

# TRANSPORT FOR NSW (TfNSW)

## QA SPECIFICATION R37

### INTRA-PAVEMENT DRAINS

#### NOTICE

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#### REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 3/Rev 0	Various  Foreword 1.1, 2.2 1.2 5 2, 4, R37/1, R37/2 R37/3	Text revised to direct imperative style "Superintendent" replaced by "Principal" "Shall" replaced by "must" References updated Reformatting and minor editing  New clause after the Table of Contents  Materials requirements transferred to cl. 2  New clause, references transferred to Annexure R37/M  Transferred to Annexure R37/B  Renumbered 4, 5, R37/E respectively Renumbered R37/L, R37/C respectively	GM, RNIC	14.10.05
Ed 3/Rev 1	"Notice"  Global 5  Annex M	RTA PO Box and Fax numbers updated.  "shall" replaced by "must".  "ceramic pavement markers" replaced by "Type B (non-retroreflective) pavement markers complying with AS 1906.3".  "a suitable epoxy adhesive" replaced by "an adhesive complying with RTA 3554".  Referenced documents updated.	GM, IC	31.03.09
Ed 3/Rev 2	1.1  1.3 4	Statement on requirement to comply with Model Drawings (duplicated in Clause 1.2.4) deleted.  Definitions of "you" and "your" added.  Previous clause 1.3 "Order of Construction" moved to clause 4.1; clauses following renumbered.  Hold Point moved to clause 4.3 from preceding clause.	GM, IC B Chellingworth	14.01.10

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
Ed 4/Rev 0		Previous clause 1.2.4 “Drawings”, clause 3 “(Not Used)”, clause 4.1 “Order of Construction”, clause 4.6 “Cleanouts and Inspection Structures” and Annex E deleted.  Some clauses renumbered.	GM, IC	16.05.11
	1.1	Reference to spec R33 for trench drains requirements inserted.		
	2	Expanded to incorporate requirements found in spec R32 (withdrawn).		
	3.1	Previous clause 4.2. Shape of trench changed from “V” to 300 mm square.		
	3.2	Previous clause 4.3. Rewritten. Hold Point from previous clause 4.4 “Backfilling” relocated here.		
	3.3	Previous clause 4.4. Rewritten. Method of placing no fines concrete to be detailed in Project Quality Plan. Hold Point relocated to Clause 3.2.		
	3.4	Previous clause 4.5. Clause expanded with all clauses relating to batter outlets collated under sub-clause 3.4.2.		
	4	Previous clause 5. Physical marking replaced by GPS coordinates.		
	Annex B	Pay Items rearranged and renumbered. Measurement and Payment description of excavation and backfill volumes changed. Pay item for no fines concrete filter material added, cleanouts deleted.		
	Annex C	Updated.		
	Annex D	New annexure for “Planning Documents” added.		
	Annex L	Requirements changed.		
	Annex M	Reference documents updated.		
Ed 4/Rev 1	4	Clarification of requirement to mark drains physically on site.	GM, IC	17.06.11
Ed 4/Rev 2	4	Clause reworded to improve clarity.	GM, CPS	24.09.13
Ed 4/Rev 3	2	Headings added to form new (sub-)clauses 2.1 to 2.3.	MCQ	28.06.19
	Annex B	Pay Item P1 - Clarification added that no further payment will be made under R44 for excavation and backfilling work.  Pay Item P6 – Statement added that measurement excludes batter outlets paid for under spec R33.		

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
Ed 4/Rev 4	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20





# INTRA-PAVEMENT DRAINS

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VERSION FOR: DATE:
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## FOREWORD

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### REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R37 Edition 4 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 are 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 R37

## INTRA-PAVEMENT DRAINS

### 1 GENERAL

#### 1.1 SCOPE

This Specification sets out the requirements for the supply and installation of all materials associated with the provision of intra-pavement drains.

Intra-pavement drains are used to drain water from pavements layers on steep grades and sag curves where water flows are likely to be more parallel than transverse to the road alignment. They are often used in conjunction with trench drains.

The requirements for trench drains are set out in Specification TfNSW R33.

#### 1.2 STRUCTURE OF THE SPECIFICATION

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

##### 1.2.1 Measurement and Payment

The method of measurement and payment is detailed in Annexure R37/B.

##### 1.2.2 Schedules of HOLD POINTS and Identified Records

The schedules in Annexure R37/C list the **HOLD POINTS** that must be observed. Refer to Specification TfNSW Q for the definition of **HOLD POINTS**.

The records listed in Annexure R37/C are **Identified Records** for the purposes of TfNSW Q Annexure Q/E.

##### 1.2.3 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements shown in Annexure R37/D and must be implemented.

##### 1.2.4 Minimum Frequency of Testing

The Inspection and Test Plan must nominate the proposed testing frequency to verify conformity of the item, which must not be less than the frequency specified in Annexure R37/L. Where a minimum frequency is not specified, nominate an appropriate frequency.

##### 1.2.5 Referenced Documents

Unless specified otherwise or is specifically supplied by the Principal, the applicable issue of a referenced document, is 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. TfNSW T166). For convenience, the full titles are given in Annexure R37/M.

### **1.3 DEFINITIONS**

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

## **2 MATERIALS**

For each type of material, submit to the Principal the brand, the name of the supplier and compliance records at least seven (7) days prior to use.

### **2.1 SLOTTED FIBRE-REINFORCED CONCRETE PIPE**

Drainage pipes must be slotted fibre-reinforced concrete pipes complying with Specification TfNSW 3555 or approved equivalent. Caps and other fittings must be in accordance with the manufacturer’s recommendations.

### **2.2 GEOTEXTILE**

Geotextile must comply with Specification TfNSW R63.

### **2.3 NO FINES CONCRETE**

No fines concrete must be Grade NFC SD complying with Specification TfNSW 3222.

## **3 INSTALLATION OF INTRA-PAVEMENT DRAINS**

### **3.1 EXCAVATION**

Excavate for the trench, 300 mm wide and minimum 300 mm deep, to the required line and grade in the Selected Material Zone layer immediately below the pavement layer as shown on the Drawings.

The excavated trench must have a minimum fall of 0.5% towards the outlet. Prevent any localised ponding of water from occurring in the trench. Compact the floor of the trench and remove any loose material.

Excavated material must be stockpiled and incorporated in the works or disposed of in accordance with Specification TfNSW R44.

### **3.2 LAYING OF PIPE**

Line the trench with geotextile prior to placing the pipe and bedding.

Lay the slotted pipe in the excavated trench on a bed of no fines concrete as shown on the Drawings.

Join the pipe with the socket end upstream and secure the pipe so that it will not move during the placement and compaction of no fines concrete backfill.

Fit the upstream end with a suitable cap to prevent entry of material.

The pipe must not vary from the specified line or grade by more than 10 mm at any point.

### **HOLD POINT**

Process Held:	Covering of pipe with no fines concrete.
Submission Details:	Verification that pipe laying and jointing are complete and conforming.
Release of Hold Point:	The Principal may inspect the pipe prior to authorising the release of the Hold Point

### **3.3 BACKFILLING**

Backfill the trench containing the slotted pipe with no fines concrete.

Do not disturb or damage the pipe when placing spreading and compacting the no fines concrete backfill.

Detail in the PROJECT QUALITY PLAN your method of placing the no fines concrete to prevent segregation during placing and the formation of a slurry layer at the surface of the concrete which may prevent the passage of water into the filter material. The no fines concrete as placed must allow the free flow of water through it.

After completion of backfilling with no fines concrete, the geotextile must be folded over the no fines concrete and secured in place.

### **3.4 OUTLETS**

#### **3.4.1 General**

Where possible, water from intra-pavement drains must discharge to stormwater pits or other stormwater drainage structures.

Where it is not possible to discharge water from intra-pavement drains directly to stormwater pits or other stormwater drainage structures, connect the intra-pavement drain to a trench drain system (by connecting the pipe in the intra-pavement drain to the pipe in the trench drain) or extend the intra-pavement drain through fill batters to discharge at batter outlets.

#### **3.4.2 Batter Outlets**

Where the intra-pavement drain connects to batter outlets, extend the trench, with the same width and at the same grade, through the batter to the outlet. The section of pipe for intra-pavement drain extending beyond the pavement to be drained and through fill batters must be unslotted pipe.

For the unslotted pipe in the fill batter, lay the pipe at the base of the trench. Taper the height above the base of the trench of the connecting section of slotted pipe, from zero to 100 mm, over a 2 m length.

Backfill the trench along this section of pipe with Selected Material of maximum particle size of 50 mm, and compacted to a relative compaction of 95% as determined by Test Method TfNSW T166.

Construct an outlet structure at the discharge end in accordance with the Drawings. Locate the outlet so that erosion of the adjacent area does not occur, or protect the outlet by placing selected stone at the splash zone.

## **4 MARKING OF DRAINS**

During construction, physically mark out on site the inlets (or upstream ends where there are no distinct inlets) and outlets of all subsurface drains, to avoid damage to them during construction. Detail in the PROJECT QUALITY PLAN the method of marking these locations.

Mark on the work-as-executed drawings of the completed drainage system the GPS coordinates of the “start” and “finish” positions of the subsurface drains on relevant extracts of half-size drawings for the Works and submit them to the Principal within 28 days of completion of the subsurface drainage work. The GPS coordinates must be in WGS 84 format.

## **ANNEXURE R37/A – (NOT USED)**

## **ANNEXURE R37/B – 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 Items.

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 R37P1 – Excavation**

The unit of measurement is the “cubic metre”, measured as bank volume of excavation in all types of material.

The volume of excavation is computed from the length, depth and width of the trench, as shown on the Drawings or as directed by the Principal.

No payment will be made for any work as a result of over-excavation.

The rate covers all costs associated with the excavation, handling, stockpiling, incorporation into the Works or disposal off site of the excavated material in accordance with the requirements of TfNSW R44. No further payment will be made for this work under TfNSW R44.

### **Pay Item R37P2 – Drainage Pipe**

#### **Pay Item R37P2.1 - 100 mm Slotted Fibre-reinforced Concrete Pipe**

#### **Pay Item R37P2.1 - 100 mm Unslotted Fibre-reinforced Concrete Pipe**

The unit of measurement is the “lineal metre”, measured along the centreline of the pipe as the actual length laid.

The rate covers all costs associated with the supply and laying of the pipe including any connections, fittings and markers where necessary.

### **Pay Item R37P3 – Filter Material - No Fines Concrete**

The unit of measurement is the compacted “cubic metre”.

The volume is computed from the length, depth and width of no fines concrete filter material as shown on the Drawings or as directed by the Principal.

The rate covers all costs associated with the supply, placement and compaction of the no fines concrete filter material.

### **Pay Item R37P4 – Supply and Installation of Geotextile**

The unit of measurement is the “square metre”, measured using the theoretical cross section as shown on the Drawings and the length installed in place.

Measurement includes the areas of laps where shown on the Drawings except for the areas of laps required to provide a continuous length or width of geotextile.

The rate covers all costs associated with the supply and installation of the geotextile.

**Pay Item R37P5 – Selected Material Backfill at Batter Outlets**

The unit of measurement is the compacted “cubic metre”.

The volume is computed from the length, depth and width of Selected Material backfill as shown on the Drawings or as directed by the Principal.

The rate covers all costs associated with the supply, placement and compaction of the Selected Material.

**Pay Item R37P6 – Batter Outlets**

**Pay Item R37P6.1 - Steep Batter Outlet**

**Pay Item R37P6.2 - Flat Batter Outlet**

Steep batters are defined in Model Drawing MD.R33.A04 as steeper than 4(H):1(V).

The unit of measurement is “each” batter outlet provided in accordance with this Specification. The rate includes concrete, reinforcing bar and galvanized mesh cover.

Measurement for this work excludes those batter outlets for trench drains which are paid for under TfNSW R33.

**ANNEXURE R37/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS**

Refer to Clause 1.2.2.

**C1 SCHEDULE OF HOLD POINTS**

<b>Clause</b>	<b>Description</b>
3.2	Covering of the pipe with no fines concrete.

**C2 SCHEDULE OF IDENTIFIED RECORDS**

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

<b>Clause</b>	<b>Description of Identified Records</b>
2	Brand, supplier and compliance records for each type of material.
3.2	Verification that pipe laying and joints are complete and conforming
4	Work-as-executed drawings of the completed drainage system

**ANNEXURE R37/D – PLANNING DOCUMENTS**

Refer to Clause 1.2.3.

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.

<b>Clause</b>	<b>Description</b>
3.3	Method of placing no fines concrete
4	Method of marking intra-pavement drains

**ANNEXURES R37/E TO R37/K – (NOT USED)**

**ANNEXURE R37/L – MINIMUM FREQUENCY OF TESTING**

<b>Clause</b>	<b>Characteristics Tested</b>	<b>Test Method</b>	<b>Minimum Frequency of Testing</b>
2	Material properties	As per relevant material specification	As per relevant material specification
3.4.2	Relative compaction of Selected Material adjacent to batter outlets	TfNSW T166	One per 15 batter outlets or part thereof.

**ANNEXURE R37/M – REFERENCED DOCUMENTS**

Refer to Clause 1.2.5.

**TfNSW Specifications**

TfNSW Q	Quality Management System
TfNSW R33	Trench Drains
TfNSW R44	Earthworks
TfNSW R63	Geotextiles (Separation and Filtration)
TfNSW 3222	No Fines Concrete (for Subsurface Drainage)
TfNSW 3555	Subsurface Drainage Pipe (Slotted and Unslotted Fibre-reinforced Concrete)

**TfNSW Test Methods**

TfNSW T166	Relative Compaction of Road Construction Materials
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