

DESIGN BULLETIN #70/2010

Highway Geometric Design Guide Centreline to Centreline Spacing For New Rural Divided Highways

Summary

This Bulletin is issued to inform practitioners of the Department's revised guidelines on the centerline to centerline spacing for new rural divided highway cross-section. Where land is considered to be of lower value (not suitable for cultivation or grazing) the use of a wider median (55m or more is desirable) has many economic advantages resulting from capital, maintenance and operational savings. Where the desirable spacing is not economical, a minimum centerline to centerline spacing of 40m is acceptable.

Background

The revised plan (Figure C-6.0) which provides for a wider standard median should be used in areas where the land is of lower value and where the provision of grade-separations is expected to be deferred for many years. The use of a wider median has many economic advantages resulting from safety, capital, maintenance and operational savings.

- Operationally, due to the use of long vehicles such as Log Haul Trucks (30.5m), Long Combination Vehicles (40 m) and Super B Trains (25m), it is very desirable to have a median which is wide enough to allow these vehicles to take refuge while crossing or making left turns. Narrower medians will lead to pressure to build grade separations many years earlier than would be required on a wider median.
- When four-lane divided highways need to be upgraded to six or eight lanes (expressway or freeway) to increase capacity or level of service, the median spacing can still accommodate design vehicles up to a WB-23 design vehicle (25m length), which is beneficial especially at the expressway stage. At the eight lane divided highway stage, the facility typically will have very strict access control and therefore the operational difficulties at at-grade intersections are minimized. Figure C-6.1 illustrates the divided highway staging.
- Wide medians permit the use of independent roadway alignments, both vertically and horizontally, blending the divided highway into the natural topography with less construction cost.
- The increased width reduces the problems of headlight glare and cross-the-median head-on crashes and may eliminate the need for median barriers.

- The increased width provides greater flexibility for roadway planning and staging of interchange construction. Interchange construction can frequently be deferred.
- The increased width provides a buffer area which meets the suggested shy line offset values (TAC 1999, Table 3.1.6.4) for WB-36 design vehicles. Refer to Figure C-6.0 for TAC table.

Key Changes

Where the land is considered to be of lower value (not suitable for cultivation or grazing), a centreline to centreline spacing of 55m or more is desirable for new rural divided highway cross-sections.

Where the desirable spacing is not economical or not feasible, a minimum centerline to centerline spacing of 40m is acceptable. The 40 m minimum spacing accommodates design vehicles up to a WB-23 (25m length). Sites where the desirable spacing is not economical/feasible may include bridge or culvert crossings of watercourses and/or areas where embankments may be impacted by watercourses. At locations where interchanges will ultimately replace at-grade intersections the width will be reassessed at that stage to ensure optimization of the overall design. In addition, where limited by bridge requirements or other constraints, suitable safe transitions in median width conforming to the department's best practices shall be used.

The centerline to centerline spacing shall be based on design vehicle measurements. Provision for refuge of design vehicles in the median of at-grade intersections is a key factor. Spacing of 55m or more is desirable at all major at-grade intersections with truck-trailer turning movements. A reduced median may be used between intersections if required due to constraints.

The revised guidelines as indicated in this Bulletin are to be implemented immediately as per the usual practice.

Effective Date: June 1, 2010.

Contact

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Attachments

1. Figure C-6.0, Typical Centreline to Centreline Spacing for New Rural Divided Highways in Alberta.
2. Figure C-6.1, Rural Multi-Lane Divided Highway Staging
3. Figure C-8.2a - Rev.1, Standard Cross-section for Six Lane Divided Highway RFD/RAD-616.6-130.

4. Figure C-8.2b - Rev.1, Standard Cross-section for Four Lane Divided Highway RFD 412.4-130 & RAD-412.4-120.

References

Highway Geometric Design Guide, 1995 (Updated 1999) – Alberta Transportation

Recommended:

Approved:

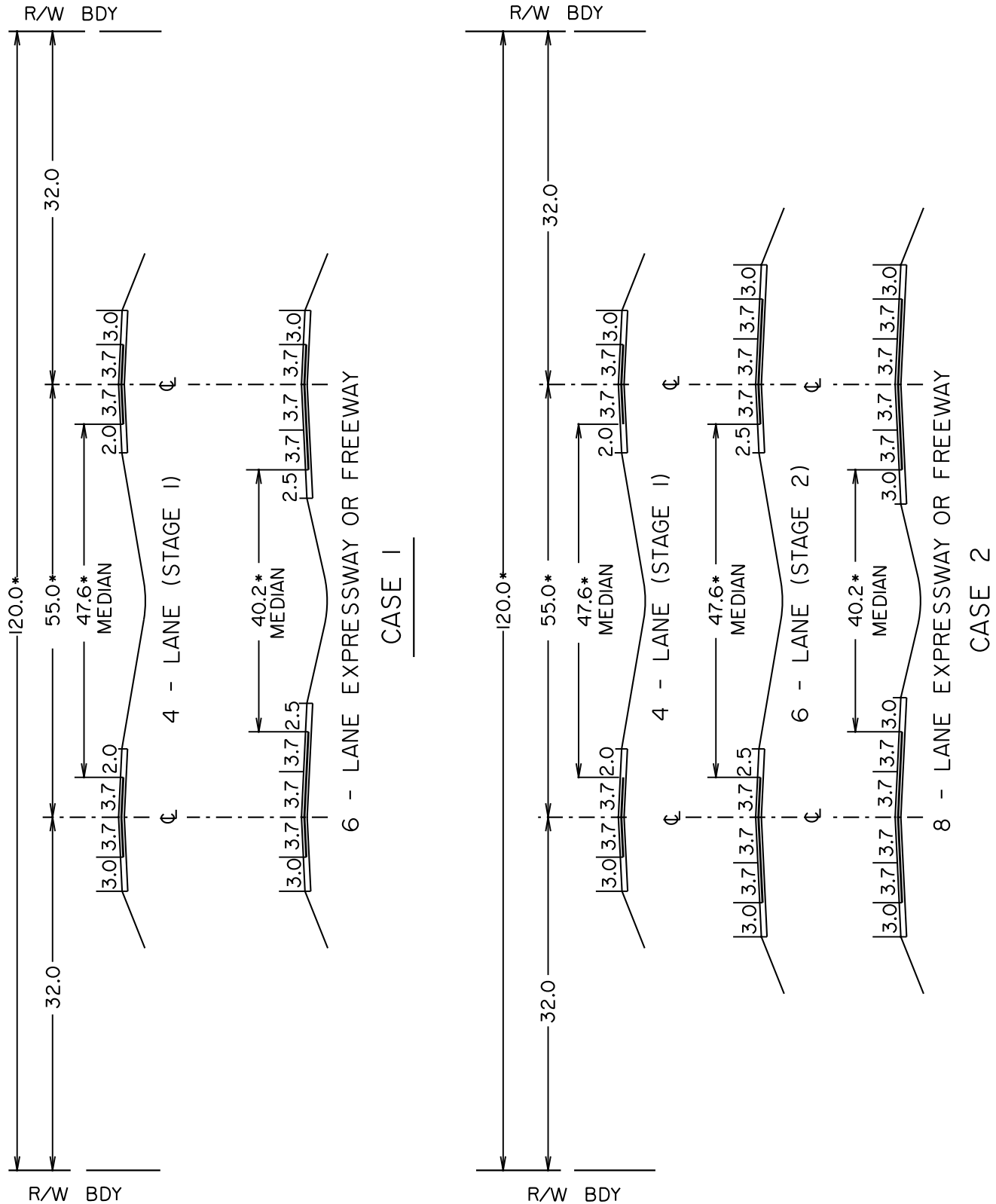


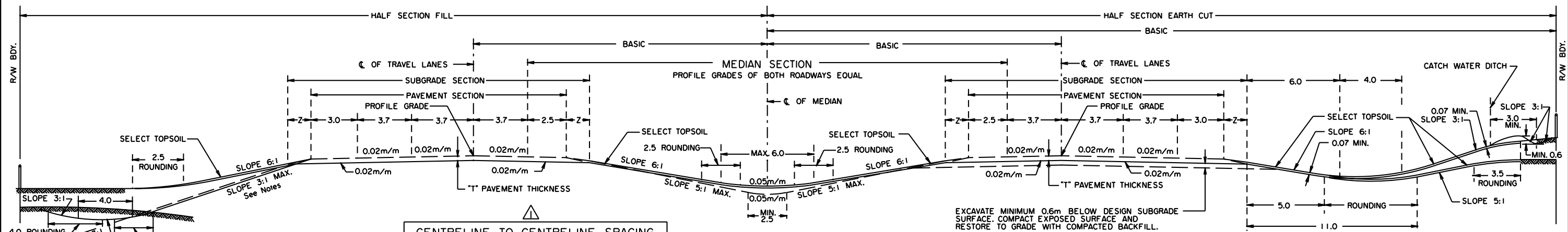
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FIGURE C-6.1 RURAL MULTI-LANE DIVIDED HIGHWAY STAGING





CENTRELINE TO CENTRELINE SPACING

THE CENTRELINE TO CENTRELINE SPACING SHALL BE BASED ON DESIGN VEHICLE REQUIREMENTS. PROVISION OF REFUGE FOR DESIGN VEHICLES IN MEDIAN OF AT-GRADE INTERSECTIONS IS A KEY FACTOR. SPACING OF 55m OR MORE IS DESIRABLE AT ALL MAJOR AT-GRADE INTERSECTIONS WITH TRUCK-TRAILER TURNING MOVEMENTS. A REDUCED MEDIAN MAY BE USED BETWEEN INTERSECTIONS IF REQUIRED DUE TO CONSTRAINTS. REFER TO FIG. C-6.0 FOR FUTURE DETAILS.

- NOTES:**
- Z VALUES MAY BE BASED ON FIG. C-8.1c AND FIG. C-8.1d OF HIGHWAY GEOMETRIC DESIGN GUIDE.
 - T PAVEMENT THICKNESS IS DEPENDENT ON SURFACING DESIGN. A GREATER PAVEMENT DEPTH MAY BE USED ON THE LANES CARRYING HEAVIER VEHICLE LOADS. REFER TO FIG. C-8.1g FOR CROWN OFFSET DIMENSIONS.
 - WIDTH OF SUBGRADE SECTION IS DEPENDENT ON THE DEPTH OF SURFACING MATERIAL. A GUIDE FOR DETERMINATION OF TOTAL SUBGRADE WIDTH MAY BE BASED ON FIG. C-8.1g OF DESIGN GUIDE.
 - THE PROFILE GRADES ARE AT THE CROWN POINTS ON THE FINISHED PAVEMENT SURFACE AS SHOWN ON THE CROSS-SECTIONS ABOVE.
 - SUPERELEVATION IS NORMALLY ATTAINED BY ROTATING INDIVIDUAL ROADWAYS ABOUT THE CENTRE LINE OF TRAVEL LANES.

- MEDIAN SECTION**
- SLOPES:**
- NORMAL SLOPE 6 : 1
 - MAXIMUM 5 : 1 TO BE USED ONLY WHERE MAXIMUM DIFFERENCE BETWEEN INDEPENDENT GRADES OCCUR AND WHERE ESSENTIAL FOR DEVELOPMENT OF MEDIAN DRAINAGE.
 - MINIMUM DEPTH OF MEDIAN DITCH 0.5m BELOW SUBGRADE SHOULDER.

- FILL SECTION**
- SLOPES:**
- 6:1 FOR AVERAGE FILLS TO 2.5m.
 - 5:1 FOR AVERAGE FILLS 2.5m. TO 4m.
 - 4:1 FOR AVERAGE FILLS 4m TO 6m.
 - 4:1 SLOPES CAN BE USED ON SHORT SECTIONS OF HIGHWAY FILL UP TO 14m IN HEIGHT (TO ELIMINATE THE NEED FOR GUARDRAIL), PROVIDING THERE ARE NO OBSTRUCTIONS WITHIN OR NEAR THE RIGHT-OF-WAY LIMITS.
 - 3:1 SLOPES TO BE USED IN AREAS WHERE GUARDRAIL IS TO BE INSTALLED.
 - THE CHOICE BETWEEN 4:1 SLOPE AND GUARDRAIL INSTALLATION ON HIGH EMBANKMENTS IS GENERALLY MADE BASED ON LIFE-CYCLE COST-EFFECTIVENESS.
 - 3:1 SLOPES ARE TO BE USED ON ALL FILLS ADJACENT TO DRAINAGE STRUCTURES OVER 1200mm IN DIAMETER, CATTLE PASSES, OPEN WATER, ETC. WHERE GUARDRAIL INSTALLATION IS NECESSARY FOR HIGHWAY SAFETY.
 - BERM ALSO TO BE CONSTRUCTED ADJACENT TO OPEN WATER.
 - TRANSITION BETWEEN 6 : 1 AND 3 : 1 SLOPES SHALL BE ATTAINED BY USING UNIFORMLY VARYING SLOPES; GENERALLY THE MINIMUM LENGTH OF TRANSITION SHALL BE NOT LESS THAN 100m.

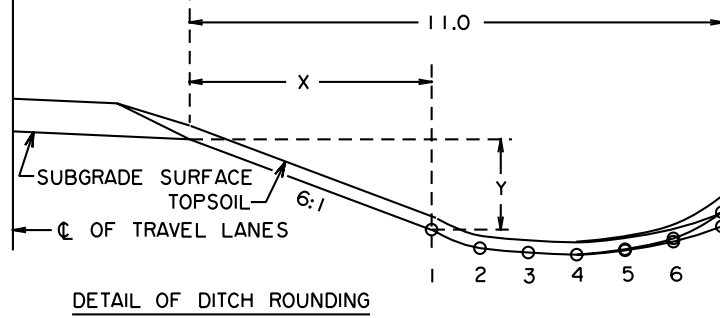
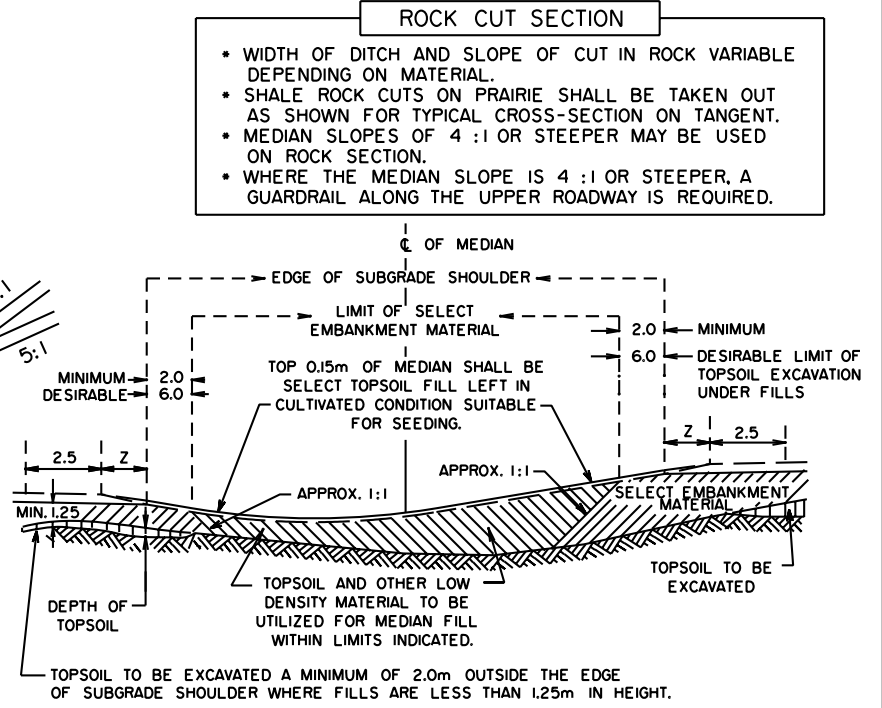


TABLE I

ROUNDED DITCH COORDINATE	1	2	3	4	5	6	7
X (METRES)	5	6	7	8	9	10	11
Y (METRES) 5 : 1 BACKSLOPE	0.83	0.97	1.04	1.06	1.02	0.94	0.80
Y (METRES) 3 : 1 BACKSLOPE	0.83	0.97	1.04	1.06	1.01	0.91	0.67



- USE OF TOPSOIL**
- SELECT TOPSOIL SHALL BE REMOVED WITHIN THE CONSTRUCTION LIMITS TO THE DEPTH AND WIDTH AS DIRECTED BY THE ENGINEER AND THE SALVAGED TOPSOIL STOCKPILED AT DESIGNATED POINTS WITHIN THE RIGHT-OF-WAY LIMITS FOR REDISTRIBUTION ON THE MEDIAN SECTION AND ON CUT OR FILL SLOPES AS REQUIRED.
 - WHERE DETERMINED FEASIBLE, THE ENGINEER WILL REQUIRE THE EXCAVATED SELECT TOPSOIL TO BE MOVED TO ITS FINAL POSITION WITHOUT DOUBLE HANDLING.
 - SURPLUS TOPSOIL AND OTHER MATERIAL DESIGNATED BY THE ENGINEER AS BEING UNSUITABLE FOR SALVAGE SHALL BE UTILIZED FOR CONSTRUCTION WITHIN THE MEDIAN AS INDICATED ON THE PLAN.
 - REFER TO SPECIFICATION 2.6 "TOPSOILING" FOR DETAILS REGARDING PLACEMENT OF TOPSOIL ON MEDIAN SLOPES, CUT AND FILL SLOPES.

- EARTH CUT SECTION**
- SLOPES:**
- 6 : 1 SIDESLOPE
 - 5 : 1 BACKSLOPE FOR AVERAGE CUT LESS 2m MEASURED FROM DITCH BOTTOM.
 - 3 : 1 BACKSLOPE FOR AVERAGE CUT GREATER THAN 2m.
 - BACKSLOPES ARE TO BE UNIFORM THROUGHOUT EACH CUT.
 - TRANSITION BETWEEN CUT AND FILL SHALL BE ATTAINED BY USING VARIABLE SLOPES BETWEEN 6 : 1 AND 3 : 1 LIMITS.
 - DITCH WIDTH AND ROUNDING OF BACKSLOPE TO BE INCREASED AT BEGINNING AND END OF CUT SECTIONS FOR AESTHETICS.

DETAIL FOR CONSTRUCTION OF MEDIAN SECTION

NOTE: ALL DIMENSIONS ARE EXPRESSED IN METRES UNLESS OTHERWISE NOTED.

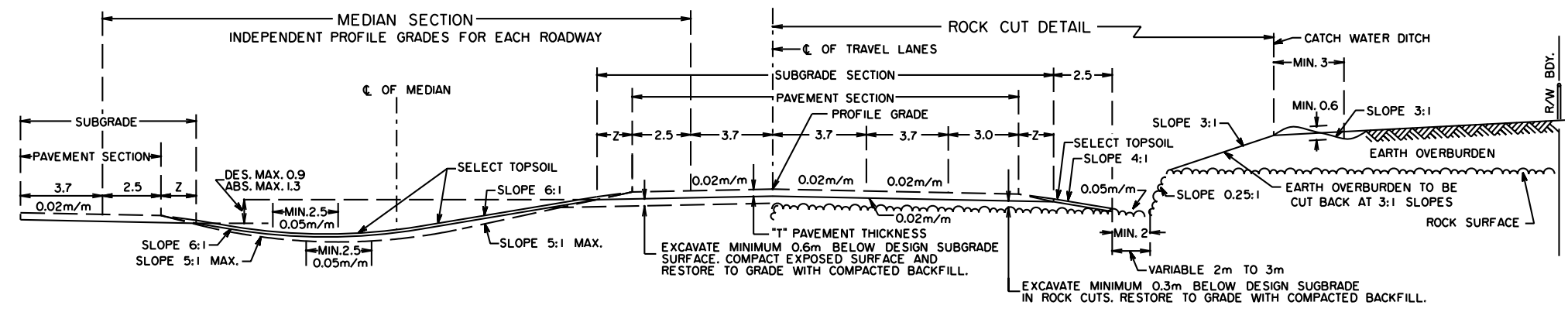


FIGURE C-8.2a

Date: DECEMBER 2002

STANDARD CROSS-SECTION FOR SIX-LANE DIVIDED HIGHWAY

RFD/RAD-616.6-130

Prepared By: R.T.	Checked By: B.K.	Scale: N.T.S.	PAGE C-96
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