



**Ontario
Ministry of
Natural
Resources**

Subject GEOMETRIC STANDARDS		Policy PL 10.06.00
Compiled by - Branch Lands & Waters	Section Land Management	Date Issued August, 1992
Formerly Referenced As Access Roads Manual: Geometric Standards		Number RA 3-1

ACCESS ROADS MANUAL	Number RA 3-1
	Section OPERATIONS
	Subject GEOMETRIC STANDARDS

All resource access roads constructed or reconstructed on Crown and Agreement Forest lands, regardless of the proponent, will be consistent with the Environmental Guidelines for Access Roads and Water Crossings, the provincial road design standards and / or with the agreed FMA Standards.

The District Managers in consultation with the Regional Engineer will determine the category for each road in accordance with the following tables which outline specifications for the three classes of roads: primary, secondary and tertiary. Within each class, the specifications will provide flexibility to design and construct a road which meets the need.

The design standard guidelines for the construction of roads on Crown land is defined in the accompanying table. This guideline is designed to give flexibility to road planners and road builders to choose or combine standards and specifications to best meet local needs, (eg. topography, type of traffic, frequency, safety and cost). The District shall undertake the following:

1. Establishes the standard for a given road taking into account above factors where MNR is the proponent. Negotiates with other party where MNR is not the proponent.
2. Ensures that all road projects in the District are carried out to meet the standard established for road.
3. Takes appropriate action to ensure that engineering specifications and revisions are properly carried out.
4. Negotiates with the MTO Engineer and provides road specifications to the staff for roads, for cottage or residential purposes, to be constructed or upgraded and that will be transferred to the MTO or a Local Roads Board.
5. Reviews and approves exceptions where geometrics fall outside the standards.

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6. Ensures all road projects in the District are carried out as per sound engineering practice and in accordance with Ministry policies and guidelines.

7. Regional Engineer to assist District by providing engineering assistance and technical advice as required.

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RESOURCE ACCESS ROAD SPECIFICATIONS - MINISTRY OF NATURAL RESOURCES
PRIMARY ROAD GUIDELINES

Primary roads are constructed, maintained and used as the main all-weather road system providing principle access to the forest management unit, provincial parks, communities, and M.N.R. facilities. They are essentially permanent roads, regularly maintained, with an expected life in excess of fifteen years.

As per Use Management Strategies, the geometric specifications required for each road shall be based on class A, B, C, D, or combination. Key components to consider are traffic type, frequency, topography, safety and cost. In some cases, roads may be upgraded so that the responsibility for maintenance may be transferred to a Local Roads Board or other agencies. Usually these are roads to cottaging areas or communities. M.T.O. standards must be met. Usually class B with crushed gravel is accepted by M.T.O., however it is important that the field planner contact the M.T.O. Municipal Engineer to develop appropriate specifications.

SPECIFICATIONS

CLASS	MIN. - MAX. CLEARING WIDTH	SPEED	ROADWAY WIDTH	HORIZONTAL CURVATURE	MAXIMUM GRADE	MINIMUM SIGHT DISTANCE	MINIMUM DITCH DEPTH	MINIMUM CULVERT SIZE*	MAXIMUM AGGREGATE SIZE	GRAVEL STRUCTURE
A	30-61 m. (100-200 ft.)	60-80 kph (40-50 mph)	6-9 m. (20-30 ft.)	270 m. radius (6°)	6-8%	100 m. (400 ft.)	400 mm. (24 in.)	400 mm. (24 in.)	Crushed Gravel or Pit Run 40 mm. (1 1/2 in.)	300-600 mm. (12-24 in.)
B	20-61 m. (66-200 ft.)	40-60 kph (25-40 mph)	4-6 m. (20-20 ft.)	210 m. radius (6°)	10%	100 m. (350 ft.)	300 mm. (12 in.)	450 mm. (18 in.)	70 mm. (3 in.)	200-300 mm. (8-12 in.)
C	20-30 m. (66-100 ft.)	30-50 kph (20-30 mph)	3-6 m. (10-20 ft.)	117 m. radius (15°)	15%	60 m. (200 ft.)	300 mm. (12 in.)	450 mm. (18 in.)	100 mm. (4 in.)	200 mm. (8 in.)
D	As Required	20-35 kph (15-20 mph)			15%	60 m. (200 ft.)	Control Surface Water	450 mm. (18 in.)	100 mm. (4 in.)	0-150 mm. (0-6 in.)

* Minimum Culvert sizes are a general guideline.

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RESOURCE ACCESS ROAD SPECIFICATIONS - MINISTRY OF NATURAL RESOURCES

SECONDARY ROAD GUIDELINES

Secondary roads are constructed, maintained and used as branch roads off the primary roads providing access to timber operating units, access points and for fuelwood and recreation. Depending on the Use Management Strategies for each road, these roads may become long term roads but they are not normally maintained beyond fifteen years. Geometric specifications required by the district shall be based on class B, C, D, or combination. Key components to consider are traffic type, frequency, topography, safety and cost.

Note of explanation: A secondary road may require high geometric standards. For example if the topography is clay, the frequency of industrial vehicle is high and the bulk of the haul will occur in the summer over a number of years. Therefore the District may choose a combination standard of class B and C.

SPECIFICATIONS

CLASS	MIN. - MAX. CLEARING WIDTH	SPEED	ROADWAY WIDTH	HORIZONTAL CURVATURE	MAXIMUM GRADIENT	MINIMUM SIGHT DISTANCE	MINIMUM DITCH DEPTH	MINIMUM CULVERT SIZE*	MAXIMUM AGGREGATE SIZE	GRAVELLAR STRUCTURE
B	20-61 m. (66-200 ft.)	40-60 kph (25-40 mph)	6-8 m. (20-26 ft.)	218 m. radius (8°)	10%	100 m. (330 ft.)	300 mm. (12 in.)	450 mm. (18 in.)	70 mm. (3 in.)	200-300 mm. (8-12 in.)
C	20-30 m. (66-100 ft.)	30-50 kph (20-30 mph)	5-6 m. (16-20 ft.)	117 m. radius (15°)	15%	60 m. (200 ft.)	300 mm. (12 in.)	450 mm. (18 in.)	100 mm. (4 in.)	70-200 mm. (3-8 in.)
D	As Required	20-35 kph (15-20 mph)			15%	60 m. (200 ft.)	Control Surface Water	450 mm. (18 in.)	100 mm. (4 in.)	0-150 mm. (0-6 in.)

* Minimum Culvert Sizes are a general guidelines.

RESOURCE ACCESS ROAD SPECIFICATIONS - MINISTRY OF NATURAL RESOURCES

TERTIARY ROAD GUIDELINES

Tertiary roads are constructed to provide short term access (usually less than five years), to annual cutting areas to extract a volume of wood and permit silviculture work and receive minimal maintenance. Depending on the Use Management Strategies and topography, some of these roads may become long term roads. Geometric standards and specifications required by the District shall be based on tertiary, class D, or combination, standards.

SPECIFICATIONS

CLASS	MIN. - MAX. CLEARING WIDTH	SPEED	ROADWAY WIDTH	HORIZONTAL CURVATURE	MAXIMUM GRADIENT	MINIMUM SIGHT DISTANCE	MINIMUM DITCH DEPTH	MINIMUM CULVERT SIZE*	MAXIMUM AGGREGATE SIZE	GRANULAR STRUCTURE
D	As Required	20-25 kph (15-20 mph)			15%	60 m. (200 ft.)	Control Surface Meter	450 mm. (18 in.)	100 mm. (4 in.)	0-150 mm. (0-6 in.)
Tertiary	As Required	0-16 kph (0-10 mph)			15%	60 m. (200 ft.)	Control Surface Meter			as required

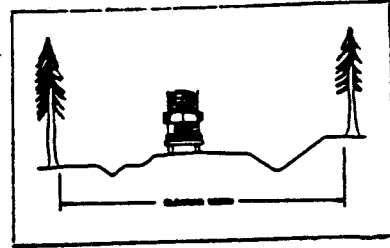
* Minimum Culvert Sizes are a general guideline.

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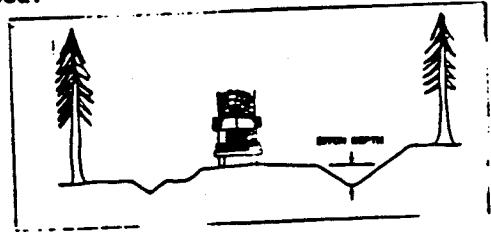
ROAD STANDARDS - GLOSSARY OF TERMS

The following glossary of terms used when describing resource access road specifications is provided for information and clarification purposes, along with a series of engineering drawings illustrating various road construction situations.

Clearing Width - The width of clearing for road construction and recognizing sight conditions. A minimum width is specified to provide sight distance for safety, to allow sufficient room for road construction equipment to operate and to allow the roadway to dry out quickly. A maximum width is specified to protect specific values eg. approaches to a water crossing, a timber stand not to be harvested, or in certain circumstances maximum clearing width may be used to reduce cost, whereby the value of wood harvested would offset some or all the cost of clearing.



Ditching - On class "A" and some class "B" roads, ditching shall be carried out for the full length of the road to control both surface water and to drain the roadbed structure which must carry the heavy traffic loads. On lower standard roads, the objective of ditching is to keep the water out of the roadbed.



Gravel Structure - The depth of imported gravel applied to strengthen the road structure and to create the driving surface after the fills are completed.

Structure is the amount of granular material (sand, gravel or combination) applied over the earth grade to support traffic load designs.

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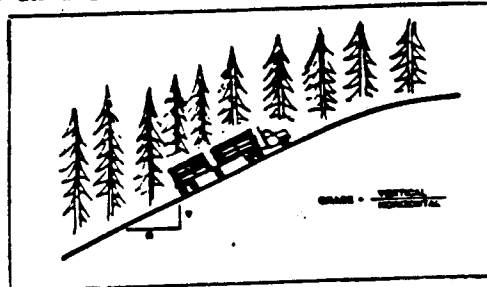
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Maximum
Aggregate
Size

- The material size considered necessary in order to provide a smooth ride at the design speed and to permit grading within tolerance.

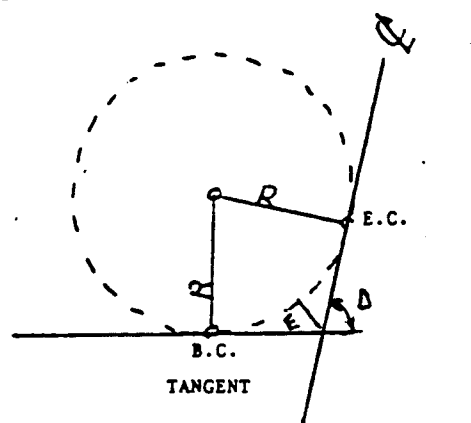
Maximum
Gradient

- The percent rise - that is, the number of vertical unit in a 100 unit horizontal distance.



Maximum
Horizontal
Curvature

- No curve on the road should exceed the maximum. Curvature is the number of degrees turned off within a 100 foot chord.
- In metric, curvature is expressed as radius. Radius is a line segment extending from the centre of a circle to join two tangents of different direction in a road horizontal alignment to form a circular curve.



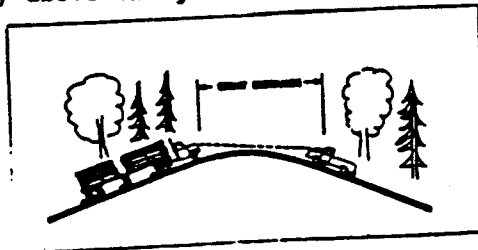
Minimum
Culvert
Size

- As a precaution against freezing during the winter and as insurance against replacement cost, minimum culvert sizes are recommended.

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Minimum
Stopping
Sight
Distance

- This is defined as the minimum clear sight distance necessary to come to a safe stop from the design driving speed. It is measured 1200 mm (4 feet) above the ground.

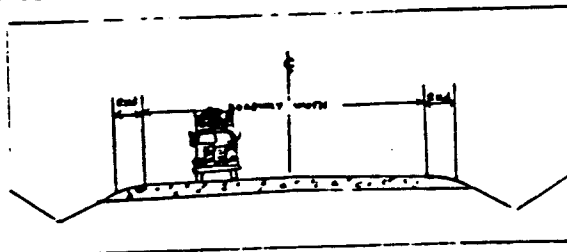


Operating
Speed

- This would be the average driving speed on the road.

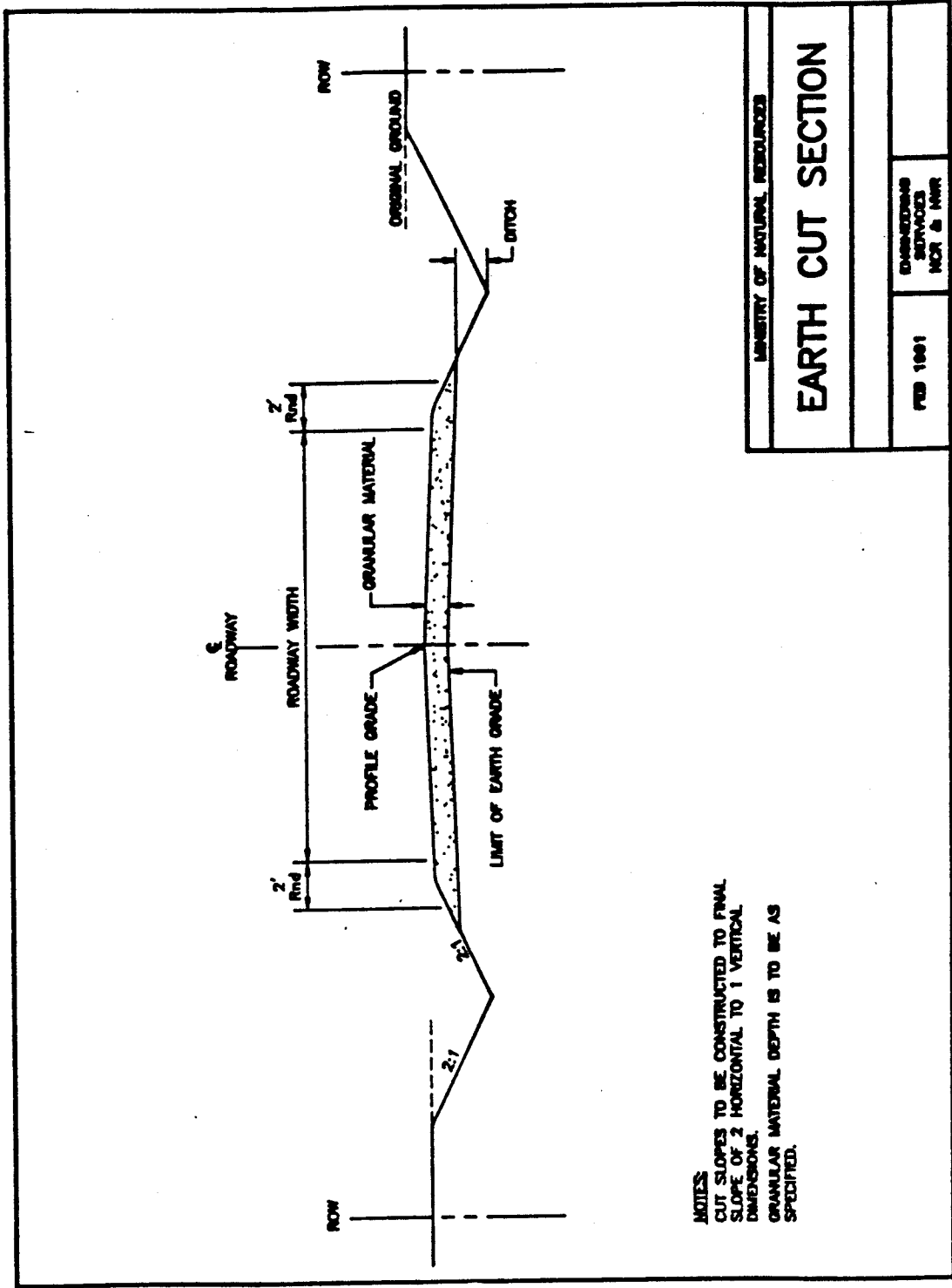
Roadway
Width

- The travelled portion of a roadway usually graveled and consisting of 1 to 2 lanes. The furthest point on a road not including the rounding, that a vehicle can safely travel to the right or to the left.



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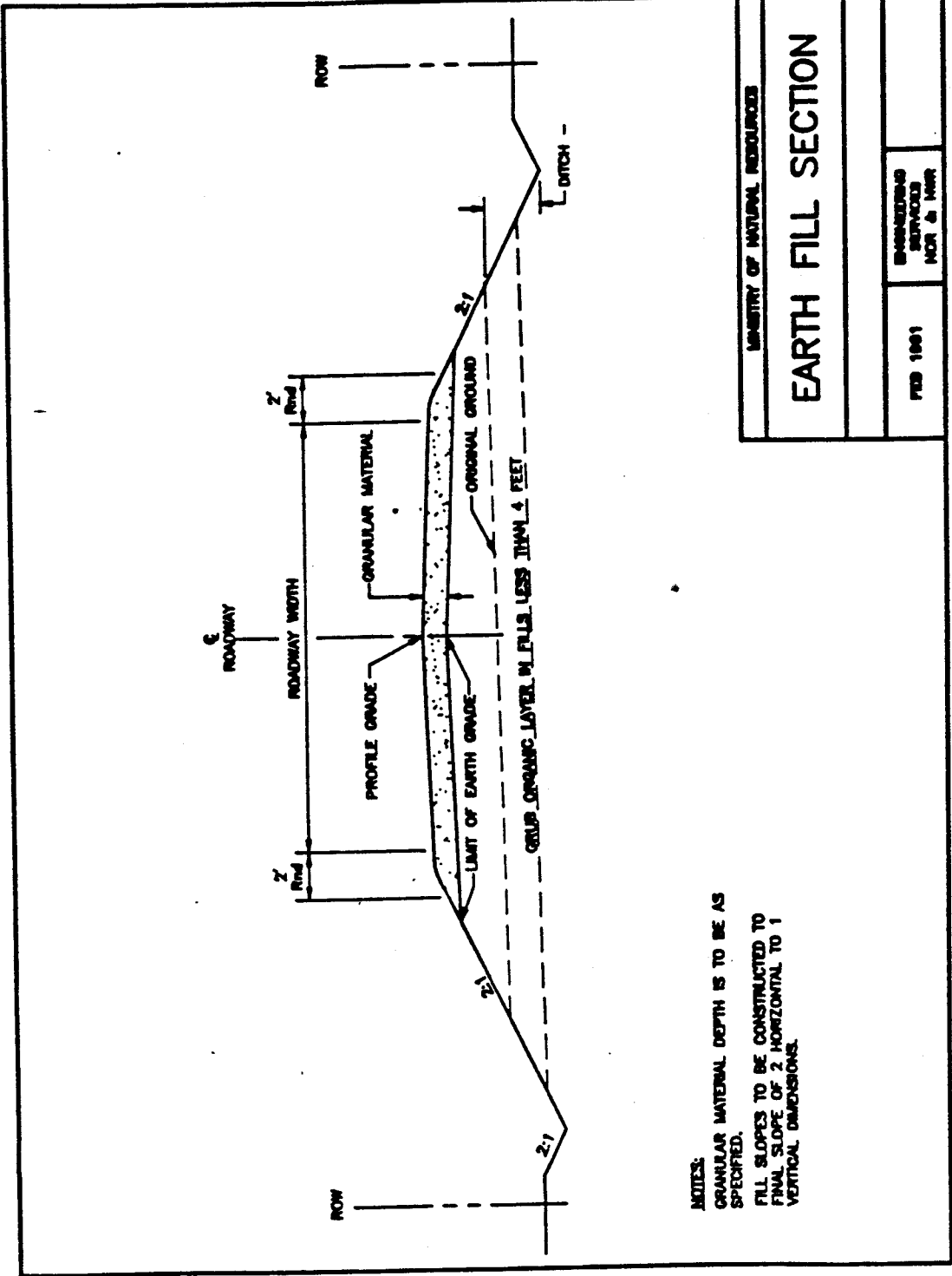


MINISTRY OF NATURAL RESOURCES	
EARTH CUT SECTION	
FEB 1991	ENGINEERING SERVICES MCR & MRR

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NOTES:
GRANULAR MATERIAL DEPTH IS TO BE AS SPECIFIED.
FILL SLOPES TO BE CONSTRUCTED TO FINAL SLOPE OF 2 HORIZONTAL TO 1 VERTICAL DIMENSIONS.

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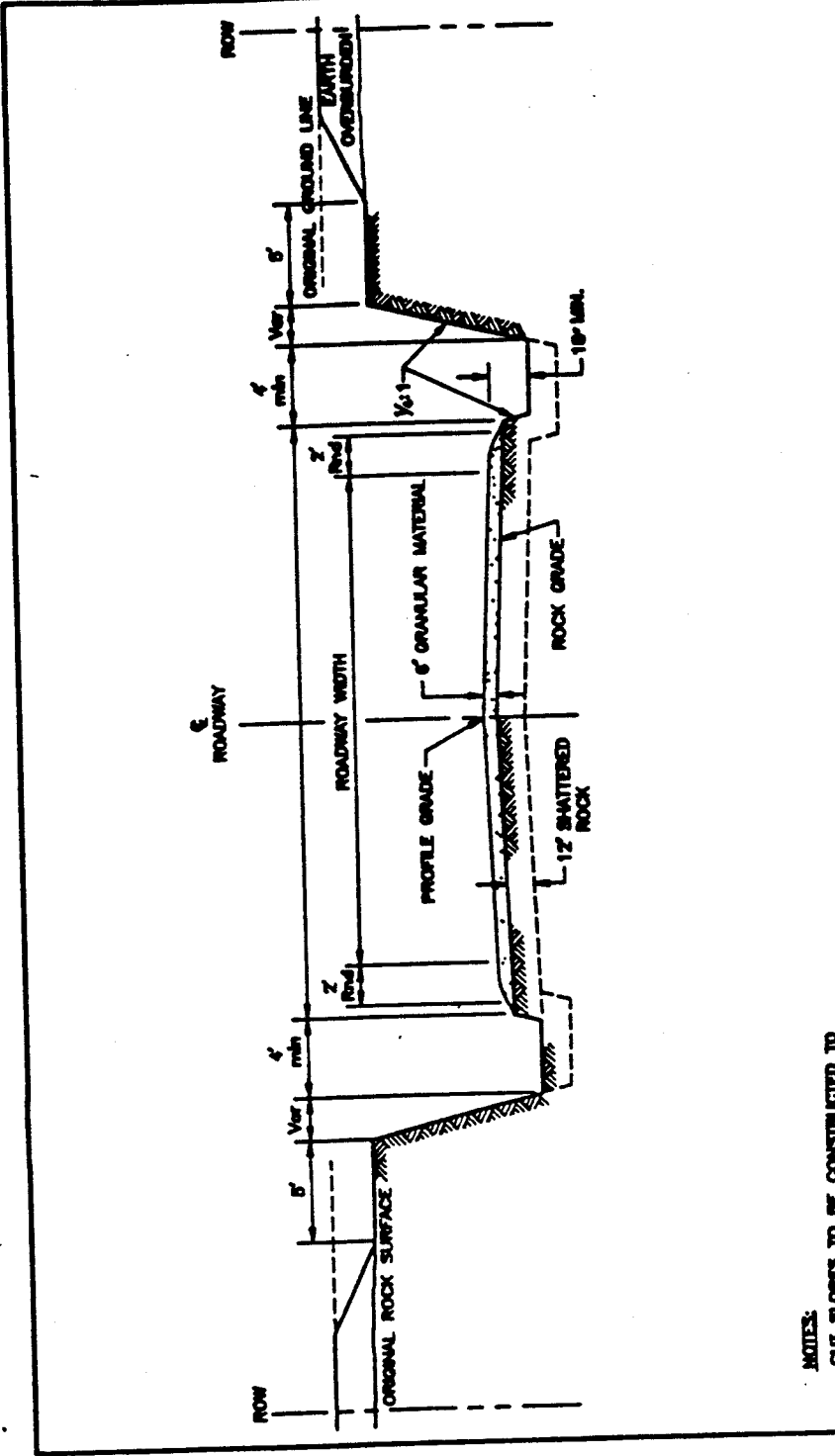
EARTH FILL SECTION

FEB 1961
ENGINEERING SERVICES
MOR & HWR

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MINISTRY OF HIGHWAY TRANSPORTATION ROCK CUT SECTION	
FEB 1981	DESIGNED BY STRUCTURES MOH & MHR

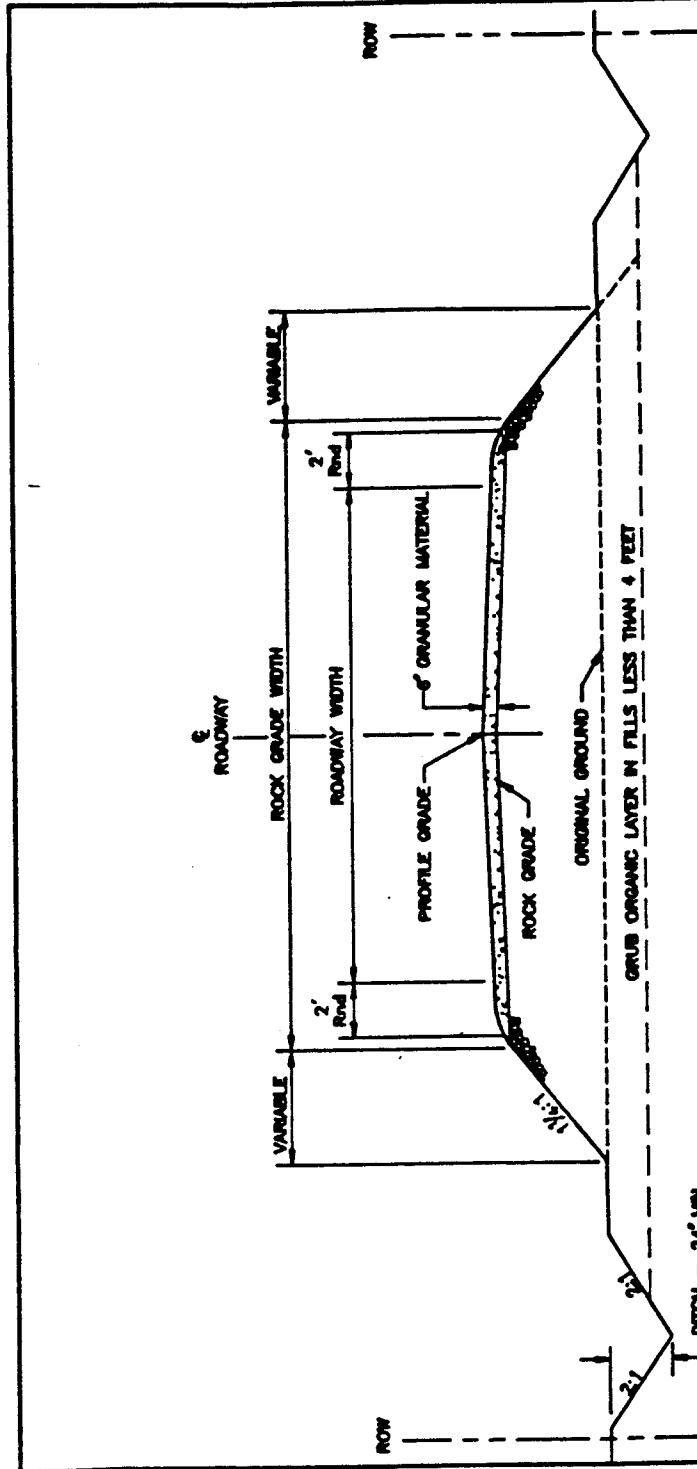
NOTES:
CUT SLOPES TO BE CONSTRUCTED TO
FINAL SLOPE OF 1/4 HORIZONTAL TO 1
VERTICAL DIMENSIONS.

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NOTES:
FILL SLOPES TO BE CONSTRUCTED TO
FINAL SLOPE OF 1 1/4 HORIZONTAL TO 1
VERTICAL DIMENSION.

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ROCK FILL SECTION

DESIGNING
SERVICES
MOR & MWR

FEB 1991

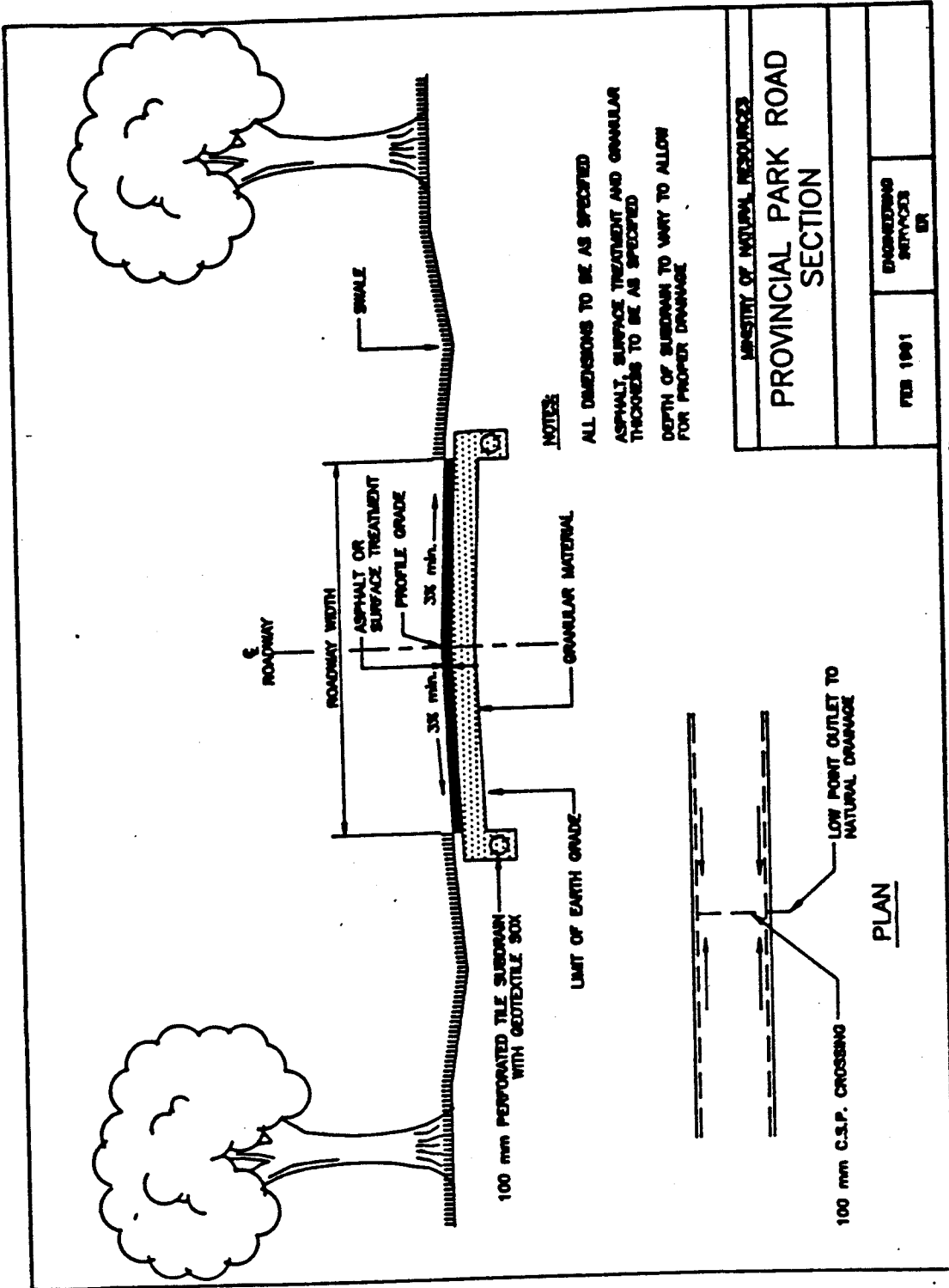
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