

TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION R40

HORIZONTAL DRAINS

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		New specification	GM, IC	23.03.09
Ed 1/Rev 1	“Notice” 2.1 3.2 3.3 Annex M	RTA PO Box and Fax numbers updated. Strength grade of UPVC drain pipe specified. Holding tank specified to collect sediment resulting from drilling. Inclination of horizontal drains extended to include details shown on the Drawings. Contractor’s responsibility for determining need for temporary casing clarified. Reference documents updated.	GM, IC	08.04.09
Ed 1/Rev 2	1.2.4 Fig 1	Previously clause 1.3. Heading retitled “Planning Documents”. Subsequent clauses renumbered. Previously Fig A.1 in Annex A. Now moved to after clause 2.	GM, IC	17.06.11
Ed 1/Rev 3	2.2	Geotextile strength grade updated to accord with Spec R63.	MCQ	04.06.20
Ed 1/Rev 4	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20



HORIZONTAL DRAINS

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VERSION FOR: DATE:

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FOREWORD

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This document should be read with all the documents forming the Contract.

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R40 Edition 1 Revision 3.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes have been indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION R40

HORIZONTAL DRAINS

1 GENERAL

1.1 SCOPE

This Specification sets out the requirements for the drilling and installation of horizontal drains in soil/rock into natural and man-made slopes. The work includes:

- (a) the drilling of drain holes at specified locations, orientations and depths;
- (b) the installation of slotted UPVC pipes of specified diameter, thickness and length, wrapped in a geotextile filter fabric; and
- (c) the connection of the installed horizontal drains to the existing stormwater drain network as shown on the Drawings.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Project Specific Requirements

Project specific details of work are shown in Annexure R40/A.

1.2.2 Measurement and Payment

The method of measurement and payment must comply with Annexure R40/B.

1.2.3 Schedule of HOLD POINTS

The schedules in Annexure R40/C list the **HOLD POINTS** that must be observed. Refer to Specification TfNSW Q for the definition of **HOLD POINTS**.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure R40/D and must be implemented.

In all cases where this Specification refers to the manufacturer's recommendations, these must be included in the PROJECT QUALITY PLAN.

1.2.5 Referenced Documents and Definitions

Unless specified otherwise, the applicable issue of a referenced document, other than a TfNSW Specification, must be the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 2350). For convenience, the full titles are given in Annexure R40/M.

The terms “you” and “your” mean “the Contractor” and “the Contractor’s” respectively.

2 MATERIALS

2.1 DRAIN PIPE

The drain pipe must be of rigid unplasticised polyvinyl chloride (UPVC) complying with AS 1477.1 and have a strength grade of Class 18.

Each drain comprises an inner and outer pipe, and the outside diameters and the wall thickness must be as given in Table R40.1 below.

Table R40.1 – Pipe Diameters and Wall Thickness

	Outer Pipe	Inner Pipe
Outside diameter	114 mm	75 mm
Minimum wall thickness	8.5 mm	5.5 mm

A UPVC cap complying with the same standard must be fitted to the upstream end of each drain pipe.

The pipes must be provided with slots of width between 0.90 mm and 1.10 mm, extending to a minimum depth equal to $\frac{3}{8}$ of the outside diameter of the pipe and a maximum depth equal to half the outside diameter of the pipe, and spaced at 25 mm apart.

The slots must be cut in groups of twelve. Each set of twelve slots at 30° to the horizontal and orientate each alternate group to lie within the top 240° of the circumference. In this fashion, the bottom 120° of the circumference of the pipe remains uncut over its entire length (see Figure R40.1).

The pipe must be unslotted for a length of 1 m from the outlet end, or whatever length as directed by the Principal.

2.2 FILTER FABRIC

The geotextile forming the filter fabric must be a nonwoven geotextile conforming to Specification TfNSW R63 (Strength Class B and Filtration Class 1), hydrophically treated to reduce surface tension and must be abrasion resistant to resist damage during installation.

Submit details of your proposed geotextile filter fabric at least 10 day(s) prior to its use.

Figure R40.1a - Horizontal Drain Details

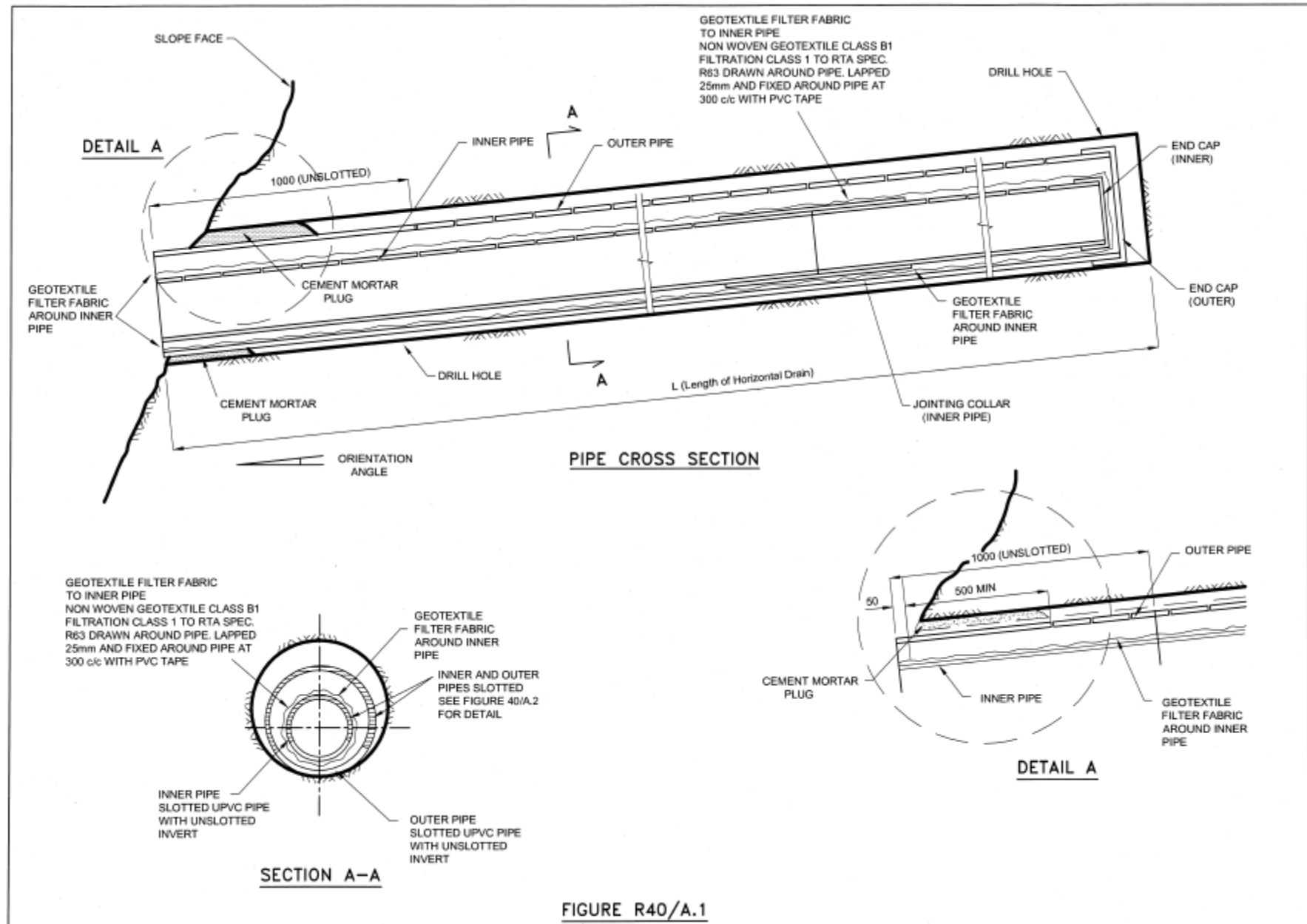


Figure R40.1b - Horizontal Drain Details

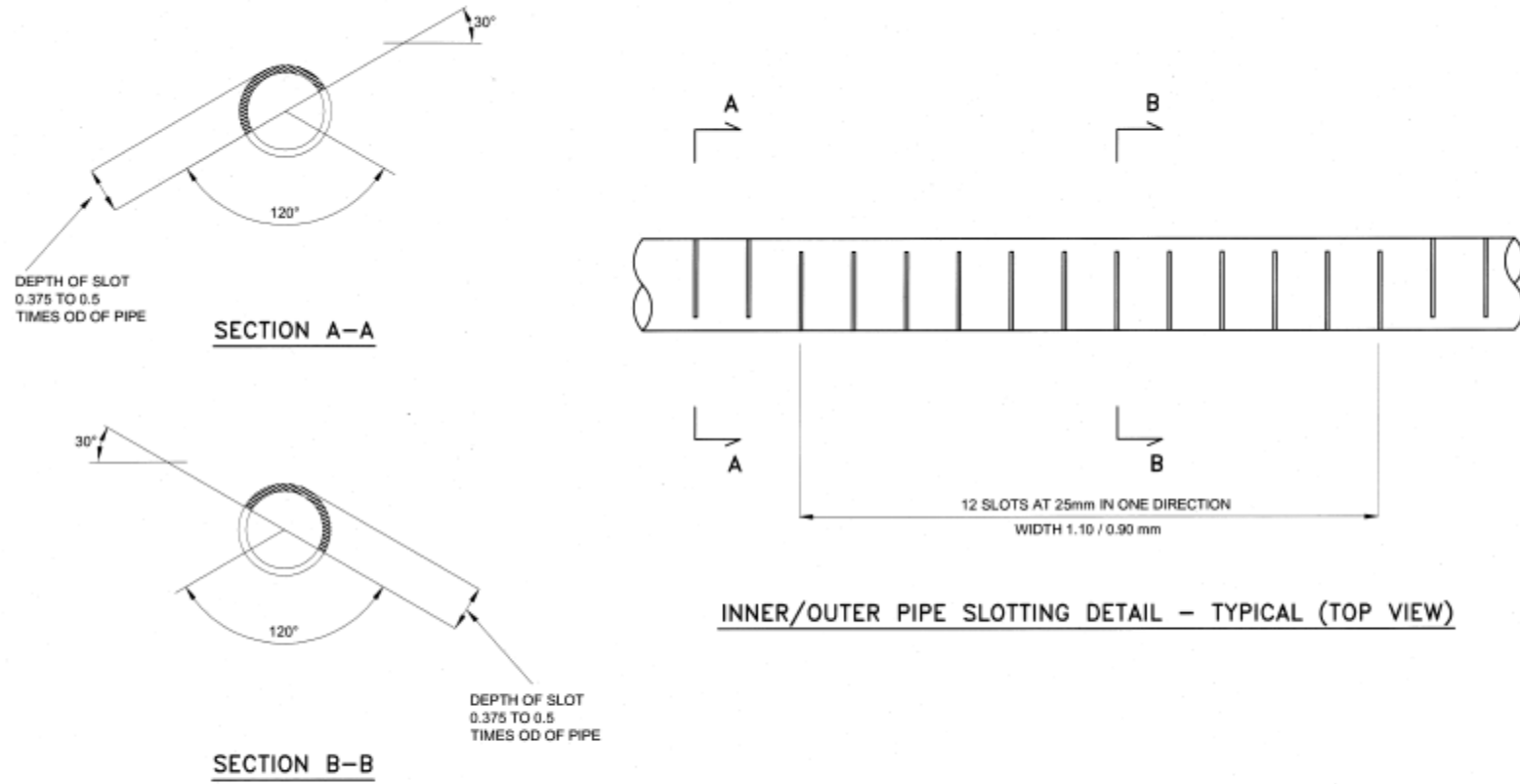


FIGURE R40/A.2

3 DRILLING OF DRAIN HOLES

3.1 LOCATION OF DRAIN HOLES

The locations, orientations and lengths of the drain holes must be in accordance with the Drawings and the details given in Figure R40.1, or as directed by the Principal.

Set out the drain holes as detailed. The maximum allowable tolerances for locating the position of drain holes are ± 100 mm vertically, ± 300 mm horizontally. Provide facilities to enable the inspection of the drain hole locations by the Principal.

HOLD POINT

Process Held:	Commencement of drilling drain holes.
Submission Details:	Notice of intention to commence drilling, at least 3 working day(s) prior to the event.
Release of Hold Point:	The Principal will inspect the set out of the drain hole locations, prior to authorising the release of the Hold Point.

3.2 DRILLING

Use only rotary or rotary-percussion drilling equipment to carry out your drilling. Provide effective dust suppression or containment devices in accordance with the Construction Safety Act and to the satisfaction of the Workcover Authority.

Carry out the drilling of holes in a manner which does not affect the stability of the cut batter. In particular, take due care to avoid the introduction of large volumes of water into the slope. Do not use drilling lubricants other than clean water or air. Ground water outflow resulting from the drilling process must be directed to a holding tank to enable settlement of the sediment resulting from the drilling in accordance with Specification TfNSW G36. Discharge of ground water outflow or waste water onto the pavement is not permitted.

Drill the holes for the horizontal drains to an inclination of between 3° and 8° dipping towards the exposed slope face or to the inclinations shown on the Drawings. Drillholes must be at least 150 mm in diameter to allow installation of the slotted outer UPVC pipe. Holes must be smooth, clean and true to size.

Drill holes in a straight alignment. Maximum permissible deviation of the holes must not exceed 2° (as measured on a horizontal plane). Deviation from straight must not exceed 25 mm in any 2 m length of hole.

Any hole which is more than 1° from the specified inclination angle is not acceptable and must be redrilled, unless the Principal authorises acceptance of the particular hole.

3.3 TEMPORARY CASING

In the case of drillholes penetrating through material likely to collapse, install temporary casing to protect the drillholes from caving in whilst drilling is in progress. Retract the casing after each UPVC pipe has been successfully installed.

You are responsible for determining whether temporary casing is required.

If extraction of the casing results in damage to an installed UPVC pipe, drill a new hole and/or re-install another UPVC pipe at the discretion of the Principal and at your own cost.

Backfill and properly seal any abandoned hole(s) at your cost. Subject to the approval of the Principal, you may propose other procedures for supporting this material during drilling and the installation of the UPVC pipe.

Clear drillholes of all deleterious material on completion of drilling. Carry out cleaning by flushing with water, or water in conjunction with air, using side jet bits, so as to ensure removal of all drill cuttings from the walls and bottom of the drillholes.

Provide an additional drill hole length of 100 mm to leave space for the deposition of cuttings that cannot be flushed out of the end of the drillhole.

4 INSTALLATION OF DRAIN PIPES

HOLD POINT

Process Held:	Installation of UPVC drain pipe into drillholes.
Submission Details:	Detailed drilling records for each hole including drilling method and equipment, types of materials penetrated and presence of groundwater with related depths, drilling rates, difficulties and breakdowns.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

Unless directed otherwise by the Principal, install an outer and an inner UPVC drain pipe in each drillhole, with the unslotted 120° of the circumference section of the pipe at the bottom (see Figure R40.1).

The pipe must be jointed either as spigot and socket joints, or as butt joints with a sleeve extending about 50 mm over the end of each pipe. Sleeve couplers must not affect the drain installation process. Secure joints with PVC solvent cement.

Seal the upstream end of each pipe with a UPVC cap secured with PVC solvent cement.

Wrap the geotextile filter fabric around the inner pipe with an overlap length of 25 mm and fix with PVC tape at 300 mm centres.

After installation of an outer pipe, tightly plug the annular space between the drilled hole and the outer pipe with cement mortar for a length of at least 0.5 m at the outlet end of the hole.

Connect all drain pipes to the existing stormwater network as shown on the Drawings.

ANNEXURE R40/A – PROJECT SPECIFIC REQUIREMENTS

Insert any project specific requirements here.

ANNEXURE R40/B – MEASUREMENT AND PAYMENT

B1 MEASUREMENT AND PAYMENT

Payment will be made for all costs associated with completing the work detailed in this Specification in accordance with the following Pay Item.

Where no specific pay items are provided for a particular item of work, the costs associated with that item of work are deemed to be included in the rates and prices generally for the Work Under the Contract.

Unless otherwise specified, a lump sum price for any of these items will not be accepted.

Pay Item R40P1 - Supply and Installation of Horizontal Drains

The unit of measurement is the lineal metre.

The rate includes all costs associated with setting up for drilling, drilling and cleaning the hole to receive the drain pipe, supply and installation of the slotted UPVC pipe, end cap, filter fabric, connection to the existing stormwater network and all other activities required by this Specification.

ANNEXURE R40/C – SCHEDULE OF HOLD POINTS

Refer to Clause 1.2.3.

Clause	Description
3.1	Commencement of drilling drain holes
4	Installation of UPVC drain pipe into drillholes

ANNEXURE R40/D – PLANNING DOCUMENTS

Refer to Clause 1.2.4.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. The requirements of this Specification and others included in the Contract must be reviewed to determine additional documentation requirements.

Clause	Description
2.2	Proposed geotextile filter fabric details
3.2	Drilling method and measures to ensure that the specified hole orientation and inclination are maintained during the drilling process
3.3	Temporary casing details
4	Installation details of UPVC outer and inner drain pipes

ANNEXURES R40/E TO R40/L – (NOT USED)**ANNEXURE R40/M – REFERENCED DOCUMENTS**

Refer to Clause 1.2.5.

TfNSW Specifications

TfNSW G36	Environmental Protection
TfNSW Q	Quality Management System
TfNSW R63	Geotextiles (Separation and Filtration)

Australian Standards

AS 1477.1	Unplasticized PVC (UPVC) pipes and fittings for pressure applications – Pipes
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