Forestry Commission

FORESTRY COMMISSION ROAD SPECIFICATION WITH REFERENCE TO THE DfT HIGHWAYS AGENCY *DESIGN MANUAL FOR ROADS AND BRIDGES* (DMRB) AND *MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS* (MCHW)

This specification is the standard for forest roads built by outside parties on FC land. Any reduction in this standard is to have the FC Engineer's written approval before construction starts. Road survey and design should also have taken place before felling takes place.

Design speed	25 km/h.
Design loading	Full C&U (currently 44 tonnes).
Road Width	3.4 m running width (+/- 200 mm) - widened on inside of bends to suit radius (see table page 3).
Road alignment	Roads shall fit into the landscape and be constructed to a uniform horizontal and longitudinal profile. They shall avoid unstable ground and any features that require preserving.
Felled width	25 m average recommended.
Max gradient	<8% in general to be preferred, but gradients up to 10% acceptable. Small lengths (<200m) up to 12.5% may be permitted provided that they are contained within an overall gradient of 10%. For restrictions on gradient on bends, see table.
Min gradient	2% except over short sections on crests and sags. (This is an important requirement.)
Passing places	20m long and at least 3m wide with 10m splays. Spaced to be inter-visible with a maximum spacing to be agreed.
Bridge approaches	Minimum approach straight is 20m.
Turning places	Turning "T's" to be 26m in overall length (i.e. from far edge of road to end of 'T'), 4m wide with 11m radii.
Harvesting facilities	Ramps and stacking areas supplied as required. For guidance: ramps provided every 40m; stacking areas 30m by 3m provided every 200m. Surfaced where there is a risk of erosion.
Earthworks	Earthworks will be undertaken in accordance with Clauses 601 & 602 of the MCHW. Unsuitable materials to be stripped and removed. The formation shall be shaped to keep it free of standing water. Minimise disturbance of peaty soils to retain the stored carbon.
Cuttings	Cutting slopes must be stable and free of overhangs and loose rock. The maximum slope to be 30% for slopes up to 2m high. For slopes more than 2 m high, the maximum slope to be 1 in 2 (50%) for fine grained soils, 1 in 1½ (67%) for other soils, and 1 in 1 for rock slopes.
Embankments	Unless agreed beforehand, the fill material to be free draining and non-cohesive, placed in layers and effectively compacted in accordance with Clause 612 of the MCHW. Slopes as for cuttings.

Roadside drains & ditches	A roadside ditch shall be provided on the uphill side of a road and on both sides where the road formation is at or below the adjacent ground. Drains shall have a depth of not less than 150 mm below the formation edge and a longitudinal gradient of not less than 2%. Ditches and drains shall not lead directly into watercourses. Filters will be provided in and adjacent to the drains and culverts to avoid pollution and sedimentation of watercourses. Drains can help in temporary storage of flood water.
Culverts	All pipes shall be to Clause 501 of the MCHW - excavated in accordance with Clause 502; bedded, laid and surrounded in accordance with Clause 503; and backfilled in accordance with Clause 505. Laid in natural ground or in bed of original watercourse where applicable. Aim for bed continuum, for flora and fauna. Minimum size 300 mm although 450 mm preferred. Inlets to be provided with erosion protection. Outfalls should be so constructed as to eliminate possible erosion. Ditch relief culverts should be spaced as required with a maximum spacing of 200m. Where appropriate, culverts to be designed for 1 in 50 year storm. Where the diameter is greater than 1.2 m, the culvert to be designed for 1 in 100 year storm. Bridges are preferred, including for flora and fauna riparian zones.
Geosynthetics	Used as necessary over silty clay and peat formations.
Road construction	Capping layer of durable rock or road base to Clause 613 of MCHW to improve subgrade CBR to a minimum of 5%. Road metal Granular Sub-base Type 1 to Clause 803 and laid in accordance with Clause 801 of MCHW. Material for the running surface shall have a minimum Magnesium Sulphate Soundness Value of 85. Principal or arterial forest roads shall have a minimum compacted surfacing thickness of 100mm of hard wearing well bound continuously graded aggregate

Road metal thickness

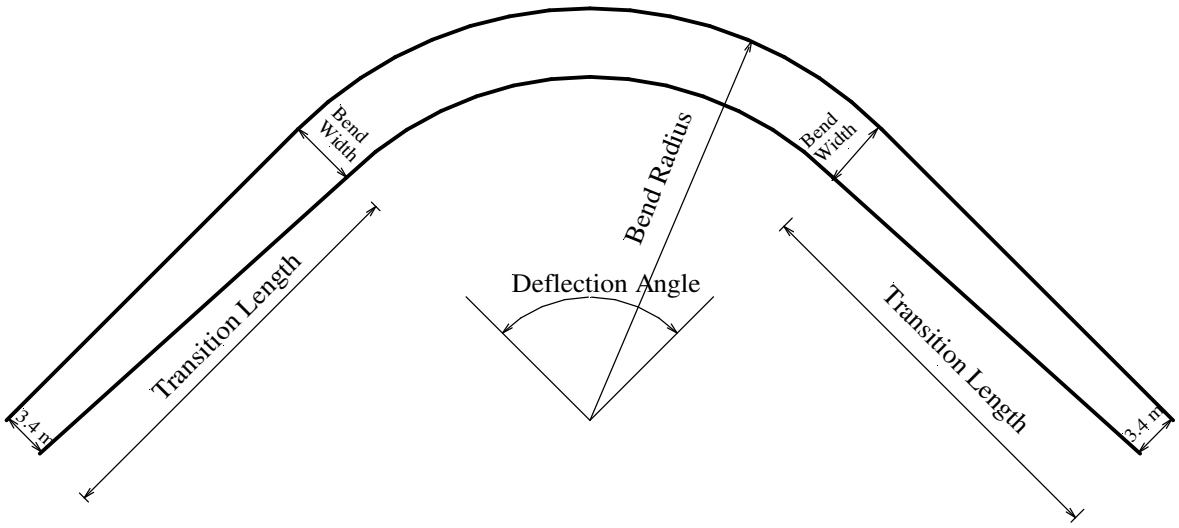
Subgrade	Min. Road Construction Depth
5% CBR	450 mm
7% CBR	325 mm
10% CBR	250 mm
>10% CBR	To be agreed by FC Engineer, but 100 mm minimum.

Cross slope (camber or crossfall)	The surface shall be cambered with 5% falls from the crown, or with a 5% crossfall sloping inwards on steep side slopes.
Water Guidelines	UKFS Guidelines on Forests and Water (FC) Account must also be taken of any requirements of EA/SEPA.
Fuel spillage	A written procedure to be in place prior to work start.
Signs	The site to be adequately signed.
Blasting	Excavation of rock by blasting shall only be undertaken by suitably qualified personnel appointed in writing.
Quarrying	The method of working (and re-instatement where applicable) of borrow pits and quarries must be in accordance with the *Quarries Regulations 1999,* and approved by the Forestry Commission.

HORIZONTAL BEND RECOMMENDED WIDTHS AND GRADIENTS

Outside Radius	Minimum Widths For Maximum Angle of Deflection (°)				Transition Straight Length	Maximum Gradient on Outside Radius
	15	45	90	180		
	Running surface width					
m	m	m	m	m	m	%
90	3.8	3.8	3.8	3.8	-	10
60	4.0	4.0	4.0	4.1	20	8
45	4.0	4.2	4.5	4.5	20	7
30*	4.0	4.7	5.0	5.1	25	6.5
25		4.8	5.1	5.3	30	5
20		5.0	5.6	5.9	30	4.5
15			6.3	7.0	40	4
10**				10.0	40	3

* Preferred minimum radius
** Absolute minimum hairpin



Bend Widening

Forestry Commission

EXAMPLE CROSS SECTION