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REVISION REGISTER

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<th>Ed/Rev Number</th>
<th>Clause Number</th>
<th>Description of Revision</th>
<th>Authorised By</th>
<th>Date</th>
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<tr>
<td>Ed 1/Rev 0</td>
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HORIZONTAL DRAINS

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IC-DC-R40
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FOREWORD

RMS COPYRIGHT AND USE OF THIS DOCUMENT

Copyright in this document belongs to Roads and Maritime Services.

When this document forms part of a deed

This document should be read with all the documents forming the Project Deed.

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BASE SPECIFICATION

This document is based on Specification RMS R40 Edition 1 Revision 2.
RMS SPECIFICATION D&C 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 in the Design Documentation.

1.2 STRUCTURE OF THE SPECIFICATION

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

1.2.1 (Not Used)

1.2.2 (Not Used)

1.2.3 Schedule of HOLD POINTS

The schedules in Annexure R40/C list the HOLD POINTS that must be observed. Refer to Specification RMS D&C Q6 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

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>
<thead>
<tr>
<th></th>
<th>Outer Pipe</th>
<th>Inner Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>114 mm</td>
<td>75 mm</td>
</tr>
<tr>
<td>Minimum wall thickness</td>
<td>8.5 mm</td>
<td>5.5 mm</td>
</tr>
</tbody>
</table>

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 remain uncut over its entire length (see Figure R40.1).

The pipe must be unslotted for a length of 1 m from the outlet end.

2.2 FILTER FABRIC

The geotextile forming the filter fabric must be a non woven geotetile conforming to Specification RMS D&C R63 (Class B1, Filtration Class 1), hydrophically treated to reduce surface tension and must be abrasion resistant to resist damage during installation.
Figure R40.1a – Horizontal Drain Details

GEOTEXTILE FILTER FABRIC TO INNER PIPE
NON WOVEN GEOTEXTILE CLASS B1
FILTRATION CLASS 1 TO RTA SPEC.
R.O.Drawn around pipe, lapped 25mm and fixed around pipe at 300 mm with PVC TAPE

DETAIL A

INNER PIPE
SLOPE FACE
INNER PIPE SLOTTED UPVC PIPE WITH UNSLOTTED INVERT

GEOTEXTILE FILTER FABRIC AROUND INNER PIPE
CEMENT MORTAR PLUG

DRILL HOLE

END CAP (INNER)
END CAP (OUTER)

ORIENTATION ANGLE

PIECE CROSS SECTION

GEOTEXTILE FILTER FABRIC TO INNER PIPE
NON WOVEN GEOTEXTILE CLASS B1
FILTRATION CLASS 1 TO RTA SPEC.
R.O.Drawn around pipe, lapped 25mm and fixed around pipe at 300 mm with PVC TAPE

INNER AND OUTER PIPES SLOTTED FOR DETAIL

SECTION A-A
Figure R40.1b – Horizontal Drain Details

SECTION A–A

SECTION B–B

DEPTH OF SLOT
0.375 TO 0.5
TIMES OD OF PIPE

DEPTH OF SLOT
0.375 TO 0.5
TIMES OD OF PIPE

12 SLOTS AT 25mm IN ONE DIRECTION
WIDTH 1.10 / 0.50 mm

INNER/OUTER PIPE SLOTTING DETAIL – TYPICAL (TOP VIEW)
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 Design Documentation.

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.

**HOLD POINT**

<table>
<thead>
<tr>
<th>Process Held:</th>
<th>Commencement of drilling drain holes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission Details:</td>
<td>Notice to the Nominated Authority of intention to commence drilling, at least 3 working day(s) prior to the event.</td>
</tr>
<tr>
<td>Release of Hold Point:</td>
<td>The Nominated Authority will inspect the set out of the drain hole locations, prior to authorising the release of the Hold Point.</td>
</tr>
</tbody>
</table>

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 RMS D&C 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 in the Design Documentation. 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.

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.

Backfill and properly seal any abandoned hole(s). Subject to the approval of the Geotechnical Design Representative, 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

<table>
<thead>
<tr>
<th>Process Held:</th>
<th>Installation of UPVC drain pipe into drillholes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission Details:</td>
<td>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.</td>
</tr>
<tr>
<td>Release of Hold Point:</td>
<td>The Nominated Authority will consider the submitted documents prior to authorising the release of the Hold Point.</td>
</tr>
</tbody>
</table>

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 in the Design Documentation.
**ANNEXURES R40/A TO R40/B – (NOT USED)**

**ANNEXURE R40/C – SCHEDULE OF HOLD POINTS**

Refer to Clause 1.2.3.

<table>
<thead>
<tr>
<th>Clause</th>
<th>Description</th>
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<tbody>
<tr>
<td>3.1</td>
<td>Commencement of drilling drain holes</td>
</tr>
<tr>
<td>4</td>
<td>Installation of UPVC drain pipe into drillholes</td>
</tr>
</tbody>
</table>

**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 deed must be reviewed to determine additional documentation requirements.

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

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

Refer to Clause 1.2.5.

**RMS Specifications**

- RMS D&C G36  Environmental Protection
- RMS D&C Q6  Quality Management System (Type 6)
- RMS D&C R63  Geotextiles (Separation and Filtration)

**Australian Standards**

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