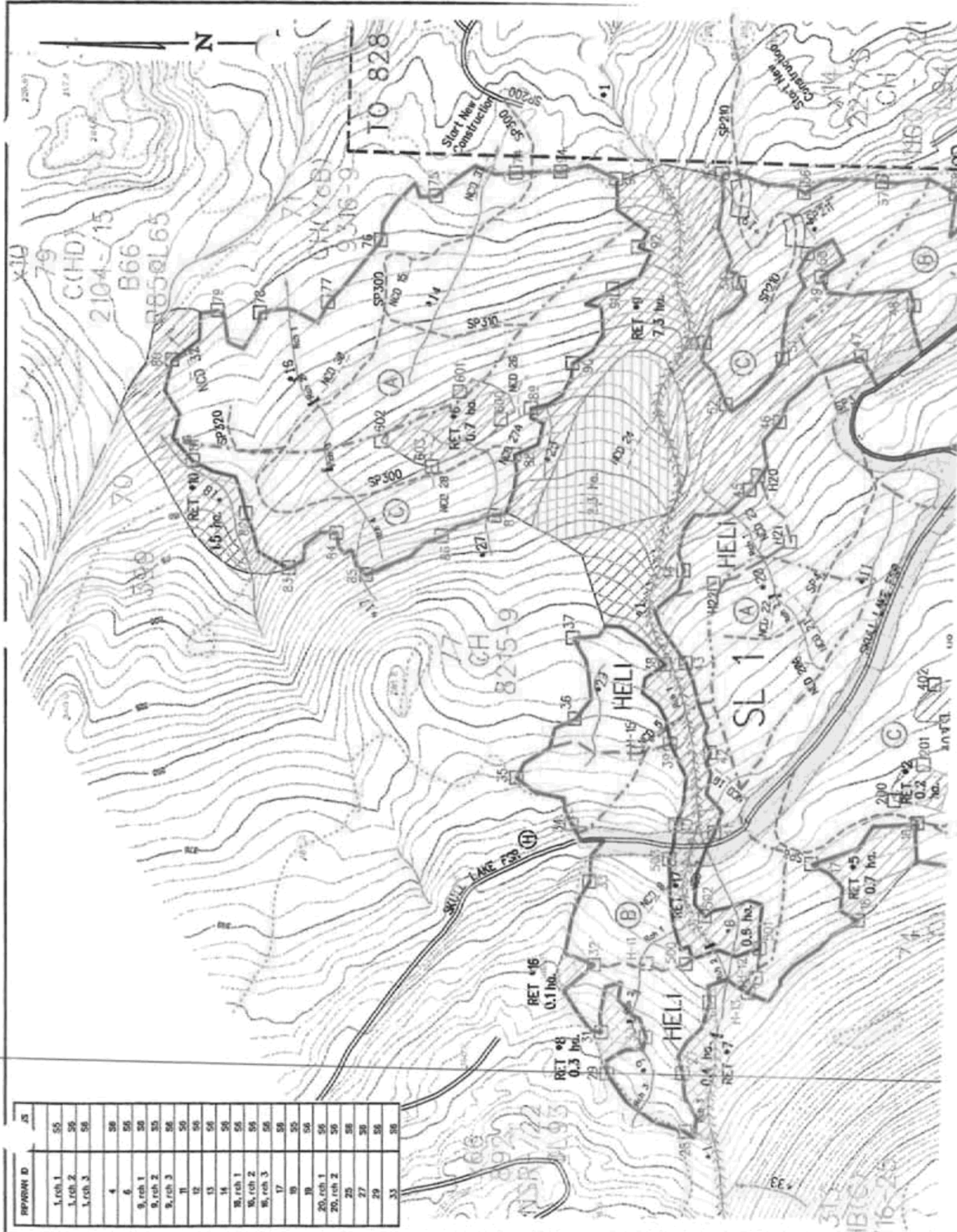
Critical Site Factors That Affect the Timing of Operations	
SU 1	N/A
SU 2	N/A
SU 3	N/A

Free Growing Stocking Standards										
ID	Silv Stra. Ref.	SU	Area (ha)	Regen Delay (yrs)	Preferred Species (P); Height (m)	Acceptable Species (A); Height (m)	Target WS P&A (#/ha)	Min. WS P&A (#/ha)	Min. WS P (#/ha)	Min. Inter- tree Dist. (m)
36533	33	1	9.5	6	Ba 1.75, Cw 1.5, Hw 3.0	N/A	900	500	400	2.0
36536	36	2	6.9	3	Ba 1.75, Cw 1.5, Hw 3.0	N/A	900	500	400	2.0
36538	38	3	22.5	3	Ba 2.25, Cw 2.0, Hw 4.0	N/A	900	500	400	2.0

SU	Early FTG (yrs)	Late FTG (yrs)	Max. Coniferous @ FTG (#/ha)	Post Spacing Density (max/min) (#/ha)	Height vs. Comp. (%)
1	11	14	1500	500	150%
2	8	11	1500	500	150%
3	8	11	1500	500	150%
COMMENTS: N/A					

Assessments (OSPR sec. 36.1)			Registered Professional Forester – Signature and Seal
Type	Required (Yes/No)	Date Completed	
Visual Impact Assessment	Yes	21 Jun/04	
Gully Assessment	Yes	13 May/04	
Pest Incidence Survey	No	N/A	
Archaeological Impact Assessment	Yes	28 Jun/04	
<p>The procedures required by regulation have been followed for any assessment that is required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p> <p>This Site Plan is consistent with the results and recommendations of any assessment required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p>			<p>R.P.F. Signature:</p> <p>Date: December 9, 2004</p>

REPARAN ID	AS
1, reb 1	55
1, reb 2	56
1, reb 3	56
4	56
6	56
8, reb 1	56
8, reb 2	55
8, reb 3	56
11	56
12	56
13	56
14	56
18, reb 1	56
18, reb 2	56
18, reb 3	56
17	56
19	55
19	56
20, reb 1	56
20, reb 2	56
25	56
27	56
29	56
33	55





19620-40
TSLA 0650 CPG

SITE PLAN AMENDMENT #1

Supporting Information

B.C. Timber Sales

Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: AG	CUTBLOCK NO: SL1	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004 - 161	ENGINEERED BY: Colin Benoit/Erich Geddert	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPRI)									TOTAL NPRI AREA
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	
4.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	12.9	
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU/ STRATA	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
1/A	BEC: CWHvm1 ss01(4/B) The present stand consists of east facing zonal CH(Y) 941 old growth on moderate (20-40%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₅ , Menzfe ₂₅ , Blecsp ₂₅ , Cornca ₃₁ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is an 11cm Mor. The Bm horizon is a 50cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								9.5
2/B	BEC: CWHvm1 ss05(4/E) The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₅ , Menzfe ₂₅ , Rubusp ₁₀ , Blecsp ₂₅ , Cornca ₃₁ , Polymu ₁₀ , Dryoex ₂₅ , Rubupe ₂₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is an 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								6.9
3/C	BEC: CWHvm1 ss07(5/B) The present stand consists of northeast facing CH 961 old growth on moderately steep to steep (40-70%) slopes. Indicator vegetation consists of Gaulsh ₁₀ , Vaccpa ₁₅ , Menzfe ₂₅ , Rubusp ₁₀ , Blecsp ₂₅ , Cornca ₃₁ , Polymu ₁₀ , Dryoex ₂₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is an 12cm Mor. The Bm horizon is a 55cm, very well drained, light-brown coloured, SiL with 30% cobble sized coarse fragments. Substrate is karst carbonate.								20.0
TOTAL NET AREA TO BE REFORESTED									36.4
TOTAL AREA UNDER PRESCRIPTION									55.6

B.1 RESERVE DESCRIPTION

TLA	There are eight TLAs within the TAUP containing an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. Several of the protect significant karst features.
WTP	<u>Characteristics and Species of the WTP:</u> The WTP contains an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. The ecology of this area is CWHvm1/07. This is mature CwHw(Ba) timber. This area has some downed coarse woody debris and will provide good wildlife habitat now as well as into the future.

C. OBJECTIVES

C.1 MANAGEMENT OBJECTIVES

MANAGEMENT OBJECTIVES STATED IN THE FDP OR HLP(s):

Long Term Management Objectives stated:

Fibre Production: To manage for a species mix of saw and pulp logs, ensuring a continuous and economically viable supply.

Riparian Management: Prevent, or mitigate impacts on stream channel dynamics, aquatic ecosystems, water quality, and the diversity, productivity and sustainability of habitat and vegetation adjacent to riparian areas with reserve zones, or where high wildlife habitat values are present.

Wildlife: Provide habitat for large mammals and other wildlife, and maintain ecosystem processes. Preserve ungulate winter ranges, maintain adequate visual screening of preferred habitats, allow for continuous forage and, through various retention systems and WTPs, incorporate stand level biodiversity goals.

Visual Landscape Management: Manage visual values identified through Visual Landscape Inventory or planning process. VQOs have been established in a higher level plan.

Recreation: Maintain road networks used for recreational activities, and to mitigate visual impacts from cutblock on recreational landscapes.

Biodiversity: Stand level biodiversity objectives are attained through the retention of Riparian Management Areas (RMAs), Wildlife Tree Patches (WTPs), and Timber Leave Areas (TLAs). This cutblock is in the Effingham Landscape Unit with a target level of 6% WTP retention. The cutblock is also in Effingham EFZ 38. Coarse Woody Debris (CWD) will be maintained on site provided it does not impede achieving the free growing stocking standards and does not conflict with coastal utilization standards.

Cultural Heritage Resources: To identify cultural features, including Culturally Modified Trees (CMTs), and develop the necessary strategies to manage the resources.

Forest Health: Limit the spread of pathogens in the regenerating forest and address any wind concerns.

Karst: Maintain the inherent productivity of the site in order to ensure the regeneration of a healthy and vigorous forest crop, maintain key biological components in the immediate area for any significant karst feature identified, maintain the natural flow of water courses and minimize the introduction of sediments or other pollutants into these systems, protect karst features from physical damage.

C.2 CONDITIONS THAT MUST EXIST AFTER HARVEST OR TREATMENT TO ACCOMMODATE FOREST RESOURCES

C.2a WILDLIFE

Minimal evidence of wildlife activity was identified and no bear dens or eagle nests were found in this cutblock.

Prescribed site conditions:

A WTP with an area equal to 6 percent of the net harvest area has been retained for wildlife values. Wildlife for nest cavities, nest platforms, dens, roosts, hunting perches, foraging sites, and display stations during breeding. They may improve the viewscape, become a future source of CWD, and provide structural diversity.

C.2b SENSITIVE AREAS

Prescribed site conditions: N/A

C.2c FISHERIES

17 non-fish bearing streams and 15 non-classified drainages (NCD) are located in or adjacent to the proposed cutblock.

Prescribed site conditions: Harvest operations will comply with the Riparian Management Strategies (E1).

C.2d WATERSHEDS

No CWAPs have been required or completed for this watershed.

Prescribed site conditions:

Normal stream management practices as prescribed in the Riparian Management Plan will adequately protect watershed resources.

C.2e RECREATION

Karst formations are present throughout this block. Madrone Environmental Consultants completed a karst field assessment.

Prescribed site conditions:

Areas with significant karst features having recreational value have been reserved from harvesting. Additionally, harvesting and road construction operations will comply with protective measures as specified in the assessment. Several sinkholes are protected by Fall Away/Yard Away prescriptions. These management zones are mapped on the Harvest Release Map.

C.2f BIOLOGICAL DIVERSITY
See C.2a "WILDLIFE" above. Prescribed site conditions:
C.2g VISUALS
This cutblock is within a non-visible (NV) polygon. However, A VIA indicates that the opening will be visible from Effingham Inlet. Prescribed site conditions: The proposed alteration meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.
C.2h CULTURAL HERITAGE
This cutblock is in the joint traditional territories of the Toquaht and Tseshaht First Nations. Baseline Archaeological Services Ltd. completed an AIA on June 17, 2004 under heritage inspection permit 2003-289. Prescribed site conditions: No heritage resources or examples of historical use have been identified. If unanticipated archaeological remains are found during development, work in the immediate area will cease and the Archaeology Branch and the Toquaht and Tseshaht First Nations will be contacted.
C.2j OTHER RESOURCES
N/A
CONDITIONS NOT APPLICABLE TO THIS PRESCRIPTION
THE FOLLOWING CONDITIONS WERE CONSIDERED, AND FOUND NOT TO BE APPLICABLE TO THIS PRESCRIPTION: N/A

D. ECOLOGICAL INFORMATION AND SITE CHARACTERISTICS

D.1 ECOLOGY AND CRITICAL SITE CONDITIONS							
BIOGEOCLIMATIC							
SU	STRATUM	ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES	PHASE
1	A	CWH	vm	1		01	
2	B	CWH	vm	1		05	
3	C	CWH	vm	1		07	
SU	CRITICAL SITE CONDITIONS THAT AFFECT THE TIMING OF OPERATIONS, AND HOW THEY AFFECT THE TIMING						
	N/A						

E. MANAGEMENT PRACTICES



BC Timber Sales Strait of Georgia Business Unit STREAM DATA FOR TSL A50650 – BLOCK SL1

Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Slopes (%)
1, rch 1	S5	35	7.5	R70,B20,C5,G5	L	H	70-90+
1, rch 2	S5	15	6.0	R20,B30,C35,G15	M	H	15-25
1, rch 3	S5	25	5.0	R80,B5,C10,G5	L	H	Vertical Rock
4	S6	25	1.0	B20,C50,G20,F10	M	L	10-50
8	S6	40	2.0	R85,B5,C6,G5	L	M	5-110
9, rch 1	S8	35	2.8	R40,B20,C20,G20	M	M	10-15
9, rch 2	S5	65	3.5	R70,B20,C10	L	M	10-35
9, rch 3	S6	35	1.2	R10,B25,C35,G20,F10	M	L	<5
11	S6	27	0.8	R10,B10,C20,G15,F15,O30	M	L	20
12	S6	30	1.0	R10,B40,C20,G10,F10,O10	M	L	<5
13	S6	35	0.6	R10,B10,C20,G20,F20,O20	H	L	<5
14	S6	22	1.0	R60,B20,C10,G10	L	L	10-25
16, rch 1	S6	8	1.0	B5,C5,G40,F35,O15	H	L	<5
16, rch 2	S6	30	1.2	R80,B10,C5,G5	L	L	<5
16, rch 3	S6	8	1.1	R10,B10,C10,G20,F40,O10	H	L	<5
16, rch 4	S6	45	1.2	R65,B10,C5,G10,F10	L	L	<5
17	S6	60	1.8	R50,B30,C15,G5	M	M	<5
18	S5	25	4.5	R10,B50,C30,G10	M	H	<5
19	S6	30	2.0	R20,B25,C15,G30,F10	M	L	<5
20, rch 1	S6	30	2.8	R40,B20,C20,G10,F5,O5	M	M	35-90
20, rch 2	S6	26	1.0	R25,B15,C15,G20,F20,O5	M	L	<5
25	S6	42	1.5	R5,B30,C35,G20,F10	M	L	<5
27	S6	27	1.4	R15,B20,C25,G30,F10	M	L	<5
29	S6	29	0.8	C20,G30,F20,O20	H	L	<5


#5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 and 32 are non-classified drainages as indicated on the 1:5,000 map.

**Debris Transport Potential is calculated using the methodology from the Gully Assessment Procedure Guidebook.

*LWD Dependency is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5.

Streambed material: O=organics (decomposed plant and woody material); F=finer (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm); B=boulder (>25cm); R=Bedrock.

RIPARIAN MANAGEMENT STRATEGIES							
Management Strategy				DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	Riparian Reserve Zone		
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)		AVERAGE BA (m ² /ha)	DENSITY (BPH)	
1, rch 1	S5	0	30	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20		
1, rch 2	S5	0	30	Outside harvest area - NHZ Inside harvest area - FA, YA, RS, MC/HC	114 0-20		
1, rch 3	S5	0	30	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20		
4	S6	0	20	FA, YA, RS, NC	0-20		
6	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX (use best available lift), HH, HC (small introduced woody debris)	114 0		
9, rch 1	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX (use best available lift), RS, HC (small introduced woody debris)	114 0-20		
9, rch 2	S5	0	30	Outside harvest area - NHZ Inside harvest area - FX, YV, RS, HC (small & medium-sized woody debris)	114 0-20		
9, rch 3	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
11	S6	0	20	FX, YX, HH, NC	0		
12	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
13	S6	0	20	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20		
14	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
16, rch 1	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
16, rch 2	S6	0	20	FX, YX, HH, NC	0		
16, rch 3	S6	0	20	FX, YX, HH, NC	0		
16, rch 4	S6	0	20	FX, YX, HH, NC	0		
17	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	0		
18	S5	0	30	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20		
19	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
20, rch 1	S6	0	20	Outside harvest area - NHZ Inside harvest area - FA, YA, RS, HC (small & medium-sized introduced woody debris)	114 0-20		
20, rch 2	S6	0	20	FX, YX, HH, NC	0		
25	S6	0	20	Outside harvest area - NHZ Inside harvest area - FA, YA, RS	114 0-20		
27	S6	0	20	Outside harvest area - NHZ Inside harvest area - FX, YX, HH, NC	114 0		
29	S6	0	20	FX, YX, HH, NC	0		
5, 7, 8, 10, 15, 21, 22, 23, 24, 26, 27A, 28, 30, 31 32	NCD			NCD within the harvest area will be FX and YX. No RMZ is required.	N/A		

Definitions	NCD FA/BL FA YA HH RS FE BPT NHZ FX YX YV MFZ MC HC AHC NC	<p>Non-classified drainage.</p> <p>Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.</p> <p>Fall Away. Timber is to be felled away.</p> <p>Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream.</p> <p>Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.</p> <p>100% Harvested (no retention of saplings).</p> <p>Retain Saplings within 5m of the stream channel (non-merchantable).</p> <p>Feathered Edge.</p> <p>Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.</p> <p>No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.</p> <p>Fall Across.</p> <p>Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.</p> <p>Yard Vertically.</p> <p>Machine Free Zone.</p> <p>Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.</p> <p>Hand Clean introduced transportable debris.</p> <p>Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.</p> <p>No stream cleaning required.</p> <p>Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing).</p> <p>Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code.</p> <p>Reserve zone and management zone widths are provided as slope distances.</p> <p>Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.</p>
E.2. GULLY MANAGEMENT STRATEGIES (COAST)		
Stream 1 flows through a gully. Harvest management strategies are described in Section E.1.		
RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION		
RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY: Janis McLean, ERT		RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY: Bryan Fraser, RPF  SIGNATURE: _____ DATE: December 15, 2004

E. MANAGEMENT PRACTICES (CONT.)

E.3 FOREST HEALTH MANAGEMENT

MEASURES TO REDUCE FOREST HEALTH RISKS

Biotic

The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Abiotic – Wind

A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.

E.4 COARSE WOODY DEBRIS

MEASURES TO ACCOMMODATE CWD OBJECTIVES, INCLUDING VOLUME AND RANGE OF PIECE SIZES, IF ANY

Sound and rotting logs and stumps that provide habitat for plants, animals, and insects and are a source of organic matter for future soil development will be maintained through the retention of trees in the WTP, and the TLA, and the distribution of logging residue across the cutblock. Piling of slash within the setting and/or on the roadside may also contribute to wildlife habitat diversity and variations in CWD distribution. The current allowable limit for post-harvest residue that qualifies as harvestable is 35m³/ha.

E.5 ARCHAEOLOGICAL SITES

MEASURES TO MANAGE AND CONSERVE ARCHAEOLOGICAL SITES

In the event that archaeological resources are encountered, suspend all harvest activities in the immediate vicinity and inform the Ministry of Forests, the Archaeology Branch and appropriate First Nation, as soon as possible, of the location(s) and type of the archaeological resources and the nature of the disturbance.

F. SOIL CONSERVATION

F.1 SITE DISTURBANCE							
SU	HAZARD RATINGS (if logging methods other than cable or aerial are proposed)			SOIL CHARACTERISTICS (if temporary access structures are proposed)			
	SOIL COMPACTION	SOIL EROSION	SOIL DISPLACEMENT	DEPTH TO UNFAVOURABLE SUBSOIL (cm)		TYPE OF UNFAVOURABLE SUBSOIL	SEDIMENT DELIVERY RISK (community watershed)
				MIN(cm)	MAX(cm)		
1	H	H	H	30	50	Carbonates	
2	H	H	H	40	60	Carbonates	
3	H	VH	VH	30	55	Carbonates	
GROUND BASED OPERATION LIMITATIONS:							
SLOPE INSTABILITY INDICATORS: None							
F.2 SOIL DISTURBANCE LIMITS							
MAXIMUM PROPORTION OF TOTAL AREA UNDER THE PRESCRIPTION ALLOWED FOR PERMANENT ACCESS:							
SU	MAXIMUM ALLOWABLE SOIL DISTURBANCE WITHIN THE NET AREA TO REFOREST (%) per cutblock			MAXIMUM EXTENT TO WHICH SOIL DISTURBANCE LIMITS MAY BE TEMPORARILY EXCEEDED TO CONSTRUCT TEMPORARY ACCESS STRUCTURES (%)			
All	5			N/A			
MAXIMUM SOIL DISTURBANCE AT ROADSIDE: 25%							
MAXIMUM ALLOWABLE TIME TO COMPLETE REHAB (MEASURED FROM COMPLETION OF HARVEST): 1 year							
F.4 EXCAVATED AND BLADED TRAILS							
SU	MAX ALLOWABLE HEIGHT OF CUTBANKS (m)	AVERAGE HEIGHT OF CUTBANKS (m)	EQUIPMENT TO BE USED (IF OTHER THAN EXCAVATOR)				
All	No excavated and bladed trails are to be constructed.	N/A	N/A				

G. SILVICULTURAL SYSTEMS

G.1 SILVICULTURAL SYSTEMS	
SYSTEM	
Retention	
COMMENTS FOR NON VARIABLE RETENTION CUTBLOCKS	
DESCRIPTION OF POST-HARVEST STAND STRUCTURE and SITE CONDITION	<p>The "retention" system goal of retaining structural elements and forest influences from the pre-harvest stand will be achieved by retaining over a rotation, a minimum of 10% area retention in group tree patches within the cutblock. It is the intent of this prescription that reserves in excess of this 10% area minimum will be available for harvest as visual green-up of the landscape unit allows. The groups will generally be 0.25 hectares or greater. Retention is prescribed in this cutblock as follows:</p> <p>This cutblock consists of three openings within the TAUP. Within these opening there are eight retention patches adjacent to the exterior cutblock boundary and three interior retention patches. The ecology in these patches varies from zonal CWHvm1 01 to richer CWHvm1 05/07.</p> <p>Cruise data indicates that the average codominant height of the harvested stand is 39m. The WTP is similar in age, height, and development to the harvest area. Generally, Cw and Hw are the dominant stems with Hw and minor Ba in codominant layer. Minor amounts of dead and down logs exist. Canopy closure varies from open to broken.</p>
LEAVE TREE SPECIES AND FUNCTION:	<p>A retention silvicultural system retains structural elements from the pre-harvest stand, such as live and dead trees and woody debris, for at least one rotation, to provide structural diversity and forest or residual tree influences over the majority of the cutblock.</p> <p>Forest and residual tree influences, the biophysical effects of forests or individual trees on the environment of the surrounding land, will be retained over the cutblock. The degree, type, and distance of influence will vary widely. Within and adjacent to harvested areas, most forest edge and residual tree influences begin to diminish significantly at distances greater than one tree length from a standing tree, group of trees, or forest edge. The specific objective is to retain forest and/or residual tree influence over more than 50% of the harvest area.</p> <p>The intent of the reserves (TLAs and the WTP) is to maintain lifeboats and enrich reestablished stands with structural features that would otherwise be absent, as well as contributing to meeting the forest influence objective. Stocking in the reserved areas consists of mature Cw.</p> <p>The WTP provides additional wildlife values, and is designated as a long-term reserve. For a description of the WTP refer to section C.2 Wildlife and Biological Diversity.</p>

H. STOCKING REQUIREMENTS

Stocking Requirements


H.1 ASSESSMENT DATES					
SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)			
		EARLY	LATE		
1	5	11	14		
2	3	8	11		
3	3	8	11		

H.2 STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION						
SU	PREFERRED SPECIES	ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)
	SPECIES / MINIMUM HEIGHT (m)	SPECIES / MINIMUM HEIGHT (m)		MIN	MAX	
1	Ba 1.75, Cw 1.5, Hw 3.0			500	1500	10,000
2	Ba 1.75, Cw 1.5, Hw 3.0			500	1500	10,000
3	Ba 2.25, Cw 2.0, Hw 4.0			500	1500	10,000

SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	DENSITY (stems/ha)	
1	900	500	400	2.0			150%	
2	900	500	400	2.0			150%	
3	900	500	400	2.0			150%	

COMMENTS:	
SU 1/A: ID# 36533	Silv Strat REF # 33
SU 2/B: ID# 36536	Silv Strat REF # 36
SU 3/C: ID# 36538	Silv Strat REF # 38

I. ADMINISTRATION

PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser RPF Name (Printed)</p> <p>Date: December 15, 2004 3351</p> <p>RPF No:</p>	 <p>RPF Signature and Seal</p>
PRESCRIPTION REFERENCES:	BCTS REPRESENTATIVE SIGNATURE:
<p>LEGEND</p> <p><input checked="" type="checkbox"/> SP ATTACHMENT</p> <p><input checked="" type="checkbox"/> ON FILE</p> <p>N/A NOT APPLICABLE</p> <p><input checked="" type="checkbox"/> 1:5000 SP MAP</p> <p><input checked="" type="checkbox"/> SP FIELD DATA CARDS (e.g.: site and soil classification, forest health evaluations, soil hazard assessment, treatment recommendations, slope instability indicators)</p> <p><input type="checkbox"/> ADDITIONAL SP COMMENTS</p> <p><input type="checkbox"/> COMMENTS FROM REFERRALS</p> <p><input checked="" type="checkbox"/> WINDTHROW ASSESSMENT (July 2004)</p> <p><input type="checkbox"/> NON-DM DIRECTED FOREST HEALTH RECCE/SURVEY</p> <p><input checked="" type="checkbox"/> CMT SURVEY (June 2004).</p> <p><input type="checkbox"/> HABITAT DIVERSITY ASSESSMENT (N/A)</p> <p><input type="checkbox"/> GREEN UP INFORMATION (N/A)</p> <p><input checked="" type="checkbox"/> PERMANENT ACCESS CALCULATION SHEET (June 2004)</p> <p><input type="checkbox"/> GROUND BASED OPERATIONS GUIDELINES</p>	<p>BCTS Representative</p> <p>BCTS Representative (printed)</p> <p>Date: _____</p>
ASSESSMENTS COMPLETED:	
<p><input checked="" type="checkbox"/> VISUAL IMPACT ASSESSMENT (June 2004)</p> <p><input type="checkbox"/> RIPARIAN ASSESSMENT: ENGINEERING TRAVERSE (N/A)</p> <p><input checked="" type="checkbox"/> RIPARIAN ASSESSMENT: FISH ASSESSMENT (May-June 2004)</p> <p><input checked="" type="checkbox"/> TERRAIN STABILITY FIELD ASSESSMENT</p> <p><input checked="" type="checkbox"/> GULLY ASSESSMENT (May 2004)</p> <p><input checked="" type="checkbox"/> ARCHAEOLOGICAL IMPACT ASSESSMENT (June 2004)</p> <p><input checked="" type="checkbox"/> KARST MANAGEMENT REPORT (July 2004)</p>	

Amendment Site Plan FDP Block # SL 1

Forest Region: Coast Forest Region

Forest District: South Island

Amendment #2

Forest Tenure T.S.L. A50650	CP G	Block SL 1	Licensee BC Timber Sales (C Mokko Manufacturing Ltd)				Timber Mark AQ9/00G	
Opening No	Location Skull Lake		Gross Ha. 59.1	NP Nat. (ha) 0.0	Reserve (ha) 16.2	Road (ha) 4.0	NAR (ha) 38.9	
Map Sheet 092F004 -161	TSA / TFL Arrowsmith TSA		Air Photo 30BCC98011 #3,4					
Original Prepared by Bryan Fraser, RPF		Date July 27, 2004		Field work (Amendment) completed by R. Sorensen, RPF			Date April 1 2005	

Nature of Amendment

- To establish a single wildlife tree
- To provide for limited cross stream yarding of the upper portion of reach #1 of stream 20.

Back ground

- A large Cedar tree located near Falling Corner # 91 was deemed to hazardous to fall by hand because of severe forking and numerous candelabra branches. The upper portion of the tree is also dead. The tree appears stable and there are no indications that it is subject to windthrow. Rather than blast the tree down it should be reserved as a wildlife tree
- During the heli-logging of the area below spur 4, several large cedar logged were left because of their excessive weight. Recovering these logs may require cross stream yarding of the upper 10 +/- meters of Reach 1 of stream 20. The logs will be yarded to Spur 4

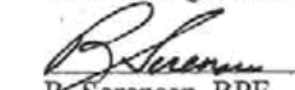
Amendments

- The danger tree located near Falling Corner 91 is to be retained as a wildlife tree
- Cross stream yarding of the upper portion of reach 1 of stream 20 is acceptable if required in order to recover the felled and bucked timber remaining in the area designated for heli-logging. Immediately upon completion of yarding, the stream reach shall be cleaned of debris introduced to the reach as a result of yarding.

Rational

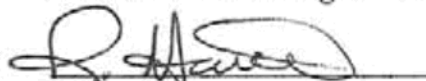
- The danger tree exhibits several attributes that make it suitable as a wildlife tree. Blasting the tree would lower the value of the resulting logs to the point that very little of the tree would be recovered.
- By allowing limited cross stream yarding of stream 20, reach 1 several high value logs will be recovered.

Prescribing Forester

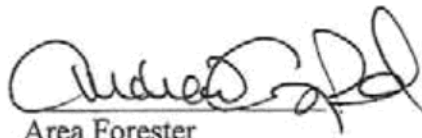

R. Sorensen, RPF
R.H. Sorensen Forestry
Services Ltd.

April 5 2005
Date

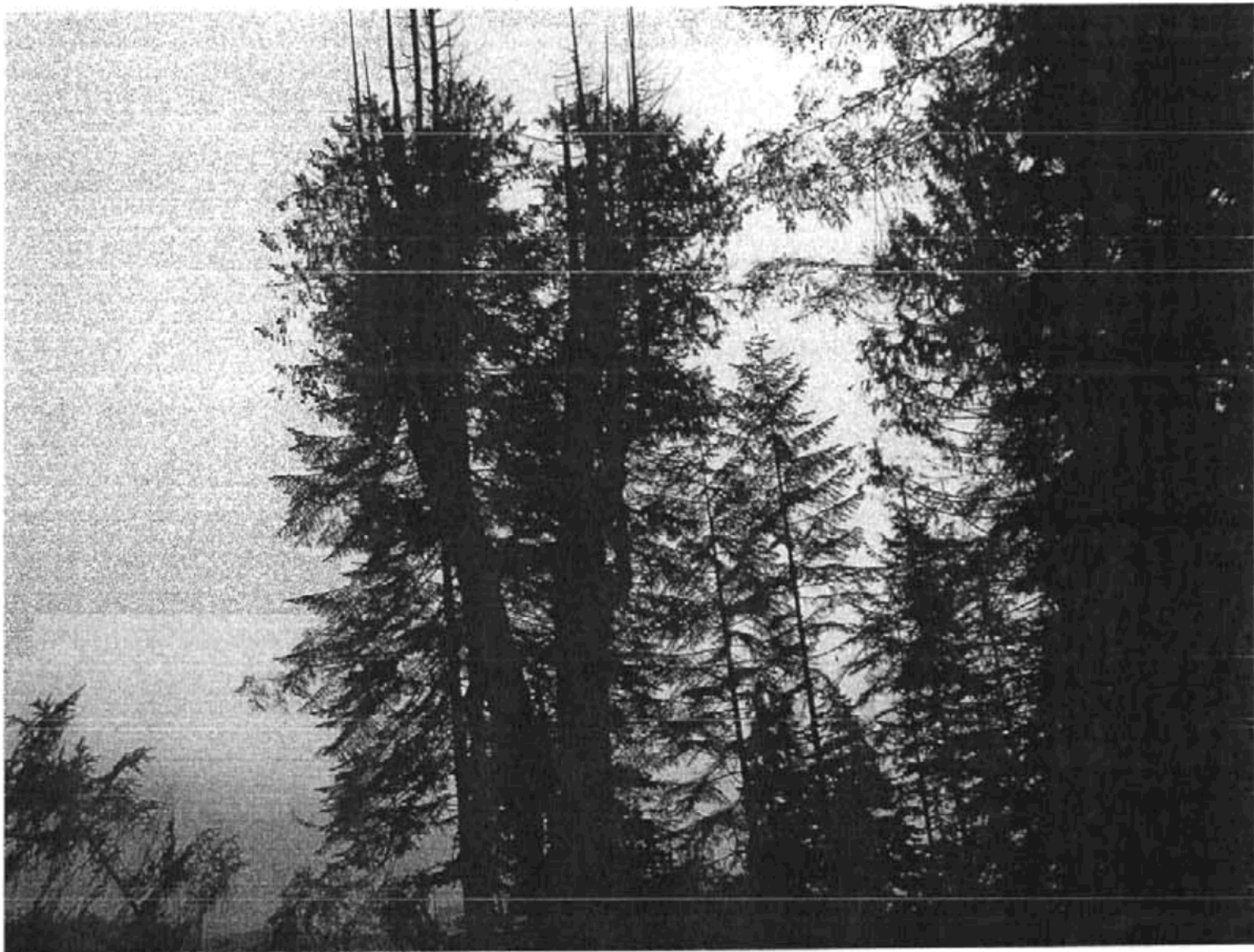
Licensee Acknowledgement


R. Howie,
C Mokko Manufacturing Ltd

Date April 6/05


Area Forester
BC Timber Sales
South Island Forest District

Date April 8/05



TREATMENT REGIME

B.C. Timber Sales Strait of Georgia Business Unit

TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO.: SL1	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004 92F.004	ENGINEERED BY: Colin Benoit/Erich Geddert	

Engineering Comments

No more than 10% of the retention trees in the aggregate or dispersed retention areas or single retention trees in this cutblock may have significant damage.

Significant damage to Hw, Ba, Yc, and Cw is defined as a tree with:

- One or more wounds (i.e. exposed cambium) that girdle more than 1/3 the circumference of the stem.
- Any wounds on a supporting root within one metre of the stem
- A gouge – a wound that penetrates (splintered) into the sapwood or deeper.

Additionally, for Hw and Cw only:

A wound >400cm² on the stem.

Forest Health

Windthrow	A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
Mistletoe	The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment conducted by C Mokko Manufacturing Ltd. will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Preferred Site Preparation

Mechanical Site Preparation Concurrent with Harvest	Fertilize all planted seedlings in all strata. Hand screef plantable spots as required. ALTERNATE SITE PREPARATION: Slash management: 1. Scatter and bury roadside accumulations to contribute to CWD. 2. Landings and roadside accumulations that present a fire hazard or excessively occupy productive growing sites will be piled and burned.
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Vegetation Management

Vegetation Management – General	It is expected that yarding operations will knock down salal cover sufficiently that the attainment of free growing will not be impeded. The need for alder brushing will be monitored in conjunction with silviculture surveys. In areas where alder competition is deemed to prevent the stand from reaching free growing, a brushing treatment consisting of stem injection of alder, and/or manual girdling of alder will be carried out.
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LICENCE NO.: A50650	CUTTING PERMIT: N/A	CUTBLOCK NO: SL1	LOCATION: Effingham Inlet	Page Number: 2 of 3
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Stand Tending/Pruning/Fertilization

Spacing	The maximum acceptable crop tree density, as determined by a survey, will be 10 000 csph (countable stems per hectare) of all species. Where assessments determine that spacing is required, space to lower the density to 500 - 1500 sph.
---------	--

Reforestation Prescription Obligation / Preferred Regeneration and Special Considerations

Planting	Plant as soon after harvest as possible. Use fertilizer tablets at time of planting to enhance crop establishment.					
SU	Area (ha)	Elevation (m)	Soil Depth (cm)	Aspect	Recommended Planting Prescription (spp. %)	Comments
1	9.5	50-300	50	NE	Plant Cw @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.
2	6.9	50-475	60	E-NE	Plant Cw ₈₀ Ba ₂₀ @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.
3	22.5	50-475	55	E-NE	Plant Cw ₈₀ Ba ₂₀ @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.

Stocking Requirements

ASSESSMENT DATES								
SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)						
		EARLY		LATE				
1	6	11		14				
2	3	8		11				
3	3	8		11				
STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION								
SU	PREFERRED SPECIES		ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)	
	SPECIES / MINIMUM HEIGHT (m)		SPECIES / MINIMUM HEIGHT (m)		MIN	MAX		
1	Ba 1.75, Cw 1.5, Hw 3.0				500	1500	10,000	
2	Ba 1.75, Cw 1.5, Hw 3.0				500	1500	10,000	
3	Ba 2.25, Cw 2.0, Hw 4.0				500	1500	10,000	
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	DENSITY (stems/ha)	
1	900	500	400	2.0				150%
2	900	500	400	2.0				150%
3	900	500	400	2.0				150%
COMMENTS:								
SU 1/A: ID# 36533		Silv Strat REF # 33						
SU 2/B: ID# 36536		Silv Strat REF # 36						
SU 3/C: ID# 36538		Silv Strat REF # 38						

LICENCE NO.: A50650	CUTTING PERMIT: N/A	CUTBLOCK NO: SL1	LOCATION: Effingham Inlet	Page Number: 3 of 3
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PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser</p> <hr/> <p>RPF Name (Printed)</p>	
<p>Date: December 9, 2004</p> <p>3351</p>	<p>RPF No: _____</p> <p>_____</p> <p>RPF Signature and Seal</p>

VISUAL IMPACT ASSESSMENT

Effingham Inlet

T.S.L. A50650

Blocks SL1, SL1A

South Island Forest District

Completed For: C Mokko Manufacturing Ltd.
4590 Helen Street
Port Alberni, B.C.
V9Y 6P5

Completed By: Coast Forest Management Ltd.
2338 South Island Highway
Campbell River, B.C.
V9W 1C3

July 2004

VISUAL IMPACT ASSESSMENT FORMAT

The report describes the geographic area and locations of proposed Blocks SL1 and SL1A and the visual quality objectives, existing visual conditions and landscape sensitivity of the applicable visual landscape units. The report combines the use of a brief descriptive text, key maps, and digitally rendered visual terrain models.

- A Key Map at 1:20,000 scale is attached to the report. This map details the location of the proposed cutblocks, the visual landscape units, and the viewpoints used in this analysis. Viewpoints were chosen to reflect the location of greatest visual impact from Effingham Inlet (VP 1 and 2).
- The digital terrain models have been generated through the use of digital TRIM and forest cover map information. The configurations of Blocks SL1 and SL1A are based on the final detail engineering completed by Coast Forest Management Ltd. (CFM).
- Photographs were also taken from the established viewpoints.

GENERAL DESCRIPTION OF REPORT OBJECTIVES

This report outlines the findings of the Visual Impact Analysis (VIA) of the harvesting proposed on Blocks SL1 and SL1A in the vicinity of Effingham Inlet, approximately 33 km northeast of the community of Ucluelet. These blocks form a part of the SBFEP 2002-2006 Forest Development Plan for the Alberni Operating Area.

VISUAL LANDSCAPE INVENTORY

The harvesting proposed for these blocks falls within a non-visible (NV) polygon. However, digital terrain modeling indicates that the opening will be visible from Effingham Inlet. For purposes of this analysis, an inventory polygon representing the visible portion of the NV polygon has been created. Based on observed conditions within this polygon the following visual inventory ratings have been assigned.

Landscape Unit	Landscape Sensitivity Rating (LSR)	Visual Absorption Capacity (VAC)	Existing Visual Condition (EVC)	Visual Quality Objective (VQO)
SL1	Medium	Medium	Partial Retention	Partial Retention

Since the majority of adjacent polygons have a VQO of partial retention this VQO was also designated for the SL1 polygon.

BLOCKS UNDER ASSESSMENT - Blocks SL1 and SL1A

This report focuses on the expected visual impact of the harvesting proposed on Blocks SL1 and SL1A. Although the proposed harvesting is being administered as two cutblocks, SL1 and SL1A are adjacent. This assessment will analyze the proposed harvesting in SL1/SL1A as a single opening. The table below provides details regarding harvest area, harvest method, and which landscape unit(s) each block is within.

Block	Net harvest Area (Ha)	Harvest Method	Landscape Unit
SL1/SL1A	51.3	Heli and Conv	SL1

VIEWPOINT 1 - Results and Recommendations

Viewpoint 1 is located in the center of Effingham Inlet at a bearing of 110°. The results of this assessment indicate that the harvesting proposed in Blocks SL1 and SL1A will increase the alteration of the VLU SL1 viewscape to a total of 3.4% of the landscape unit. Therefore, no further actions are required to meet the recommended VQO for this VLU.

VIEWPOINT 2 - Results and Recommendations

Viewpoint 2 is located in the center of Effingham Inlet at a bearing of 98°. The results of this assessment indicate that the harvesting proposed in Blocks SL1 and SL1A will increase the alteration of the VLU SL1 viewscape to a total of 3.2% of the landscape unit. Therefore, no further actions are required to meet the recommended VQO for this VLU.

GENERAL SUMMARY OF VIA

The harvesting proposed by C Mokko on Blocks SL1 and SL1A will meet the visual resource management objectives for the area. No remedial actions for these blocks are recommended.

Appendix 2



Visual Impact Assessment Summary Form

(To be completed for each individual cutblock or road proposed)

Licensee Name: **C Mokko Manufacturing Ltd.**

Licence Number:

T.S.L. A50650

CP# or RP#:

Block No.:

SL1/SL1A

Proposed Year of Harvest: **2004**

Proposed Silviculture System:

Retention

Type of Proposed Operation: **Conventional and Helicopter Harvesting**

Net Block Size excl. WTPs (ha):

Net Harvest= 51.3 ha.

Visual Resource Management LABEL (old)

VLU#: **SL1** VSR: **Medium** VAC: **Medium** EVC: **Partial Retention** RVQO: **Partial Retention**

Visual Resource Management LABEL (old)

VLU#: VSR: VAC: EVC: RVQO:

Visual Resource Management LABEL (new)

VLU#: VSR: VAC: EVC: RVQO:
BR: VC: VR:

DOES EVC EXCEED RECOMMENDED
VISUAL QUALITY OBJECTIVE?

Yes

No

x

VIEWPOINTS & PHOTOGRAPH INFORMATION

Number and name of viewpoints from which the proposal is visible and photos are taken	VP 1 Effingham Inlet	VP 2 Effingham Inlet			
Viewpoint importance (Major/Minor/Potential)	Major	Major			
Viewpoint coordinates Zone 10 (NAD 83) (Lat./Long. or UTM inc. elevation (m))	125.1501°E 49.0441°N 2m above water level	125.1487°E 49.050°N 2m above water level			
Viewing distance (Foreground/Middleground/Background)	Middleground 2.7 km	Middleground 2.5 km			
Viewing duration (High/Moderate/Low) This factor is important when deciding if the RVQC has been achieved from all selected viewpoints. (See Box 1)	High	High			
Focal length of camera lens (mm)	50mm	50mm			
Direction of view (degrees)	290°	278°			

VIA - T.S.L.-Blocks SL1/SL1A- C Mokko Manufacturing Ltd. -Effingham Inlet

VQO Calculations for visible area in VLU SL1 is				116.9 cm ²
Block	Status	Area (cm ²)	%Alteration	
SL1/SL1A	Proposed	<u>4.0</u>	<u>3.42</u>	
Totals		<u><u>4.0</u></u>	<u><u>3.42</u></u>	
Viewpoint#1 -Effingham Inlet				
VQO Calculations for visible area in VLU SL1 is				97.4 cm ²
Block	Status	Area (cm ²)	%Alteration	
SL1/SL1A	Proposed	<u>3.1</u>	<u>3.18</u>	
Totals		<u><u>3.1</u></u>	<u><u>3.18</u></u>	
Viewpoint#2 -Effingham Inlet				

Visual Impact Assessment Guidebook

1. ASSESSING BASIC VQO DEFINITION

Describe the level of impact that the proposed alteration, in combination with any existing non-VEG alterations, will have on the landscape from each viewpoint, using one of the following terms: <i>Not visible, Not visually evident, Subordinate, Dominant, Out of scale</i>	VP 1 Subordinate	VP 2 Subordinate		
Which basic VQO definition would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints and taking into account viewpoint importance, viewing distance and viewing duration?				
<input type="checkbox"/> P <input type="checkbox"/> R <input type="checkbox"/> PR <input type="checkbox"/> M <input type="checkbox"/> MM				
If applicable, state reasons why the proposed alteration(s) does not achieve the basic definition of the Recommended VQO from any of the selected viewpoints.				

2. ASSESSING VISUAL DESIGN

Have major lines of force been identified and used to develop the size and shape of the proposed operation? (If Yes, attach visual force analysis to this form.)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Has the proposed operation borrowed from the natural character of the landscape?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Have edge treatments been incorporated into the design of the proposed operation (feathered edges, irregular cutblock design, etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Have "islands," or patches of trees, been maintained to mitigate visual impacts and other resource management objectives?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are there any existing human-made alterations visible in the unit that exhibit poor design?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If Yes, describe design deficiencies below:	
If applicable, list any additional design techniques used and/or state reasons why certain design techniques could not be employed.	

VIA - T.S.L.-Blocks SL1/SL1A- C Mokko Manufacturing Ltd. -Effingham Inlet

Visual Impact Assessment Guidebook

3. ASSESSING NUMERICAL DATA

Complete either the clearcut or partial-cutting section below depending on the silviculture system used.

Percent Alteration Worksheet for Group Retention Harvesting

Use photograph or computer simulation output from each viewpoint for calculations. See Appendix 8 for example of calculation.

1. Total area of landform/VSU in perspective view as seen from each viewpoint (measured in cm²)

116.9 cm²

97.4 cm²

2. Visible ground area of *proposed* alteration(s) in perspective view as seen from each viewpoint (measured in cm²)

4.0 cm²

3.1 cm²

3. Visible ground area of all *existing* alterations in non-VEG state in perspective view as seen from each viewpoint (measured in cm²)

0 cm²

0 cm²

4. Total % alteration of the viewshed in perspective view as seen from each viewpoint [(#2 + #3)/#1] x 100 = #4

3.4%

3.2%

Identify for each viewpoint which VQO will be achieved based on % alteration. See Table 3 in VIA Guidebook for % alteration guidelines.

Partial Retention

Partial Retention

Which VQO would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints based on percent alteration only?

☒ P ☒ R ☒ PR ☒ M ☒ MM

Partial-cutting Evaluation

What % volume or stems retention is
(Retention is in Group patches in this block)

% Volume Remaining

% Stems Remaining

Which VQO would the proposed alteration, in combination with any existing non-VEG alterations, meet from all the selected viewpoints based on volume or stems remaining?

See Table 4 in VIA Guidebook for partial-cutting guidelines.

☒ P ☒ R ☒ PR ☒ M ☒ MM

N/A

VIA - T.S.L.-Blocks SL1/SL1A-C Mokko Manufacturing Ltd. - Effingham Inlet

Visual Impact Assessment Guidebook

VIA SUMMARY

Does the proposal, in combination with any existing non-VEG alterations, achieve the basic definition for the Recommended VQO?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Have visual design concepts and principles been incorporated into block/road design?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the proposal, in combination with any existing non-VEG alterations, fall within the numerical ranges for the Recommended VQO? <i>(See Note below)</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Given the three criteria listed above, does the proposal meet the Recommended VQO from all the selected viewpoint(s)? At present the RVQO of partial retention does not exceed the RVQO.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
--	---

Completed By: Bryan Fraser and Barney Guthrie Coast Forest Management Ltd.	Date Completed: July 2004
---	---------------------------

NOTES:

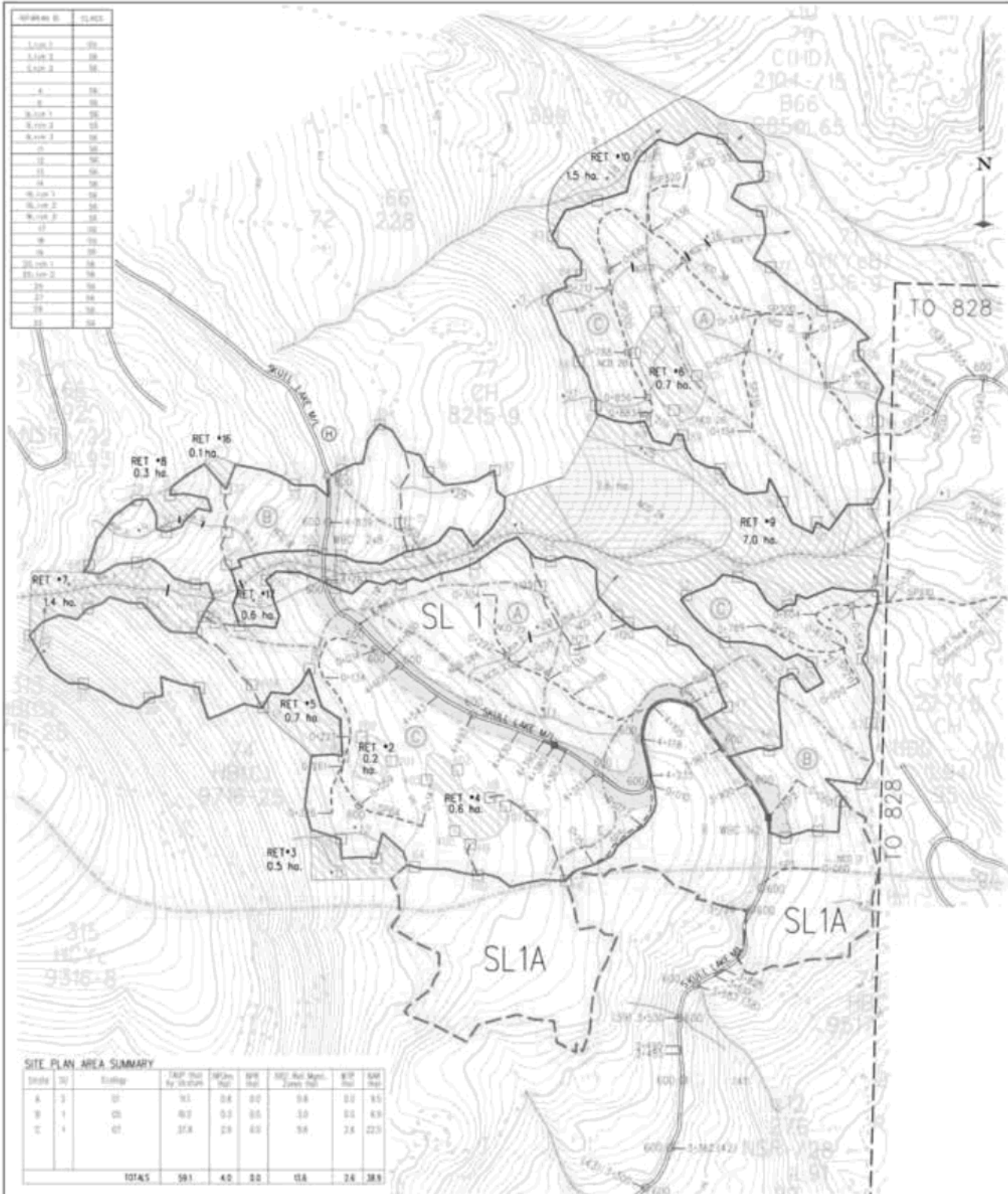
1. It is strongly recommended that the district office be consulted before carrying out an assessment to confirm viewpoint locations and content recommendations.
2. Proposed alterations are assessed using three criteria (the first two being the most critical ones):
 - (a) meeting basic definition and intent of VQO,
 - (b) quality of design, and
 - (c) scale of alteration.
3. Silvicultural systems leaving significant tree cover will be assessed using volume or stems remaining rather than by scale of alteration as outlined in Visual Impacts of Partial Cutting (1997).
4. Visual quality objectives must be achieved from all selected viewpoints.

ADDITIONAL CONSIDERATIONS

Has this visual impact assessment incorporated all known alterations proposed in the scenic area for the next 5 years (i.e., all operations proposed by the same or different licensee)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Comments:	

VIA - T.S.L.-Blocks SL1/SL1A- C Mokko Manufacturing Ltd. -Effingham Inlet

WATER ID	CLAS
1.000.1	10
1.000.2	10
1.000.3	10
2	10
3	10
3.000.1	10
3.000.2	10
3.000.3	10
4	10
5	10
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99.000.3	10
100	10
100.000.1	10
100.000.2	10
100.000.3	10



SITE PLAN AREA SUMMARY

Block	Sub	Subdiv	Area (ha)	Area (ac)	Area (sq ft)	Area (sq mi)	Area (sq km)	Area (sq mi)	Area (sq km)
A	1	10	10.1	2.5	2.5	0.001	0.001	0.001	0.001
B	1	10	10.1	2.5	2.5	0.001	0.001	0.001	0.001
C	1	10	10.1	2.5	2.5	0.001	0.001	0.001	0.001
TOTALS			30.3	7.5	7.5	0.003	0.003	0.003	0.003

SITE PLAN MAP

C MOKKO MANUFACTURING LIMITED

TENURE: T.S.L.50650

CUTBLOCK: SL1

DATE: JULY 09, 2004

DRAWN BY: AT

SCALE: 1:5,000

REFERENCE MAP: 907004



COAST FOREST
MANAGEMENT LTD.
FOREST CONSULTANTS

233K SOUTH ISLAND HWY.
CAMPELL RIVER, B.C. V9M 1C3
TELEPHONE: (250) 903-2542
FAX: (250) 923-2543

CUTTING PERMIT BERRY

ADJACENT OUTLOOK BERRY

PREVIOUSLY LOGGED BERRY

HELISPLIT LINE

WILDLIFE TRAIL

PAVING TRAIL

WILDLIFE RESERVE

ZONE (BRT)

MANAGEMENT ZONE

BOC RETENTION

NATURAL NON-PRODUCTIVE

SWAMP, SCORP, ROCK

MANAGEMENT ZONE

PAVING TRAIL

TRAIL (BRT) MODIFICATION

VS. SCORP/PC MONT ZONE

FALING CORNER

EXISTING ROADS

LOCATED ROADS

BACKSPAR TRAIL

EXISTING BRIDGE

PROPOSED BRIDGE

ROAD CHAINAGE

CL. VERTS

(C. CMP, WBC)

LANDING

CLASSIFIED FISH

STREAM (10-50) OF FSC

CLASSIFIED NON-FISH

STREAM (10-50)

GRADIENT CLASSIFIED

FISH STREAM (10-50)

NON-CLASSIFIED DRAINAGE

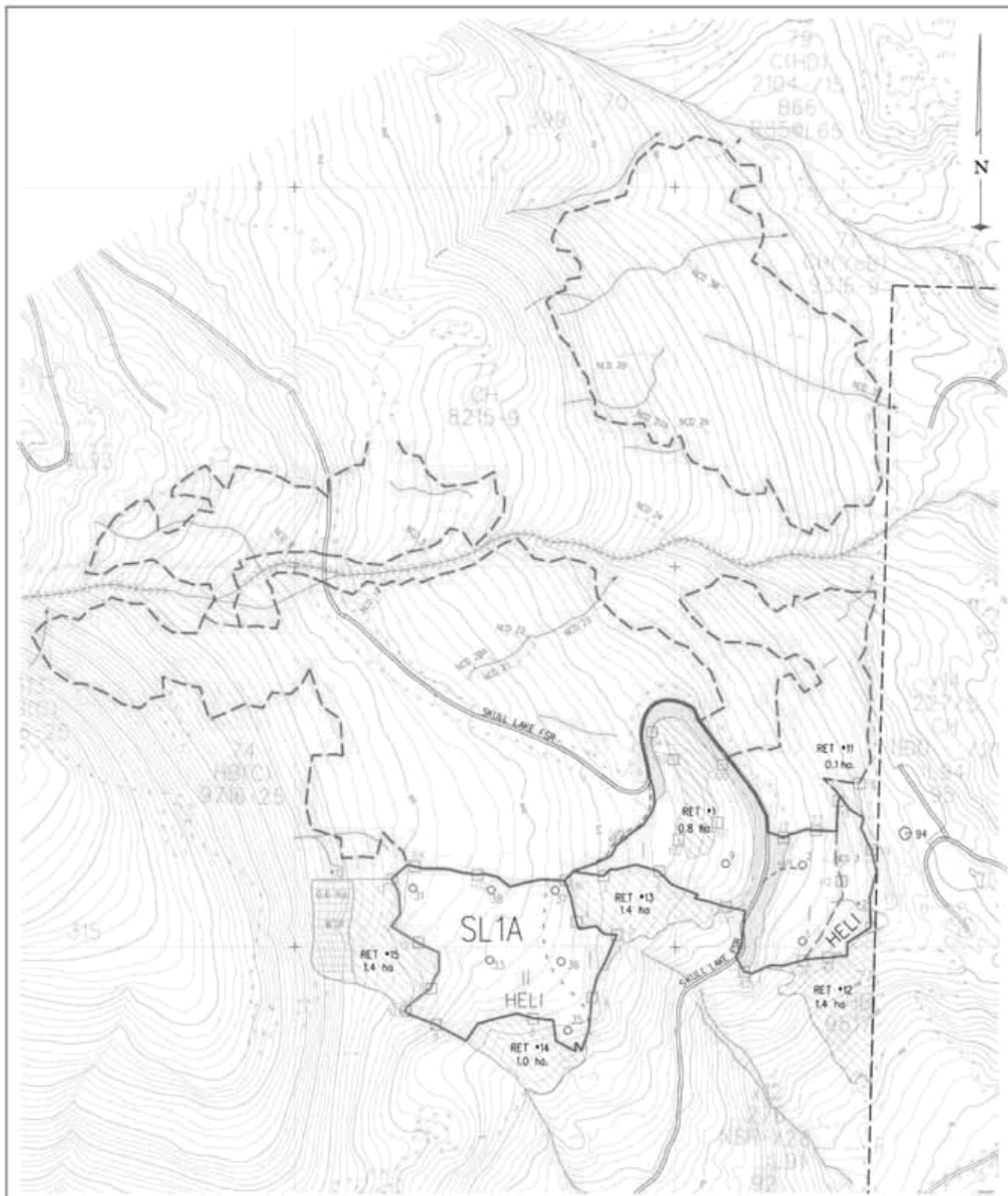
DULLED STREAM

UNCLASSIFIED STREAM

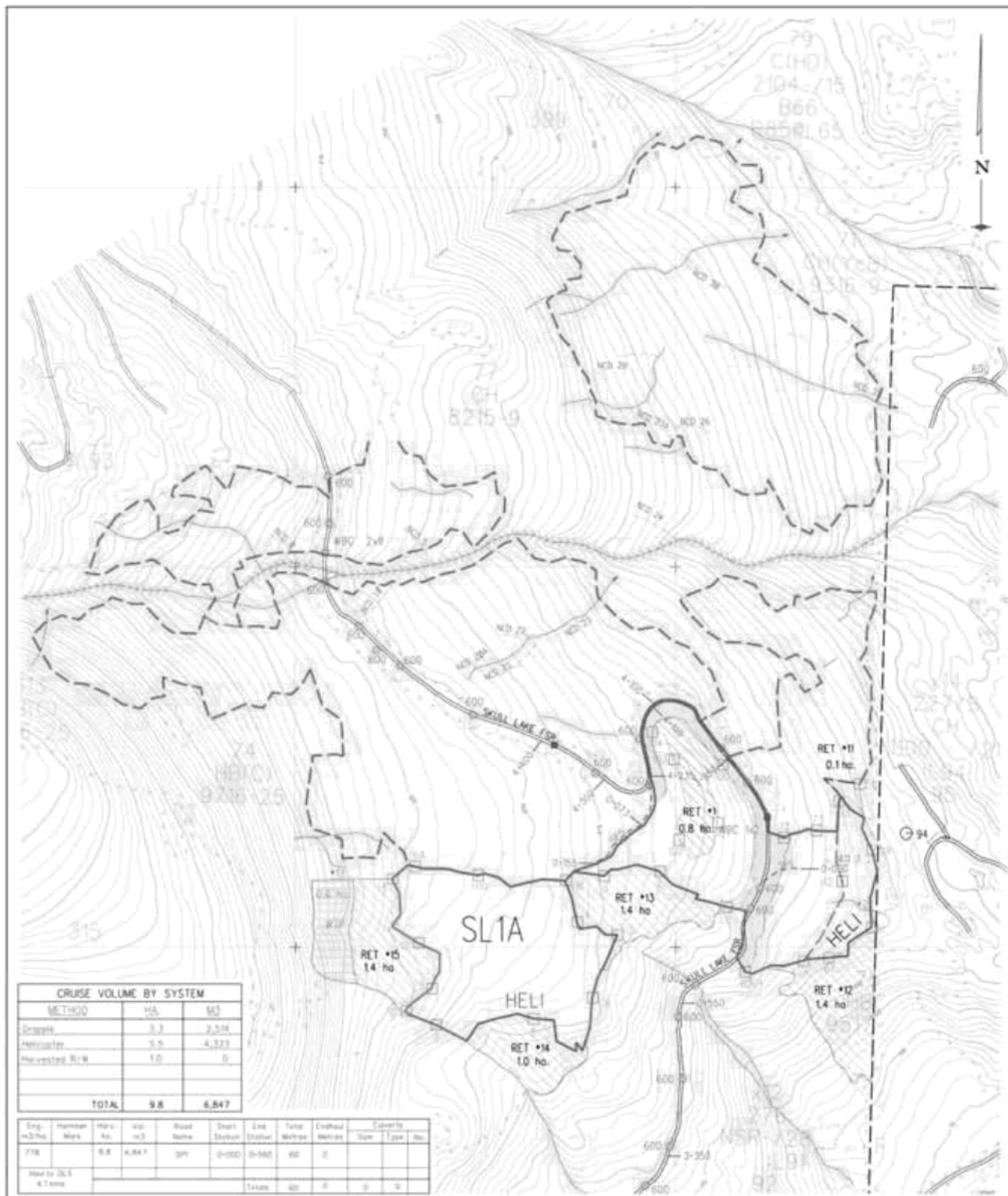
STREAM REACH BERM

REEF CONTOUR

INTERMEDIATE CONTOUR



CMOKKO MANUFACTURING LTD.	FINAL CRUISE MAP				<div>CUTTING PERMIT BERRY</div> <div>ADJACENT CUTBLOCK BERRY</div> <div>PREVIOUSLY LOGGED BERRY</div> <div>HELISPLIF LANE</div> <div>WILDLIFE TRAIL PATCH (W/F)</div> <div>WMA/MA RESERVE ZONE (RRZ)</div> <div>MANAGEMENT ZONE SOOT RETENTION</div> <div>NATURAL, NON-PRODUCTIVE (SWAMP, SLOPE, ROCK)</div> <div>MANAGEMENT ZONE PARTIAL CUT</div> <div>THEIR CROWN MODIFICATION NO SCREEN/PC MEAT ZONE</div> <div>FALLING CORNER</div> <div>EXISTING ROAD</div> <div>LOCATED ROAD</div> <div>BACKSPIN TRAIL</div> <div>EXISTING BRIDGE</div> <div>PROPOSED BRIDGE</div> <div>ROAD CHANGE</div> <div>CLIMBERS - HE, CAMP, WIDE</div> <div>LANDING</div>	<div></div> <div>LEGEND</div> <div>CLASSIFIED FISH STREAM (C1-S4) or FSE</div> <div>CLASSIFIED NON-FISH STREAM (S5-S8)</div> <div>GRADIENT CLASSIFIED FISH STREAM or FSE</div> <div>NON-CLASSIFIED DRAINAGE</div> <div>DOTTED STREAM</div> <div>UNCLASSIFIED STREAM</div> <div>STREAM REACH BREAK</div> <div>INDEX CONTOUR</div> <div>INTERMEDIATE CONTOUR</div> <div>WIDE, ROCK, ALPINE</div> <div>SCREE, BLOWDOWN, SWAMP</div> <div>LOGGED</div> <div>QUARRY, PIT</div> <div>HELICOPTER LANDING</div> <div>HELICOPTER LANDING PAD</div> <div>BECK EAGLE NEST</div> <div>HARVESTED BERRY OF W/F</div> <div>CONTOUR INTERVAL: 5 METRES</div>	<div>CRAZE TYPE LINE</div> <div>CRAZE TYPE LABEL</div> <div>MEASURE CRAZE PLOT</div> <div>COUNT CRAZE PLOT</div>																	
	TENURE: T.S.L. A50650	UTM GRID	ZONE	EASTING				NORTHING																
	CUTBLOCK *SL1A	10	33QRL.2	5435820.9																				
	DATE: 23 July 2004	LATITUDE		LONGITUDE																				
	DRAWN BY: AT	49° 03' 16.0"		125° 11' 23.7"																				
	REFERENCE MAP: 092F004	FOREST REGION:		COAST																				
	AIR PHOTO NO.: *	FOREST DISTRICT:		SOUTH ISLAND																				
	SCALE: 15,000	LAND DISTRICT:		CLAYCOOT																				
	A) HARVEST AREA (EX RET.): 9.8																							
	(EXC 1.0 Ha Harvested N/W)																							
B) PARTIAL CUT (0.0%)																								
C) NET HARVEST (A-B): 8.8																								
D) P.A.S. New: 0.3																								
E) P.A.S. Bush: 0.4																								
F) W/F/RRZ/NOOT RET.: 8.3																								
G) GROSS (AUP) (C+E+F): 9.5																								
	<div></div> <div>COAST FOREST MANAGEMENT LTD.</div> <div>2338 SOUTH ISLAND HWY, CAMPBELL HOUSE VIC. 390 1/2</div> <div>TELEPHONE: (050) 911-2547</div> <div>FIRST CONSULTANTS (04) (050) 913-2543</div>																							
	<div>CRUISE SUMMARY</div> <table><thead><tr><th>CRAZE LINE</th><th>LOG LINE</th><th>RET. TOT</th><th>STAMP TOT</th></tr></thead><tbody><tr><td>I CHE 001</td><td>3.0</td><td>3.009</td><td></td></tr><tr><td>II CHE 001</td><td>2.8</td><td>3.009</td><td></td></tr><tr><td>Per. N/W</td><td>1.0</td><td>0</td><td></td></tr><tr><td>TOTALS</td><td>6.8</td><td>6.018</td><td></td></tr></tbody></table>				CRAZE LINE	LOG LINE	RET. TOT	STAMP TOT	I CHE 001	3.0	3.009		II CHE 001	2.8	3.009		Per. N/W	1.0	0		TOTALS	6.8	6.018	
CRAZE LINE	LOG LINE	RET. TOT	STAMP TOT																					
I CHE 001	3.0	3.009																						
II CHE 001	2.8	3.009																						
Per. N/W	1.0	0																						
TOTALS	6.8	6.018																						



CRUISE VOLUME BY SYSTEM			
METHOD	HA	MS	
Skidder	3.3	2,514	
Helicopter	5.5	4,333	
Harvested R/W	1.0	0	
TOTAL	9.8	6,847	

Eng. No.	Harvested Area	Harvested Area	Harvested Area	Harvested Area	Harvested Area	Harvested Area	Harvested Area	Harvested Area	Harvested Area
718	9.8	4,847	301	0-000	0-000	0	0	0	0
How to Use: 4.7 km									
Totals: 400 0 0 0 0									

CMOKKO MANUFACTURING LTD.	APPRAISAL ROAD MAP			CUTTING PERMIT BORY		CLASSIFIED FISH STREAM (ST-5A1 or F52)	
	UTM GRID	ZONE	EASTING				
TENURE: T.S.L. A50650	10	339963.2	5455820.9	PREVIOUSLY LOGGED BORY		GRADIENT CLASSIFIED FOR STREAM in F52	
CUTBLOCK *SL1A	LATITUDE		LONGITUDE	HELICOPTER LANE		NON-CLASSIFIED DRAINAGE	
DATE: 23 July, 2004	49 03 16.0"		125 11 25.1"	WILDFIRE TREE PATCH (WTF)		DULLED STREAM	
DRAWN BY: AT	FOREST REGION:		COAST	WPA/RRS RESERVE ZONE (RRZ)		UNCLASSIFIED STREAM	
REFERENCE MAP: 0927004	FOREST DISTRICT:		SOUTH ISLAND	MANAGEMENT ZONE SOUP RETENTION		STREAM REACH BREAK	
AIR PHOTO NO.: *	LAND DISTRICT:		CLAYCOOT	NATURAL NON-PRODUCTIVE (SWAMP, SCALP, ROCK)		INDEX CONTOUR	
SCALE: 1:5,000				MANAGEMENT ZONE PARTIAL CUT		INTERMEDIATE CONTOUR	
A) HARVEST AREA (02 RET.): 9.8 (incl. 1.0 ha Harvested R/W)				TREE CHAIN MODIFICATION VS SCREENING NEXT ZONE		SIDE, ROCK, ALPINE	
B) PARTIAL CUT: (0.02)						SCORP BLOWDOWN SWAMP	
C) NET HARVEST (A+B): 9.8						LOGGED	
D) P.A.S. New: 0.3						QUARRY PIT	
E) P.A.S. Burn: 0.4						HELICOPTER LANDING	
F) WTP/RR2/1004 RET.: 6.7						HELICOPTER LANDING PAD	
G) CROSS (A+B) (C+E+F): 16.5						DOUB. NEST	
						HARVESTED RIGHT OF WAY	
						CONTOUR INTERVAL: 5 METRES	



BC Timber Sales

Strait of Georgia Business Unit

STREAM DATA FOR TSL 50650 – BLOCK SL1A

Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Sideslopes (%)
2	S6	25	0.6	R10,B10,C10,G40,F20,O10	H	L	<5

#3 is a non-classified drainage as indicated on the 1:5,000 map.

****Debris Transport Potential** is calculated using the methodology from the Gully Assessment Procedure Guidebook.

***LWD Dependency** is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5.

Streambed material: O=organics (decomposed plant and woody material); F=finer (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm); B=boulder (>25cm); R=Bedrock

RIPARIAN MANAGEMENT STRATEGIES

Riparian/Lake				DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	Residual values	
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)		AVERAGE BA (m ² /ha)	DENSITY (SP/H)
2	S6	0	20	FX, YX, HH, NC	0	

Definitions

NCD	Non-classified drainage.
FA/BL	Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.
FA	Fall Away. Timber is to be felled away.
YA	Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream. Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.
HH	100% Harvested (no retention of saplings).
RS	Retain Saplings within 5m of the stream channel (non-merchantable).
FE	Feathered Edge.
BPT	Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.
NHZ	No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.
FX	Fall Across.
YX	Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.
YV	Yard Vertically.
MFZ	Machine Free Zone.
MC	Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.
HC	Hand Clean introduced transportable debris.
AHC	Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.
NC	No stream cleaning required.
	Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing).
	Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code.
	Reserve zone and management zone widths are provided as slope distances.

Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.

E.2 GULLY MANAGEMENT STRATEGIES (COAST)

N/A

RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION

RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY:
Janis McLean

RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY:
Bryan Fraser, RPF

SIGNATURE:

DATE: June 21, 2004



SITE PLAN Supporting Information

B.C. Timber Sales Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO.: SL1A	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004	ENGINEERED BY: Colin Benoit/Erich Geddert	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
0.7	0.0	0.0	0.0	0.0	0.0	0.6	0.0	6.1	7.4
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU/STRATA	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
2/B	BEC: CWHvm1 ss05(4 / E) The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh ₂₀ , Vaccpa ₁₅ , Menzfe ₀₁ , Rubusp ₀₅ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₀₅ , Dryoex ₀₅ , Rubupe ₀₂ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is an 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								6.3
3/C	BEC: CWHvm1 ss07(5 / B) The present stand consists of northeast facing CH 961 old growth on moderately steep to steep (40-70%) slopes. Indicator vegetation consists of Gaulsh ₂₀ , Vaccpa ₁₅ , Menzfe ₀₁ , Rubusp ₁₀ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₁₀ , Dryoex ₀₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is an 12cm Mor. The Bm horizon is a 55cm, very well drained, light-brown coloured, SiL with 30% cobble sized coarse fragments. Substrate is karst carbonate.								2.8
TOTAL NET AREA TO BE REFORESTED:									9.1
TOTAL AREA UNDER PRESCRIPTION:									16.5

B.1 RESERVE DESCRIPTION

TLA	There are five TLAs within the TAUP containing an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. Several of the protect significant karst features.
WTP	<u>Characteristics and Species of the WTP:</u> The WTP contains an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. The ecology of this area is CWHvm1/07. This is mature CwHw(Ba) timber. This area has some downed coarse woody debris and will provide good wildlife habitat now as well as into the future.

C. OBJECTIVES

C.1 MANAGEMENT OBJECTIVES

MANAGEMENT OBJECTIVES STATED IN THE FDP OR HLP(s):

Long Term Management Objectives stated:

Fibre Production: To manage for a species mix of saw and pulp logs, ensuring a continuous and economically viable supply.

Riparian Management: Prevent, or mitigate impacts on stream channel dynamics, aquatic ecosystems, water quality, and the diversity, productivity and sustainability of habitat and vegetation adjacent to riparian areas with reserve zones, or where high wildlife habitat values are present.

Wildlife: Provide habitat for large mammals and other wildlife, and maintain ecosystem processes. Preserve ungulate winter ranges, maintain adequate visual screening of preferred habitats, allow for continuous forage and, through various retention systems and WTPs, incorporate stand level biodiversity goals.

Visual Landscape Management: Manage visual values identified through Visual Landscape Inventory or planning process. VQOs have been established in a higher level plan.

Recreation: Maintain road networks used for recreational activities, and to mitigate visual impacts from cutblock on recreational landscapes.

Biodiversity: Stand level biodiversity objectives are attained through the retention of Riparian Management Areas (RMAs), Wildlife Tree Patches (WTPs), and Timber Leave Areas (TLAs). This cutblock is in the Effingham Landscape Unit with a target level of 6% WTP retention. The cutblock is also in Barkley SMZ #14. Coarse Woody Debris (CWD) will be maintained on site provided it does not impede achieving the free growing stocking standards and does not conflict with coastal utilization standards.

Cultural Heritage Resources: To identify cultural features, including Culturally Modified Trees (CMTs), and develop the necessary strategies to manage the resources.

Forest Health: Limit the spread of pathogens in the regenerating forest and address any wind concerns.

Karst: Maintain the inherent productivity of the site in order to ensure the regeneration of a healthy and vigorous forest crop, maintain key biological components in the immediate area for any significant karst feature identified, maintain the natural flow of water courses and minimize the introduction of sediments or other pollutants into these systems, protect karst features from physical damage.

C.2 CONDITIONS THAT MUST EXIST AFTER HARVEST OR TREATMENT TO ACCOMMODATE FOREST RESOURCES

C.2a WILDLIFE

Minimal evidence of wildlife activity was identified and no bear dens or eagle nests were found in this cutblock.

Prescribed site conditions:

A WTP with an area equal to 6 percent of the net harvest area has been retained for wildlife values. Wildlife for nest cavities, nest platforms, dens, roosts, hunting perches, foraging sites, and display stations during breeding. They may improve the viewscape, become a future source of CWD, and provide structural diversity.

C.2b SENSITIVE AREAS

Prescribed site conditions: N/A

C.2c FISHERIES

One non-fish bearing stream is located in the proposed cutblock.

Prescribed site conditions: Harvest operations will comply with the Riparian Management Strategies (E1).

C.2d WATERSHEDS

No CWAPs have been required or completed for this watershed.

Prescribed site conditions:

Normal stream management practices as prescribed in the Riparian Management Plan will adequately protect watershed resources.

C.2e RECREATION

Karst formations are present throughout this block. Madrone Environmental Consultants completed a karst field assessment.

Prescribed site conditions:

Areas with significant karst features having recreational value have been reserved from harvesting. Additionally, harvesting and road construction operations will comply with protective measures as specified in the assessment. Several sinkholes are protected by Fall Away/Yard Away prescriptions. These management zones are mapped on the Harvest Release Map.

C.2f BIOLOGICAL DIVERSITY

See C.2a "WILDLIFE" above.

Prescribed site conditions:**C.2g VISUALS**

This cutblock is within a non-visible (NV) polygon. This polygon is classified as non-visible (NV) from Effingham Inlet. However, a VIA indicates that the opening will be visible.

Prescribed site conditions:

The proposed alteration meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.

C.2h CULTURAL HERITAGE

This cutblock is in the joint traditional territories of the Toquaht and Tseshaht First Nations. Baseline Archaeological Services Ltd. conducted an AIA on June 17, 2004 under heritage inspection permit 2003-289.

Prescribed site conditions:

No heritage resources or examples of historical use have been identified. If unanticipated archaeological remains are found during development, work in the immediate area will cease and the Archaeology Branch and the Toquaht and Tseshaht First Nations will be contacted.

C.2j OTHER RESOURCES

N/A

CONDITIONS NOT APPLICABLE TO THIS PRESCRIPTION

THE FOLLOWING CONDITIONS WERE CONSIDERED, AND FOUND NOT TO BE APPLICABLE TO THIS PRESCRIPTION: N/A

D. ECOLOGICAL INFORMATION AND SITE CHARACTERISTICS**D.1 ECOLOGY AND CRITICAL SITE CONDITIONS**

BIOGEOCLIMATIC							
SU	STRATUM	ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES	PHASE
2	B	CWH	vm	1		05	
3	C	CWH	vm	1		07	
SU	CRITICAL SITE CONDITIONS THAT AFFECT THE TIMING OF OPERATIONS, AND HOW THEY AFFECT THE TIMING						
	N/A						

E. MANAGEMENT PRACTICES

BC Timber Sales

Strait of Georgia Business Unit

STREAM DATA FOR TSL A50650 – BLOCK SL1A

Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Sideslopes (%)
2	S6	25	0.6	R10,B10,C10,G40,F20,O10	H	L	<5

#3 is a non-classified drainage as indicated on the 1:5,000 map.

**Debris Transport Potential is calculated using the methodology from the Gully Assessment Procedure Guidebook.

*LWD Dependency is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5.

Streambed material: O=organics (decomposed plant and woody material); F=finer (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm);

B=boulder (>25cm); R=Bedrock

RIPARIAN MANAGEMENT STRATEGIES

Riparian/Lake				Residual values	
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)	DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	
2	S6	0	20	FX, YX, HH, NC	AVERAGE BA (m ² /ha) DENSITY (SPH)
					0

Definitions	<p>NCD Non-classified drainage.</p> <p>FA/BL Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.</p> <p>FA Fall Away. Timber is to be felled away.</p> <p>YA Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream.</p> <p>Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.</p> <p>HH 100% Harvested (no retention of saplings).</p> <p>RS Retain Saplings within 5m of the stream channel (non-merchantable).</p> <p>FE Feathered Edge.</p> <p>BPT Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.</p> <p>NHZ No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.</p> <p>FX Fall Across.</p> <p>YX Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.</p> <p>YV Yard Vertically.</p> <p>MFZ Machine Free Zone.</p> <p>MC Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.</p> <p>HC Hand Clean introduced transportable debris.</p> <p>AHC Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.</p> <p>NC No stream cleaning required.</p> <p>Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing).</p> <p>Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code.</p> <p>Reserve zone and management zone widths are provided as slope distances.</p> <p>Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.</p>
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E.2 GULLY MANAGEMENT STRATEGIES (COAST)

N/A

RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION

RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY:
Janis McLean

RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY:
Bryan Fraser, RPF

SIGNATURE:

DATE: December 9, 2004

E. MANAGEMENT PRACTICES (CONT.)

E.3 FOREST HEALTH MANAGEMENT

MEASURES TO REDUCE FOREST HEALTH RISKS

Biotic

The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Abiotic – Wind

A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.

E.4 COARSE WOODY DEBRIS

MEASURES TO ACCOMMODATE CWD OBJECTIVES, INCLUDING VOLUME AND RANGE OF PIECE SIZES, IF ANY

Sound and rotting logs and stumps that provide habitat for plants, animals, and insects and are a source of organic matter for future soil development will be maintained through the retention of trees in the WTP, and the TLA, and the distribution of logging residue across the cutblock. Piling of slash within the setting and/or on the roadside may also contribute to wildlife habitat diversity and variations in CWD distribution. The current allowable limit for post-harvest residue that qualifies as harvestable is 35m³/ha.

E.5 ARCHAEOLOGICAL SITES

MEASURES TO MANAGE AND CONSERVE ARCHAEOLOGICAL SITES

In the event that archaeological resources are encountered, suspend all harvest activities in the immediate vicinity and inform the Ministry of Forests, the Archaeology Branch and appropriate First Nation, as soon as possible, of the location(s) and type of the archaeological resources and the nature of the disturbance.

F. SOIL CONSERVATION

F.1 SITE DISTURBANCE

SU	HAZARD RATINGS <i>(if logging methods other than cable or aerial are proposed)</i>			SOIL CHARACTERISTICS <i>(if temporary access structures are proposed)</i>			
	SOIL COMPACTION	SOIL EROSION	SOIL DISPLACEMENT	DEPTH TO UNFAVOURABLE SUBSOIL (cm)		TYPE OF UNFAVOURABLE SUBSOIL	SEDIMENT DELIVERY RISK (community watershed)
				MIN(cm)	MAX(cm)		
2	H	H	H	40	60	Carbonates	
3	H	VH	VH	30	55	Carbonates	

GROUND BASED OPERATION LIMITATIONS:

SLOPE INSTABILITY INDICATORS: None

F.2 SOIL DISTURBANCE LIMITS

MAXIMUM PROPORTION OF TOTAL AREA UNDER THE PRESCRIPTION ALLOWED FOR PERMANENT ACCESS:

SU	MAXIMUM ALLOWABLE SOIL DISTURBANCE WITHIN THE NET AREA TO REFOREST (%) per cutblock	MAXIMUM EXTENT TO WHICH SOIL DISTURBANCE LIMITS MAY BE TEMPORARILY EXCEEDED TO CONSTRUCT TEMPORARY ACCESS STRUCTURES (%)
All	5	N/A

MAXIMUM SOIL DISTURBANCE AT ROADSIDE: 25%

MAXIMUM ALLOWABLE TIME TO COMPLETE REHAB (MEASURED FROM COMPLETION OF HARVEST): 1 year

F.4 EXCAVATED AND BLADED TRAILS

SU	MAX ALLOWABLE HEIGHT OF CUTBANKS (m)	AVERAGE HEIGHT OF CUTBANKS (m)	EQUIPMENT TO BE USED (IF OTHER THAN EXCAVATOR)
All	No excavated and bladed trails are to be constructed.	N/A	N/A

G. SILVICULTURAL SYSTEMS

G.1 SILVICULTURAL SYSTEMS

SYSTEM	
Retention	
COMMENTS FOR NON VARIABLE RETENTION CUTBLOCKS	
DESCRIPTION OF POST-HARVEST STAND STRUCTURE and SITE CONDITION	<p>The "retention" system goal of retaining structural elements and forest influences from the pre-harvest stand will be achieved by retaining over a rotation, a minimum of 10% area retention in group tree patches within the cutblock. It is the intent of this prescription that reserves in excess of this 10% area minimum will be available for harvest as visual green-up of the landscape unit allows. The groups will generally be 0.25 hectares or greater. Retention is prescribed in this cutblock as follows:</p> <p>This cutblock consists of three openings within the TAUP. Within these opening there are eight retention patches adjacent to the exterior cutblock boundary and three interior retention patches. The ecology in these patches varies from zonal CWHvm1 01 to richer CWHvm1 05/07.</p> <p>Cruise data indicates that the average codominant height of the harvested stand is 39m. The WTP is similar in age, height, and development to the harvest area. Generally, Cw and Hw are the dominant stems with Hw and minor Ba in codominant layer. Minor amounts of dead and down logs exist. Canopy closure varies from open to broken.</p>
LEAVE TREE SPECIES AND FUNCTION:	<p>A retention silvicultural system retains structural elements from the pre-harvest stand, such as live and dead trees and woody debris, for at least one rotation, to provide structural diversity and forest or residual tree influences over the majority of the cutblock.</p> <p>Forest and residual tree influences, the biophysical effects of forests or individual trees on the environment of the surrounding land, will be retained over the cutblock. The degree, type, and distance of influence will vary widely. Within and adjacent to harvested areas, most forest edge and residual tree influences begin to diminish significantly at distances greater than one tree length from a standing tree, group of trees, or forest edge. The specific objective is to retain forest and/or residual tree influence over more than 50% of the harvest area.</p> <p>The intent of the reserves (TLAs and the WTP) is to maintain lifeboats and enrich reestablished stands with structural features that would otherwise be absent, as well as contributing to meeting the forest influence objective. Stocking in the reserved areas consists of mature Cw.</p> <p>The WTP provides additional wildlife values, and is designated as a long-term reserve. For a description of the WTP refer to section C.2 Wildlife and Biological Diversity.</p>

H. STOCKING REQUIREMENTS

Stocking Requirements

H.1 ASSESSMENT DATES							
SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)					
		EARLY		LATE			
2	3	8		11			
3	3	8		11			
H.2 STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION							
SU	PREFERRED SPECIES	ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)	
	SPECIES / MINIMUM HEIGHT (m)	SPECIES / MINIMUM HEIGHT (m)		MIN	MAX		
2	Ba 1.75, Cw 1.5, Hw 3.0			500	1500	10,000	
3	Ba 2.25, Cw 2.0, Hw 4.0			500	1500	10,000	
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)	HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	
2	900	500	400	2.0			150%
3	900	500	400	2.0			150%
COMMENTS:							
SU 2/B: ID# 36536		Silv Strat REF # 36					
SU 3/C: ID# 36538		Silv Strat REF # 38					

I. ADMINISTRATION

PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser</p> <p>RPF Name (Printed)</p> <p>Date: December 9, 2004 RPF No: 3351</p>	<p>_____</p> <p>RPF Signature and Seal</p>
PRESCRIPTION REFERENCES:	SBFEP REPRESENTATIVE SIGNATURE:
<p>LEGEND</p> <p><input checked="" type="checkbox"/> SP ATTACHMENT</p> <p><input checked="" type="checkbox"/> ON FILE</p> <p>N/A NOT APPLICABLE</p> <p><input checked="" type="checkbox"/> 1:5000 SP MAP</p> <p><input checked="" type="checkbox"/> SP FIELD DATA CARDS (e.g.: site and soil classification, forest health evaluations, soil hazard assessment, treatment recommendations, slope instability indicators)</p> <p><input type="checkbox"/> ADDITIONAL SP COMMENTS</p> <p><input type="checkbox"/> COMMENTS FROM REFERRALS</p> <p><input checked="" type="checkbox"/> WINDTHROW ASSESSMENT (July 2004)</p> <p><input type="checkbox"/> NON-DM DIRECTED FOREST HEALTH RECCE/SURVEY</p> <p><input checked="" type="checkbox"/> CMT SURVEY (June 2004).</p> <p><input type="checkbox"/> HABITAT DIVERSITY ASSESSMENT (N/A)</p> <p><input type="checkbox"/> GREEN UP INFORMATION (N/A)</p> <p><input checked="" type="checkbox"/> PERMANENT ACCESS CALCULATION SHEET (June 2004)</p> <p><input type="checkbox"/> GROUND BASED OPERATIONS GUIDELINES</p>	<p>_____</p> <p>SBFEP Representative</p> <p>_____</p> <p>SBFEP Representative (printed)</p> <p>Date: _____</p>
ASSESSMENTS COMPLETED:	
<p><input checked="" type="checkbox"/> VISUAL IMPACT ASSESSMENT (June 2004)</p> <p><input type="checkbox"/> RIPARIAN ASSESSMENT: ENGINEERING TRAVERSE (N/A)</p> <p><input checked="" type="checkbox"/> RIPARIAN ASSESSMENT: FISH ASSESSMENT (May-June 2004)</p> <p><input checked="" type="checkbox"/> TERRAIN STABILITY FIELD ASSESSMENT</p> <p><input type="checkbox"/> GULLY ASSESSMENT (N/A)</p> <p><input checked="" type="checkbox"/> ARCHAEOLOGICAL IMPACT ASSESSMENT (June 2004)</p> <p><input checked="" type="checkbox"/> KARST MANAGEMENT REPORT (July 2004)</p>	



SITE PLAN

BC Timber Sales Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO: SL1A	LICENSEE NAME: BC Timber Sales, Strait of Georgia Business Unit
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004	LOCATION: Pipestem Inlet	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
0.7	0.0	0.0	0.0	0.0	0.0	0.6	0.0	6.1	7.4
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
2	BEC: CWHvm1 ss05(4 / E) The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh ₃₀ , Vaccpa ₁₅ , Menzfe ₀₁ , Rubusp ₀₅ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₀₅ , Dryoex ₀₅ , Rubupe ₃₃ , Hylosp ₁₅ , Rhytlo ₁₀ . Soils: The humus horizon is a 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SiL with 40% cobble sized coarse fragments. Substrate is karst carbonate.								6.3
3	BEC: CWHvm1 ss07(5 / B) The present stand consists of northeast facing CH 961 old growth on moderately steep to steep (40-70%) slopes. Indicator vegetation consists of Gaulsh ₂₅ , Vaccpa ₃₀ , Menzfe ₀₁ , Rubusp ₁₀ , Blecsp ₀₅ , Cornca ₀₁ , Polymu ₁₀ , Dryoex ₀₅ , Hylosp ₁₅ , Rhytlo ₁₅ . Soils: The humus horizon is a 12cm Mor. The Bm horizon is a 55cm, very well drained, light-brown coloured, SiL with 30% cobble sized coarse fragments. Substrate is karst carbonate.								2.8
TOTAL NET AREA TO BE REFORESTED:									9.1
TOTAL AREA UNDER PRESCRIPTION:									16.5

Max. Soil Disturbance Roadside (%)	Max. Temp Soil Dist. Setting (%)	Max. Permanent Access Structure (%)	Coarse Woody Debris Requirement (%)	Wildlife Tree Retention Requirement (%)
25%	5%	7%	35%	6%

Critical Site Factors That Affect the Timing of Operations	
SU 2	N/A
SU 3	N/A

Free Growing Stocking Standards										
ID	Silv Stra. Ref.	SU	Area (ha)	Regen Delay (yrs)	Preferred Species (P); Height (m)	Acceptable Species (A); Height (m)	Target WS P&A (#/ha)	Min. WS P&A (#/ha)	Min. WS P (#/ha)	Min. Inter- tree Dist. (m)
36536	36	2	6.9	3	Ba 1.75, Cw 1.5, Hw 3.0	N/A	900	500	400	2.0
36538	38	3	22.5	3	Ba 2.25, Cw 2.0, Hw 4.0	N/A	900	500	400	2.0

SU	Early FTG (yrs)	Late FTG (yrs)	Max. Coniferous @ FTG (#/ha)	Post Spacing Density (max/min) (#/ha)	Height vs. Comp. (%)
2	8	11	1500	500	150%
3	8	11	1500	500	150%
COMMENTS: N/A					

Assessments (OSPR sec. 36.1)			Registered Professional Forester – Signature and Seal
Type	Required (Yes/No)	Date Completed	
Visual Impact Assessment	Yes	21 Jun/04	
Gully Assessment	No	N/A	
Pest Incidence Survey	No	N/A	
Archaeological Impact Assessment	Yes	28 Jun/04	
<p>The procedures required by regulation have been followed for any assessment that is required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p> <p>This Site Plan is consistent with the results and recommendations of any assessment required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p>			<p>R.P.F. Signature:</p> <p>Date: December 9, 2004</p>



SITE PLAN AMENDMENT #1

BC Timber Sales

Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: X G	CUTBLOCK NO.: SL1A	LICENSEE NAME: BC Timber Sales, Strait of Georgia Business Unit
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004 - 162	LOCATION: Pipestem Inlet	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	3.7	4.7
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
2	<p>BEC: CWHvm1 ss05(4 / E)</p> <p>The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh₃₀, Vaccpa₁₅, Menzfe₀₁, Rubusp₀₅, Bleesp₀₅, Cornce₀₁, Polymu₀₅, Dryoex₀₅, Rubupe₀₅, Hylosp₁₅, Rhytlo₁₅. Soils: The humus horizon is a 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SIL with 40% cobble sized coarse fragments. Substrate is karst carbonate.</p>								4.4
TOTAL NET AREA TO BE REFORESTED:									4.4
TOTAL AREA UNDER PRESCRIPTION:									9.1


Max. Soil Disturbance Roadside (%)	Max. Temp. Soil Dist. Setting (%)	Max. Permanent Access Structure (%)	Coarse Woody Debris Requirement (%)	Wildlife Tree Retention Requirement (%)
25%	5%	7.2%	35%	6%

The permanent access structure percentage is calculated at 7.2%. This amount exceeds the default performance standard of 7.0%. Pursuant to THSPR Sections 30(3)(a) and 30(4), this amendment is exempted from District Manager approval. This small cutblock has a net harvest area of 4.4 ha. Due to its location on a switchback of an existing mainline road, the size, topography and engineering constraints of the cutblock cannot accommodate the required permanent access structures.

Critical Site Factors That Affect the Timing of Operations	
SU 2	N/A

Free Growing Stocking Standards										
ID	Site Stra. Ref.	SU	Area (ha)	Regen Delay (yrs)	Preferred Species (P); Height (m)	Acceptable Species (A), Height (m)	Target WS P&A (#/ha)	Min. WS P&A (#/ha)	Min. WS P (#/ha)	Min. Inter- tree Dist. (m)
36536	36	2	4.4	3	Ba 1.75, Cw 1.5, Hw 3.0	N/A	900	500	400	2.0

SU	Early FTG (yrs)	Late FTG (yrs)	Max. Coniferous @ FTG (#/ha)	Post Spacing Density (max/min) (#/ha)	Height vs. Comp. (%)
2	8	11	1500	500	150%
COMMENTS: N/A					

Assessments (OSPR sec. 36.1)			Registered Professional Forester – Signature and Seal	
Type	Required (Yes/No)	Date Completed		
Visual Impact Assessment	Yes	21 Jun/04		
Gully Assessment	No	N/A		
Pest Incidence Survey	No	N/A		
Archaeological Impact Assessment	Yes	28 Jun/04		
<p>The procedures required by regulation have been followed for any assessment that is required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p> <p>This Site Plan is consistent with the results and recommendations of any assessment required under section 36.1 of the <i>Operational and Site Planning Regulation</i>.</p>			<p>R.P.F. Signature:</p> <p>Date: December 15, 2004</p>	

MAXIMUM PERMANENT AND TEMPORARY ACCESS STRUCTURES

TENURE: TSL A50650 Block SL1ADRAINAGE: Skull LakePrepared by: Janis McLean Date: December 15, 2004

Category of Disturbance	Road Name	Stations		End Haul (Y/N)	Side Slope %	MoF Constr. Category	Access Class M/TD/SPD/PD/PR (Notes (1)(3))	Length		Length	Width			Area (m2)	Disturbed Area (m2)	Comments
		From	To					OM	ROCK		OM	ROCK	Boundary Reduction			
Road Constr.	Spur 1	0.0	60.0	N	15	6	SPD	3.6	56.4	60.0	10.0	10.0	1.0	600.0		
	Spur 2	0.0	155.0	N	30	6	SPD	9.3	145.7	155.0	14.0	11.0	0.5	866.5		
Built Road	Skull Lake M/L	3650.0	3715.0	N	40	5	M	16.3	48.8	45.0	14.0	11.8	0.5	400.2		**
		3715.0	3870.0	N	40	5	M	38.8	116.3	155.0	14.0	12.5	1.0	1995.6		**
		3870.0	4025.0	N	40	5	M	58.8	116.3	155.0	14.0	11.8	0.5	954.2		**
		4025.0	4235.0	N	20	5	M	52.5	157.5	210.0	11.0	10.8	0.5	1135.3		**
								0.0	0.0	0.0	0.0	0.0		0.0		
								0.0	0.0	0.0	0.0	0.0		0.0		
								0.0	0.0							
	Total									800.0				5951.8	0.0	

Note (1) - Access class of PR indicates road to be rebuilt.

Note (2) - to maintain 15 m. road width siderset must be minimized (i.e. endhaul).

Note (3) - Access Codes:

M - Maintained

TD - Temporary (Seasonal) Deactivation

SPD - Semi-Permanent Deactivation

PD - Permanent Deactivation - Abandoned (no rehab potential)

PR - Permanent Rehabilitation - Abandoned (fully rehabilitate)

** 1.5m added to full width, and 0.75m added to half width on M/L to reflect actual built PAS.

PAS built area = 0.4ha.

Disturbed Area Calculations

Disturbance by Roads		5,952 m2
Number of Landings	1.5	600 m2
Areas of Quarries and Gravel Pits		0 m2
End Haul Spoil Areas		0 m2
Number of Ldgs to Rebuild	0	0 m2
Area of Roads to Rebuild		m2
Total Disturbed Area =		6,552 m2

Site Disturbance	=	Total Disturbed Area (m2)	x 100%	=	6,552 m2 x 100%	=	7.2%
		Gross Area (ha)			9.1 ha		

Note - This worksheet is an estimate of maximum site degradation occurring from the construction of roads, landings, turnouts, quarries and endhaul spoil areas. This estimate has been made prior to SP and cutting permit approval. Actual site degradation measurements will be made after the block is harvested. The Ministry of Forests has set 15 metres as the maximum site degraded road width that can be used on this worksheet.



SITE PLAN AMENDMENT #1 Supporting Information

B.C. Timber Sales Strait of Georgia Business Unit

A. TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: X G	CUTBLOCK NO: SL1A	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004 - 162	ENGINEERED BY: Colin Benoit/Erich Geddert	

B. AREA SUMMARY

AREA OF NO PLANNED REFORESTATION (ha) (NPR)									
PERMANENT ACCESS	ROCK	WATER	SWAMP	OTHER NP	NC>4ha	RESERVES WITH NO MODIFICATIONS: (specify) WTP	IMMATURE	OTHER (specify) TLAs	TOTAL NPR AREA
0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	3.7	4.7
NET AREA TO BE REFORESTED INCLUDING RESERVES WITH MODIFICATIONS (ha)									
SU/ STRATA	SU AREA DESCRIPTION								NET AREA TO BE REFORESTED:
2/B	<p>BEC: CWHvm1 s905(4 / E)</p> <p>The present stand consists of east facing CH 951 old growth on moderately steep (25-50%) slopes. Indicator vegetation consists of Gaulsh_{sp}, Vaccap_{sp}, Menzle_{sp}, Rubusp_{sp}, Blecsp_{sp}, Cornca_{sp}, Polymu_{sp}, Dryoex_{sp}, Rubupe_{sp}, Hylosp_{sp}, Rhylo_{sp}. Soils: The humus horizon is an 14cm Mor. The Bm horizon is a 60cm, very well drained, light-brown coloured, SIL with 40% cobble sized coarse fragments. Substrate is karst carbonate.</p>								4.4
TOTAL NET AREA TO BE REFORESTED:								4.4	
TOTAL AREA UNDER PRESCRIPTION:								9.1	

B.1 RESERVE DESCRIPTION

TLA	There are five TLAs within the TAUP containing an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. Several of the protect significant karst features.
WTP	<u>Characteristics and Species of the WTP:</u> The WTP contains an equivalent percentage of mature trees compared to the harvest areas of the proposed cutblock. The ecology of this area is CWHvm1/07. This is mature CwHw(Ba) timber. This area has some downed coarse woody debris and will provide good wildlife habitat now as well as into the future.

C. OBJECTIVES

C.1 MANAGEMENT OBJECTIVES

MANAGEMENT OBJECTIVES STATED IN THE FDP OR HLP(s):

Long Term Management Objectives stated:

Fibre Production: To manage for a species mix of saw and pulp logs, ensuring a continuous and economically viable supply.

Riparian Management: Prevent, or mitigate impacts on stream channel dynamics, aquatic ecosystems, water quality, and the diversity, productivity and sustainability of habitat and vegetation adjacent to riparian areas with reserve zones, or where high wildlife habitat values are present.

Wildlife: Provide habitat for large mammals and other wildlife, and maintain ecosystem processes. Preserve ungulate winter ranges, maintain adequate visual screening of preferred habitats, allow for continuous forage and, through various retention systems and WTPs, incorporate stand level biodiversity goals.

Visual Landscape Management: Manage visual values identified through Visual Landscape Inventory or planning process. VQOs have been established in a higher level plan.

Recreation: Maintain road networks used for recreational activities, and to mitigate visual impacts from cutblock on recreational landscapes.

Biodiversity: Stand level biodiversity objectives are attained through the retention of Riparian Management Areas (RMAs), Wildlife Tree Patches (WTPs), and Timber Leave Areas (TLAs). This cutblock is in the Effingham Landscape Unit with a target level of 6% WTP retention. The cutblock is also in Barkley SMZ #14. Coarse Woody Debris (CWD) will be maintained on site provided it does not impede achieving the free growing stocking standards and does not conflict with coastal utilization standards.

Cultural Heritage Resources: To identify cultural features, including Culturally Modified Trees (CMTs), and develop the necessary strategies to manage the resources.

Forest Health: Limit the spread of pathogens in the regenerating forest and address any wind concerns.

Karst: Maintain the inherent productivity of the site in order to ensure the regeneration of a healthy and vigorous forest crop, maintain key biological components in the immediate area for any significant karst feature identified, maintain the natural flow of water courses and minimize the introduction of sediments or other pollutants into these systems, protect karst features from physical damage.

C.2 CONDITIONS THAT MUST EXIST AFTER HARVEST OR TREATMENT TO ACCOMMODATE FOREST RESOURCES

C.2a WILDLIFE

Minimal evidence of wildlife activity was identified and no bear dens or eagle nests were found in this cutblock.

Prescribed site conditions:

A WTP with an area equal to 6 percent of the net harvest area has been retained for wildlife values. Wildlife for nest cavities, nest platforms, dens, roosts, hunting perches, foraging sites, and display stations during breeding. They may improve the viewscape, become a future source of CWD, and provide structural diversity.

C.2b SENSITIVE AREAS

Prescribed site conditions: N/A

C.2c FISHERIES

One non-fish bearing stream is located in the proposed cutblock.

Prescribed site conditions: Harvest operations will comply with the Riparian Management Strategies (E1).

C.2d WATERSHEDS

No CWAPs have been required or completed for this watershed.

Prescribed site conditions:

Normal stream management practices as prescribed in the Riparian Management Plan will adequately protect watershed resources.

C.2e RECREATION

Karst formations are present throughout this block. Madrone Environmental Consultants completed a karst field assessment.

Prescribed site conditions:

Areas with significant karst features having recreational value have been reserved from harvesting. Additionally, harvesting and road construction operations will comply with protective measures as specified in the assessment. Several sinkholes are protected by Fall Away/Yard Away prescriptions. These management zones are mapped on the Harvest Release Map.

C.2f BIOLOGICAL DIVERSITY
See C.2a "WILDLIFE" above. Prescribed site conditions:
C.2g VISUALS
This cutblock is within a non-visible (NV) polygon. This polygon is classified as non-visible (NV) from Effingham Inlet. However, a VIA indicates that the opening will be visible. Prescribed site conditions: The proposed alteration meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.
C.2h CULTURAL HERITAGE
This cutblock is in the joint traditional territories of the Toquaht and Tseshaht First Nations. Baseline Archaeological Services Ltd. conducted an AIA on June 17, 2004 under heritage inspection permit 2003-289. Prescribed site conditions: No heritage resources or examples of historical use have been identified. If unanticipated archaeological remains are found during development, work in the immediate area will cease and the Archaeology Branch and the Toquaht and Tseshaht First Nations will be contacted.
C.2j OTHER RESOURCES
N/A
CONDITIONS NOT APPLICABLE TO THIS PRESCRIPTION
THE FOLLOWING CONDITIONS WERE CONSIDERED, AND FOUND NOT TO BE APPLICABLE TO THIS PRESCRIPTION: N/A

D. ECOLOGICAL INFORMATION AND SITE CHARACTERISTICS


D.1 ECOLOGY AND CRITICAL SITE CONDITIONS							
	BIOGEOCLIMATIC						
SU	STRATUM	ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES	PHASE
2	B	CWH	vm	1		05	
SU	CRITICAL SITE CONDITIONS THAT AFFECT THE TIMING OF OPERATIONS, AND HOW THEY AFFECT THE TIMING						
	N/A						

E. MANAGEMENT PRACTICES

 <div style="text-align: center;"> BC Timber Sales Strait of Georgia Business Unit STREAM DATA FOR TSL A50650 – BLOCK SL1A </div>							
Stream Number	Stream Classification	Avg. Gradient (%)	Avg. Width (m)	Streambed Material	*L.W.D. Dependency (L/M/H)	**Debris Transport Potential (L/M/H)	Stream bank Slopes (%)
2	S6	25	0.6	R10,B10,C10,G40,F20,O10	H	L	<5
#3 is a non-classified drainage as indicated on the 1:5,000 map.							
**Debris Transport Potential is calculated using the methodology from the Gully Assessment Procedure Guidebook. *LWD Dependency is a function of the substrate & number of working pieces per 20m of stream length. Low: <=1, Moderate: 2-4, High: >=5. Streambed material: O=organics (decomposed plant and woody material); F=finer (<2.0mm); G=gravel (2.0mm to 65.0mm); C=cobble (65mm to 25cm); B=boulder (>25cm); R=Bedrock							

RIPARIAN MANAGEMENT STRATEGIES						
I.D.	CLASS	Reserve Zone Width (m)	Mgmt Zone Width (m)	DESCRIPTION OF THE PURPOSE AND EXTENT OF REMOVAL OR MODIFICATION OF TREES AND ANY RELATED FOREST PRACTICES IN RIPARIAN RESERVE ZONE(S) (RRZ) (Indicate here if you will be felling or modifying trees for pruning, stream crossings (including b/s trails), or for worker safety in a riparian reserve zone); and MANAGEMENT STRATEGIES FOR RIPARIAN OR LAKESHORE MANAGEMENT ZONES (RMZ) INCLUDING PROTECTING STREAM BANKS (if there is no RRZ), MAINTAINING SHADE, AND DEBRIS MANAGEMENT (IF FELLING AND/OR YARDING ACROSS STREAMS). INCLUDE EITHER THE RESIDUAL BASAL AREA OR DENSITY FOR RMZ(S) AND LMZ(S).	AVERAGE BA (m ² /ha)	DENSITY (SPH)
2	S6	0	20	FX, YX, HH, NC	0	

Definitions	<p>NCD Non-classified drainage.</p> <p>FA/BL Fall Away. Timber is to be felled away. Leaners and danger trees that cannot be safely felled away shall be felled and left bridging the stream.</p> <p>FA Fall Away. Timber is to be felled away.</p> <p>YA Yard Away. Timber is to be yarded away. In order to improve deflection, cables are allowed to be suspended above the stream. Non-fish streams: merchantable leaners and danger trees which have been felled across the stream will, by necessity, be yarded across the stream. Fish streams: leaners and danger trees which have been felled across the stream will be left unless detrimental to the stream.</p> <p>HH 100% Harvested (no retention of saplings).</p> <p>RS Retain Saplings within 5m of the stream channel (non-merchantable).</p> <p>FE Feathered Edge.</p> <p>BPT Blue Painted Trees (selected for removal). Faller's choice of alternate tree if unable to fall painted tree safely.</p> <p>NHZ No Harvest Zone. Trees are to be felled away from the zone. Safe trees that cannot be felled away are to be left as part of the NHZ. Danger trees must be felled and will be left for future LWD or removed if detrimental to the stream.</p> <p>FX Fall Across.</p> <p>YX Yard Across. Stream bank protection measure: Maximize deflection to minimize stream bank disturbance.</p> <p>YV Yard Vertically.</p> <p>MFZ Machine Free Zone.</p> <p>MC Machine Clean transportable introduced large woody debris (LWD) and accumulations concurrent with yarding.</p> <p>HC Hand Clean introduced transportable debris.</p> <p>AHC Assess for Hand Cleaning, post-harvest, based on stream transport capability. Stream cleaning will be done if necessary.</p> <p>NC No stream cleaning required.</p> <p>Do not remove stable natural material that is in a stream or that is embedded in a stream bank, or a root system that contributes to stream bank stability and fish habitat during harvesting or stream cleaning (except when constructing or modifying an authorized stream crossing).</p> <p>Temporary stream crossings must be shown on the SP map. Construction of a temporary stream crossing without authorization or failure to remove a temporary stream crossing may be subject to a penalty under the Forest Practices Code.</p> <p>Reserve zone and management zone widths are provided as slope distances.</p> <p>Note: Where the stream lies outside the harvest area and a portion of the RMA is within the harvest area the prescription will be RS, FA, YA, by necessity. Where the RMZ falls within retention areas (e.g. TLA, WTP), or is completely outside the harvest area, no harvesting will occur; therefore, 100% of the pre-harvest basal area will be retained. When this document is signed, he/she is certifying that the RMP is consistent with the approved FDP and the riparian management strategies contained within.</p>
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E.2 GULLY MANAGEMENT STRATEGIES (COAST)	
N/A	
RIPARIAN MANAGEMENT AND GULLY MANAGEMENT ADMINISTRATION	
RIPARIAN AND GULLY MANAGEMENT STRATEGIES PREPARED BY: Janis McLean	RIPARIAN AND GULLY MANAGEMENT STRATEGIES REVIEWED BY: Bryan Fraser, RPF  SIGNATURE: _____ DATE: December 15, 2004

E. MANAGEMENT PRACTICES (CONT.)

E.3 FOREST HEALTH MANAGEMENT
MEASURES TO REDUCE FOREST HEALTH RISKS
Biotic The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.
Ablotic – Wind A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
E.4 COARSE WOODY DEBRIS
MEASURES TO ACCOMMODATE CWD OBJECTIVES, INCLUDING VOLUME AND RANGE OF PIECE SIZES, IF ANY
Sound and rotting logs and stumps that provide habitat for plants, animals, and insects and are a source of organic matter for future soil development will be maintained through the retention of trees in the WTP, and the TLA, and the distribution of logging residue across the cutblock. Piling of slash within the setting and/or on the roadside may also contribute to wildlife habitat diversity and variations in CWD distribution. The current allowable limit for post-harvest residue that qualifies as harvestable is 35m ³ /ha.
E.5 ARCHAEOLOGICAL SITES
MEASURES TO MANAGE AND CONSERVE ARCHAEOLOGICAL SITES
In the event that archaeological resources are encountered, suspend all harvest activities in the immediate vicinity and inform the Ministry of Forests, the Archaeology Branch and appropriate First Nation, as soon as possible, of the location(s) and type of the archaeological resources and the nature of the disturbance.

F. SOIL CONSERVATION

F.1 SITE DISTURBANCE							
SU	HAZARD RATINGS <i>(if logging methods other than cable or aerial are proposed)</i>			SOIL CHARACTERISTICS <i>(if temporary access structures are proposed)</i>			
	SOIL COMPACTION	SOIL EROSION	SOIL DISPLACEMENT	DEPTH TO UNFAVOURABLE SUBSOIL (cm)		TYPE OF UNFAVOURABLE SUBSOIL	SEDIMENT DELIVERY RISK (community watershed)
				MIN(cm)	MAX(cm)		
2	H	H	H	40	60	Carbonates	
GROUND BASED OPERATION LIMITATIONS:							
SLOPE INSTABILITY INDICATORS: None							
F.2 SOIL DISTURBANCE LIMITS							
MAXIMUM PROPORTION OF TOTAL AREA UNDER THE PRESCRIPTION ALLOWED FOR PERMANENT ACCESS:							
SU	MAXIMUM ALLOWABLE SOIL DISTURBANCE WITHIN THE NET AREA TO REFOREST (%) per cutblock			MAXIMUM EXTENT TO WHICH SOIL DISTURBANCE LIMITS MAY BE TEMPORARILY EXCEEDED TO CONSTRUCT TEMPORARY ACCESS STRUCTURES (%)			
2	5			N/A			
MAXIMUM SOIL DISTURBANCE AT ROADSIDE: 25%							
MAXIMUM ALLOWABLE TIME TO COMPLETE REHAB (MEASURED FROM COMPLETION OF HARVEST): <u>1 year</u>							
F.4 EXCAVATED AND BLADED TRAILS							
SU	MAX ALLOWABLE HEIGHT OF CUTBANKS (m)	AVERAGE HEIGHT OF CUTBANKS (m)	EQUIPMENT TO BE USED (IF OTHER THAN EXCAVATOR)				
2	No excavated and bladed trails are to be constructed.	N/A	N/A				

G. SILVICULTURAL SYSTEMS


G.1 SILVICULTURAL SYSTEMS	
SYSTEM	
Retention	
COMMENTS FOR NON VARIABLE RETENTION CUTBLOCKS	
DESCRIPTION OF POST-HARVEST STAND STRUCTURE and SITE CONDITION	<p>The "retention" system goal of retaining structural elements and forest influences from the pre-harvest stand will be achieved by retaining over a rotation, a minimum of 10% area retention in group tree patches within the cutblock. It is the intent of this prescription that reserves in excess of this 10% area minimum will be available for harvest as visual green-up of the landscape unit allows. The groups will generally be 0.25 hectares or greater. Retention is prescribed in this cutblock as follows:</p> <p>This cutblock consists of one opening within the TAUP. Within this opening there are three retention patches adjacent to the exterior cutblock boundary and one interior retention patch. The ecology in these patches varies from zonal CWHvm1 01 to richer CWHvm1 05/07.</p> <p>Cruise data indicates that the average codominant height of the harvested stand is 39m. The WTP is similar in age, height, and development to the harvest area. Generally, Cw and Hw are the dominant stems with Hw and minor Ba in codominant layer. Minor amounts of dead and down logs exist. Canopy closure varies from open to broken.</p>
LEAVE TREE SPECIES AND FUNCTION:	<p>A retention silvicultural system retains structural elements from the pre-harvest stand, such as live and dead trees and woody debris, for at least one rotation, to provide structural diversity and forest or residual tree influences over the majority of the cutblock.</p> <p>Forest and residual tree influences, the biophysical effects of forests or individual trees on the environment of the surrounding land, will be retained over the cutblock. The degree, type, and distance of influence will vary widely. Within and adjacent to harvested areas, most forest edge and residual tree influences begin to diminish significantly at distances greater than one tree length from a standing tree, group of trees, or forest edge. The specific objective is to retain forest and/or residual tree influence over more than 50% of the harvest area.</p> <p>The intent of the reserves (TLAs and the WTP) is to maintain lifeboats and enrich reestablished stands with structural features that would otherwise be absent, as well as contributing to meeting the forest influence objective. Stocking in the reserved areas consists of mature Cw.</p> <p>The WTP provides additional wildlife values, and is designated as a long-term reserve. For a description of the WTP refer to section C.2 Wildlife and Biological Diversity.</p>

H. STOCKING REQUIREMENTS

Stocking Requirements

H.1 ASSESSMENT DATES								
SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)						
		EARLY				LATE		
2	3	8				11		
H.2 STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION								
SU	PREFERRED SPECIES		ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)	
	SPECIES / MINIMUM HEIGHT (m)		SPECIES / MINIMUM HEIGHT (m)		MIN	MAX		
2	Ba 1.75, Cw 1.5, Hw 3.0				500	1500	10,000	
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	DENSITY (stems/ha)	
2	900	500	400	2.0			150%	
COMMENTS:								
SU 2/B: ID# 36536 Silv Strat REF # 36								

I. ADMINISTRATION

PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser RPF Name (Printed)</p> <p>Date: December 15, 2004 RPF No: 3351</p>	 <p>RPF Signature and Seal</p>
PRESCRIPTION REFERENCES:	SBFEP REPRESENTATIVE SIGNATURE:
<p>LEGEND</p> <p><input checked="" type="checkbox"/> SP ATTACHMENT</p> <p><input checked="" type="checkbox"/> ON FILE</p> <p>N/A NOT APPLICABLE</p> <p><input checked="" type="checkbox"/> 1:5000 SP MAP</p> <p><input checked="" type="checkbox"/> SP FIELD DATA CARDS (e.g.: site and soil classification, forest health evaluations, soil hazard assessment, treatment recommendations, slope instability indicators)</p> <p><input type="checkbox"/> ADDITIONAL SP COMMENTS</p> <p><input type="checkbox"/> COMMENTS FROM REFERRALS</p> <p><input checked="" type="checkbox"/> WINDTHROW ASSESSMENT (July 2004)</p> <p><input type="checkbox"/> NON-DM DIRECTED FOREST HEALTH RECCE/SURVEY</p> <p><input checked="" type="checkbox"/> CMT SURVEY (June 2004).</p> <p><input type="checkbox"/> HABITAT DIVERSITY ASSESSMENT (N/A)</p> <p><input type="checkbox"/> GREEN UP INFORMATION (N/A)</p> <p><input checked="" type="checkbox"/> PERMANENT ACCESS CALCULATION SHEET (June 2004)</p> <p><input type="checkbox"/> GROUND BASED OPERATIONS GUIDELINES</p>	<p>SBFEP Representative</p> <p>SBFEP Representative (printed)</p> <p>Date: _____</p>
ASSESSMENTS COMPLETED:	
<p><input checked="" type="checkbox"/> VISUAL IMPACT ASSESSMENT (June 2004)</p> <p><input type="checkbox"/> RIPARIAN ASSESSMENT: ENGINEERING TRAVERSE (N/A)</p> <p><input checked="" type="checkbox"/> RIPARIAN ASSESSMENT: FISH ASSESSMENT (May-June 2004)</p> <p><input checked="" type="checkbox"/> TERRAIN STABILITY FIELD ASSESSMENT</p> <p><input type="checkbox"/> GULLY ASSESSMENT (N/A)</p> <p><input checked="" type="checkbox"/> ARCHAEOLOGICAL IMPACT ASSESSMENT (June 2004)</p> <p><input checked="" type="checkbox"/> KARST MANAGEMENT REPORT (July 2004)</p>	



TREATMENT REGIME AMENDMENT #1

B.C. Timber Sales Strait of Georgia Business Unit

TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: XG	CUTBLOCK NO: SL1A	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004 - 162	ENGINEERED BY: Colin Benoit/Erich Gedert	

Engineering Comments

No more than 10% of the retention trees in the aggregate or dispersed retention areas or single retention trees in this cutblock may have significant damage.

Significant damage to Hw, Ba, Yc, and Cw is defined as a tree with:

- One or more wounds (i.e. exposed cambium) that girdle more than 1/3 the circumference of the stem.
- Any wounds on a supporting root within one metre of the stem
- A gouge – a wound that penetrates (splintered) into the sapwood or deeper.

Additionally, for Hw and Cw only:

A wound >400cm² on the stem.

Forest Health

Windthrow	A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
Mistletoe	The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment conducted by C Mokko Manufacturing Ltd. will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Preferred Site Preparation

Mechanical Site Preparation Concurrent with Harvest	Fertilize all planted seedlings in all strata. Hand screef plantable spots as required. ALTERNATE SITE PREPARATION: Slash management: 1. Scatter and bury roadside accumulations to contribute to CWD. 2. Landings and roadside accumulations that present a fire hazard or excessively occupy productive growing sites will be piled and burned.
---	---

Vegetation Management

Vegetation Management – General	It is expected that yarding operations will knock down salal cover sufficiently that the attainment of free growing will not be impeded. The need for alder brushing will be monitored in conjunction with silviculture surveys. In areas where alder competition is deemed to prevent the stand from reaching free growing, a brushing treatment consisting of stem injection of alder, and/or manual girdling of alder will be carried out.
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LICENCE NO.: A50650	CUTTING PERMIT: N/A	CUTBLOCK NO: SL1A	LOCATION: Effingham Inlet	Page Number: 2 of 3
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Stand Tending/Pruning/Fertilization

Spacing	The maximum acceptable crop tree density, as determined by a survey, will be 10 000 csph (countable stems per hectare) of all species. Where assessments determine that spacing is required, space to lower the density to 500 - 1500 sph.
---------	--


Reforestation Prescription Obligation / Preferred Regeneration and Special Considerations

Planting	Plant as soon after harvest as possible. Use fertilizer tablets at time of planting to enhance crop establishment.					
SU	Area (ha)	Elevation (m)	Soil Depth (cm)	Aspect	Recommended Planting Prescription (spp. %)	Comments
2	4.4	50-300	55	E-NE	Plant Cw ₈₀ Ba ₂₀ @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.

Stocking Requirements

ASSESSMENT DATES								
SU	REGENERATION DATE (years)	FREE-GROWING ASSESSMENT PERIOD (years)						
		EARLY			LATE			
2	3	8			11			
STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION								
SU	PREFERRED SPECIES	ACCEPTABLE SPECIES			POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)	
	SPECIES / MINIMUM HEIGHT (m)	SPECIES / MINIMUM HEIGHT (m)			MIN	MAX		
2	Ba 1.75, Cw 1.5, Hw 3.0				500	1500	10,000	
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT (delete if not applicable)	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE		BA (m ² /ha)	DENSITY (stems/ha)	
2	900	500	400	2.0			150%	
COMMENTS:								
SU 2/B: ID# 36536 Silv Strat REF # 36								

LICENCE NO.: A50650	CUTTING PERMIT: N/A	CUTBLOCK NO: SL1A	LOCATION: Effingham Inlet	Page Number: 3 of 3
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PRESCRIPTION PREPARED BY (RPF SIGNATURE AND SEAL):	
<p>Bryan Fraser RPF Name (Printed)</p> <p>Date: December 15, 2004 RPF No: 3351</p>	 <p>RPF Signature and Seal</p>

TREATMENT REGIME

B.C. Timber Sales Strait of Georgia Business Unit

TENURE IDENTIFICATION

LICENCE NO.: T.S.L. A50650	CUTTING PERMIT: F	CUTBLOCK NO: SL1A	LOCATION: Pipestem Inlet
TIMBER MARK:	OPENING NUMBER (or mapsheet): 92F.004	ENGINEERED BY: Colin Benoit/Erich Geddert	

Engineering Comments

No more than 10% of the retention trees in the aggregate or dispersed retention areas or single retention trees in this cutblock may have significant damage.

Significant damage to Hw, Ba, Yc, and Cw is defined as a tree with:

- One or more wounds (i.e. exposed cambium) that girdle more than 1/3 the circumference of the stem.
- Any wounds on a supporting root within one metre of the stem
- A gouge – a wound that penetrates (splintered) into the sapwood or deeper.

Additionally, for Hw and Cw only:

A wound >400cm² on the stem.

Forest Health

Windthrow	A windthrow assessment was completed for this cutblock in July 2004. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
Mistletoe	The low to moderate incidence of hemlock dwarf mistletoe (DMH) infection identified during the SP fieldwork necessitates a 3m knockdown of all hemlock during harvest. A post harvest assessment conducted by C Mokko Manufacturing Ltd. will determine whether a sanitation cut of >1m tall damaged conifer residuals (all species) is required.

Preferred Site Preparation

Mechanical Site Preparation Concurrent with Harvest	<p>Fertilize all planted seedlings in all strata. Hand screef plantable spots as required.</p> <p>ALTERNATE SITE PREPARATION:</p> <p>Slash management:</p> <ol style="list-style-type: none"> 1. Scatter and bury roadside accumulations to contribute to CWD. 2. Landings and roadside accumulations that present a fire hazard or excessively occupy productive growing sites will be piled and burned.
---	---

Vegetation Management

Vegetation Management – General	It is expected that yarding operations will knock down salal cover sufficiently that the attainment of free growing will not be impeded. The need for alder brushing will be monitored in conjunction with silviculture surveys. In areas where alder competition is deemed to prevent the stand from reaching free growing, a brushing treatment consisting of stem injection of alder, and/or manual girdling of alder will be carried out.
---------------------------------	---

LICENCE NO.: A50650	CUTTING PERMIT: N/A	CUTBLOCK NO: SL1A	LOCATION: Effingham Inlet	Page Number: 2 of 3
---------------------	---------------------	-------------------	---------------------------	---------------------

Stand Tending/Pruning/Fertilization

Spacing	The maximum acceptable crop tree density, as determined by a survey, will be 10 000 csph (countable stems per hectare) of all species. Where assessments determine that spacing is required, space to lower the density to 500 - 1500 sph.
---------	--

Reforestation Prescription Obligation / Preferred Regeneration and Special Considerations

Planting		Plant as soon after harvest as possible. Use fertilizer tablets at time of planting to enhance crop establishment.				
SU	Area (ha)	Elevation (m)	Soil Depth (cm)	Aspect	Recommended Planting Prescription (spp. %)	Comments
2	6.3	50-300	55	E-NE	Plant Cw ₈₀ Ba ₂₀ @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.
3	2.8	50-325	55	E-SE	Plant Cw ₈₀ Ba ₂₀ @ 1,000 sph	Dispersed surficial karst formations may require reduction of intertree spacing to 1.5 m in some areas, but overall plantability will be adequate.

Stocking Requirements

ASSESSMENT DATES								
SU	REGENERATION DATE (years)		FREE-GROWING ASSESSMENT PERIOD (years)					
			EARLY			LATE		
2	3		8			11		
3	3		8			11		
STOCKING REQUIREMENTS FOR SILVICULTURAL SYSTEMS OTHER THAN SINGLE TREE SELECTION								
SU	PREFERRED SPECIES		ACCEPTABLE SPECIES		POST-SPACING DENSITY (stems/ha)		MAX CONIFEROUS (stems/ha)	
	SPECIES / MINIMUM HEIGHT (m)		SPECIES / MINIMUM HEIGHT (m)		MIN	MAX		
2	Ba 1.75, Cw 1.5, Hw 3.0				500	1500	10,000	
3	Ba 2.25, Cw 2.0, Hw 4.0				500	1500	10,000	
SU	WELL-SPACED TREES/HA				MINIMUM PRUNING HEIGHT	RESIDUAL STAND STRUCTURE (BA or Density)		HEIGHT RELATIVE TO COMPETITION (% or cm)
	TARGET PREF & ACC	MINIMUM PREF & ACC	MIN PREF	MIN HORIZ DISTANCE	(delete if not applicable)	BA (m ² /ha)	DENSITY (stems/ha)	
2	900	500	400	2.0				150%
3	900	500	400	2.0				150%
COMMENTS:								
SU 2/B: ID# 36536		Silv Strat REF # 36						
SU 3/C: ID# 36538		Silv Strat REF # 38						

SITE PLAN CHECKLIST

Region: Coast

District: South Island

Tenure: TSL A50650

FDP (Year): 2002

Cutblock: SL1A

Resource	No	Yes	N/A	Comments
Cutblock Consistent with FDP?		X		
FDP Amendment Submitted?		X		Sec. 42.1 amendment completed 7 July/04
FDP Amendment Approved?			X	
Cutblock in Community Watershed?	X			
Cutblock in RMZ?		X		Effingham RMZ #38
Cutblock in SMZ?		X		Barkley SMZ #14
Cutblock in EFZ?		X		
Cutblock Size Exemption Required?	X			
Adjacent Cutblock Greened-up?	X			Block SL1A is within Barkley SMZ #14. Harvesting this block adjacent to Block SL1 will meet the requirements of the HLP because Block SL1A will use a retention silviculture system, have a net harvest area less than 40 ha, and will retain greater than 40% of the pre-harvest basal area uniformly distributed across the harvest area. Harvesting of Block SL1 must commence prior to commencement of harvesting of Block SL1A.
Cutblock Consistent with CWAP?		X		
FEN Infringement?	X			
WHA Infringement?	X			
Wildlife Habitat Measures Required?	X			
Cutblock in Visual Inventory Polygon?	X			This cutblock is within a non-visible (NV) polygon. However, A VIA indicates that the opening will be visible from Effingham Inlet.
VIA Completed?		X		21 June/04
Cutblock Meets VQO?		X		Meets the definition of Partial Retention for the NV polygon, which is consistent with the VQOs of adjacent visual management polygons.
Cutblock in Recreation Polygon?	X			Karst features within cutblock offer potential recreational opportunities.
Cutblock Consistent with Recreation Objectives?		X		Significant Karst features are protected in accordance with Karst report completed July/04.
Cutblock within 400m of Park Boundary?	X			
Parks Consultation Completed?			X	
TSFA Completed?		X		July/04
Cutblock Consistent with TSFA?		X		Terrain has a terrain stability hazard of low or elevated low terrain stability hazard ratings.
Gully Assessments Completed?			X	
Windthrow Assessment Completed?		X		July/04. Hazard rating is low. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.
CMT Survey Completed?		X		17 June/04
Archaeological Resources Found?	X			No archaeological resources were identified during the survey of Block
AIA Completed?		X		28 June/04
Green Letter Received?			X	No cultural resources identified. No letter required.
Site Deg. Worksheet Completed?		X		30 June/04
Site Deg. ≤ 7.0%?		X		4.0%
50% Forest Influence for Retention System		X		
Stream Assessments Completed?		X		13 May - 9 June/04
RMP Completed?		X		28 June/04
SP Cards Completed?		X		19 April/04

 ?

RPF SIGNATURE

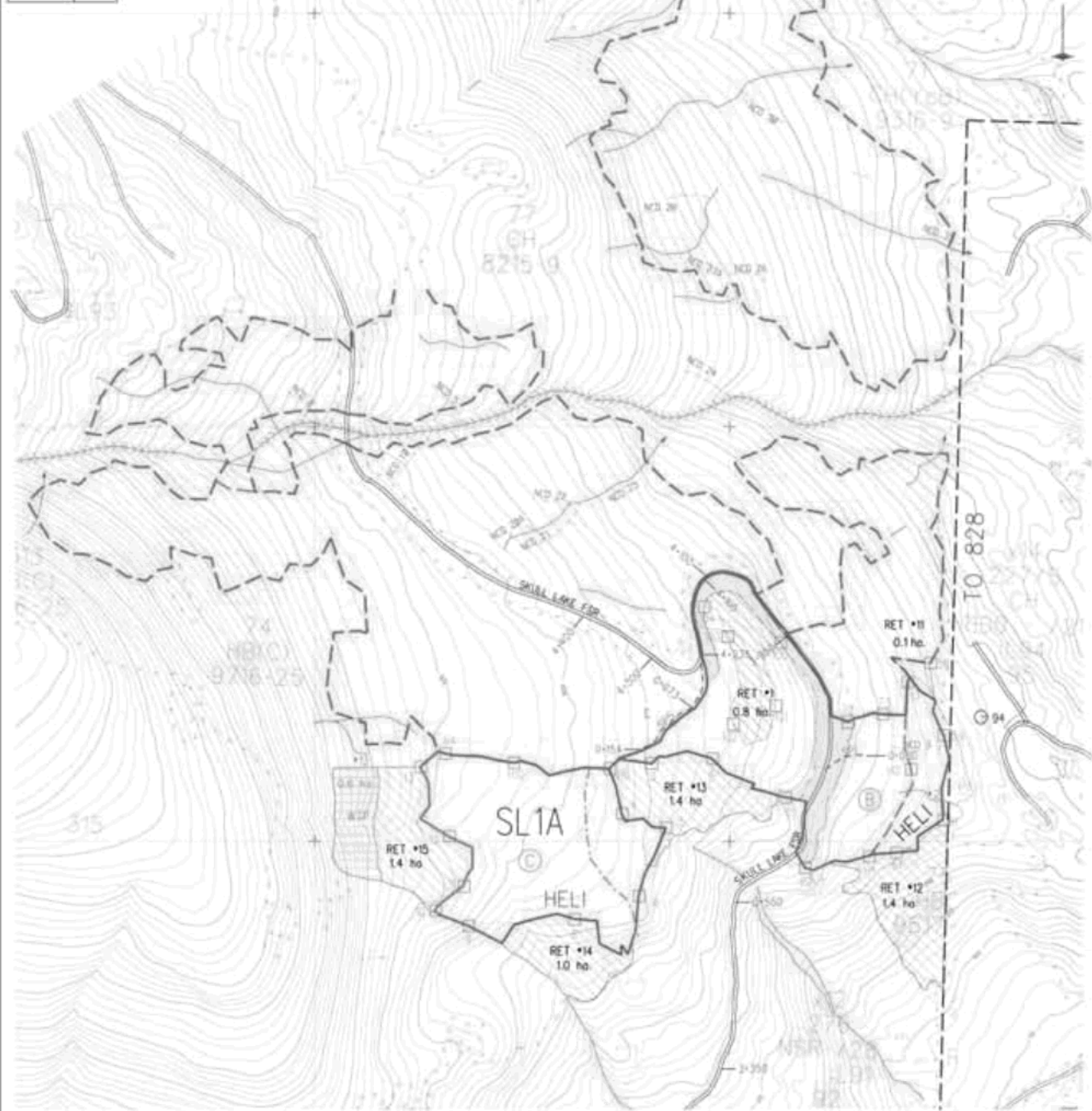
August 30, 2004

DATE

Stream ID	CLAS
1	20
2	20
3	20
4	20
5	20
6	20
7	20
8	20
9	20
10	20
11	20
12	20
13	20
14	20
15	20
16	20
17	20
18	20
19	20
20	20

SITE PLAN AREA SUMMARY

Stream ID	CLAS	Length (m)	Area (ha)	Flow (m³/s)	Flow (m³/s)	Flow (m³/s)	Flow (m³/s)	Flow (m³/s)	Flow (m³/s)
1	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
8	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
11	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
13	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
14	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
15	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
16	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
17	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
18	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
19	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
20	20	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TOTALS		100	1.0	1.0	1.0	1.0	1.0	1.0	1.0



SITE PLAN MAP

C MOKKO MANUFACTURING LIMITED

TENURE: T.S.L. A50650

CUTBLOCK: SL1A

DATE: JULY 02 2004

DRAWN BY: AT

SCALE: 1:5,000

REFERENCE MAP: 92F004



COAST FOREST
MANAGEMENT LTD.
FOREST CONSULTANTS

2308 SOUTH ISLAND HWY.
CAMPELL, NEW ZEALAND
TELEPHONE: (050) 923-2540
FAX: (050) 923-2541

CUTTING PERMIT BODY

ADJACENT OUTBLOCK BODY

PREVIOUSLY LOGGED BODY

HELICOPTER LINE

WILD FIRE TREE

WILDERNESS ZONE (WZ)

WILDERNESS ZONE (WZ)

WILDERNESS ZONE (WZ)

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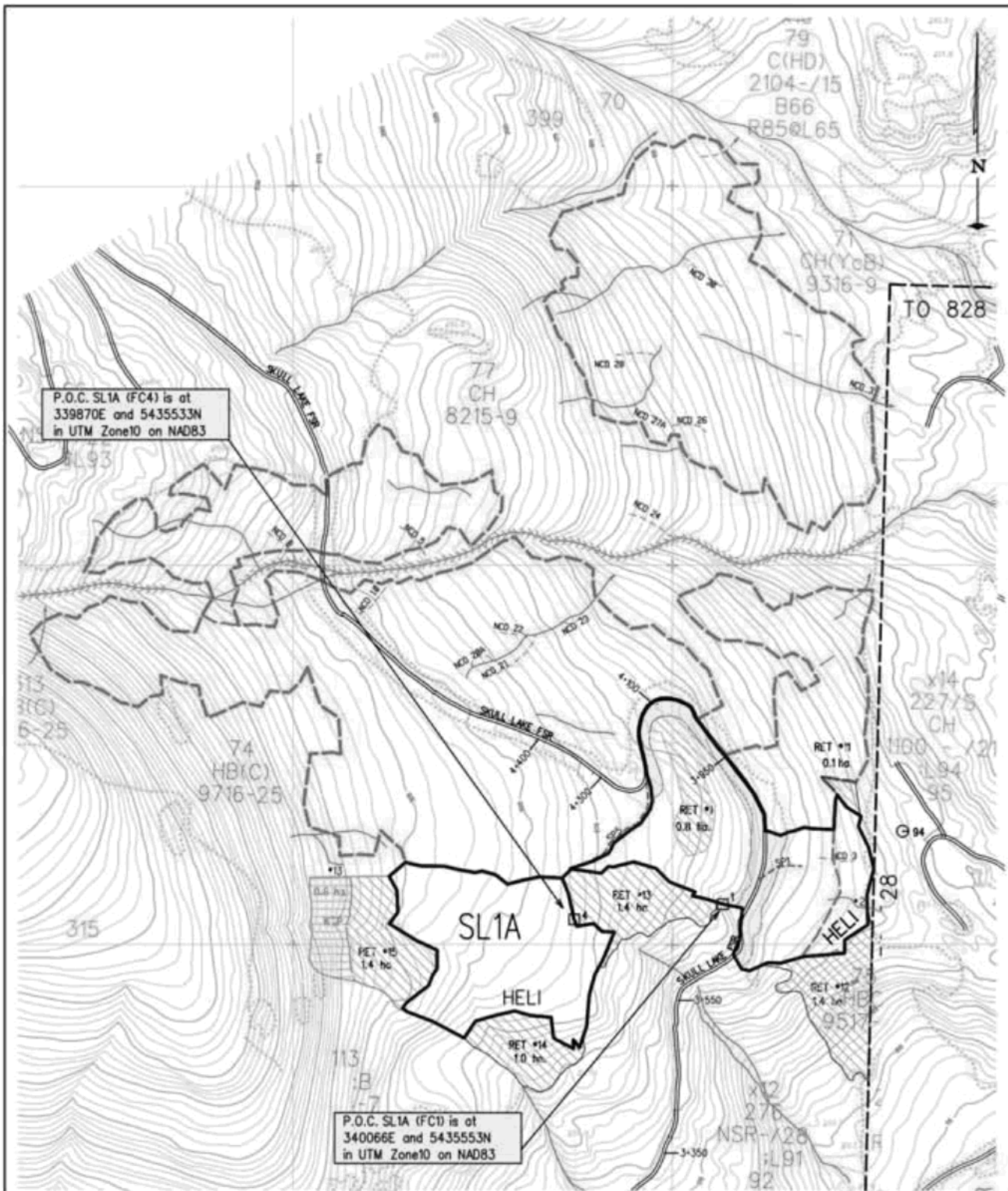
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C MOKKO MANUFACTURING LTD.
4590 HELEN STREET
PORT ALBERNI, BC V9Y 6P5
TEL: (250) 723-8118

CUTTING PERMIT APPLICATION MAP

TSL A50650, C.P. F, BLOCK SL1A



EXHIBIT 'A'
MAP 2 OF 2

REG.:	5
COMPT.:	8
L:	8

P.O.C. OF BLOCK (FC1) UNDER APPLICATION	
(NAD 83) EASTING: 340066 NORTHING: 543553	
U.T.M. 10 LAT: 49° 03' 07" LONG: 125° 11' 20"	

PLANNING CELL:
REF. MAP: 92F.004 & 92F.005
BASE MAP:
FOREST REGION: COAST
FOREST DISTRICT: SOUTH ISLAND
LAND DISTRICT: CLAYOQUOT

DATE: 23 JULY, 2004
DRAWN BY: AT
SCALE: 1:5,000
SHOWN AS:
ORCS:
MDM ID:
CP:

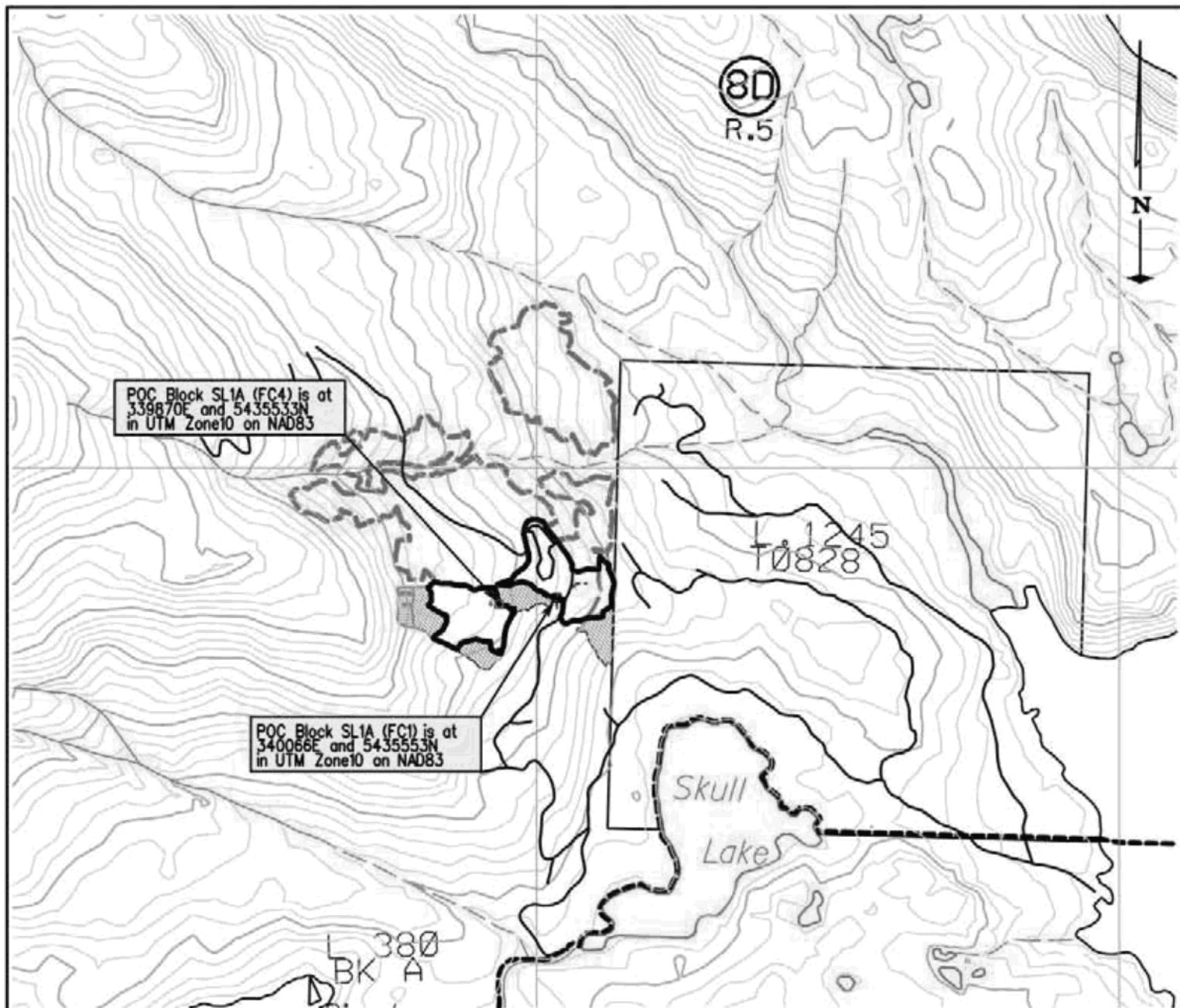
A) HARVEST AREA (OZ RET.):	9.8 ha.
B) PARTIAL CUT (X RET.):	0.0 ha.
C) NET HARVEST (A-B):	9.8 ha.
D) RESERVES INSIDE SURVEYED BLOCK:	0.8 ha.
E) TOTAL AREA (C-D):	10.6 ha.

WILDLIFE RET. PATCH (WTP)	CLASSIFIED FISH STREAM (S1-S4) or FS2	1
MANAGEMENT ZONE 100% RETENTION	CLASSIFIED NON-FISH STREAM (S5-S8)	2
MANAGEMENT ZONE PARTIAL CUT	GRADIENT CLASSIFIED FISH STREAM (S1-S4) or FS2	3
HELISPLUTINE	NON-CLASSIFIED DRAINAGE	4
EXISTING ROADS	UNCLASSIFIED STREAM	5
LOCATED ROADS		

MANAGEMENT UNIT	TIMBER SUPPLY AREA	PULPMWOOD AGREEMENT	CASCADES
TYPE: Z	NUMBER: ARROWSMITH		EAST:
NUMBER:	BLOCK:		WEST: C
	SUB-C:		

COAST FOREST MANAGEMENT LTD.
FOREST CONSULTANTS

2338 SOUTH ISLAND HIGHWAY
CAMPELL RIVER, BC V9W 1C3
TELEPHONE: (250) 923-2542
FAX: (250) 923-2542



C MOKKO MANUFACTURING LTD.
4590 HELEN STREET
PORT ALBERNI, BC V9Y 6P5
TEL: (250) 723-8118

CUTTING PERMIT LOCATION MAP

MAP 2 OF 2


TSL A50650, C.P. F, BLOCK SL1A

REG.:	5
COMPT.:	8
L:	B

POC OF BLOCK (FC1) UNDER APPLICATION

(NAD 83)	EASTING: 340066	NORTHING: 5435553
U.T.M. 10	LAT: 49° 03' 07" LONG: 125° 11' 20"	

PLANNING CELL *:
REF. MAP: 92F.004 & 92F.005
BASE MAP:
FOREST REGION: COAST
FOREST DISTRICT: SOUTH ISLAND
LAND DISTRICT: CLAYOQUOT

DATE: 23 JULY, 2004
DRAWN BY: AT
SCALE: 1:20,000
SHOWN AS: 
ORCS *:
MDM ID:
CP*:

A) HARVEST AREA (0% RET.):	Includes 1.0 ha. Harv. R/W	9.8 ha.
B) PARTIAL CUT (% RET.):		0.0 ha.
C) NET HARVEST (A+B):		9.8 ha.
D) RESERVES INSIDE SURVEYED BLOCK:		0.8 ha.
E) TOTAL AREA (C+D):		10.6 ha.

MANAGEMENT UNIT	TIMBER SUPPLY AREA	PULPWOOD AGREEMENT	CASCADES
TYPE: Z	NUMBER: ARROWSMITH		EAST:
NUMBER:	BLOCK:		WEST: C
	SUB-C:		



**COAST FOREST
MANAGEMENT LTD.
FOREST CONSULTANTS**

2338 SOUTH ISLAND HIGHWAY
CAMPBELL RIVER, BC V9W 1C3
TELEPHONE: (250) 923-2542
FAX: (250) 923-2543

Page 208 to/à Page 240

Withheld pursuant to/removed as

DUPLICATE



**TERRAIN STABILITY HAZARD ASSESSMENT
TSL A50650 – Block SL1
Skull Lake Area**

Coastal Forest Management Limited

for:

Mr. Eric Geddert

by:

Wanda Miller, B.Sc., G.I.T.

**MADRONE ENVIRONMENTAL SERVICES LTD.
1081 Canada Avenue, Duncan, BC V9L 1V2**

July 9, 2004

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TERRAIN STABILITY HAZARD ASSESSMENT TSL A50650 – Block SL1 Skull Lake Area

1.0 SUMMARY

1.1 Terrain Stability Hazards Related to Harvesting

1. The majority of the terrain inspected in the proposed block appears to be stable and has a terrain stability hazard of *low*.
2. Polygons 8 and 9 have *elevated low* terrain stability hazard ratings.

1.2 Terrain Stability Hazards Related to Road Construction

1. At the request of CFM, I conducted a detailed road inspection along a section of the proposed Road SP4 where slopes were over 60%, and along a section of the existing Skull Lake Mainline where instability had occurred.
2. Between stations 0+118 and 0+138 on proposed Road SP4 there is a *moderate* hazard with respect to conventional construction. Full bench construction with partial sidecast composed of coarse material and full bench construction with no sidecast have a *low* terrain stability hazard.
3. Between Stations 4+365 and 4+390 along the built Skull Lake Mainline there is evidence of instability in the form of fillslope failures, tension cracks and slumps. This section has a *moderate* terrain stability hazard. To reduce the hazard rating to *low*, pullback of

oversteeped fillslope material and full bench construction is suggested. All organic debris should be removed from the fillslope.

1.3 Blowdown Hazards

Segment A, totaling approximately 600m in length, has a *low* blowdown hazard. No treatment is suggested.

2.0 INTRODUCTION

Madrone Environmental Services Ltd. (Madrone) was retained by Coast Forest Management Ltd. (CFM), acting as a client for Mokko Manufacturing Ltd., to conduct an assessment of terrain stability and blowdown hazards in the proposed Block SL1 in the Skull Lake area along the west coast of Vancouver Island. I completed a detailed ground inspection of the area on June 9, 2004, in the company of Mr. Charlton Beggs of CFM. CFM was responsible for the block and road layout. At the time of the assessment the block boundaries were ribboned in and roads, retention patches, and streams were being ribboned and surveyed.

Weather conditions on the inspection were slightly overcast and mild. Visibility was good and the ground was free of snow. Access to the block was by helicopter from Port Alberni. A total of 10 hours were spent on site.

2.1 Scope

This assessment is intended to provide information about harmful geomorphic events that may occur as a result of harvesting, road construction and road reconstruction, and blowdown. I have identified the likelihood (*i.e.*, the hazard) of such events and their geomorphic consequences, so that land managers may make appropriate decisions regarding risk management.

The procedures used in this assessment satisfy the requirements for a terrain stability assessment, as identified in the APEGBC *Guidelines for Terrain Stability*

*Assessments in the Forest Sector*¹. Assessment of the potential for bedrock failures is beyond the scope of this report.

2.2 Assessment Method

The assessment involved a review of aerial photographs and maps, and ground traverses in the area. Terrain stability hazards were assessed within the harvesting boundaries, along a section of proposed road, along a section of the existing Skull Lake Mainline and along portions of Reach 1 and 3 of Stream 1 in the form of a gully assessment. My inspection route is shown on Figure 1.

The field component involved the observation of watercourses, terrain attributes, vegetative indicators, and evidence of inherent instability (if any), with observations of soil exposures in windthrows, gullies, and/or shallow soil pits. No other subsurface investigation was performed, and no laboratory tests were conducted.

Madrone geoscientists have assessed landslides and unstable terrain in logged and unlogged land throughout BC and elsewhere for the past fifteen years. The deductions presented in this report are based on observations and considerations of soil mechanics and soil failure theories and terrain attribute studies.

The potential for instability and sedimentation induced by blowdown related to harvesting was also assessed for a small section of the block. In assessing blowdown hazards, the soil, depth, texture, and drainage, stand composition and morphology, and topography were observed. Boundaries affected by windthrow were divided into segments based on similar stand structure and terrain.

During the field investigation, the block was divided into terrain polygons of broadly homogenous physiographic character and terrain stability hazard. The boundaries of these polygons on the attached map are approximations only, based on one or more transects through an area. Identification of terrain stability hazard is based on numerous parameters, including slope gradient, surficial

¹ Anonymous, 2003. *Guidelines for Terrain Stability Assessments in the Forest Sector, 1st Edition*. Association of Professional Engineers and Geoscientists of British Columbia, Burnaby, B.C. See: <http://www.degifs.com/pdf/Final%20Terrain%20Stability%20Guidelines%20as%20published.pdf>

material type and texture, soil drainage, slope morphology, evidence of past instability in the area, and experience in similar logged terrain. In addition, the identification of hazard takes into account block layout, proposed yarding techniques, the effects of root strength loss resulting from tree removal, and the potential implication of drainage pattern disruptions.

Gullied portions of Stream 1 were assessed for debris flow potential based on criteria from the Gully Assessment Procedure Guidebook². My hazard ratings and conclusions are based on inspected portions of Reaches 1 and 3 (see Polygon 5 on Figure 1) along with Streamside Checklists and Gully Assessment Cards supplied by CFM. Factors investigated include downstream impact potential, upslope debris flow potential, gully wall failure potential, gully geometry potential for debris flow initiation and the debris flow initiation potential. As requested by CFM, a hazard rating for debris flow initiation potential for Reach 1 and Reach 3 of Stream 1 was determined.

I assessed areas of the block and proposed roads for terrain hazards that met one or more of the following criteria:

- CFM had identified the area as being potentially hazardous, based on ground observations.
- Slope gradients in the area were greater than 60%.
- The proposed block falls within or adjacent to polygons previously mapped as terrain stability Class IV and V.

With respect to road reconstruction, the field portion of the terrain stability assessment involved walking built road sections and assessing the following terrain features and road conditions:

- Nature of the sub grade and downslope gradient
- Nature of the cutslope and upslope gradient
- Stability of the fillslope

² Province of British Columbia 1995. *Gully Assessment Procedure Guidebook*. Forest Practices Code of British Columbia, Forests Service of British Columbia.

In addition to observations made during my inspection, the following information was used in preparing this report:

- A 1:5,000-scale topographic map used in the field from CFM showing the proposed block boundary, approximate proposed road location, and areas of varying harvest techniques.
- A 1:5000-scale topographic map from CFM following my inspection showing revised block location and stream identification.
- A CFM Stream Data Assessment Survey for Block SL1
- CFM streamside checklists for Stream 1
- CFM completed field forms for gully assessments for Reaches 1 and 3 for Stream 1
- 1998 laser-copied color aerial photographs BCC98011-3 and 4 at approximately 1:21,000 scale.
- Map sheets 092F005 and 092F005 from the Ministry of Sustainable Resource Management website for an overview of the area I investigated³.

The topographic map was used to prepare Figure 1 showing the inspection route, terrain polygons, road segments, road construction and road reconstruction hazards, and blowdown hazard segments.

3.0 PHYSICAL SETTING AND PROPOSED DEVELOPMENT

3.1 Proposed Harvest Areas

Block SL1 is located approximately 35 km southwest of Port Alberni B.C. The block is situated upslope of Skull Lake, between Effingham and Pipestem Inlets, in Barkley Sound on the west coast of Vancouver Island.

Block SL1 consists of two portions; an approximately 40 ha block predominantly south of Stream 1, and an approximate 10 ha area, located north of Stream 1 (see Figure 1). Both portions of the block are located on predominantly east-facing

³ <http://maps.gov.bc.ca/> Ministry of Sustainable Resources, Internet Mapping – Provincial Basemap.
Accessed June 10, 2004.

slopes with irregular topography and several small streams. The elevation in the harvesting area ranges from 80 to 485 m above sea level. The block is surrounded by logged areas (approximately 10 to 40 years ago) to the north, east, and south and by timber to the west.

The terrain in the area is dominated by karst topography with overlying surficial material consisting of thin colluvial deposits with intermittent till on lower gradient slopes and scattered organics. Drainage within the harvest area ranges from well drained along steeper gradients with bedrock outcrops, to imperfectly drained on gentle and planar slopes containing organics.

The bedrock in the area consists of the Middle to Upper Triassic-aged Vancouver Group, which includes three formations.⁴ The Parson Bay and Quatsino Formations (predominantly limestone karst topography) were observed throughout the block as grikes (deep, narrow vertically inclined slots in carbonate bedrock developed by solution along a joint or fracture) and scattered outcrops (see Karst Assessment Report for detailed explanation of topography)⁵. The Karmutsen Formation occurs as scattered outcrops generally located in the northwestern portions of the block.

The Karmutsen Formation is composed of theoleiitic volcanic rocks displaying low-grade metamorphism. Limestone of the Quatsino Formation, and the calcareous siltstone, greywacke, silty-limestone, and minor conglomerate and breccia of the Parson Bay Formation were deposited top of the basalt lava platform.

The nearest Environment Canada weather station is Cape Beale Light 30 km southwest of the proposed block, at an elevation of 25.9 m above mean sea level. Records for this station are available for the 29-year period from 1971 to 2000. Mean annual precipitation is 2753 mm, with 75% of that falling during October through March. Mean annual snowfall is 17.6 cm. Extreme daily precipitation was 137.0 mm on July 1991. The proposed harvesting area sits at an elevation

⁴ <http://www.em.gov.bc/Mining/Geolsurv/MapPlace/maps.htm> updated May 4, 2004. Accessed June 14, 2004.

⁵ WESTON, S. (2004). *Karst Field Assessment; TSL A50650 Block SL1; Skull Lake*. Unpublished report prepared for Coast Forest Management Ltd. by Madrone Environmental Services Ltd., Duncan BC.

higher than Cape Beale, and therefore probably receives higher precipitation, and more snow.

Block SL1 occupies approximately 50 ha and will be harvested using a combination of ground based, cable, and helicopter yarding.

3.2 Proposed Roads

The block will be accessed via a network of roads including the existing Skull Lake Mainline and proposed roads SP1, SP2, SP4, SP5, SP6, SP6A, SP210, SP211, SP300, SP310, and SP320. It is understood that the new roads are designed for short-term use (design life of less than five years).

The only new road assessed for terrain stability hazard was Road SP4 between 0+118m to 0+138m. The remaining road sections cross slopes that are less than 60% and CFM did not request an assessment. A portion of the deactivated Skull Lake Mainline (See Figure 1) was also assessed for potential stability hazards associated with road reactivation. The Skull Lake Mainline did not have stations ribboned. The location of the inspected section is an approximation only supplemented by a GPS reading taken at the approximate centre of the assessed section during a subsequent visit by CFM.

3.3 Downslope Resources

An assessment of ecological, recreational, and other specific values are beyond the scope of this report. Downslope resources in Block SL1 include eighteen S6/S5 classified streams, and sixteen non-classified drainages (NCD's), eleven proposed roads, and the existing Skull Lake Mainline. The L1 classified Skull Lake is located approximately 1.5 km downslope of the harvesting area.

Only portions of Streams 1, 9, 14, 16, 17, 20, 27, 33 and NCD's 4, 21, 22, and 32 were observed in the field. The S5-classified Stream 1 enters Effingham Inlet at the mouth of Wallace Creek, approximately 2 km down gradient from the block. Along the harvesting boundaries, a riparian management zone surrounds the predominantly steep sideslopes of the well-defined Stream 1 channel.

Stream 1 is an insurgent stream along lower gradient slopes outside of the harvesting area as the flow sinks in to the subsurface and returns to the surface periodically.

Streams 9, 20, and 33 flow into Reaches 3, 2, and 1 respectively, of Stream 1 and therefore have indirect connectivity to marine ecosystems. There is also a stream located approximately 50 m north of the harvesting area which also drains into Effingham Inlet over 2 km down gradient of the block. Stream 16 and NCD 32 assumingly flow into this stream, and therefore have indirect connectivity to marine ecosystems. It is assumed that the remaining streams within the block have indirect connectivity to Skull Lake and/or Effingham Inlet.

If instability occurs above 200m in elevation, Streams 1, 6, 9, 11, 29, 17, 27, 20, NCD's 7, 8, 10, 20, 20A, 21, 22, proposed Roads SP 4, 5, 6, and 6A, and the existing Skull Lake Mainline may be affected. The intervening ground between the upper slopes of the block and 200 m elevation contour is benchy with irregular bedrock exposures.

If instability occurs below 200m in elevation Streams 1, 2, 4, 16, 17, 19, 25, 27; NCD's 3, 24, 26, 27A, 31, 32; proposed Roads SP1, SP 2, SP 210, SP211, SP300, SP310, and SP320, may be affected. The intervening ground between the 200 m elevation contour and the eastern (lower) boundary of the block consists of irregular and steep bedrock outcrops, with intermittent benches of gentle slopes. The terrain between the lower block boundary and Skull Lake and Effingham Inlet is benchy and irregular with large areas of low gradient terrain.

3.4 Regional Landslide History and Geomorphic Activity

The surrounding terrain was inspected for evidence of natural or logging-related instability on the aerial photographs and while traveling to and from the block.

Active, naturally occurring geomorphic processes and natural instability in the area include minor slumping and relict rockfall. Minor slumping was observed in Polygons 2, 3, 7, 8, and 9, and along Reaches 1 and 3 of Stream 1 (See Figure 1).

A relict slump was observed in the northern portion of Polygon 2. A mix of organic material and thin colluvial deposits traveled approximately 8 m downslope between steep bedrock exposures.

In Polygon 3, small volumes of organics traveled less than 1 m along the northeastern, moderately- steep bedrock slopes of the polygon boundary. The

slumps occurred along steeper pitches of exposed bedrock where pockets of thick organics have become saturated and slumped down the bedrock face to deposit at the base of the outcrop.

There are similar minor slumps occurring in organics and thin colluvial material overlying steep bedrock in Polygon 6, (also observed along the sidewalls of NCD 22, and Reach 2 of Stream 20), Polygon 7, Polygon 8 and Polygon 9. The minor slumps scattered throughout these polygons have traveled less than 2 m and did not initiate further instability.

Small volumes of colluvium have traveled up to 5 m along the steep sidewalls of Stream 1 along section of Reaches 1 and 3, with only a minimal amount of material entering the stream. In general, the shallow depth to bedrock limits the volume of material available for erosion and deposition along the steeper sections of Stream 1. Two larger relict slumps, approximately 2 m wide and 4 m long were observed along the upper portion of Reach 2 and the lower portion of Reach 3, both located outside of the harvesting area, within the 100% retention portion of the riparian management zone. The slumps likely occurred due to a thicker pocket of colluvial material becoming saturated along the interface of exposed bedrock and slumping downslope. The material did not enter Stream 1.

Relict rockfall was observed throughout the block, predominantly in Polygons 1, 3, 6, 7, and 8. Rubble, small blocks and the occasional large block have deposited at the base of numerous steep bedrock outcrops (predominantly limestone grikes) where water and weathering action have broken off fractured material. Fractured bedrock rubble, blocks and blocks have been deposited immediately downslope of the bedrock exposures, traveling less than 5 m to 10 m from the point of origin. The location and terrain conditions associated with the instability were taken into consideration in this assessment.

Surrounding regions to the east and the south have been logged over the last 50 years. Based on an air photo review and partial ground inspection, it appears that the terrain conditions associated with past logging have been relatively stable.

Tension cracks and minor sidecast failures were observed along a section of the existing Skull Lake Mainline. The tension cracks were approximately 15 cm to 30 cm in width, approximately 0.5 m to 2 m in length, and were predominantly located up to 1 m from the top of the fillslope. Material from sidecast failures

traveled less than 50 m from the base of the fillslope. The location and terrain conditions associated with this type of instability were taken into consideration during this assessment.

3.5 Regional Blowdown Pattern

Storm winds on Vancouver Island are generally caused by cyclonic circulation around winter low-pressure systems approaching the west coast of the island. The strongest winds usually blow from the southern quarter—south, southeast, or southwest. Storm winds from other directions are unusual, though very strong winds occasionally blow from the west along Pipestem Inlet and from the east along a small valley crossing Effingham Inlet.

The cutblock is situated on predominantly east-facing irregular slopes, downslope of several bedrock ridges. Topography may modify the local direction of these storm winds. I observed scattered and small swaths of blowdown during the assessment of the block, with the most damaging winds coming from the southern quarter. Blowdown orientations were primarily to the north and northeast, which indicates dominant wind direction was from the south and southwest. Blowdown of various ages was evident, indicating periodic storm events.

Based on local and regional evidence, I conclude that the most probable damaging wind direction will be from the south and southwest. However, local evidence suggests that storm winds can also be expected to blow from the west and the east.

4.0 HAZARD ASSESSMENT AND MITIGATION OPTIONS

4.1 Terrain Hazards Related to Harvesting

Table 1 on the following pages summarizes terrain polygons identified within the inspected area of Block SL1. For each polygon, I present terrain attributes and terrain stability hazards related to harvesting. Geomorphic consequence of a landslide is provided where the terrain stability hazard is greater than *very low*. The criteria used for this classification system can be found in the attached Appendix A. Definitions of terrain and geomorphic terms used in this report can be found in the attached Appendix B.

Table 1. Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
1	65-85% along limestone grikes 40-50% along benches Benchy and irregular in profile, irregular ridges along contour.	Rubbly colluvial veneer with scattered blocks overlying bedrock. The soil is well drained.	Polygon is located in the southeast portion of the block along middle slopes. Relict rockfall was observed along the base of steep limestone grikes and along intermittent deep slots between bedrock ridges. Workers should be made aware of hazards relating to deep fractures in this area.	LOW	If a slide occurs, it will deposit on benches and irregular terrain immediately downslope of the lower block boundary. If a slide occurs in the western, upper slope portion of the polygon, it will cross the Skull Lake Mainline and proposed Roads SP1 and SP2. Sediment will be introduced to Reach 1 of Stream 20 (classified as an S6 stream) and NCD 23. Stream 20 has indirect connectivity to fish-bearing streams because it enters Stream 1 outside of the harvesting area. The potential for post-logging instability impacting the non fish-bearing streams is low.

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
2	35-50% Steeper slopes due to scattered bedrock knobs	Sandy, rubbly colluvium with scattered blocks overlying bedrock. Pockets of discontinuous till deposits are located along slopes less than 30%.	Polygon is located in the southeastern portion of the block along lower slopes.	LOW	If a slide occurs, it will deposit on the irregular terrain within the polygon, or on the gentle slopes along the lower block boundary.
	Benchy in profile, irregular along contour.	The soil is well to moderately well drained. Small areas of seepage were observed.	A relict slump of organic material and thin colluvial deposits approximately 4 m wide and 8 m long slumped off of a steep bedrock exposure.		
			Bedrock exposures decline in the northern portion of the polygon.		Sediment would be introduced into the S6-classified Streams 4 and 19, and NCD 3. The downstream impact potential would be low due to low stream gradients (both less than 30%), and small volumes of material available for transport. The Debris Transport Potential for both streams has been rated as LOW ⁶ . The potential for post-logging instability impacting the non fish-bearing streams is low.

⁶ BC Timber Sales Strait of Georgia Business Unit Stream Data for TSL A50650 - Block SL1. By Coast Forest Management Ltd., 2004.

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
3	40-55% Minor pitches of 70-80% along bedrock outcrops	Silty, sandy till mixed with rubbly colluvial deposits with scattered blocks overlying steep bedrock exposures.	Polygon is located in the western portion of the 10 ha portion of the block, on middle and upper slopes.	LOW	If a slide occurs, it will deposits on the benchy and irregular terrain immediately downslope of the polygon.
	Irregular and convex in profile, irregular and hummocky along contour.	Bedrock ridges (grikes) are located along the southern boundary of the polygon, and steep, bedrock exposures (metavolcanics) are situated along the northern boundary of the polygon.	Relict rockfall was observed at the base of steep bedrock outcrops.		
		The soil is moderately-well drained.	Portions of Streams 16, 17 and 27, all classified as S6 streams, were observed in the field as having poorly, to moderately well developed channels with low to moderate debris transport potential.		
					Debris material will cross proposed Roads SP300, SP 310, SP320, and intersect Streams 14, 16, 17, 27, and NCDs 26, 27A and 30.
					The downstream impact potential for all four streams would be low due gentle slopes down gradient.
					The potential for post-logging instability impacting the non fish-bearing streams is low

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
4	10-20% Pitches of 20-35% along hummocks.	Till deposits with scattered organics overlying bedrock hummocks.	Polygon is located in the eastern portion of the 10 ha harvest area, on lower slopes.	VERY LOW	If a slide occurs it will deposit on the gentle terrain within the polygon. The potential for post-logging instability impacting the non fish-bearing streams is very low.
	Benchy with minor hummocky terrain in profile and along contour.	The soil is imperfectly drained with scattered areas of poorly drained soils.	Ponding was observed throughout the polygon. The S6-classified Streams 14, 16, and NCD 32 were observed during the field investigation.		
5	20-40% channel gradient 65- 85% sidewalls with pitches of 90-100% +	Active fluvial material along channel gradients, colluvial veneer and bedrock along channel sidewalls.	Polygon encompasses a portion of Reaches 1 and 3 of the S5-classified Stream 1.	MODERATE	If a slide occurs, material will directly enter Stream 1, potentially initiating a debris flow, and transporting sediment downstream. Stream 1 has direct connectivity to marine ecosystems (although it is an interrupted stream). The potential for post-logging instability impacting the non fish-bearing stream is moderate.
	Steep sided v-shaped stream reaches.	The sideslope material is moderately-well drained.	The polygon is located outside of the harvesting area within a 100% retention management zone. Evidence of slumping, minor rockfall and debris slides located along steep channel sidewalls. Only small volumes of material entered the stream.		

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
6	35-55% open slopes 60-70% bedrock outcrops 20-30% intermittent benches	Rubby colluvial deposits and silty, sandy till mantles of variable thickness located throughout polygon. The terrain is dominated by steep grikes and scattered metavolcanic outcrops. Bedrock exposures increase upslope.	Polygon is located in the central portion of the block along middle slopes. Several scattered bedrock exposures with steeper slopes have piles of relict rockfall (blocks and rubble) at their base. Minor relict slumps were also observed as small deposits of organics, which had slumped off of steep bedrock exposures.	LOW	If a slide occurs, it will deposit on the irregular and benchy terrain within the polygon. Depending on location, debris material may cross the existing Skull Lake Mainline, proposed Roads SP6, SP6A, SP4, and sediment may directly enter the S6 Streams 1, 6, 9, 11, 12, 20, and NCDs 20A, 21, and 22.
	Irregular and benchy in profile, irregular along contour.	The soil is moderately well to well drained.	Stream 1 has direct connectivity to marine ecosystems. Workers should be made aware of hazards relating to deep fractures in this area.		The downstream impact potential would be moderate based on the well developed channel of Stream 1 and the moderately-well-developed channel of Stream 20. There is also a moderate volume of material available for transport.
					The potential for post-logging instability impacting the non fish-bearing streams is low to moderate.

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
7	45-55% Minor pitches of 70-85% along bedrock hummocks.	Till blanket overlying hummocky bedrock knobs.	Polygon is located in the northwestern portion of the block, north of Stream 1.	LOW	If a slide occurs, it will deposit on the irregular, lesser gradient slopes of Polygon 6. Debris material may reach the existing Skull Lake Mainline if it travels more than 100 m.
	Benchy and hummocky in profile, and along contour.	The soil is moderately-well drained.	Minor relict slumps of saturated organics off of steep bedrock pitches were observed. Relict rockfall was also observed at the base of fractured outcrops. Stream 1 has direct connectivity to marine ecosystems.		
					If a slide occurs on the upper, western slopes of the polygon, sediment will enter Stream 1 (less than 50m downslope of the harvesting boundary), and may also be introduced into Stream 9 within the harvesting boundary. The downstream impact potential would be moderate for Stream 1 due to well-developed channel and gradients able to transport material. Stream 9 has a low impact potential due to its poor channel definition. The potential for post-logging instability impacting the non fish-bearing Stream 9 is low; the potential for instability impacting Stream 1 is moderate.

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
8	70-90%	Blocky, rubbly colluvial deposits overlying metavolcanic bedrock.	Polygon is located on upper slopes in the northwestern portion of the block, south of Stream 1.	ELEVATED LOW	If a slide occurs it will travel up to 100 m and enter Stream 1. Sediment would be introduced into the S5 stream. The downstream impact potential would be moderate due to a well-developed channel and gradients able to transport material. The potential for post-logging instability impacting the non fish-bearing streams is elevated low.
	Convex and irregular in profile, convex along contour.	Thicker colluvial deposits and thin deposits of saturated organics are located in bedrock hollows. Grikes were observed in the southeastern portion of the polygon.	Relict rockfall was observed at the base of bedrock exposures, and small, relict slumps of organics were also observed along the steeper pitches of bedrock.		
		The soil is well-drained with scattered areas of imperfectly drained soils along seepage sites off of steep bedrock exposures.	Scattered blowdown within this polygon did not initiate instability. Immediately west of the block boundary, the slopes increase to 90% to 110%, and displayed evidence of past rockfall. Stream 1 has direct connectivity to marine ecosystems.		

Table 1 (continued). Observations, Terrain Hazards, and Consequences for Polygons in Block SL1

Polygon	Slope Gradient and Topography	Surficial Material and Soil Drainage	Remarks	Hazard	Geomorphic Consequences
9	50-60% along upper slopes 60-70% along eastern edge of polygon.	Thin, silty, sandy colluvial veneer mixed with thin, saturated organic soil overlying a bedrock outcrop.	Polygon is located in western portion of the block upslope of proposed Road SP6 and the S6-classified Stream 12.	ELEVATED LOW	If a slide occurs, it will deposit in the trough and along the bench on the eastern boundary of the polygon.
	Convex and benchy in profile, convex along contour.	The soil is moderately well drained.	Minor slumps of organic material off of the convex bedrock outcrops were observed. The material traveled less than 2 m. A trough is situated between the base of the bedrock exposure and the proposed Road SP6, and the terrain benches out along the eastern boundary.		Minor slumping of saturated organics is expected, but should not initiate a slide. Sediment would be introduced into Stream 12.
			The upper reach of Stream 12 (located outside of the harvesting area within a management zone with 100% retention) was concave and appeared to have been the site of a relict slide (over 70 years ago). During the field investigation, the material did not display signs of instability. Stream 12 was not flowing during inspection and had a poorly developed channel.		The downstream impact potential would be low due to a poorly developed channel. The potential for post-logging instability impacting the non fish-bearing streams is elevated low.

4.2 Terrain Hazards Related to Road Construction and Road Reconstruction

Tables 2 and 3 presents the results of a qualitative analysis of the likelihood of landslides with conventional road construction or reconstruction along natural slopes or along an existing sub grade, and the potential consequences of a landslide along sections of the proposed roads.

CFM requested that only sections of the roads with potential road prism stability hazards and slopes greater than 60% be assessed in detail. During the field investigation of the existing Skull Lake Mainline, road stations were not marked. Distances are based on approximate locations only. Sections assessed are shown in Figure 1.

Conventional reconstruction of existing running surfaces involves the implementation of proper resurfacing techniques, ensuring there is adequate water control (i.e. installation of required drainage structures), and stabilizing and cleaning ditch lines where applicable. Where the hazard rating for conventional construction is greater than LOW, landslide consequence, lower hazard options, and the hazard rating associated with each option have been identified.

The hazard rating for each option assumes that recommendations specified under the "Construction Remarks and Recommendations" column are incorporated into the road design. The ratings also assume that drainage structures will be installed where appropriate and that they will be designed with sufficient hydraulic capacity. Unless otherwise indicated, either metal pipe culverts or wood box culverts are adequate for all drainage structures.

Construction operations should be shut down during periods of heavy precipitation or snowmelt on road sections if the Coulson Group Rainfall Shutdown Guideline criteria is exceeded. However, road supervisors must exercise judgment and shut down operations when they observe excessively wet soil conditions, particularly during rain-on-snow events, even if the rainfall shutdown criteria have not been exceeded.

Table 2: Hazard Rating and Consequences for Construction Options – Proposed road SP4

Road Section	Hillslope Gradient (%)	Terrain/Drainage	Remarks	Construction Technique	Hazard	Construction Remarks & Recommendations	Geomorphic Consequences of Road-Related Landslides
0+000-0+118	This section was not inspected because the road crosses slopes that are less than 60% and CFM did not request an assessment.						
0+118-0+138	50-65% Uniform in profile, irregular and convex along contour.	Gravelly, sandy till veneer with scattered rubbly, sandy colluvial veneer overlying hummocky bedrock exposures. The soil is moderately-well drained.	A 10-15m wide bench is located approximately 20 m downslope. Beyond this bench downslope, bedrock outcrops dominate 45-55% irregular slopes. Slopes along the section 0+130 to 0+138 are 50% to 55%. Based on construction plans, fillslope material may exceed 60% and intersect Stream 20.	Conventional (Cut/Fill)	MODERATE	Conventional ½ cut and ½ fill will create a large unstable fill slope resting on steep gradients.	Sidecast failures will deposit on the benchy and irregular terrain immediately downslope.
				Full bench construction with partial sidecast ⁷	LOW	A ¾ bench could be constructed if fill material is made of coarse rubble.	
				Full Bench construction with no sidecast ⁸	LOW		

⁷ With partial sidecast, the road design may vary from ¾ to full bench. In a ¾ bench design, the ¼ fill may form the shoulder of the road but should not be load bearing. The fill depth should be no more than 1 m. The remainder of the spoil is end-hauled to a suitable location or back-cast. Incorporation of fine material in the fillslope should be avoided.

⁸ Sidecast implies deliberately placed material. However, the no sidecast criterion recognizes that scattered amounts of fugitive material, including small amounts of rock and soil, can be expected. Reasonable efforts should be made to limit fugitive material.

Table 3: Hazard Rating and Consequences for Reconstruction Options – Skull Lake Mainline

Road Section	Observations	Existing Terrain Stability Hazard	Geomorphic Consequence	Remarks and Options	Terrain Stability Hazard Following Construction
4 + 365 to 4 + 390	<p>Fillslope gradient ranges from 60-80% Cutslope gradients range from 65-90%.</p> <p>The running surface of the road is between 5 m and 8 m in width. Several large, discontinuous tension cracks and smaller slumps are located along the fillslope. Several large blocks and rubble have traveled up to 70 m downslope. These failures are related to road construction.</p> <p>The vertical offset of the tensions cracks are approximately 0.15 m to 0.3m and the horizontal offset is approximately 0.5 m to 2 m. The tension cracks were located up to 3 m from the edge of the road.</p> <p>Material from sidecast failures traveled less than 70 m from the edge of the road.</p> <p>There is also scattered organic debris mixed within the fillslope material, and an existing wood box culvert is located at approximately 4 + 380 m.</p>	MODERATE	If a slide occurs, it will travel up to 100m, depositing on the irregular terrain within the block.	<p>Pullback of all material in the fillslope is required. This will require pullback with 3-9m of reach. This will ensure the road is built as a full bench, which will also ensure there is no chance of the tension cracks retrogressing further.</p> <p>Because there is already a wide road running surface, further cutting into the cutslope is not expected to be necessary following pullback.</p> <p>Spoil sites for the removed fill slope material are located at several areas along the Skull Lake Mainline. Ensure properly functioning ditchline is maintained if material is spoiled on the inside of the road.</p> <p>Ensure that large volumes of organic debris are removed from the fillslope.</p> <p>The existing wood box culvert should be inspected during reconstruction to assure structural stability.</p>	LOW

4.3 Blowdown Hazards

Table 4 on the following pages presents the blowdown hazard ratings and consequences for Block SL1 along Stream 1. Figure 1 depicts the boundary segments.

As used in this report, "blowdown hazard" refers to the probability that a significant number of trees will be downed by normal storm events. Blowdown of a small number of individual trees may occur during normal storm events, even if hazards are deemed to be *low* or *very low*. Similarly, an unusually powerful windstorm, particularly within five years of falling, may cause significant, unanticipated blowdown.

The most probable damaging winds will blow from the south, southwest, south, or to a lesser extent from the east. A windward-facing edge may be subject to swath blowdown, extending for considerable distance into the standing timber. An along-wind edge (i.e., oriented parallel to the wind) may be subject to blowdown parallel to the edge, but this will not likely extend far into the standing timber. A leeward-facing edge (i.e., one facing away from the wind direction) may be subject to minor blowdown resulting from turbulence or eddying effects.

As requested by CFM, only boundaries located along Stream 1 were assessed for windthrow hazards. Numerous boundaries along retention patches are either leeward facing or along wind to the most probable damaging winds. Leeward-facing and along-wind edges are unlikely to experience significant blowdown. Consequently, these edges, along with the leeward edges of the block, are not discussed.

Table 4: Blowdown Hazard Rating and Consequences for Block SL1

Segment A		Comments:					
FC 52 to FC 54		Scattered windthrown trees were observed. Segment is located along the western boundary of the block running parallel to Stream 1. The boundary is located along the break in slope to the steep sidewalls of Stream 1. The channel of Stream 1 located along this segment has several vertical bedrock bluffs, a well-defined channel, and has direct connectivity to sensitive marine ecosystems approximately 2 km down stream.					
FC 44 to FC 501							
FC 25 to FC 22							
Edge Exposure	Surficial Material	Drainage	Canopy Closure*	Canopy Structure	Rooting Depth (cm)		
Windward facing to southern quarter winds.	Colluvial veneer and scattered till deposits overlying bedrock exposures.	Moderately- well drained.	Moderately open	Moderately multilevel. Some of the emergents are approximately the same height.	<40 where bedrock is exposed 40-60 where scattered pockets of colluvium and till are deposited.		
Dominants							
Species	Height (m)	Height-to-Diameter	Crown Size	Species	Height (m)	Height-to-Diameter	Crown Size
Western redcedar	30-35 scattered emergents up to 40 m	Moderate	Moderate to small	Western Hemlock	20-30 dispersed trees up to 35 m	Moderate to high	Moderate to small
Consequences of Blowdown:							
<ul style="list-style-type: none">Loss of timberWindthrown trees will enter the channel of Stream 1, potentially dislodging material along the sidewalls.Sediment may be introduced into the S5-classified Stream 1.Trees landing along the channel gradient may initiate debris flow if a large volume of water and sediment becomes trapped upstream of the logjam.							

Table 4 (continued): Blowdown Hazard Rating and Consequences for Block SL1

Hazard Rating	Treatment	Comments
Low	No treatment	<ul style="list-style-type: none"> Only minor evidence of blowdown. Trees located along ridge have been exposed to damaging winds. Trees that have been windthrown have lain across the stream or have directly entered the stream. There is a fairly large volume of coarse woody debris in the stream due to past windfall. Single stem blowdown is expected along windward edges, but is not expected to initiate a large slide. Due to the stand structure and evidence of past blowdown, pruning and/or topping is not warranted.

* - refers to closure at the dominant level (i.e. above the tops of the co-dominants, if present)

4.4 Debris Flow Initiation Hazards

Gullied sections of the S5 classified Stream 1 of Block SL1 were assessed for downstream impact potential, gully wall failure potential, and the potential for debris flow initiation based on criteria from the Gully Assessment Procedure⁹. The portions of Stream 1 investigated during the gully assessment are located outside of the harvesting area.

Stream 1 discharges into a small bay off of Effingham Inlet approximately 2 km down gradient of the lower block boundary. The stream directly enters marine habitat, however, on lower gradient slopes of Reach 1, the stream flow sinks in into subsurface and returns to the surface due to karst topography. The gully assessment cards filled out by CFM indicate that there is an indirect connectivity to marine habitat.

The channel gradient of Reach 1 is approximately 30% to 40%, the sidewalls are generally over 20 m in height and have slopes between 70 % and 140%. The sidewalls are typically comprised of bedrock and lesser volumes of colluvium. There is evidence of small slides initiating from organics and fractured bedrock on oversteepend slopes, and small, relict slumps situated just south of the active channel near Falling Corner 24.

Over time, rockfall and slumping of sidewalls contributes a steady, although low volume, input of sediment and organic debris to the creek system. Along the channel there are moderate sized sediment wedges and debris jams. These attributes do not represent a debris flow initiation hazard. However if a debris flow occurs in the system, they could be fuel to increase the size of a debris flow. *The hazard for debris flow initiation potential along Reach 1 of Stream 1 is moderate.*

Reach 2 of Stream 1 has channel gradients ranging from 20% to 30%, sidewalls between 5 m and 10 m in height, and sidewall slope gradients between 60% and 90%. The sidewalls are predominantly bedrock and colluvium. Only minor, relict rockslides and small slides of organic material were observed along this

⁹ Ibid 2

reach. Small volumes of material entered the active channel. There was no evidence of large volumes of material being transported downstream. *Based on the sidewall slopes and surficial material, and the gully geometry along this reach, the debris flow initiation hazard is low.*

5.0 CONCLUSIONS

5.1 Terrain Stability Hazards Related to Harvesting

Much of the terrain inspected appears to be stable and has a terrain stability hazard of *low or very low* with respect to harvesting.

Polygon 5 has a *moderate* terrain stability hazard rating. Polygon 5 includes portions of Stream 1 (Reaches 1 and 3), and is located outside of the harvesting area within a 100% retention management zone. This area should remain outside of the harvesting area, as a slide would directly enter the stream, inducing sedimentation of the S5 watercourse.

Polygons 8 and 9 have *elevated low* terrain stability hazard ratings. If a slide initiated along the northern boundaries of Polygon 8, it would intersect Stream 1, inducing sedimentation of the S5 watercourse. If a slide originates in other locations within the polygon, debris material will deposit on the benchy terrain within the block. Small organic slides are expected along the steeper slopes of the exposed bedrock, but should not initiate a slide.

If a slide does originate in Polygon 9, it will deposit on the benchy terrain immediately downslope of the polygon and should not reach the proposed Road SP 6. Sediment may be introduced into the S6-classified Stream 12.

5.2 Terrain Stability Hazards Related to Road Construction and Road Reconstruction

At the request of CFM, only one section of proposed Road SP4 and one section on the existing Skull Lake Mainline were assessed in detail for terrain stability hazards.

On proposed Road SP4, Section 0+118 to 0+138 (a total of 20 m), has a *moderate* hazard, but can be reduced to a low hazard with full-bench construction with no side cast, or full bench construction with partial sidecast. However the partial sidecast should be constructed with coarse material only. If a fillslope

failure occurs, material will deposit on the benchy and irregular terrain approximately 20m downslope.

Along the existing Skull Lake Mainline between stations 4+365 and 4+390 (approximations only, as stations were not marked during the field investigation), a total of 25 m, the existing terrain stability hazard is *moderate*. All fillslope material along this section should be removed, and pullback with a 3-9m reach and 1-3m offset is required. This will ensure the road is on a full bench. Additional widening of the road is not expected to be necessary. There are several open area located along the Skull Lake Mainline where the coarse fillslope material can be relocated. If material is spoiled along the inside of the road, a proper functioning ditchline must be maintained. These options will minimize site disturbance and downslope impacts and reduce the possibility of the initiation of fill slope failures.

5.3 Blowdown Hazards

Segment A is a windward facing edge and has a *low* blowdown hazard rating. This south-facing boundary of Block SL1 located along Stream 1 will be exposed to potentially damaging winds from the south. Scattered single stem blowdown should be expected along windward edges of the segment boundary.

5.4 Debris Flow Initiation Hazards

Gullied sections of Reaches 1 and 3 of Stream 1 (Polygon 5) were assessed for hazards relating to debris flow initiation potential. Reach 1 has *moderate* hazard with respect to debris flow initiation and Reach 3 has a *low* hazard. Due to the small volumes of material available for transport, the evidence of only minor instabilities along the sidewalls and channels, and that Stream 1 is interrupted further downslope, large volumes of material will not reach the marine ecosystem of Effingham Inlet.

6.0 LIMITATIONS

This report provides an assessment of potential for terrain instability and blowdown following harvesting, road construction and road reconstruction. Evaluation of these hazards is based on professional judgment and experience in similar logged or roaded terrain and is inherently imprecise. Geological conditions other than those indicated above may exist on the site. If such conditions are observed, Madrone Environmental Services Ltd. should be contacted so that this report may be reviewed and amended accordingly.

The recommendations contained in this report pertain only to the road and harvesting plans as disclosed to Madrone Environmental Services Ltd. at the time of the inspection. This report was prepared considering circumstances applying specifically to the client. It is intended only for internal use by the client for the purposes for which it was commissioned, and for use by government agencies regulating the specific activities to which it pertains. It is not reasonable for other parties to rely on the observations or conclusions contained herein.

Prepared by:



Wanda Miller, B.Sc., G.I.T.

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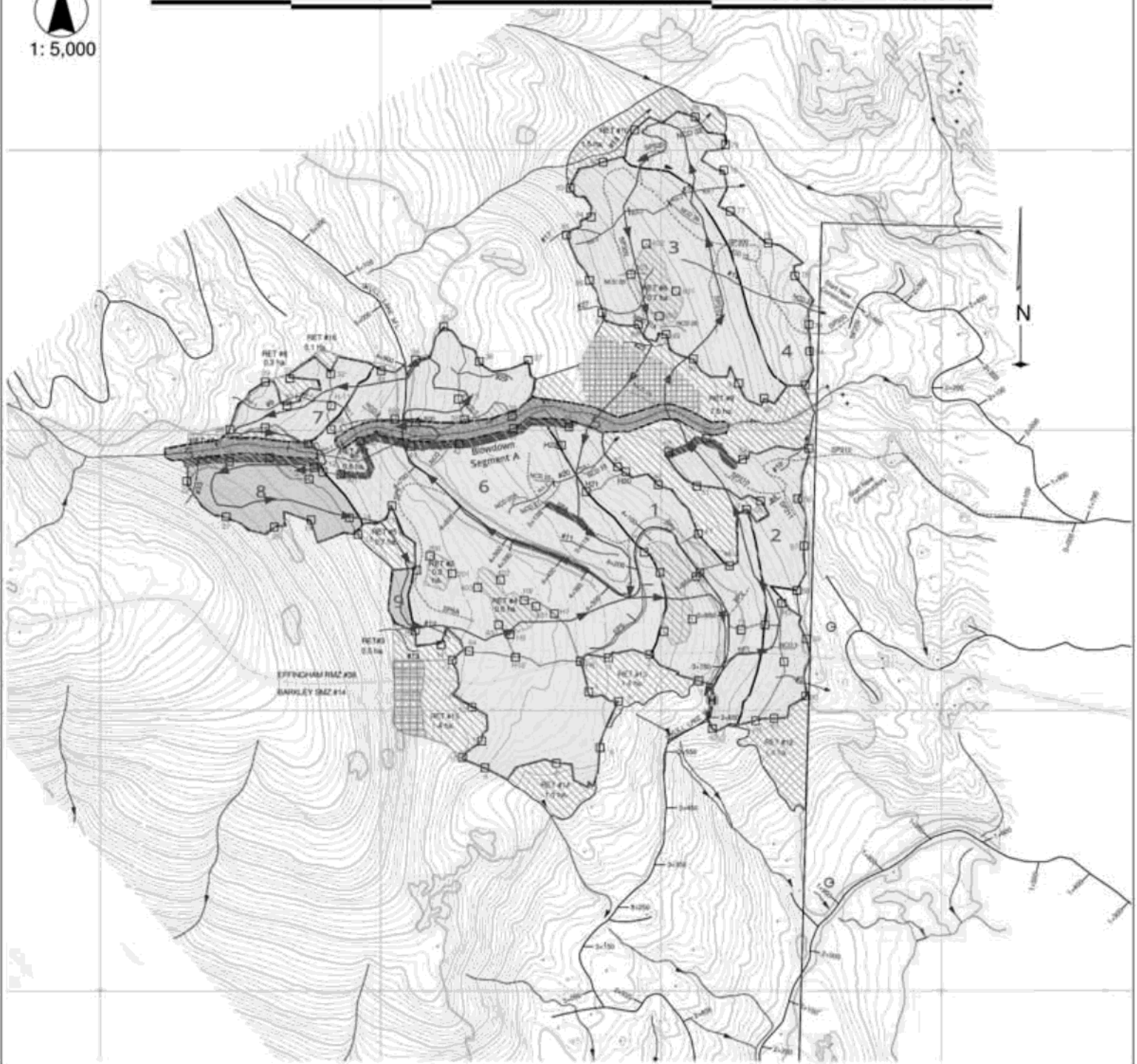
Gordon Butt, M.Sc., P.Ag., P.Geo.

TERRAIN STABILITY HAZARD ASSESSMENT: TSL A50650-BLOCK SL1 SKULL LAKE AREA, VANCOUVER ISLAND



1: 5,000

500 0 500 1000 Meters



LEGEND

SL1 Terrain Hazards

- VERY LOW
- LOW
- ELEVATED LOW
- MODERATE
- HIGH
- VERY HIGH

Helicopter Landing
 Inspection Route
 Blowdown (Low Hazard)
 Moderate Road Hazard (0+138-0+118) (Proposed)
 Moderate Road Hazard (4+365-4+390) (Existing)

Contour
 100m Index Contour
 SMZ Boundary
 Block Boundary
 Wildlife Tree Patch
 Retention Area
 Creeks
 Existing Roads
 Proposed Roads

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APPENDIX A

Classification of Slope Failure Hazard

As used in this report in reference to slope failures, the term "hazard" refers to the probability that a slope failure will occur. The term "risk" combines hazard and consequence.

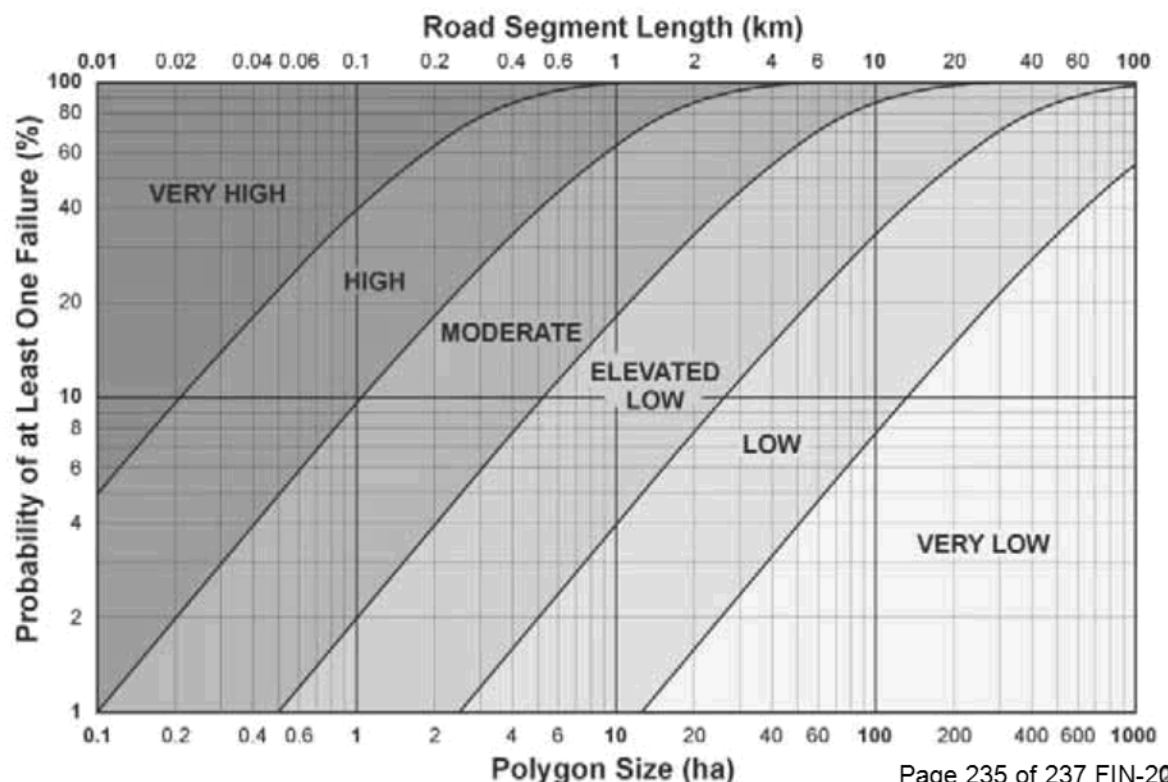
A hazard rating assigned to a polygon indicates that the statistical "expected value" of the number of failures within the polygon (or on a road segment), *per unit area (or per unit road length)*, is as shown in Table A1 below. The number of failures refers to the incremental number resulting from timber harvesting or road building that would occur within the period of one rotation. Only failures whose initiation plane is sufficiently large so that on an open slope the area of the failure would be greater than 0.05 ha are considered. In gullies where the failure would stop in the creek, the total area of a failure may be less than 0.05 ha.

Table A1. Definition of Slope Failure Hazard Classes

Hazard Class	Expected Average Failure Spacing	
	Polygons	Roads
Very High	>1 failure per 2 ha	>1 failure per 200 m
High	1 failure per 2 ha to 10 ha	1 failure per 200 m to 1 km
Moderate	1 failure per 10 ha to 50 ha	1 failure per 1 km to 5 km
Elevated Low	1 failure per 50 ha to 250 ha	1 failure per 5 km to 25 km
Low	1 failure per 250 ha to 1250 ha	1 failure per 25 km to 125 km
Very Low	<1 failure per 1250 ha	<1 failure per 125 km

Assuming that the size of the failure initiation surfaces is small in relation to the polygon size, the probability of a specified number of failures occurring within a polygon is related to the size of the polygon by the Poisson distribution. The probability of at least one failure occurring in a polygon is plotted below against polygon size.

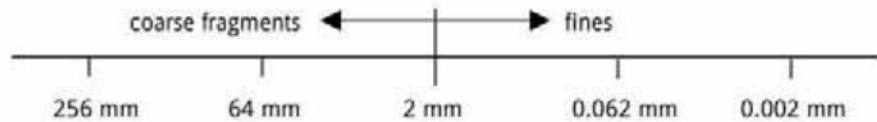
Probability of at Least One Failure



APPENDIX B

Glossary of Geomorphologic Classifications

Surficial Material Texture



Rounded	boulders	cobbles	pebbles	
Mixed Shapes	mixed fragments (diamicton)		sand	silt clay
Angular	blocks	rubble		
	angular fragments			

Multiple textural terms are listed in ascending order of quantity.

Consolidation of Surficial Materials

Non-cohesive Soils		Cohesive Soils	
very loose	easily excavated with spade	very soft	easily penetrated by fist
loose	some resistance to spade	soft	easily penetrated by thumb
compact	considerable resistance to spade	firm	readily penetrated by thumb
dense	requires pick for excavation	stiff	penetrated by thumbnail
very dense	high resistance to pick	hard	difficult to penetrate with thumbnail

Spacing of Bedrock Joints and Fractures

extremely close	<20 mm	moderately close	0.2 m to 0.6 m
very close	20 mm to 60 mm	wide	0.6 m to 2 m
close	60 mm to 200 mm	very wide	>2 m

Slope Drainage

Drainage describes the rate at which saturated surficial material reaches field capacity. (Field capacity is the moisture content remaining after removal of water that, given a drainage path, could be moved by gravity). It is controlled by the rate of subsurface water influx, the available pathways for water removal, and the permeability of the surficial material itself.

very rapidly drained	moisture content is above field capacity only during heavy precipitation
rapidly drained	moisture content is above field capacity for only brief periods after heavy precipitation
well drained	moisture content is above field capacity for several hours after heavy precipitation
moderately well drained	moisture content is above field capacity for several days after heavy precipitation
imperfectly drained	moisture content is above field capacity for a significant part of the time that the surficial material is not frozen
poorly drained	moisture content is above field capacity for most of the time that the surficial material is not frozen
very poorly drained	the water table is at or near the surface for most of the time that the surficial material is not frozen

Depth of Surficial Material

thin veneer*	a layer of surficial material <20 cm thick
veneer*	a layer of surficial material, less than 1 m thick, that conforms to minor irregularities in the underlying material
mantle	a layer of surficial material, typically 0 m to 3 m thick, that fills or partially fills depressions in an irregular substrate, but is too thin to mask prominent irregularities
blanket	a layer of surficial material, >1 m thick, that masks minor irregularities of the substrate, but conforms to its larger-scale shape
deep deposit	a layer of surficial material whose surface is unrelated to the shape of the underlying substrate

* - More than 10 cm of humus lying directly on bedrock is referred to as a folisol

Slope Gradient

gentle	<25%	moderately steep	50% to 70%
moderate	25% to 50%	steep	>70%

Microtopography

Microtopography describes the magnitude of surface irregularities on a horizontal scale of 1 m to 10 m. It contrasts with mesotopography which is on a scale of roughly 10 m to 100 m and may be described using the self-explanatory terms concave, convex, undulating (sideslopes <25%), hummocky (sideslopes >25%,) or benchy.

uniform	no surface irregularities >0.5 m high
slightly irregular	irregularities 0.5 m to 1.0 m high
moderately irregular	irregularities 1.0 m to 2.0 m high
(highly) irregular	irregularities >2.0 m high

Creek Bedload Amount

Bedload is the portion of total sediment load that is moved along the creek bed and consists primarily of rock fragments. It is distinct from lag deposits, which consist of rock fragments eroded in-place out of surficial material originally in the channel. Deposition volume refers to the volume of mobile sediment, per unit of channel length, which is present in the reach.

negligible	bedload is absent or almost so
trace	the creek bed is not completely covered by bedload
minor	deposition volume is <0.2 m ³ per metre of channel length
moderate	deposition volume is between 0.2 m ³ and 0.5 m ³ per metre of channel length
considerable	expected deposition is >0.5 m ³ per metre of channel length

Creek Bedload Size

Bedload size refers to the upper 90th percentile of clasts and is measured along the intermediate axis of the clasts.

