Feature	Absolute minimum	Standard	Desirable
Berms (top width)	3.5 m[c]	3.5 m[c]	6 m[d]
Change in alignment			
Less than 45 degrees	Radius = 8 m	Radius = 15 m	Radius = 15 m
Greater than 45 degrees	Radius = 15 m	Radius = 15 m	Radius = 23 m
Ponds/retention area			
Fenced	2h:1v for vegetated or gravelled slopes, 1.5h:1v for paved or riprap slopes	3h:1v	3h:1v
Not fenced	3h:1vg	4h:1vf	6h:1ve

[a]Side slopes not suitable for roadside ditches within the clear zone, unless otherwise protected from traffic by guardrail or barrier.; however, the 1.5h:1v paved/rocked or a 2h:1v natural/vegetated side slope is often used for the ditch back slope.
[b]Side slope acceptable for recovery area adjacent to traffic areas shall meet the criteria in the DoT Road Geometric Design Manual (1), but is generally constructed on a 4h:1v, or flatter slope.
[c]Berm widths shall be suitable for maintenance equipment access. For roadside ditches with standard to desirable side slopes, maintenance access is provided by the roadway shoulder from within the ditch itself.
[d]This top of berm width is usually associated with main ditch or flood protection barriers, which are located away from the roadside.
[e]Use 6h:1v for vegetated landscape areas with public access, such as in parks or playgrounds.
[f]Vegetated slopes shall be easily maintained at this slope, especially if irrigated grass requiring mowing.
[g]Safety provisions for open channels in public areas, not otherwise fenced, require side slopes of not steeper then 3h:1v (so people can easily climb out of), design velocities within the allowable velocities for bare-earth channels, and where in the vehicle clear zone along highways, design depths no deeper than 1.3 m.

6. Velocity of flow in open channels shall not exceed the maximum permissible velocities given in Table A5.2.
7. Ideally, a drainage channel shall have flow velocities that neither erode nor cause deposition in the channel.

Table A5-2: Maximum permissible velocities in channels

Type of channels	Maximum permissible velocity (m/second)
Bare-earth channels:	
Fine sand and silts (non-colloidal)	0.8
Coarse sand	1.2
With channel linings:	
Gravel, 13-mm to 19-mm size	2.2
Coarse gravel, crushed > 19 mm	2.4
Coarse gravel with rock riprap (under 150-mm size)	2.7
Loose riprap with gravel bedding**	3.0
Grass with mulch	Less than 1.2
Sod; grass; or well-rooted, low-growing ground cover (irrigated and well maintained)	1.4
Asphalt	2.4
Geo-textile grid	1.2 to 2.4*
Concrete and grouted riprap linings	> 3.0**