

<b>Title</b>	<b>Demonstrate knowledge of the design, construction, and maintenance of road drainage systems</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	<p>This unit standard is for people who are responsible for and require understanding of the design, construction, and maintenance of road drainage systems.</p> <p>People credited with this unit standard are able to demonstrate knowledge of: road drainage system design; the construction of stormwater systems for road drainage; the construction of subsoil drainage systems for road drainage; road drainage system structures and their connections; and drainage system maintenance.</p>
----------------	--

<b>Classification</b>	Infrastructure Works > Generic Road Works
-----------------------	---

<b>Available grade</b>	Achieved
------------------------	----------

<b>Entry information</b>	
<b>Recommended skills and knowledge</b>	Unit 20875, <i>Demonstrate knowledge of slinging, lifting, moving, and placing loads with an excavator or loader</i> , or demonstrate equivalent knowledge and skills.

### Explanatory notes

- The following codes of practice, guidelines, and Standards must be complied with as appropriate to the context of assessment for this unit standard:
  - Cranes – Approved Code of Practice (ACOP)* (Includes the Design, Manufacture, Supply, Safe Operation, Maintenance and Inspection of Cranes) (Wellington: Department of Labour, 2009) available at <http://www.business.govt.nz/worksafe/information-guidance/approved-codes-of-practice-acops>;
  - Excavation and Shafts for Foundations – Approved Code of Practice* (Wellington: Department of Labour, 1995) available at <http://www.business.govt.nz/worksafe/information-guidance/approved-codes-of-practice-acops>;
  - NZ Transport Agency (previously Transit NZ) specification TNZ F/2: 2000 *Specification for Pipe Subsoil Drain Construction* and TNZ F/2 Notes. A full listing of NZTA's principal external manuals, manual amendments, and technical documents is available at <http://www.nzta.govt.nz/resources/index.html>;
  - AS/NZS 1254:2010 *PVC-U pipes and fittings for stormwater and surface water applications*; AS/NZS 1260:2009 *PVC-U pipes and fittings for drain, waste and vent*

*application*; AS/NZS 1462: series *Methods of test for plastics pipes and fittings*; AS/NZS 2033:2008 *Installation of polyethylene pipe systems*; AS/NZS 3725:2007 *Design for installation of buried concrete pipes*; AS/NZS 4058:2007 *Precast concrete pipes (pressure and non-pressure)*; NZS 4406:1986 *Helical lock-seam corrugated steel pipes – Design and installation*; available at <http://www.standards.co.nz>.

- 2 Assessment against this unit standard may take place in a workplace and/or provider environment. Assessment parameters will depend on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with NZ Transport Agency (NZTA) and/or local authority requirements. Assessment against this unit standard excludes assessment of knowledge of slinging, lifting, and placing requirements or trench shoring requirements, which are covered in unit standards 20875 and 22103 respectively.
- 3 **Definitions**  
*Company requirements* include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements applicable to the company or a specific site. Requirements are documented in the company's health and safety plans, traffic management plans, contract work programmes, quality assurance programmes, policies, and procedural documents.  
*Contract specifications* include plans, diagrams, and special technical conditions. They do not include special administrative conditions.  
*Specialist structures* mean drainage features such as pump stations, flood gates, and dams.  
*Technical instructions* mean the defined procedures for the method of carrying out the construction process. For this unit standard they include manufacturers' instructions, local authority requirements, and NZTA specifications.

---

## Outcomes and evidence requirements

### Outcome 1

Demonstrate knowledge of road drainage system design.

### Evidence requirements

- 1.1 The main considerations involved in road drainage system design are identified and described in accordance with NZTA and local authority requirements.
- 1.2 Methods for providing road drainage are identified and explained in relation to site conditions and local authority requirements.
- Range road drainage – surface stormwater, pavement, subsoil; site conditions – steep slope, sand, permeable gravel, low water table, high water table, swamp, cambers, crossfall.
- 1.3 Methods for constructing drainage channels to relate to road pavement levels are identified and described in accordance with company requirements.
- Range one method each for – open drain, kerb and channel.

- 1.4 Effects of different pavement compositions on drainage requirements are identified and explained.

Range chipseal, asphalt, unsealed.

## Outcome 2

Demonstrate knowledge of the construction of stormwater systems for road drainage.

### Evidence requirements

- 2.1 Planning procedures for road drainage works are identified and described in accordance with contract specifications and company requirements.
- 2.2 The setting out of culvert lines is explained in accordance with technical instructions.
- 2.3 The determining of trench dimensions for road drainage stormwater systems is outlined in accordance with technical instructions.
- Range includes – clearances, fittings batter;  
may include – width of shields, benching.
- 2.4 Methods for setting depth and gradient of trench for constructing road drainage stormwater systems are identified and described in accordance with technical instructions and *Approved Code of Practice for Safety in Excavation and Shafts for Foundations*.
- 2.5 Placing of pipe bedding in trenches for road stormwater drainage is described in accordance with technical instructions.
- 2.6 The use of geotextiles in road drainage stormwater system construction is described in accordance with technical instructions.

## Outcome 3

Demonstrate knowledge of the construction of subsoil drainage systems for road drainage.

### Evidence requirements

- 3.1 Procedures for constructing subsoil drainage systems are determined and explained in accordance with contract specifications, company requirements, and technical instructions.
- 3.2 Requirements for setting out subsoil lines are determined and explained in accordance with technical instructions.
- 3.3 The determining of trench dimensions is explained in accordance with technical instructions.
- Range includes – clearances, fittings batter;  
may include – width of shields, benching.

- 3.4 Methods for setting depth and gradient of trench are explained in accordance with technical instructions.
- 3.5 Installation of filter fabric is described in accordance with technical instructions.
- 3.6 Installation of filter aggregate is described in accordance with technical instructions.
- 3.7 Placing of pipe bedding in trenches is described in accordance with technical instructions.
- 3.8 Orientation of perforations when placing pipes is justified in accordance with technical instructions.

#### **Outcome 4**

Demonstrate knowledge of road drainage system structures and their connections.

Range sump, inspection chamber, access point, head wall, drop structure, specialist structure.

#### **Evidence requirements**

- 4.1 The purpose and the effect of function on the design of road drainage system structures are identified and explained.
- 4.2 Requirements for the installation of drainage system structures are described and explained in accordance with technical instructions.  
  
Range includes – clearances, fittings batter;  
may include – width of shields, benching.
- 4.3 Requirements for connecting pipes to drainage system structures are determined and explained in accordance with technical instructions.

#### **Outcome 5**

Demonstrate knowledge of drainage system maintenance.

#### **Evidence requirements**

- 5.1 Maintenance of drainage system is described in accordance with technical instructions.  
  
Range pavement drainage, underground stormwater pipes, subsoil drainage;  
may include specialist structures.
- 5.2 Maintenance of drains, culverts, and sumps is described in accordance with technical instructions.

- 5.3 Bridge drainage maintenance is described in accordance with technical instructions.
- 5.4 The repair of undermined culvert end-walls is described in accordance with technical instructions.

<b>Planned review date</b>	31 December 2019
----------------------------	------------------

#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 December 1998	31 December 2012
Review	2	30 May 2000	31 December 2012
Review	3	25 September 2006	31 December 2012
Review	4	18 March 2011	31 December 2016
Review	5	19 February 2015	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0101
--	------

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

#### Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

#### Comments on this unit standard

Please contact the Infrastructure ITO [qualifications@infrastructureito.org.nz](mailto:qualifications@infrastructureito.org.nz) if you wish to suggest changes to the content of this unit standard.