

CONSTRUCTION OF A STREAM CROSSING IN SMALL WOODLANDS

Introduction

This Information Note is one of a series derived from a Technical Development Branch (TDB) Outdoor Workshop (ODW). It is produced as a guide to part of a harvesting system suitable for use in small scale broadleaved woodlands. ODWs are a TDB initiative designed to offer practical advice to practical people through presentation, demonstration and user guidance. The ODW programme will involve repeating trials and introducing new systems around Great Britain so that a wide range of sites, systems and practitioners can be included.

Information has been gathered from equipment and method trial based at a single location. This information therefore must be taken as indicative only. Variation could be expected for other operations where factors such as terrain, crop specification, product specification, operating distances or operator efficiency differ.

Legislation

The new environmental constraints and regulations concerning river, stream and water courses state that it is no longer permissible for forestry machinery to travel (ford) through any water course and that they must be bridged.

Planning considerations. Forest roads and tracks are governed under Permitted Developments in The Town and Country Planning Act 1995 (SI 418) for England and Wales and in Scotland (SI 223) 1992.

Water. The legal obligation pertaining to water are covered under the Control of Pollution Act (1974). Advice can be obtained from the Environment Agency (EA) in England and Wales and the Scottish Environmental Protection Agency (SEPA) in Scotland.



Outdoor Workshop Case Study

The workshop site had an existing track with an inadequate stream crossing subject to flooding.

Crossing Specification: Consultation with a road engineer determined that the dimensions of the 4 m long stream crossing should be as follows:

- Width of the substructure 4.3 m.
- Width of the running surface 3.0 m.
- Total height of the soil/stone formation of the track be just over 1.5 m.

Construction: A 60 cm x 6 m plastic pipe was laid centrally in the bottom of the stream. Light soil from the track formation was laid over the pipes to allow the pipes to firm up and prevent any movement. A second layer (substructure) of soft stone and soil was placed on the top to produce the base of the crossing. A final layer of hardcore was placed onto the formation to produce the running surface.

Machine Description and Cost: A 13 tonne Hitachi excavator fitted with a standard square mouth bucket was used to construct the crossing. It was hired from a local contractor at a cost including driver and transportation of £21.00/hr. A 5 tonne Front End Loading Dump Truck transported the hardcore at a cost of £10/hr.

Outputs and Costs: The 4 m stream crossing was completed in 6 standard hours (shr) at a cost of c £ 20/shr giving a total cost of £121, including the cost of the single pipe (£39). The breakdown of the costs (2000) are given in Table 1.

Table 1

Costs of Construction

Operation	Cost (£)
Excavator Cost (2 hrs @ £21/hr)	42.00
Dump Truck (4 hrs @ £10/hr)	40.00
60 cm Pipe	39.00
Total	121.00

Previous Case Study

A previous case study in a typical small broadleaved woodland involved bridging a small stream to gain access.

Stream Piping Specifications: To determine the required pipe specification a site visit was carried out with SEPA to evaluate the water flow, total catchment area and expected flood flow of water. This determined the dimensions and construction required for the water crossing.

SEPA recommended that the stream should be bridged with a minimum of 6 pipes, each with a diameter not less than 21 cm. Further consultation allowed a minimum of 3 pipes of not less than 45 cm diameter to be installed to remain within the recommendations of SEPA.

Crossing Specification: Consultation with a road engineer determined that the dimensions of the 2.5 m long stream crossing should be as follows:

- Width of the substructure 4.3 m.
- Width of the running surface 3.0 m.
- Total height of the soil/stone formation of the track be just over 1.0 m.

Construction: Four 4.5 m x 45 cm pipes were laid in the bottom of the stream. Light soil from the track formation was laid over the pipes to allow the pipes to firm up and prevent any movement. A second layer (substructure) of soft stone and soil was placed on the top to produce the base of the crossing. A final layer of hardcore was placed onto the formation to produce the running surface.

Machine Description and Cost: A 13 tonne Samsung SE130 excavator fitted with a standard square mouth

bucket was used to construct the crossing. It was hired from a local contractor at a cost including driver of £21.00/hr (1998) which increased to £29.60/hr when transportation costs were apportioned to all the operations on the site.

Transportation can add considerably to the overall cost of the job particularly those of short duration using the larger machines.

Outputs and Costs: The 2.5 m stream crossing was completed in 25.12 standard minutes which included allowances of 16% for Rest and 15% for Other Work.

The cost of construction (1999) including the cost of the machine and operator, an additional man and the pipes is shown in Table 2.

Table 2

Costs of Construction

Operation	Cost (£)
Machine Cost	12.44
Labour	4.20
Four Pipes	85.16
Total	101.80

General Features: Construction of the crossing allows access for light weight harvesting machines and 4 wheeled drive vehicles but not heavy haulage systems.

The crossing is suitable for all weather use, although care should be taken during extreme rainfall to prevent run off into the stream.

Comments on Case Studies

The cost and outputs relate to the crossings studied. The availability of stone and hardcore from the formation of the access track reduced the cost of construction.

Specific advice from SEPA increased awareness of the correct specification required to prevent any possibility of the crossing being washed away in a flash flood.

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