

Appendix I: Inventory Attributes

The following lists of attributes are intended to illustrate the types of information and data to be considered during planning and inventory projects. These lists should not be applied as a standard or considered exhaustive. The precise types of information to be included in an inventory will depend on the watershed and on the judgment of the individuals carrying out the assessment.

Typical Road Inventory Attributes

- a unique identifier for the road segment or road system
- length of road segment or road system
- estimated or known year the road was built
- inferred or known construction method used to build road (e.g. bulldozer, backhoe, winter construction)
- degree of revegetation occurring on the road
- location if different from base maps
- any observed instability indicators
- any anticipated erosion problems (hazards)
- known existing access and deactivation levels
- planned access and deactivation levels
- interpreted slope stability hazard rating
- interpreted consequence rating if a slope stability event occurs
- interpreted risk rating from hazard and consequence
- estimated priority rating (based on risk rating) for deactivation assessment (WRP Stage II Assessments and Prescriptions), if any
- suggested potential treatment of road, if any (e.g., water management or pullback)
- type of field assessment and qualifications of personnel required, if any
- estimated time and cost required for detailed field assessments, if any
- a preliminary access strategy (for reactivation and following deactivation)

Typical Landslide Inventory Attributes

- unique identifier for each landslide
 - GPS location
 - type of landslide (e.g. 7 class system of Rollerson and Fannin, 1992, or Cruden and Varnes, 1997 or LRAP)
 - area of landslide in hectares (estimated from photos or measured in field)
 - point of origin of landslide (e.g. road fill, road cut, cutblock or unlogged area)
 - point of initiation of the landslide on the landscape (e.g. upper slope, lower slope)
 - interpreted surficial geology at site of initiation
 - estimated runout location (e.g. termination of slide on slope or in gully)
-

- interpreted degree of revegetation (may be repeated for historical photos to assess change in cover over time)
- estimated availability of local seeds and brush to landslide from surrounding vegetation
- interpreted risk of further landslide activity
- interpreted current active processes, if any (i.e. dry ravelling, surface erosion, stream rilling)
- estimated potential risks to downslope resources
- estimated priority for detailed assessment (WRP Stage II Assessments and Prescriptions), if any
- suggested potential remedial treatments, if any
- estimated time and cost required for detailed field assessments, if any

Typical Gully Inventory Attributes

- a unique gully identifier
- the number of years since harvesting occurred
- the number of road crossings over the gully
- the estimated or measured length of the gully
- the estimated bankfull width of the floor of the gully
- the estimated water transport and debris flow transport potential
- identified sediment sources feeding into the gully
- identified receiving location for sediment transported by the gully
- interpreted degree of revegetation of the gully
- estimated potential risks to downslope resources
- estimated priority for detailed assessment (WRP Stage II Assessments and Prescriptions), if any
- suggested potential remedial treatments, if any
- estimated time and cost for detailed field assessments, if any

Typical Riparian Area Attributes

- unique identifier for each riparian area
 - dimensions of riparian area (e.g. length, width and overall area)
 - extent of logging along channel margins
 - age and type of second growth
 - objective for potential treatment of site, if any
 - suggested strategy for treating site, if any
 - estimated benefit to watershed or component level objectives from treatment of site (e.g. fish habitat, water quality and stream health)
 - estimated risk to riparian management treatments from potential upslope landslide events, if any
 - estimated priority for detailed assessment (WRP Stage II Assessments and Prescriptions), if any
 - estimated time and cost for detailed field assessments, if any
-

Typical Stream Channel Attributes

- unique identifier for each stream reach
- length of the stream reach
- stream channel class according to the Forest Practices Code (i.e. S1 to S4)
- stream channel classification based on the Channel Assessment Procedure (CAP) or comparable classification (e.g. Rosgen, 1994)
- sediment sources actively feeding the stream reach
- objective for potential treatment of site, if any
- suggested in-stream rehabilitation strategy for treating site, if any
- estimated benefit to watershed or component level objectives from treatment of site (e.g. fish habitat, water quality and stream health), if any
- estimated risk to in-stream treatments from potential upslope landslide events, if any
- estimated priority for detailed assessment (WRP Stage II Assessments and Prescriptions), if any
- estimated time and cost required for detailed field assessments, if any

Appendix II: Example – Risk Assessment Matrices

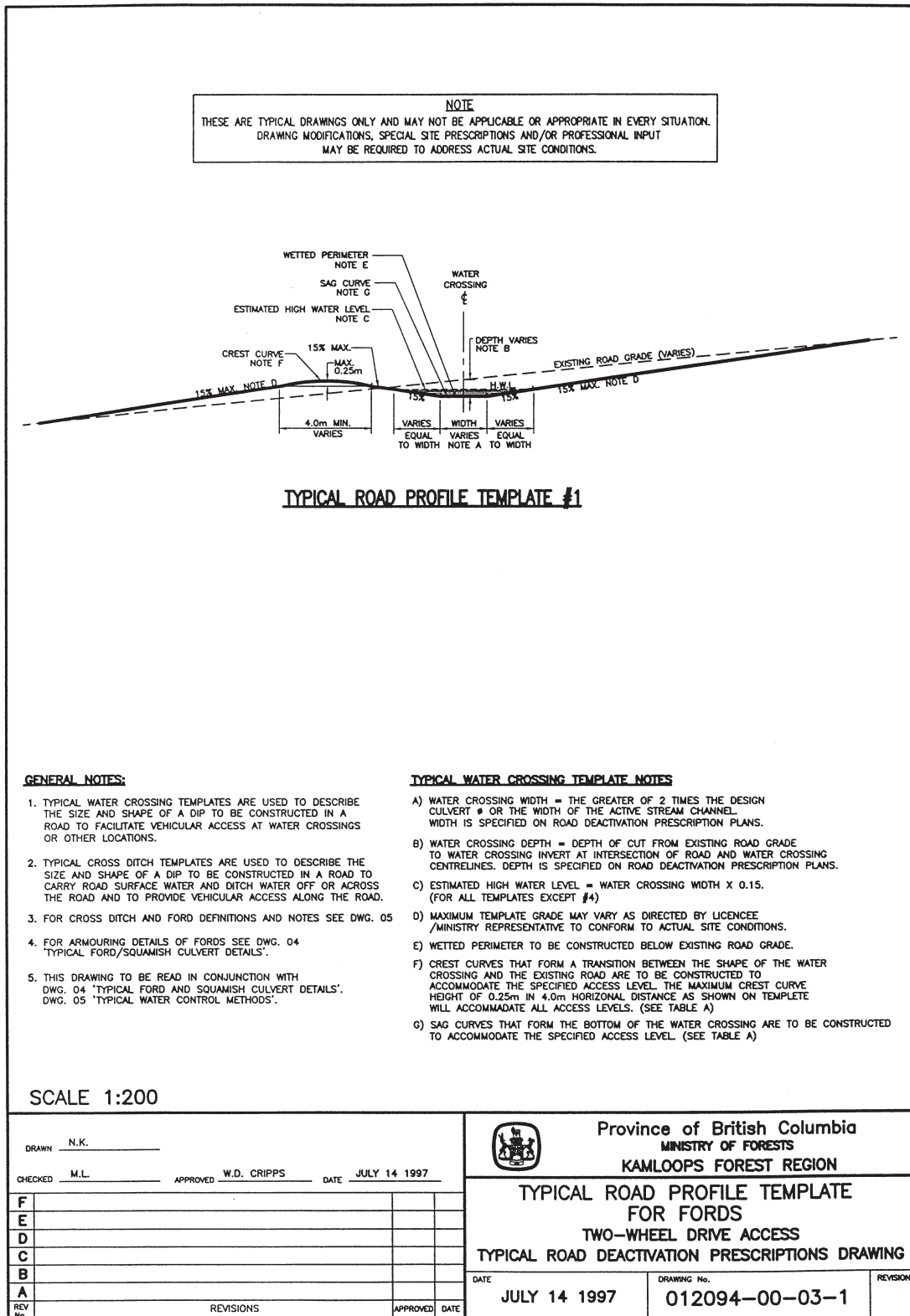
The following example risk assessment matrices are only illustrative and should not be considered a procedural standard. Examples 1A and 1B were derived for use on coastal watersheds for use in office-based overview assessments and for identifying project priorities. Interior watersheds may involve criteria related to erosion of fine grained soils. Example 2 was developed to include a rating of restoration feasibility along with risk and consequence in the determination of project priority. Practitioners should develop specific criteria for each project area, sub-basin or road system in consultation with stakeholders.

Rating	<i>Example 1A: Road Hazard and Consequence Classification Criteria for use in Office-based Overview Assessments</i>
	Criteria
High (H)	Hazard
Moderate (M)	<ul style="list-style-type: none"> ◆ Evidence of mass wasting along design segment; ◆ Approximately 50 % or more of similar design segments show mass wasting; and, ◆ Steeply gullied terrain, slopes in excess of 60 % unless on bedrock.
Low (L)	<ul style="list-style-type: none"> ◆ Minor evidence of mass wasting along design segment; ◆ Approximately 25% or more of similar design segments show mass wasting; ◆ Steep terrain on bedrock with slopes in excess of 40 %; and, ◆ Moderately steeply gullied terrain, slopes in excess of 40 % unless on bedrock.
	Consequence
High (H)	
Moderate (M)	<ul style="list-style-type: none"> ◆ Sediment delivery from source area leads directly into fish stream; and, ◆ life/safety-generally not addressed except for mainlines which have public traffic.
Low (L)	<ul style="list-style-type: none"> ◆ Sediment delivery from source area leads directly into non-fish stream; and, ◆ Sediment delivery from source area leads indirectly to fish stream.
	<ul style="list-style-type: none"> ◆ Sediment delivery from source area leads onto slopes; and, ◆ Sediment delivery from source area has no connection to streams.

Example 1B: Risk Assessment Matrix

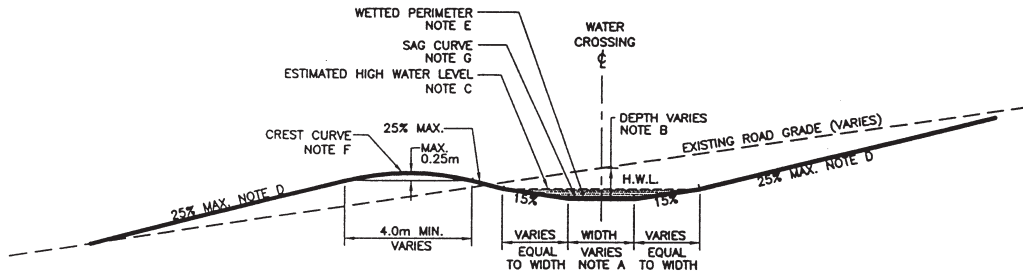
Hazard/Consequence	Low	Moderate	High
Low	Very Low	Low	Moderate
Moderate	Low	Moderate	High
High	Moderate	High	Very High

Appendix III: Road Deactivation Typical Drawings



PREPARED BY: SNC-LAVALLIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION. 1800-1075 WEST GEORGIA STREET, VANCOUVER B.C. V6E 3C9 PH 662-3555 FAX 662-7688

NOTE
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 DRAWING MODIFICATIONS, SPECIAL SITE PRESCRIPTIONS AND/OR PROFESSIONAL INPUT
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TYPICAL ROAD PROFILE TEMPLATE #2

PREPARED BY: SNC-LAVALIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION, 1800-1075 WEST GEORGIA STREET VANCOUVER B.C. V6E 3C9 PH.662-3555 FAX.662-7868

GENERAL NOTES:

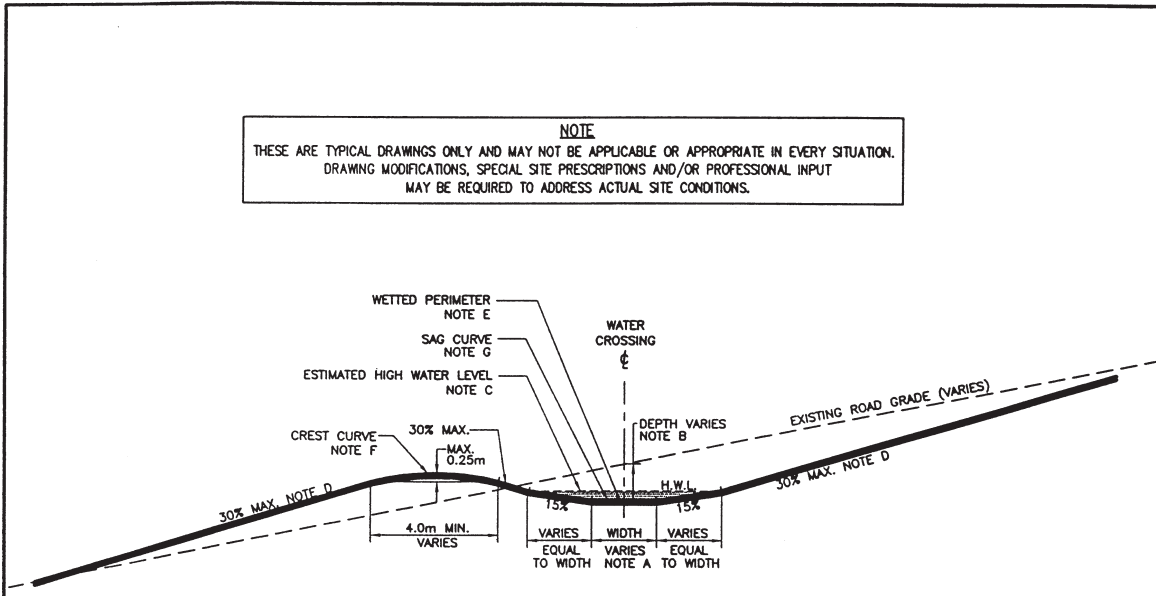
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2. TYPICAL CROSS DITCH TEMPLATES ARE USED TO DESCRIBE THE SIZE AND SHAPE OF A DIP TO BE CONSTRUCTED IN A ROAD TO CARRY ROAD SURFACE WATER AND DITCH WATER OFF OR ACROSS THE ROAD AND TO PROVIDE VEHICULAR ACCESS ALONG THE ROAD.
3. FOR CROSS DITCH AND FORD DEFINITIONS AND NOTES SEE DWG. 05
4. FOR ARMOURING DETAILS OF FORDS SEE DWG. 04 'TYPICAL FORD/SQUAMISH CULVERT DETAILS'.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG. 04 'TYPICAL FORD AND SQUAMISH CULVERT DETAILS'. DWG. 05 'TYPICAL WATER CONTROL METHODS'.

TYPICAL WATER CROSSING TEMPLATE NOTES

- A) WATER CROSSING WIDTH = THE GREATER OF 2 TIMES THE DESIGN CULVERT Ø OR THE WIDTH OF THE ACTIVE STREAM CHANNEL. WIDTH IS SPECIFIED ON ROAD DEACTIVATION PRESCRIPTION PLANS.
- B) WATER CROSSING DEPTH = DEPTH OF CUT FROM EXISTING ROAD GRADE TO WATER CROSSING INVERT AT INTERSECTION OF ROAD AND WATER CROSSING CENTRELINES. DEPTH IS SPECIFIED ON ROAD DEACTIVATION PRESCRIPTION PLANS.
- C) ESTIMATED HIGH WATER LEVEL = WATER CROSSING WIDTH X 0.15. (FOR ALL TEMPLATES EXCEPT #4)
- D) MAXIMUM TEMPLATE GRADE MAY VARY AS DIRECTED BY LICENCEE /MINISTRY REPRESENTATIVE TO CONFORM TO ACTUAL SITE CONDITIONS.
- E) WETTED PERIMETER TO BE CONSTRUCTED BELOW EXISTING ROAD GRADE.
- F) CREST CURVES THAT FORM A TRANSITION BETWEEN THE SHAPE OF THE WATER CROSSING AND THE EXISTING ROAD ARE TO BE CONSTRUCTED TO ACCOMMODATE THE SPECIFIED ACCESS LEVEL. THE MAXIMUM CREST CURVE HEIGHT OF 0.25m IN 4.0m HORIZONTAL DISTANCE AS SHOWN ON TEMPLATE WILL ACCOMMODATE ALL ACCESS LEVELS. (SEE TABLE A)
- G) SAG CURVES THAT FORM THE BOTTOM OF THE WATER CROSSING ARE TO BE CONSTRUCTED TO ACCOMMODATE THE SPECIFIED ACCESS LEVEL. (SEE TABLE A)

SCALE 1:200

DRAWN <u>N.K.</u> CHECKED <u>M.L.</u> APPROVED <u>W.D. CRIPPS</u> DATE <u>JULY 14 1997</u>	 Province of British Columbia MINISTRY OF FORESTS KAMLOOPS FOREST REGION TYPICAL ROAD PROFILE TEMPLATE FOR FORDS FOUR-WHEEL DRIVE ACCESS TYPICAL ROAD DEACTIVATION PRESCRIPTIONS DRAWING																																										
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TYPICAL ROAD PROFILE TEMPLATE #3

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GENERAL NOTES:

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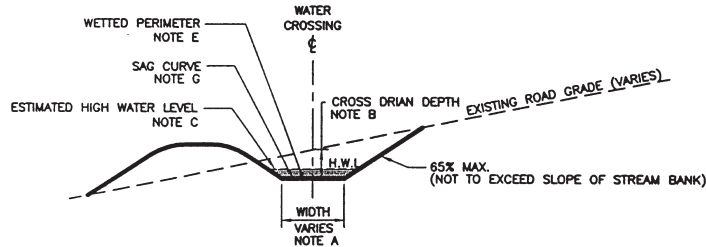
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- A) WATER CROSSING WIDTH = THE GREATER OF 2 TIMES THE DESIGN CULVERT # OR THE WIDTH OF THE ACTIVE STREAM CHANNEL. WIDTH IS SPECIFIED ON ROAD DEACTIVATION PRESCRIPTION PLANS.
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**TYPICAL ROAD PROFILE TEMPLATE #4
 (REESTABLISH STREAM CROSSING)**

PREPARED BY: SNC-LAVALLIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION, 1800-1075 WEST GEORGIA STREET VANCOUVER B.C. V6E 3C9 PH:662-3555 FAX:662-7688

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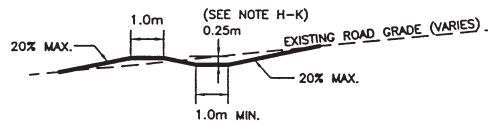
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TYPICAL CROSS DITCH TEMPLATE #1

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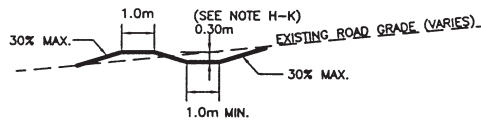
TYPICAL CROSS DITCH TEMPLATE NOTES

- H) CROSS DITCH TEMPLATES ARE DESIGNED TO CARRY A DISCHARGE EQUIVALENT TO A 600mm# CULVERT
- I) CROSS DITCHES ARE TO BE CONSTRUCTED AT LOCATIONS AS SPECIFIED ON THE ROAD DEACTIVATION PRESCRIPTIONS PLANS
- J) CROSS DITCH TEMPLATES USED MUST BE CONSISTENT WITH ACCESS LEVELS AS SPECIFIED ON THE ROAD DEACTIVATION PRESCRIPTIONS PLANS
- K) CROSS DITCH TEMPLATES MUST BE RESHAPED AT THE INLET END TO ALLOW A DIRECT HYDRAULIC CONNECTION TO THE ROAD SIDE DITCH WITHOUT RESTRICTING THE SPECIFIED ACCESS LEVEL.

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TYPICAL CROSS DITCH TEMPLATE #2

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3. FOR CROSS DITCH AND FORD DEFINITIONS AND NOTES SEE DWG. 05
4. FOR ARMOURING DETAILS OF FORDS SEE DWG. 04 'TYPICAL FORD/SQUAMISH CULVERT DETAILS'.
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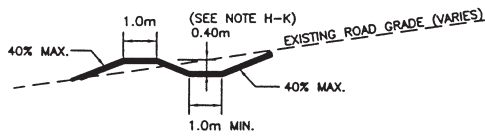
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PREPARED BY: SIK-LAVALLIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION. 1800-1075 WEST GEORGIA STREET VANCOUVER B.C. V6E 3C9 PH.662-3555 FAX.662-7688

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NOTE
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TYPICAL CROSS DITCH TEMPLATE #3

GENERAL NOTES:

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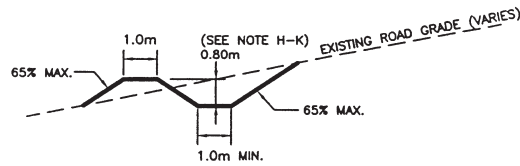
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SCALE 1:200

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TYPICAL CROSS DITCH TEMPLATE #4

PREPARED BY: SNC-LAVALIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION, 1800-1075 WEST GEORGIA STREET VANCOUVER B.C. V6E 3C9 PH:602-3555 FAX:602-7688

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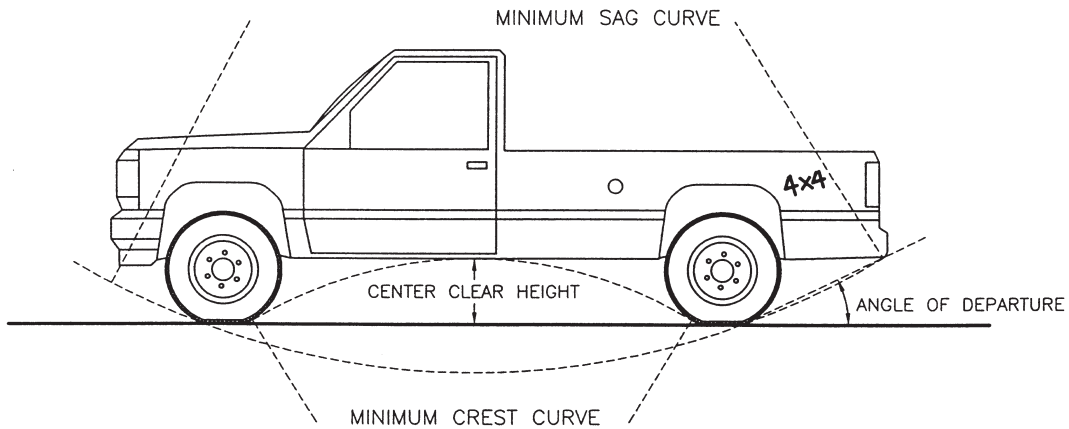
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TABLE A

(FOR INFORMATION ONLY)


VEHICLE DIMENSION SUMMARY TABLE							
VEHICLE CLASSIFICATION	SUB-CLASSIFICATION	CENTER CLEAR HEIGHT mm	ANGLE OF DEPARTURE %	MINIMUM SAG CURVE mm	MINIMUM CREST CURVE mm	MAX HT OF CREST CURVE IN 4.0m HORZ DISTANCE mm	MINIMUM WATER CROSSING WIDTH mm
TWO WHEEL DRIVE TRUCKS	COMPACT PICK-UP	270	50%	4400	3000	750	700
	FULL SIZE PICK-UP	270	45%	5400	3800	570	900
	EXTENDED CAB PICK-UP	300	43%	6300	4850	430	1000
	CREW CAB PICK-UP	300	39%	7100	7000	280	1000
	MAX.	300	50%	7100	7000	750	1000
MIN.	270	39%	4400	3000	280	700	
FOUR WHEEL DRIVE TRUCKS	COMPACT PICK-UP	370	61%	4200	3100	730	600
	FULL SIZE PICK-UP	300	45%	5800	4200	510	900
	EXTENDED CAB PICK-UP	350	50%	5400	4040	530	800
	CREW CAB PICK-UP	340	46%	6900	6200	330	1000
	COMPACT SPORT UTILITY	300	55%	4000	2650	910	600
	FULL SIZE SPORT UTILITY	310	38%	6100	3300	670	900
	MAX.	370	61%	6900	6200	910	1000
MIN.	300	38%	4000	2650	330	600	
SPECIAL ACCESS VEHICLE	FIRE PROTECTION VEHICLE	430	32%	9300	3350	660	1300

MINIMUM VEHICLE GROUND CLEARANCES AND ROAD PROFILE
TEMPLATE DIMENSIONS BY VEHICLE SUB-CLASSIFICATION



NOT TO SCALE

PREPARED BY: SNC-LAVALIN FOR THE MINISTRY OF FORESTS, KAMLOOPS FOREST REGION, 1800-1075 WEST GEORGIA STREET VANCOUVER B.C. V6E 3C9 PH.662-3555 FAX.662-7888

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