

Title	Interpret the requirements of contract documents for infrastructure works supervision activities		
Level	4	Credits	10

Purpose	<p>This unit standard is designed for people in the infrastructure works industry who are responsible for executing the requirements of contract documents for infrastructure works activities.</p> <p>People credited with this unit standard are able to: interpret infrastructure works contract documents; describe the roles, duties and responsibilities of parties identified in infrastructure works contract documents; and determine communication and reporting requirements for infrastructure works contract documents.</p>
----------------	--

Classification	Infrastructure Works > Infrastructure Works Supervision
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements apply to this unit standard, and must be complied with:
Traffic Regulations 1976;
NZS 3910:2003 *Conditions of Contract for Building and Civil Engineering Construction*, Standards New Zealand available at <http://www.standards.co.nz>;
Local authority regulations;
Contract documents.
- 2 Assessment against this unit standard must be based on evidence from a workplace context. An understanding of the components of contract documents and the conditions generally found in them is required. This may be determined by reference to specific contracts.
- 3 Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Contract documents refers to, all documents included in the signed contract. These normally include: general conditions of contract, special conditions of contract, operational requirements, project specifications, schedule of quantities, plans, and appendices.

Outcomes and evidence requirements

Outcome 1

Interpret the requirements of infrastructure works contract documents.

Evidence requirements

- 1.1 Components of contract documents and their purpose and function are interpreted.
- Range includes but is not limited to – general conditions, special conditions, project specifications, operational requirements, technical specifications, schedule of prices, appendices.
- 1.2 Legislative and local authority requirements generally contained in contract documents are interpreted.
- Range requirements include but are not limited to – health, public safety, staff safety, Traffic Regulations 1976, resource consents, environmental protection, hazardous substances.
- 1.3 Requirements for bonds and insurance are interpreted in general terms.
- 1.4 The relationship between specific contract requirements and the duties of infrastructure works supervisors are interpreted.
- Range requirements – payment schedules, contract period, contract programme, quality assurance, traffic management, variations, maintenance, penalties, performance measures, reporting procedures.
- 1.5 Requirements of a nominated contract are described in accordance with the project and technical specifications.

Outcome 2

Describe roles, duties, and responsibilities of parties given status by infrastructure works contract documents.

Evidence requirements

- 2.1 Roles, duties, and status of empowered persons are described in accordance with contract documents.
- Range roles – responsibility, authority, communication;
duties – inspection, quality assurance.
- 2.2 Duties and responsibilities of supervisors are described in accordance with contract documents and company procedures.
- Range work programming, organising materials, plant and labour, obtaining weather reports, directing, complying, recording

(including weather conditions), monitoring, traffic safety, public, client and staff relations.

Outcome 3

Determine communication and reporting requirements for infrastructure works contract documents.

Evidence requirements

- 3.1 Communication requirements for a contract are determined in accordance with contract documents and company procedures.

Range traffic control, notifications, permits, approvals, safety, public relations, engineer, principal's representative.

- 3.2 Contract progress and final reporting procedures are determined in accordance with contract documents and company procedures.

Range inspections, notices, records, output reports, performance reports, quality reports, measurement of areas and quantities, payment claims, variances in programmed work, variations.

Replacement information	This unit standard replaced unit standard 1502
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 October 1994	31 December 2013
Review	2	4 October 1995	31 December 2013
Review	3	24 March 1998	31 December 2013
Revision	4	5 January 1999	31 December 2013
Review	5	27 October 2005	31 December 2013
Review	6	15 March 2012	31 December 2016
Review	7	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Interpret contract documents for planning an infrastructure works project		
Level	5	Credits	10

Purpose	<p>This unit standard is designed for people working in the infrastructure works industry who are required to interpret contract documents in order to implement work programmes and issue work instructions.</p> <p>People credited with this unit standard are able to interpret components of contract documents for an infrastructure works project, and identify from contract documents the information required to plan an infrastructure works project.</p>
----------------	---

Classification	Infrastructure Works > Infrastructure Works Management
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26798, <i>Demonstrate knowledge of infrastructure works contracts</i> ; or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will depend on the contract documents for the project.
- 2 Legislation, regulations, and standards relevant to this unit standard include: Construction Contracts Act 2002; Construction Contracts Regulations 2003; and the current version of NZS 3910 *Conditions of contract for building and civil engineering construction*; available from <http://www.standards.co.nz>.
- 3 In this unit standard, terms used for components of contract documents are those commonly used, but these terms may differ from contract to contract.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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 documents include general conditions, special conditions, plans, diagrams, technical specifications, schedule of quantities and contract agreement.

Outcomes and evidence requirements

Outcome 1

Interpret components of contract documents for an infrastructure works project.

Evidence requirements

- 1.1 General conditions of contract are interpreted in relation to an infrastructure works project.
- Range contract types, possession of site, materials, plant labour, contract variations, insurance, payment methods, dispute proceedings; may include but is not limited to – engineer's role, subcontractors, performance bonds, setting out, suspension of work, emergency work, day work, time extensions, maintenance responsibilities, frustration and default, service of notices, cost fluctuation.
- 1.2 Special conditions included in a contract are interpreted for an infrastructure works project.
- 1.3 Other conditions of contract are interpreted for an infrastructure works project.
- Range may include but is not limited to – location of works, extent of work, description of works, consents, fees, regulations, standards, codes of practice, permits, site meetings, materials supply, material storage sites, access; evidence is required of at least nine.
- 1.4 Technical specifications are interpreted for an infrastructure works project.
- Range may include but is not limited to – plans, drawings, detailed description of construction requirements, dimensions, levels, methods, work content, work programmes, work quality, materials quality, testing requirements, special local requirements, traffic control, drainage details, slopes, site stabilisation; evidence is required of at least seven.
- 1.5 Where present, information contained in the schedule of quantities is identified and interpreted for an infrastructure works project.
- Range work components, quantities, monetary rates, monetary amounts, total tender price.

Outcome 2

Identify from contract documents the information required to plan an infrastructure works project.

Evidence requirements

- 2.1 The objectives of the project are identified and recorded in accordance with company requirements.

Range project type, scope, time constraints, quality, maintenance requirements;
may include – method, performance.

- 2.2 Work required for the project is identified and recorded in accordance with company requirements.

Range management, labour, plant and equipment, quantities, programming, safety requirements, inspections, payment claims;
may include but is not limited to – planning, materials supply, testing.

- 2.3 Contractual constraints are identified and recorded in accordance with company requirements.

Range constraints may include but are not limited to – contract period, completion date, work hours, holiday work, retentions, defects liability period, inclement weather, variations, extensions of time, partial completion dates, cost fluctuations, liquidated damages, nominated subcontractors, suppliers.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2014
Review	5	18 March 2011	31 December 2016
Review	6	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Carry out notifiable work and permit requirements on an infrastructure works site		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: confirm notifiable work for an infrastructure works site; confirm and carry out permit requirements on site; and report and document notifiable work.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Supervision
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Unit 20869, <i>Demonstrate knowledge of notifiable works and permits in the civil infrastructure industry</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 The following legislation, regulations, and codes of practice must be complied with as appropriate to the context of assessment for this unit standard: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Approved Code of Practice for Cranes - 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> ; Approved Code of Practice for Safety in Excavation and Shafts for Foundations (Wellington: Department of Labour, 1995) available at <http://www.business.govt.nz/worksafe/information-guidance/approved-codes-of-practice-acops>; and Approved Code of Practice for Demolition (Wellington: Department of Labour, 1994) available at <http://www.business.govt.nz/worksafe/information-guidance/approved-codes-of-practice-acops>.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will depend on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Assessment against this unit standard requires candidates to complete and process a Notification of Particular Hazardous Works form as required under the Health and Safety in Employment Regulations 1995. Forms are available at <http://www.dol.govt.nz>.

4 Definitions

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements that may apply across the company or to 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. *Technical instructions* mean the defined procedures for the method of carrying out the construction process. For this unit standard instructions may be defined in manufacturers' instructions, safety data sheets, company instructions, legislation, regulations, or Department of Labour Codes of Practice.

Outcomes and evidence requirements

Outcome 1

Confirm notifiable work for an infrastructure works site.

Evidence requirements

- 1.1 Notifiable work requirements are confirmed in accordance with technical instructions.

Outcome 2

Confirm and carry out permit requirements on an infrastructure works site.

Evidence requirements

- 2.1 Permit requirements are confirmed in accordance with technical instructions.
- 2.2 Site is visually inspected to confirm the types of protection required in accordance with legislative requirements and technical instructions.
- 2.3 Any additional requirements are determined to match site conditions and reported in accordance with company requirements.
- 2.4 Confirmation ensures that permit documentation has been obtained in accordance with company requirements and is on site prior to commencing work.
- 2.5 All site personnel are briefed on specific requirements of permits in accordance with company requirements.
- 2.6 Services and obstructions on site are identified in accordance with legislative requirements and technical instructions.
- 2.7 Visual inspections are undertaken to confirm that instructions have been carried out in accordance with legislative requirements and technical instructions.

Outcome 3

Report and document notifiable work.

Evidence requirements

- 3.1 Notifiable work is reported in accordance with legislative requirements.
- 3.2 Safety procedures are documented in accordance with legislative requirements and technical instructions.
- 3.3 Actions and corrective actions are documented in accordance with legislative and company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2012
Revision	2	9 March 1999	31 December 2012
Review	3	30 May 2000	31 December 2012
Review	4	25 September 2006	31 December 2012
Review	5	18 March 2011	31 December 2016
Review	6	xxxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a power-driven rotary broom on infrastructure works sites		
Level	3	Credits	6

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on vehicle and broom; confirm job instructions for sweeping; sweep surfaces with rotary broom; and shut down vehicle, park, and store equipment.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on vehicle and broom.

Evidence requirements

- 1.1 Walk round is completed prior to starting work in accordance with company requirements.
- 1.2 Vehicle pre-start check is performed prior to start-up in accordance with manufacturer's instructions.
 - Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls, pivot points, hot and cold checks; check controls and gauges after warm-up.
- 1.3 Broom is inspected for operability prior to start-up in accordance with company requirements.
 - Range bristles, linkages, chains, belts and pulleys, clearances, obstructions, lubrication, hoses, bearings.
- 1.4 Field servicing is performed on broom in accordance with manufacturer's instructions.
 - Range fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.5 Vehicle is checked for currency of licence and registration.
 - Range road user charge, warrant of fitness.

Outcome 2

Confirm job instructions for sweeping.

Evidence requirements

- 2.1 Type of surface to be swept is confirmed in accordance with job instructions.
- 2.2 Method of sweeping is confirmed in accordance with job instructions.
- 2.3 Removal of windrowed material is described in accordance with job instructions.
- 2.4 Brooming sequences are described in accordance with contract specifications and company requirements.
 - Range includes but is not limited to – sequences for intersections.

Outcome 3

Sweep surfaces with rotary broom.

Evidence requirements

- 3.1 Surfaces are swept in accordance with contract specifications and company requirements.
- Range surfaces include two of – first coat, reseal, base course, footpaths, existing road surfaces, running course.
- 3.2 Sweeping to edge and sweeping to channel are demonstrated in accordance with company requirements.
- 3.3 Windrowing to edge and windrowing to centre are demonstrated in accordance with company requirements.
- 3.4 Dust is controlled in accordance with company requirements.

Outcome 4

Refuel, park, and inspect vehicle and store equipment.

Evidence requirements

- 4.1 Vehicle is refuelled and oils checked in accordance with company requirements.
- 4.2 Vehicle is parked, shut down safely, and secured in accordance with manufacturer's instructions.
- 4.3 Vehicle is inspected and any faults or any wear on bristles is reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2016
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Convey civil construction plant by transporter		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: receive instructions and prepare for transporting civil construction plant; confirm load characteristics and confirm permits; prepare for loading civil construction plant; load and secure civil construction plant on transporter; transport civil construction plant by road; and unload civil construction plant from transporter.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Traffic Regulations 1976; Land Transport Rule: Vehicle Dimensions and Mass 2002; and Land Transport Rule: Heavy Vehicles 2004.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The following code of practice and manual must be complied with: *The Official New Zealand Truck Loading Code*, LTSA (Auckland: MacMillan, 1999) ISBN: 047306104X available from local book shops published by Land Transport NZ; *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrains.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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. *Technical instructions* mean the defined procedures for the method of carrying out the construction process.

Outcomes and evidence requirements

Outcome 1

Receive instructions and prepare for transporting civil construction plant.

Evidence requirements

- 1.1 Instructions regarding machinery required, pick-up location, and delivery destination are confirmed in accordance with company requirements.
- 1.2 Machinery items, numbers, and location are confirmed against instructions received.
- 1.3 Route is planned and confirmed in relation to weight and dimensions of loaded transporter in accordance with Traffic Regulations 1976, Land Transport Rules, company requirements, route obstructions, and local authority requirements.

Outcome 2

Confirm load characteristics and confirm permits.

Evidence requirements

- 2.1 Weight of civil construction plant is confirmed in accordance with transporter's carrying capacity, and traffic load restriction rules and regulations.

Range weighbridge or axle loads, tare weights.
- 2.2 Loading and dimensions of civil construction plant are confirmed in accordance with Traffic Regulations 1976 and Land Transport Rules.

Range width, height, and length are measured with a tape measure.
- 2.3 Permits are confirmed in accordance with Traffic Regulations 1976 and roading authority requirements.

Range permits – overweight, overdimension.
- 2.4 Piloting requirements are confirmed in accordance with Traffic Regulations 1976 and roading authority requirements.

Outcome 3

Prepare for loading civil construction plant.

Evidence requirements

- 3.1 Transporter is positioned on firm level ground prior to loading in accordance with technical instructions.
- 3.2 Deck of transporter is clear of debris prior to loading.
- 3.3 Civil construction plant is free of loose material prior to being loaded onto transporter.

Outcome 4

Load and secure civil construction plant on transporter.

Evidence requirements

- 4.1 Civil construction plant is loaded onto transporter in accordance with company requirements and the Operator Safety Manual for Earthmoving Machinery.

Range machinery – on wheels, on self-laying tracks, on rollers.

- 4.2 Civil construction plant is located on transporter according to the axle loadings of the transporter in accordance with Traffic Regulations 1976 and Land Transport Rules.

- 4.3 Civil construction plant is secured to the transporter in accordance with The Official NZ Truck Loading Code.

Range rated anchor points, number, rating, position, tensioning of load-securing devices.

Outcome 5

Transport civil construction plant by road.

Evidence requirements

- 5.1 Transporter enters into traffic flow in accordance with Traffic Regulations 1976 and company requirements.
- 5.2 Civil construction plant is transported to specified destination in accordance with Traffic Regulations 1976 and permits.
- 5.3 Specified route is adhered to.

Outcome 6

Unload civil construction plant from transporter.

Evidence requirements

- 6.1 Civil construction plant is unloaded from transporter in accordance with company requirements and Operator Safety Manual for Earthmoving Machinery.
- 6.2 Confirmation of the arrival of machinery at the destination is sent in accordance with company requirements.

Range supervisor or transport coordinator is contacted.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2016
Rollover	5		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Maintain small machinery used on infrastructure works sites		
Level	2	Credits	2

Purpose	People credited with this unit standard are, for small machinery used on infrastructure works sites, able to: select maintenance tools, fuel, and lubricants; carry out maintenance checks; and clean up and store tools and materials.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 2 Range any three items of small machinery such as – blowervac, compactor, chainsaw, generator, rotary hoe, sawcutter, scrub cutter, shredder, water pump.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Manufacturer's instructions may include specifications, safety data sheets, and instructions for installation, handling, use, and maintenance.
Small machinery is equipment with small internal combustion engines such as chainsaws, scrub cutters, rotary hoes, plate compactors, and water pumps.

Outcomes and evidence requirements

Outcome 1

Select maintenance tools, fuel, and lubricants for small machinery used on infrastructure works sites.

Evidence requirements

- 1.1 Tools are selected for small machinery maintenance check in accordance with company requirements.

1.2 Fuel and oil are selected in accordance with manufacturer's instructions for type and mix.

1.3 Lubricants are selected in accordance with manufacturer's instructions.

Range includes but is not limited to – oil for moving parts, grease; may include – water, lubricant, inhibitor.

Outcome 2

Carry out maintenance checks on small machinery used on infrastructure works sites.

Evidence requirements

2.1 Fluid levels are checked and adjusted in accordance with manufacturer's instructions.

2.2 Importance and sequence of checking and tightening bolts, nuts, and attachment couplings is explained in accordance with manufacturer's instructions.

2.3 Controls and gauges are checked for operation and adjusted in accordance with manufacturer's instructions.

2.4 Items requiring specialist maintenance are identified and reported in accordance with company requirements.

Range may include but is not limited to – cutting edges, tyres, blades, pull cords.

Outcome 3

Clean up and store tools and materials for small machinery used on infrastructure works sites.

Evidence requirements

3.1 Tools and equipment are cleaned, maintained, and stored in accordance with company requirements.

3.2 Waste products are recycled and/or disposed of in accordance with company requirements.

3.3 Surplus fuel and lubricants are returned to the designated location and stored in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2014
Review	5	18 February 2011	31 December 2016
Revision	6		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Read and interpret infrastructure works plans		
Level	3	Credits	3

Purpose	People credited with this unit standard are able to: identify and describe details and features of infrastructure works plans; and use plans to locate features on site.
----------------	--

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

Outcomes and evidence requirements

Outcome 1

Identify and describe details of infrastructure works plans.

Evidence requirements

- 1.1 Location plan, site plan, contour plan, plan view, elevation, longitudinal section, and cross-section are identified.
- 1.2 The uses of location plan, site plan, contour plan, plan view, elevation, longitudinal section, and cross-section are described.

Outcome 2

Identify and describe features of infrastructure works plans.

Evidence requirements

- 2.1 Features on the plan are identified and described.

Range plan version, north symbol, location and level, tangent point, date, kerb line, centre line, underground services.

Outcome 3

Use plans to locate features on site.

Evidence requirements

- 3.1 Features are located on site in accordance with site plan.
- 3.2 Features are located on site in accordance with contour, longitudinal section, and cross-section.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2016
Review	5	xxxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Identify, hand spread, and assist in compacting materials for infrastructure works		
Level	2	Credits	3

Purpose	People credited with this unit standard are able to: identify and describe infrastructure works materials and compaction; prepare for compacting operations; accept and hand spread materials; and assist with compaction of materials.
----------------	---

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following code of practice must be complied with: *Code of Practice for Manual Handling* (Wellington: Department of Labour, 2001). It is available from the Occupational Safety and Health service at <http://www.osh.dol.govt.nz/order/catalogue/68.shtml>.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Outcomes and evidence requirements

Outcome 1

Identify and describe infrastructure works materials and compaction.

Evidence requirements

- 1.1 The terms durability, grade, and cleanliness are explained in relation to infrastructure works materials.

1.2 Types of aggregates are identified and described.

Range hardfill, sub-base grade, base course grade, topcourse grade, running course, sealing chips, drainage, bedding.

1.3 Types of manufactured mixes are identified and described.

Range asphaltic concrete, cold mix.

1.4 Compaction equipment is identified and compaction techniques are explained.

Range plate compactor, roller, tamper.

Outcome 2

Prepare for compacting operations.

Evidence requirements

2.1 Job instructions are confirmed with supervisor in accordance with company requirements.

Range location and extent of works, material type, depth of fill, compaction requirements.

2.2 Tools and equipment are selected in accordance with supervisor's instructions.

Range may include but is not limited to – hand shovels, rake, broom, wheelbarrow, screed, tamper.

Outcome 3

Accept and hand spread materials.

Evidence requirements

3.1 Delivered material is accepted in accordance with job instructions for grade, mix, and quality.

3.2 Materials are hand spread in accordance with supervisor's instructions.

Outcome 4

Assist with compaction of materials.

Evidence requirements

4.1 Material is placed in layers for compacting in accordance with job instructions.

4.2 Water is added to dense aggregates to assist compaction in accordance with company requirements.

4.3 Surface finish matches adjacent surfaces and job instructions.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2014
Review	5	18 February 2011	31 December 2016
Review	6	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Install pipe culverts and structures on road construction works		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: prepare for culvert works; prepare sites for works; prepare bedding for culverts; lay and joint pipes and carry out initial inspection; install inlet and outlet structures; backfill trench and apply surfacing; and inspect and clean up sites.
----------------	--

Classification	Infrastructure Works> Road Construction
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
As-built refers to what is actually constructed as opposed to that which was planned.
Benchmark is the starting set-out position from which control marks are derived.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.
Set-out means to set out site by survey method using pegs.

Outcomes and evidence requirements

Outcome 1

Prepare for culvert works.

Evidence requirements

- 1.1 Location of culvert is confirmed from plans in accordance with contract specifications.
- 1.2 Pipe type, class, and diameter are confirmed from plans in accordance with contract specifications.
- 1.3 Bedding material and backfill are confirmed from plans in accordance with contract specifications.
- 1.4 Culvert details such as inlets, outlets, aprons, and reinforcing are confirmed from plans in accordance with contract specifications.
- 1.5 Existing services are verified in accordance with company requirements.
- 1.6 Responsibilities to adjoining landowners during culvert works are described in accordance with contract specifications and company requirements.
- 1.7 Plant and labour requirements are confirmed in accordance with plans, contract specifications, and company requirements.

Outcome 2

Prepare sites for works.

Evidence requirements

- 2.1 Sites are set out in accordance with plans, specifications, and on-site survey marks.

Range levels, benchmarks, alignment, gradients, offsets, measuring equipment, pegs, stakes.
- 2.2 Underground services are marked and located in accordance with service authority requirements.
- 2.3 Trench is excavated in accordance with plans, contract specifications, and company requirements.

Outcome 3

Prepare bedding for culverts.

Evidence requirements

- 3.1 Water is removed from the area through which the culvert is to be installed in accordance with site conditions and company requirements.

Range temporary diversion, temporary sump, submersible pump, well pointing, sediment trap.
- 3.2 Alignment and invert levels of trench are checked in accordance with contract specifications.

Range benchmarks, levels, alignment, gradient, offsets, pegs, stakes, pipe laser.

3.3 Trench bed is trimmed and shaped in accordance with contract specifications.

3.4 Pipe bedding material is placed in trench in accordance with contract specifications.

Outcome 4

Lay and joint pipes and carry out initial inspection.

Evidence requirements

4.1 Methods of lifting pipes for laying are described in accordance with manufacturer's instructions and company requirements.

4.2 Pipes are orientated and laid ensuring continuous contact and support of collars and barrels in accordance with contract specifications.

4.3 Pipes are firmly bedded in accordance with contract specifications for compaction.

4.4 Pipes are jointed in accordance with contract specifications and manufacturer's instructions.

Range at least one of – rubber ring, solvent cement, butt, thermo butt, bevel joint, steel weld, thermo weld, solvent weld.

4.5 Culvert and joints are visually inspected on completion of bedding to ensure they meet contract specifications.

Outcome 5

Install inlet and outlet structures.

Evidence requirements

5.1 Area for structure is excavated in accordance with contract specifications and site conditions.

5.2 Pipe ends are prepared for fitting to structure in accordance with contract specifications.

Range may include but is not limited to – removal of collar, scabbling, sawcutting.

5.3 Structures are installed in accordance with contract specifications.

Range at least one of – precast, in-situ structure, gabion basket, rockwork, geotextile bag, flume.

- 5.4 Area around structure is backfilled, compacted, and shaped in accordance with contract specifications.

Outcome 6

Backfill trench and apply surfacing.

Evidence requirements

- 6.1 Trench is backfilled in accordance with contract specifications.

Range material type, layer depth, compaction, suitable compaction equipment, testing requirements.

- 6.2 Trench is surfaced in accordance with contract specifications.

Outcome 7

Inspect and clean up sites.

Evidence requirements

- 7.1 Culvert and structures are inspected to ensure they meet contract specifications and company requirements.

- 7.2 Quality assurance records are completed in accordance with company requirements.

Range includes but is not limited to – as-built records.

- 7.3 Surplus materials and debris are removed from site in accordance with contract specifications and company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2016
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Construct concrete vehicle crossings		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: source information on vehicle crossings and confirm gradients; prepare site and construct vehicle crossing; and reinstate site.
----------------	--

Classification	Infrastructure Works > Road Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Source information on vehicle crossings and confirm gradients.

Evidence requirements

- 1.1 Vehicle crossing plans for vehicular access to site are sourced and uplifted in accordance with local authority requirements.

Range two of – residential, light commercial, heavy commercial.
- 1.2 Identify locations and depths of underground services in accordance with contract specifications and company requirements.

- 1.3 Access gradients are confirmed with local authority and landowner.

Outcome 2

Prepare site and construct vehicle crossing.

Range two of – residential, light commercial, heavy commercial.

Evidence requirements

- 2.1 Site is excavated to dimensions specified in contract specifications.
- 2.2 Foundation material is compacted in accordance with contract specifications and company requirements.
- 2.3 Reinforcing is placed in accordance with contract specifications.
- 2.4 Vehicle crossing is constructed in accordance with contract specifications and company requirements.
- 2.5 Vehicle crossing is finished in accordance with contract specifications and company requirements.

Range may include – finish, concrete curing, traffic restriction.

Outcome 3

Reinstate site.

Evidence requirements

- 3.1 Formwork and surplus materials are removed in accordance with company requirements.
- Range includes off-site – storage, disposal.
- 3.2 Site is reinstated in accordance with contract specifications and company requirements.
- Range may include – topsoil and grass, asphalt fill-in, chipseal, concrete, paving.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 July 1996	31 December 2014
Revision	2	9 March 1999	31 December 2014
Review	3	30 May 2000	31 December 2014
Review	4	25 September 2006	31 December 2016
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Deliver, stockpile, and spread aggregates with truck and trailer		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: prepare for the loading of aggregates; load truck and trailer; deliver aggregates by truck and trailer; stockpile aggregates from truck and trailer; and spread aggregates from truck and trailer on an infrastructure works site.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Traffic Regulations 1976; Land Transport Rule: Vehicle Dimensions and Mass 2002; and Land Transport Rule: Heavy Vehicles 2004.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Prepare for the loading of aggregates.

Evidence requirements

- 1.1 Decks of truck and trailer are cleaned down between loads of different materials in accordance with company requirements.
- 1.2 Product is confirmed as meeting contract specifications.
- 1.3 Truck and trailer are placed in safe position for loading as indicated by loading operator and in accordance with company requirements.

Range may include loading from hopper.

Outcome 2

Load truck and trailer.

Evidence requirements

- 2.1 Communication is maintained with loading operator in accordance with company requirements.
- 2.2 Truck driver ensures that load is positioned in accordance with the company requirements.

Range may include – split load, ease of tailgate operation.

- 2.3 Truck driver ensures that axle loadings comply with Traffic Regulations 1976 and Land Transport Rules.

Outcome 3

Deliver aggregates by truck and trailer.

Evidence requirements

- 3.1 Load is secured prior to and during delivery and on return journey in accordance with Traffic Regulations 1976 and Land Transport Rules.

Range tail gate, loose stones.

- 3.2 Aggregate delivery is confirmed with client in accordance with company requirements.

Outcome 4

Stockpile aggregates from truck and trailer.

Evidence requirements

- 4.1 Location of stockpile on site is confirmed in accordance with company requirements.
- 4.2 Trailer is manoeuvred to stockpile, tailgate released, hoist engaged, and load dumped in sequence in accordance with company requirements.
- Range loads – rocks, aggregates;
locations – yard, infrastructure works site.
- 4.3 Emptied trailer is jack-knifed clear of truck and truckload is stockpiled in accordance with company requirements.
- 4.4 Single load is distributed to several stockpiles in accordance with contract specifications.
- Range evidence is required of two instances of unloading a full load into a series of stockpiles.

Outcome 5

Spread aggregates from truck and trailer on an infrastructure works site.

Evidence requirements

- 5.1 Location of spread is confirmed with site supervisor.
- 5.2 Vehicle is positioned for spread, chains set, hoist engaged, truck moved, and load spread from trailer then from truck in sequence in accordance with company requirements.
- 5.3 Aggregate is spread to an even depth in accordance with contract specifications.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		31 December 2014
Review	2		31 December 2014
Review	3		31 December 2014
Review	4	25 September 2006	31 December 2016
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Maintain road by repairing unbound pavement layers		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to: prepare for the dig out and repair of unbound pavement layers using granular materials; identify and excavate the failed area; backfill and shape the area; and clear the worksite on completion of work.
----------------	--

Classification	Infrastructure Works> Roading Maintenance
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The requirements within the following code of practice applying to civil construction operations must be complied with as appropriate to the context of assessment for this unit standard: The current issue of SP/M/010 *Code of Practice for Temporary Traffic Management* (CoPTTM), produced by Transit New Zealand and available at <http://www.transit.govt.nz/technical/copttm.jsp>, and such other specifications as are required by the road controlling authority on its network.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Traffic Management Plan is a document describing the design, implementation, maintenance and removal of temporary traffic management.

Outcomes and evidence requirements

Outcome 1

Prepare for the dig out and repair of unbound pavement layers using granular materials.

Evidence requirements

1.1 Site conditions are confirmed in accordance with company requirements.

Range location, extent, drainage, environmental conditions.

1.2 Resources are confirmed with supervisor.

Range materials, equipment, workforce.

1.3 Site is set up in accordance with Traffic Management Plan.

Outcome 2

Identify and excavate the failed area.

Evidence requirements

2.1 The failed area is identified in accordance with the contract specifications.

2.2 The failed material is excavated in accordance with company requirements.

Range cut edge of excavation;
excavation – trim, shape, prepare for backfill.

2.3 The excavated area is assessed to determine suitability for backfill in accordance with company requirements.

Range assessment may include but is not limited to – Clegg impact test, Scala penetrometer.

Outcome 3

Backfill and shape the area.

Evidence requirements

3.1 The area is backfilled and compacted in accordance with contract specifications.

3.2 Shape is compatible with the surrounding finished surface levels.

Outcome 4

Clear the worksite on completion of work.

Evidence requirements

4.1 Surplus and loose materials are cleared from the site in accordance with company requirements.

- 4.2 Temporary traffic control measures are removed in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 July 1997	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Maintain road by repairing chipsealed surfaces		
Level	3	Credits	3

Purpose	People credited with this unit standard are able to: prepare for repairing chipsealed surfaces with hot or cold mix; repair the damaged chipsealed surface; and clear the worksite on completion of work.
----------------	---

Classification	Infrastructure Works > Road Maintenance
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Prepare for repairing chipsealed surfaces with hot or cold mix.

Evidence requirements

- 1.1 Site conditions are confirmed in accordance with company requirements.
Range location, extent, environmental conditions.
- 1.2 Resources are confirmed with supervisor.

Range materials, equipment, workforce.

1.3 Site is set up in accordance with Traffic Management Plan.

Outcome 2

Repair the damaged chipsealed surface.

Evidence requirements

2.1 The damaged area is prepared in accordance with contract specifications.

2.2 The damaged chipsealed surface is swept, and the sweepings are removed.

Range equipment – broom, shovel.

2.3 Chipsealed surface is tack coated in accordance with contract specifications and company requirements.

2.4 The premix is placed, shaped and compacted in accordance with contract specifications and company requirements.

Range hot mix, cold mix.

Outcome 3

Clear the worksite on completion of work.

Evidence requirements

3.1 Surplus and loose materials are cleared from the site in accordance with company requirements.

3.2 Temporary traffic control measures are removed in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 July 1997	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Restore pavement using stabilisation techniques		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to: confirm requirements for the restoration of pavement layers; restore failed pavement; and clear the worksite on completion of work.
----------------	--

Classification	Infrastructure Works> Road Maintenance
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The requirements within the following code of practice applying to civil construction operations must be complied with as appropriate to the context of assessment for this unit standard: The current issue of SP/M/010 *Code of Practice for Temporary Traffic Management* (CoPTTM), produced by New Zealand Transport Agency and available at <http://www.nzta.govt.nz/resources/index.html> and such other specifications as are required by the road controlling authority on its network.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Road controlling authority in relation to a road, means the Minister, Department of State, Crown entity, State enterprise, or territorial authority that controls the road.
Traffic Management Plan is a document describing the design, implementation, maintenance and removal of temporary traffic management.

Outcomes and evidence requirements

Outcome 1

Prepare for the restoration of pavement layers.

Evidence requirements

1.1 Site conditions are confirmed in accordance with company requirements.

Range location, extent, drainage, environmental conditions.

1.2 Resources are confirmed with supervisor.

Range materials, equipment, workforce.

1.3 Site is set up in accordance with Traffic Management Plan.

Outcome 2

Restore failed pavement.

Evidence requirements

2.1 Failed pavement is identified in accordance with company requirements.

2.2 Stabilising material is applied to pavement layer in accordance with contract specifications and company requirements.

Range stabilising material – lime, cement or equivalent.

2.3 The surface profile is milled, shaped and trimmed to contract specifications using in-situ materials in accordance with company requirements.

Outcome 3

Clear the worksite on completion of work.

Evidence requirements

3.1 Surplus and loose materials are cleared from the site in accordance with company requirements.

3.2 Temporary traffic control measures are removed in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 July 1997	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		

Consent and Moderation Requirements (CMR) reference

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 Infrastructure ITO askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Maintain road bridge surface and furniture		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to: confirm requirements for bridge maintenance work; clean the bridge deck; inspect, remove and replace defective components; and clear the worksite on completion of work.
----------------	---

Classification	Infrastructure Works > Road Maintenance
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Confirm requirements for bridge maintenance work.

Evidence requirements

- 1.1 Site conditions are confirmed in accordance with company requirements.
Range location, extent, drainage, environmental conditions.
- 1.2 Resources are confirmed with supervisor.

Range materials, equipment, workforce.

1.3 Site is set up in accordance with Traffic Management Plan.

Outcome 2

Clean the bridge deck.

Evidence requirements

2.1 The bridge deck, deck joints, wheelguards, drainage holes, and expansion joints are cleaned of debris in accordance with company requirements.

2.2 Cleaning includes documenting the condition of the bridge deck in accordance with contract specifications.

Outcome 3

Inspect, remove and replace defective components.

Range may include – bridge end markers, protective coating, handrail, guardrail, marker post, sight board, signs.

Evidence requirements

3.1 Components are inspected and, if required, are repaired or removed in accordance with company requirements.

3.2 Damaged components are replaced in accordance with contract specifications.

Outcome 4

Clear the worksite on completion of work.

Evidence requirements

4.1 Surplus and loose materials are cleared from the site in accordance with company requirements.

4.2 Temporary traffic control measures are removed in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 July 1997	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Trim and remove vegetation for road maintenance		
Level	2	Credits	2

Purpose	People credited with this unit standard are able to: prepare to trim, and remove roadside vegetation; carry out roadside vegetation trimming and removal for road maintenance, and clear the worksite on completion of work.
----------------	--

Classification	Infrastructure Works > Road Maintenance
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Prepare to trim and remove unwanted roadside vegetation.

Evidence requirements

- 1.1 Site conditions are confirmed in accordance with company requirements.
Range location, extent, vegetation type, environmental conditions.
- 1.2 Resources are confirmed with supervisor.

Range materials, equipment, workforce.

1.3 Site is set up in accordance with Traffic Management Plan.

Outcome 2

Carry out roadside vegetation trimming and removal for road maintenance.

Evidence requirements

2.1 Vegetation is trimmed, in accordance with contract specifications.

Range trimming may include but is not limited to – pruning, shaping.

2.2 Vegetation is removed from the ground and the surface is reinstated in accordance with company requirements and contract specifications.

Range reinstatement may include but is not limited to – backfilling, consolidating, regrassing.

Outcome 2

Clear the worksite on completion of work.

Evidence requirements

2.1 Trimmings and prunings are cleared from the site and disposed of in accordance with company requirements.

2.2 Uplifted plants are removed from the site and disposed of in accordance with company requirements.

2.3 Temporary traffic control measures are removed in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 July 1997	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

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

Purpose	<p>This unit standard is for people who are responsible for and require an 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>
----------------	---

Classification	Infrastructure Works > Generic Road Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 20875, <i>Demonstrate knowledge of slinging, lifting, moving, and placing loads using mobile plant</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:
Approved Code of Practice for Cranes - 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>;
Approved Code of Practice for Safety in Excavation and Shafts for Foundations (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 be dependent 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 that 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 which may apply across the company or to 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.

Planned review date	31 December 2018
----------------------------	------------------

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
Revision	5		N/A

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of the materials used in road formation		
Level	4	Credits	10

Purpose	People credited with this unit standard are able to: describe materials used during road formation; demonstrate knowledge of material compaction; and demonstrate knowledge of testing of materials used in road formation.
----------------	---

Classification	Infrastructure Works > Road Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definition
Contract specifications include plans, diagrams, and special technical conditions. They do not include special administrative conditions.

Outcomes and evidence requirements

Outcome 1

Describe materials used during road formation.

Evidence requirements

- 1.1 Local materials used in road formation are described.
- 1.2 Unsuitable materials for road formation are described in accordance with local conditions.
- 1.3 Likely cut-and-fill materials are described in accordance with local conditions.
- 1.4 Subgrade materials are described in accordance with contract specifications and local conditions.

- 1.5 Sub-base materials are described in accordance with contract specifications and local conditions.
- 1.6 Base course materials are described in accordance with contract specifications and local conditions.
- 1.7 Geotextile filters are described in accordance with contract specifications.
- 1.8 Filter materials are described in accordance with contract specifications and local conditions.
- 1.9 Bedding materials are described in accordance with contract specifications and local conditions.
- 1.10 Quarried material is described in terms of its origin and use.
- Range river, hardrock, pit.

Outcome 2

Demonstrate knowledge of material compaction.

Evidence requirements

- 2.1 The Optimum Moisture Content is identified in accordance with material compaction.
- 2.2 Maximum Dry Density is described in terms of the degree of compaction as measured by density.
- 2.3 Plant is described in terms of achieving optimum compaction of materials.
- Range plant includes – rubber, steel, vibrating, sheepsfoot, grid rollers; material includes – asphalt, base course, clay, rock.

Outcome 3

Demonstrate knowledge of testing of materials used in road formation.

Evidence requirements

- 3.1 Tests are identified and described for earthworks and subgrade.
- Range Scala penetrometer, nuclear densometer, Benkleman beam.
- 3.2 Tests are identified and described for sub-base and base course.
- Range grading, crushed-face, Clegg hammer, Benkleman beam, nuclear densometer.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 December 1998	31 December 2014
Review	2	30 May 2000	31 December 2014
Review	3	25 September 2006	31 December 2016
Review	4		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a truck-mounted roller-spreader on chipsealing works		
Level	3	Credits	12

Purpose	People credited with this unit standard are able to: demonstrate knowledge of truck-mounted roller-spreaders; perform operator checks and maintenance on a roller-spreader; prepare for chip spreading; operate a roller-spreader to spread sealing chip; and achieve quality requirements for chip spreading.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements apply to this unit standard, and must be complied with:

Health and Safety in Employment Act 1992;

Health and Safety in Employment Regulations 1995;

Code of Practice for Temporary Traffic Management (CoPTTM), New Zealand

Transport Authority, available at <http://nzta.govt.nz/resources>;

NZTA M6: Specification for Sealing Chip, New Zealand Transport Authority at

<http://nzta.govt.nz/resources>;

Job requirements;

Manufacturer's instructions.

With respect to operating roller-spreaders and achievement of chip spread rates, the current edition of the *Chipsealing in New Zealand*, New Zealand Transport Authority, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>, must be complied with.

- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 This unit standard assesses the operation of the roller-spreader and does not assess the driving of the truck to which the spreader is attached.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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. *Job requirements* take account of site conditions to meet contract specifications, and accord with procedures and work instructions written in quality manuals.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of truck-mounted roller-spreaders.

Evidence requirements

- 1.1 Roller-spreaders are described in terms of their components and functions.
- 1.2 The effect and interrelationship of hoist height, truck speed, roller speed, and spreader feed gate settings in terms of chip flow control is described.

Outcome 2

Perform operator checks and maintenance on a roller-spreader.

Evidence requirements

- 2.1 Roller-spreader is checked for minor maintenance and adjustments are made in accordance with manufacturer's instructions and job requirements.
 - Range calibration, uniformity of spreader feed gate opening, function of cut-off plates or width control, roller condition and function, control and function of drive system.
- 2.2 Operator servicing and maintenance are documented in accordance with company procedures.
- 2.3 Operator maintenance checking that indicates that specialist maintenance is required is reported to mechanic or supervisor in accordance with company procedures.

Outcome 3

Prepare for chip spreading.

Evidence requirements

- 3.1 Job instructions are confirmed with supervisor and communicated to driver in accordance with company requirements.
 - Range includes but is not limited to – location, area to be covered, chip grade, spread rate.

- 3.2 On arrival at site, chip loads are checked for grade, cleanliness, freedom from contamination, and dryness, and any inconsistencies are reported in accordance with company requirements.
- 3.3 Roller-spreader is set in accordance with specified chip coverage rate.
- Range settings – spreader feed gate, peripheral speed of roller, width of spread.
- 3.4 Hoist angle and speed of truck are set for the specified chip coverage rate after discussion with driver and obstructions for truck and tray are cleared for spreading operations.

Outcome 4

Operate a roller-spreader to spread sealing chip.

Evidence requirements

- 4.1 Stop and start locations are complied with in accordance with job requirements.
- 4.2 Instructions are given to truck driver in terms of hoist angle, truck speed, and truck direction adjustment to meet job requirements.
- 4.3 Positioning is maintained continuously within the range of view of driver or, if operating a roller-spreader fitted with an approved platform and guard rails, communication is maintained continuously with driver.
- 4.4 At all times during spreading operations, the location of other plant, site personnel, other vehicles, and the public is monitored in accordance with company requirements.
- 4.5 Height of truck tray is monitored in accordance with company requirements.
- Range monitoring includes but is not limited to – clearance from obstructions, required spread of chip.
- 4.6 Truck driver is advised of conditions that require spreading operations to cease in accordance with company requirements.
- Range three conditions.
- 4.7 Chip coverage rate is monitored and adjustments are made to roller-spreader in accordance with job requirements.
- Range adjustments – spreader feed gate, peripheral spread of roller, cut-off plates.

Outcome 5

Achieve quality requirements for chip spreading.

Evidence requirements

5.1 Chip application rate is verified in accordance with company requirements.

Range one of – measuring the total area, a square metre sample.

5.2 Chip coverage meets job requirements for width, location, and evenness of spread.

5.3 Minimal handwork is needed to meet job requirements.

5.4 Overlaps are minimised at joints and road curves.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 March 1998	31 December 2013
Revision	2	5 January 1999	31 December 2013
Review	3	27 October 2005	31 December 2013
Review	4	15 March 2012	31 December 2016
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Locate work sites using route data system, maps, and plans		
Level	2	Credits	2

Purpose	People credited with this unit standard are able to understand and use route data system; and use maps and plans to locate work sites.
----------------	--

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 SM051: 2004, *Location referencing management system (LRMS) manual*, NZ Transport Agency, available at <http://www.nzta.govt.nz>, applies to this unit standard.
- 2 Assessment against this unit standard may take place in a workplace and/or provider environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

Outcomes and evidence requirements

Outcome 1

Demonstrate understanding of and use the route data system.

Evidence requirements

- 1.1 Working mechanisms of the route data system are described in accordance with NZ Transport Agency's LRMS manual.

Range reference station, route position, established route position, increasing and decreasing direction.
- 1.2 Locations are found on route data sheets or highway information sheets.

Outcome 2

Use maps and plans to locate work sites.

Range at least four work sites including at least two types of map.

Evidence requirements

2.1 Work sites are located using maps.

2.2 Work sites are located using plans.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	20 January 1999	31 December 2014
Review	2	22 September 2005	31 December 2014
Review	3	18 February 2011	31 December 2016
Review	4	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 InfraTrain New Zealand askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a wheeled loader on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for loader operations; manoeuvre and control wheeled loader on site; and stockpile and spread materials using a wheeled loader.
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Traffic Regulations 1976; Land Transport Rule: Vehicle Dimensions and Mass 2002; and Land Transport Rule: Heavy Vehicles 2004.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- The following manual must be complied with: *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrains.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to a specific site. Requirements are documented in the company's health and safety plans, traffic management plans, and contract work.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Prepare for loader operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with company requirements.
- 1.2 Site is checked prior to starting work in accordance with job instructions.

Range walk round, remove objects impairing start-up.
- 1.3 Machine operation is checked prior to starting work in accordance with manufacturer's instructions.

Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls;
check controls and gauges after warm-up.
- 1.4 Site and machine are checked for hazards in terms of elimination, isolation, and minimisation.

Outcome 2

Manoeuvre and control wheeled loader on site.

Evidence requirements

- 2.1 Loader is manoeuvred on site with adequate clearances in accordance with job instructions.

Range working clearances include but are not limited to – overhead wires, underground services, proximity of people and plant, trenching works.
- 2.2 Loader is controlled on slopes in accordance with Operator Safety Manual for Earthmoving Machinery.
- 2.3 Loader is manoeuvred with smoothness of movement and machine stability.
- 2.4 Loader is controlled in different site conditions in accordance with Operator Safety Manual for Earthmoving Machinery.

Range wet or slippery ground, rocky ground.
- 2.5 When manoeuvring loader, survey pegs and settings are preserved at all times.

- 2.6 Machine production is maintained at maximum usage relative to the task and the safety of the operator and machine.

Range cycle optimisation is measured by travel speeds, and haul distances.

- 2.7 Materials are carried in safe load position and with operator showing awareness of the operating environment at all times.

Range includes but is not limited to – reversing, on slope.

Outcome 3

Stockpile and spread materials using a wheeled loader.

Range materials may include – soil, aggregates, rock.

Evidence requirements

- 3.1 Dump area is cleared for stockpile in accordance with job instructions.
- 3.2 Materials are loaded to stockpile, and to truck or wagon in accordance with job instructions.
- 3.3 Material is dumped and spread with minimal spillage in accordance with job instructions.

Outcome 4

Park, and inspect a wheeled loader.

Evidence requirements

- 4.1 Loader is parked, shut down safely, and secured in accordance with company requirements.
- 4.2 Loader is inspected and any faults are reported, in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 6458.
Planned review date	31 December 2018

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference

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 Infrastructure ITO at askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a motor grader for earthworks		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for grader operations; manoeuvre and control grader on site; use ripper or scarifier; use grader for earthworks; and refuel, park, and inspect a motor grader.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Traffic Regulations 1976; Land Transport Rule: Vehicle Dimensions and Mass 2002; and Land Transport Rule: Heavy Vehicles 2004.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- The following manual must be complied with: *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrains.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- Definitions
Batter refers to an earthworks cut or wall with a sloping face.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

- 5 The type of grader used in this unit standard is a construction grader that is able to position the blade for battering.

Outcomes and evidence requirements

Outcome 1

Prepare for grader operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with contract specifications and company requirements.
- 1.2 Walk round is completed prior to starting work in accordance with job instructions.
- 1.3 Machine operation is checked prior to starting work in accordance with manufacturer's instructions.
- Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls;
check controls and gauges after warm-up.
- 1.4 Site and machine are checked for hazards in accordance with the Health and Safety in Employment Act 1992 and company requirements.
- 1.5 Cutting edges are checked for wear and corrected if worn in accordance with company requirements.

Outcome 2

Manoeuvre and control grader on site.

Evidence requirements

- 2.1 Grader is manoeuvred on site with adequate clearances and in accordance with Operator Safety Manual for Earthmoving Machinery, and job instructions.
- Range clearances include but are not limited to – overhead wires, underground services, proximity of people and plant, trenching works.
- 2.2 Grader is controlled on slopes in accordance with Operator Safety Manual for Earthmoving Machinery.

- 2.3 Grader controls are used to produce controlled flow of material.
- Range forward movement, reversing, wheel lean, differential lock, articulation.
- 2.4 Grader is controlled on different ground conditions in accordance with Operator Safety Manual for Earthmoving Machinery.
- Range soft ground, slippery ground.
- 2.5 When manoeuvring grader, survey pegs and settings are preserved at all times.

Outcome 3

Use ripper or scarifier.

Evidence requirements

- 3.1 Ripper or scarifier is used to break up hard surface in accordance with manufacturer's instructions.
- 3.2 Ripper or scarifier is used to aerate cohesive soils in accordance with contract specifications.
- 3.3 Ripper or scarifier is used to mix materials in accordance with contract specifications.

Outcome 4

Use grader for earthworks.

Evidence requirements

- 4.1 Sequence and work methods are chosen to ensure safety of people and plant.
- Range production requirements, site traffic.
- 4.2 Topsoil is stripped in accordance with job instructions.
- 4.3 Formation levels are shaped in accordance with job instructions.
- Range cross-fall, grade, batter slope, super elevation.
- 4.4 Foundation material is prepared in accordance with job instructions.
- Range ripping, mixing, reshaping.
- 4.5 Drainage channels are cut in accordance with job instructions.
- Range any three of – cut-out drain, interceptor drain, vee drain, swale drain.

4.6 Materials are spread and levelled in accordance with job instructions.

Range aggregate, stabilised material.

4.7 Earthworks are trimmed to line and level in accordance with job instructions.

Range feather edge, shoulder, carriageway using either peg lines or a laser control.

4.8 Topsoil is spread and levelled in accordance with job instructions.

Outcome 5

Refuel, park, and inspect a motor grader.

Evidence requirements

5.1 Motor grader is refuelled and oils checked in accordance with company requirements.

5.2 Motor grader is parked, shut down safely, and secured in accordance with company requirements.

5.3 Motor grader is inspected and any faults are reported, in accordance with company requirements.

Replacement information	This unit standard, unit standard 17312, and unit standard 17313 replaced unit standard 6460.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2014
Review	2	7 May 2007	31 December 2016

Consent and Moderation Requirements (CMR) reference	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 at askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a motor scraper on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for scraper operations; manoeuvre and control a motor scraper on site; transport materials using a motor scraper; and refuel, park, and inspect a motor scraper
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The following manual must be complied with: *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratraining.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- 4 Definitions
Bench refers to an earthwork ledge.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Prepare for motor scraper operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with contract specifications and company requirements.
- 1.2 Walk round is completed prior to starting work in accordance with company requirements.
- 1.3 Machine operation is checked prior to starting work in accordance with manufacturer's instructions.
 - Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls;
check controls and gauges after warm-up.

Outcome 2

Manoeuvre and control a motor scraper on site.

Evidence requirements

- 2.1 Motor scraper is manoeuvred and controlled on site with adequate clearances and in accordance with Operator Safety Manual for Earthmoving Machinery and job instructions.
 - Range working clearances include but are not limited to – overhead wires, underground services, proximity of people and plant, trenching works.
- 2.2 Motor scraper is controlled on slopes in accordance with Operator Safety Manual for Earthmoving Machinery.
- 2.3 Machine controls are used to produce smooth movement of bowl and ejector.
- 2.4 When manoeuvring scraper, survey pegs and settings are preserved at all times.
- 2.5 Machine production is maintained at maximum usage relative to the task and the safety of the operator and machine.

Range cycle optimisation is achieved by adjusting engine revolutions, travel speeds, and haul distances for maximum efficiency.

2.6 Cooperation with operators of other plant on the worksite is carried out in accordance with job instructions.

Range plant may include but is not limited to – push-pull prime mover, excavator, scraper, bulldozer, roller, grader, haul-road traffic, water cart.

Outcome 3

Transport materials using a motor scraper.

Range materials – cohesive, non-cohesive, wet, dry.

Evidence requirements

3.1 Materials are loaded in accordance with machine capacity.

Range loading may include – push loading, slope loading, straddle loading, pre-ripping, loading by elevator.

3.2 Materials are hauled in accordance with machine capacity.

Range hard surface, varying terrain, varying gradients.

3.3 Materials are spread in layers to specified depth and distance in accordance with job instructions.

3.4 Stockpiles are constructed and materials are uplifted from stockpiles in accordance with job instructions.

3.5 Site is excavated and filled to dimensions specified in job instructions.

Range line, level, gradient;
slopes, cross-falls, benches.

3.6 Aggregates are uplifted and run onto site to levels and cross-falls specified in job instructions.

Outcome 4

Refuel, park, and inspect a motor scraper.

Evidence requirements

4.1 Motor scraper is refuelled and oils checked in accordance with company requirements.

4.2 Motor scraper is parked, shut down safely, and secured in accordance with company requirements.

- 4.3 Motor scraper is inspected and any faults are reported, in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 6461.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a self-propelled roller on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for roller operations; manoeuvre and control roller on site; use roller to compact materials; and refuel, park, and inspect a roller.
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The following manual must be complied with: *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrains.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Technical instructions means the defined procedures for the method of carrying out the construction process.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Prepare for roller operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with contract specifications and company requirements.
- 1.2 Walk round is completed prior to starting work in accordance with company requirements.
- 1.3 Machine operation is checked prior to starting work in accordance with manufacturer's instructions.

Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls, pivot points, hot and cold checks; check controls and gauges after warm-up.

Outcome 2

Manoeuvre and control a roller on site.

Evidence requirements

- 2.1 Roller is manoeuvred and controlled on site with adequate clearances in accordance with Operator Safety Manual for Earthmoving Machinery and job instructions.
 - Range working clearances include but are not limited to – overhead wires, underground services, proximity of people and plant, trenching works.
- 2.2 Roller is controlled on slopes in accordance with Operator Safety Manual for Earthmoving Machinery.
- 2.3 Roller is manoeuvred with smoothness of movement and machine stability.
- 2.4 Roller is controlled on different site conditions in accordance with job instructions.
 - Range slopes, wet ground, slippery ground, rough ground.
- 2.5 When manoeuvring roller, survey pegs and settings are preserved at all times.

2.6 Sequence and work methods are chosen to ensure safety of people and plant.

Range production requirements, road traffic.

Outcome 3

Use a roller to compact materials.

Evidence requirements

3.1 Roller is used for primary and secondary compaction, and overlaps in accordance with supervisor's instructions and contract specifications.

Range vibration, static, knead.

3.2 Materials are compacted in accordance with technical instructions.

Range materials may include – clay, silt, roading aggregates, roading materials.

3.3 Specified requirements for coverage and measurement are met in accordance with technical instructions.

3.4 Roller is used to compact material adjacent to structures with no damage to machine or structures.

3.5 Specified requirements for types of pavement surfacing construction are met according to contract specifications.

Range either asphalt and chipseal, or aggregates.

Outcome 4

Refuel, park, and inspect a roller.

Evidence requirements

4.1 Roller is refuelled and oil checked in accordance with company requirements.

4.2 Roller is parked, shut down safely, and secured in accordance with company requirements.

4.3 Roller is inspected and any faults are reported, in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 6462.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a bulldozer on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for bulldozing operations; manoeuvre and control a bulldozer on site; spread stockpiles and heaps; clear site using a bulldozer; cut and batter materials using bulldozer; and refuel, park, and inspect a bulldozer.
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 The following manual must be complied with: *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrain.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- 4 Definitions
Batter refers to an earthworks cut or wall with a sloping face.
Bench refers to an earthwork ledge.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Contract specifications include plans, diagrams, and special technical conditions. They do not include special administrative conditions.

Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos. *Set-out* means set out site by survey method using pegs.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Prepare for bulldozing operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with contract specifications and company requirements.
- 1.2 Walk round is completed prior to starting work in accordance with company requirements.
- 1.3 Machine operation is checked prior to starting work in accordance with manufacturer's instructions.

Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls; check controls and gauges after warm-up.

Outcome 2

Manoeuvre and control a bulldozer on site.

Evidence requirements

- 2.1 Bulldozer is manoeuvred on site with adequate clearances in accordance with Operator Safety Manual for Earthmoving Machinery and contract specifications.

Range working clearances include but are not limited to – overhead wires, underground services, proximity of people and plant, trenching works.
- 2.2 Bulldozer is controlled on slopes in accordance with Operator Safety Manual for Earthmoving Machinery.
- 2.3 Bulldozer is manoeuvred on site with smoothness of movement and machine stability.
- 2.4 Bulldozer is controlled in different site conditions in accordance with Operator Safety Manual for Earthmoving Machinery and contract specifications.

Range steep slopes, wet or slippery ground, on a bench, towards an edge.

2.5 When manoeuvring bulldozer, survey pegs and settings are preserved at all times.

2.6 Machine production is maintained at maximum usage relative to the task and the safety of the operator and machine.

Range cycle optimisation is measured by adjusting engine revolutions, travel speeds, and haul distances for maximum efficiency.

Outcome 3

Spread stockpiles and heaps.

Evidence requirements

3.1 Stockpiles and heaps are spread using the blade to produce a level surface in accordance with job instructions.

Outcome 4

Clear site using a bulldozer.

Evidence requirements

4.1 Site set-out is confirmed prior to commencement of work in accordance with job instructions.

4.2 Vegetation is cleared using the blade in accordance with job instructions.

Range windrows, stacking, heaping.

Outcome 5

Cut and batter materials using a bulldozer.

Evidence requirements

5.1 Batter slope is cut and trimmed in accordance with job instructions.

Range construction grade stakes, batter pegs.

5.2 Where ripper is fitted, material is ripped in accordance with job instructions.

Range cross ripping, line ripping.

5.3 Formation is shaped and trimmed in accordance with job instructions.

Range shaping – cross-fall, grade, side drain;
trimming using peg markings.

Outcome 6

Refuel, park, and inspect a bulldozer.

Evidence requirements

- 6.1 Bulldozer is refuelled and oils checked in accordance with company requirements.
- 6.2 Bulldozer is parked, shut down safely, and secured in accordance with company requirements.
- 6.3 Bulldozer is inspected and any faults are reported, in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 6463.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2015
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate an articulated dump truck on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for dump truck operations; receive loads for ADT; operate ADT on haul road; dump materials from ADT; and carry out shut down procedures and minor maintenance tasks on dump truck.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions**

ADT means articulated dump truck.

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Walk round means to walk round the machine inspecting it.

Outcomes and evidence requirements

Outcome 1

Prepare for dump truck operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with company requirements.
- 1.2 Walk round is completed prior to starting work and any adjustments required are made in accordance with manufacturer's instructions and company requirements.
- 1.3 Engine is warmed up in accordance with manufacturer's instructions or company requirements.
 - Range hoist must be in float position with deck down, park brake must be on.
- 1.4 ADT operation is checked prior to starting work in accordance with manufacturer's instructions and company requirements.
 - Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls, pivot points, hot and cold checks; check controls and gauges after warm up.
- 1.5 Deck is cleaned down between loads of different materials in accordance with company requirements.
- 1.6 Surrounding area is checked for hazards, before moving off in accordance with company requirements.

Outcome 2

Receive loads for ADT.

Evidence requirements

- 2.1 While another truck is being loaded, ADT is parked in waiting area with clear view of loading operations.
- 2.2 Communication is maintained with loading controller or signal person at all times.
- 2.3 Prior to loading, ADT is stopped using service brake, gear selector is put into neutral, and park brake is applied.
- 2.4 During loading, operator remains in view of loading controller and is positioned in accordance with company requirements.
- 2.5 Load does not exceed rated load of machine.
- 2.6 After loading gear is selected, park brake is disengaged, and ADT is moved slowly to settle suspension before driving away.

Outcome 3

Operate ADT on haul road.

Evidence requirements

- 3.1 ADT is driven on haul road at steady speed in accordance with manufacturer's instructions and company requirements.
- Range includes but is not limited to – use of retarder on downgrades, straddling wheel ruts, reversing in a straight line.
- 3.2 Communication is made with other vehicles on haul road in accordance with company requirements.
- Range includes communication when – overtaking, following.
- 3.3 Speed is adjusted to ground conditions in accordance with job instructions.
- 3.4 Differential lock is used in slippery conditions in accordance with manufacturer's instructions.
- 3.5 ADT is manoeuvred on slope in accordance with job instructions.
- Range includes but is not limited to – cornering, braking, travelling across slope.

Outcome 4

Dump materials from ADT.

Evidence requirements

- 4.1 Materials are dumped to stockpile or fill area in accordance with company requirements.
- 4.2 Materials are dumped at uncontrolled tip head in accordance with company requirements.
- Range includes but is not limited to – ADT is reversed square to windrow.

Outcome 5

Carry out shut down procedures and minor maintenance tasks on dump truck.

Evidence requirements

- 5.1 Dump truck is parked and shut down in accordance with manufacturer's instructions and company requirements.

Range may include but is not limited to – engine run-down, checks, refuelling, hoist position, documentation (including reporting any faults).

5.2 Scheduled minor maintenance tasks are carried out in accordance with manufacturer's instructions and company requirements.

Range may include but is not limited to – housekeeping, routine servicing, lubrication.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate fundamental knowledge of earthworks		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to: describe the nature of different soil types; demonstrate knowledge of bulk excavation; describe placement of earthwork materials; and describe dust, erosion and run-off control on earthworks.
----------------	--

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 2 Definitions
Undercutting means excavating below formation level.
Batter means an earthworks cut or wall with a sloping face.
Bench means an earthwork ledge.

Outcomes and evidence requirements

Outcome 1

Describe the nature of different soil types.

Range clay, silt, sand, gravel.

Evidence requirements

- 1.1 Soils are described in terms of their cohesive or non-cohesive structure.
- 1.2 Soils are described in terms of the effect of moisture content.
- 1.3 Description identifies methods of drying soils to achieve specified strength.
- 1.4 Description identifies methods of wetting soils to achieve specified strength.

Outcome 2

Demonstrate knowledge of bulk excavation.

Evidence requirements

2.1 Types of excavation operations are identified.

Range cut-to-waste, cut-to-fill, cut-to stockpile, strip-to stockpile, borrow-to-fill.

2.2 Principles of undercutting are described in relation to foundation requirements.

Outcome 3

Describe placement of earthwork materials.

Evidence requirements

3.1 Operations of spreading and layering are described in relation to soil type.

Range thickness of layers, optimum moisture content and compaction.

3.2 Fill area shaping is described in relation to shape and drainage.

Range during construction, at completion of earthworks.

Outcome 4

Describe dust, erosion and run-off control on earthworks.

Evidence requirements

4.1 Means of controlling water erosion on earthworks are identified.

Range includes but is not limited to – bench, batter, drainage.

4.2 Means of controlling surface run-off on earthworks are described.

Range includes but is not limited to – physical filters, settlement ponds.

4.3 Shaping and revegetating earthworks are described in relation to slope of terrain, availability of topsoil, regrassing methods, and rolling.

4.4 Means of controlling dust on earthworks are identified.

Range includes but is not limited to – ceasing operations, watering.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Rollover	3		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of subgrade for infrastructure civil works		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to describe: subgrade; the shaping and protecting of subgrade; methods of improving weak subgrade; compaction equipment used on subgrade; and shaping of the final surface for infrastructure civil works.
----------------	---

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 2 The following codes of practice and guidelines must be complied with: TNZ F/1: 1997 *Specification for Earthworks Construction*. A full listing of NZTA's principal external manuals, manual amendments and technical documents are listed on <http://www.nzta.govt.nz/resources/>.
- 3 Definition
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Outcomes and evidence requirements

Outcome 1

Describe subgrade.

Evidence requirements

- 1.1 Description of subgrade level is in accordance with TNZ F/1: 1997 *Specification for Earthworks Construction*.
- 1.2 Description includes methods and differences of excavating an area to subgrade level.

Range at least two from -- excavator and dump truck, motor scraper, loader and truck.

Outcome 2

Describe the shaping and protecting of subgrade.

Evidence requirements

2.1 Description includes reasons for shaping subgrade.

2.2 Description includes means of protecting subgrade.

Outcome 3

Describe methods of improving weak subgrade.

Evidence requirements

3.1 Description includes using geotextiles in accordance with manufacturer's instructions.

3.2 Description includes stabilising methods.

Range lime, cement, chemical, grading improvement.

3.3 Description includes undercutting and importing higher quality fill.

3.4 Description includes the importance of subsoil drainage.

3.5 Description includes the ripping, diskings, drying and recompaction.

Outcome 4

Describe compaction equipment used on subgrade.

Evidence requirements

4.1 Description identifies and explains equipment for use on cohesive materials.

4.2 Description identifies and explains equipment for use on non-cohesive materials.

Outcome 5

Describe shaping of the final surface for infrastructure civil works.

Evidence requirements

5.1 Description includes the use of stakes, boning rods, and spot levels in shaping the final surface.

- 5.2 Description compares the use of grader, bulldozer, and excavator in shaping the final surface.

Replacement information	This unit standard replaced unit standard 6481.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 May 2000	31 December 2014
Review	2	25 September 2006	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of forestry earthworks job prescriptions		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: describe the purpose and requirements of a forestry earthworks job prescription, and interpret forestry earthworks job prescription.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Legislation and other requirements relevant to this unit standard include but are not limited to:

Resource Management Act 1991;
 Health and Safety in Employment Act 1992;
 Historic Places Act 1993;
Best Practice Guidelines for Road and Landing Construction, current edition, FITEC, available at <http://www.fitec.org.nz>.

- 2 Definitions
Job prescription refers to map(s) or diagrams with written information and markings.
Map refers to an integrated map or maps and/or a separate map or maps which may cover but is not limited to – engineering, salvage, harvesting, vegetation, contour, topography, water courses. A map may also be an aerial photograph.

Outcomes and evidence requirements

Outcome 1

Describe the purpose and requirements of a forestry earthworks job prescription.

Evidence requirements

- 1.1 The purpose of forestry earthworks job prescriptions in achieving compliance and in meeting client expectations is described.
- 1.2 Possible consequences of failing to meet the requirements of forestry earthworks job prescriptions are described.

Range loss of contract, additional costs, increased hazards, structural failure, adverse environmental impact, penalties, reworks.

Outcome 2

Interpret forestry earthworks job prescription.

Range evidence may include – one exemplar job prescription and one actual job prescription of a candidate's current or past work site.

Evidence requirements

2.1 Job number, job location, and the need for any special requirements are identified.

Range special requirements may include but are not limited to – permitted activity, safety plan and types of hazards, resource consent, work instruction, site visit.

2.2 Earthworks to be achieved in terms of type, location, construction method, and quality expectations are identified.

Range quality expectations may include but are not limited to – water control and other environmental concerns, compaction, materials, gradients.

2.3 Map is oriented on site, identifying current job location and visible features to confirm location.

2.4 Features are identified on the map.

Range may include but is not limited to – ridges, bluffs, water courses, boundaries, vegetation type(s), roads and their types, landings, historic sites, wāhi tapu, environmental areas, stocked areas, contour lines.

2.5 Distances specified within a job prescription are calculated using map scales.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 2003	31 December 2015
Review	2	17 September 2010	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	0101
--	------

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). 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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of forestry earthworks		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to demonstrate knowledge of forestry earthworks.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

The following legislation and guidelines must be complied with: Resource Management Act 1991; *Best Practice Guidelines for Road and Landing Construction*, current edition, FITEC, available at: <http://www.fitec.org.nz>.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of forestry earthworks.

Evidence requirements

- 1.1 Forestry arterial roads, secondary roads, stub roads, tracks, and landings are described in terms of uses and planned life.
- 1.2 Forestry stub roads, tracks, and landings are described in terms of construction stages and processes.

Range	includes but is not limited to – side cast, end haul, benching, batter slope, cut area, fill area, compaction, salvage, slash; construction includes – original construction; may include maintenance and upgrade.
-------	--
- 1.3 Water and sediment controls are described in terms of the construction of forestry stub roads, tracks, and landings.

Range	may include but is not limited to – bund, water table, cut-off, flume, culvert, soak hole, silt trap.
-------	---
- 1.4 Additional activities forestry earthworks construction workers may become involved in are described in terms of purpose and procedures.

Range deadman installation, harvest support, forestry access, slash control.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 2003	31 December 2014
Review	2	17 September 2010	31 December 2016

Consent and Moderation Requirements (CMR) reference	0101
--	------

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Carry out forestry earthworks construction		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: prepare for, and use mobile machinery for, the construction of forestry roads, tracks, and landings.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Candidates must hold a minimum of the class of licence required for the vehicle being driven and comply with the requirements of the Land Transport (Driver Licensing) Rule 1999.

Explanatory notes

- 1 The following legislation and regulations must be complied with:
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995;
Resource Management Act 1991;
Historic Places Act 1993;
Operator Safety Manual for Earthmoving Machinery, available from InfraTrain NZ Ltd at: askus@infratraining.co.nz;
RMA Guide (Green Book), available from InfraTrain NZ Ltd at: askus@infratraining.co.nz;
Part One of the *New Zealand Environmental Code of Practice for Plantation Forestry – Best Environmental Management Practices*, Version 1, New Zealand Forest Owners Association, available at: <http://www.fitec.org.nz>;
Approved Code of Practice for Safety and Health in Forest Operations, Occupational Safety and Health Service, 1999, Department of Labour, Wellington.
- 2 References
Best Practice Guidelines for Road and Landing Construction, current edition, FITEC; and
Best Practice Guidelines for Temporary Traffic Control on Private Forestry Roads, August 2007, FITEC. Both available at <http://www.fitec.org.nz>.
- 3 Assessment against this unit standard must take place in a workplace environment.

Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

4 Definitions

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

R/T refers to radio telephone.

Outcomes and evidence requirements

Outcome 1

Prepare for construction of forestry roads, tracks, and landings.

Evidence requirements

- 1.1 Preparation includes clarifying the job in accordance with company requirements.

Range job prescription, plant, materials, personnel;
may include but is not limited to – consents, site visit or visits.

- 1.2 Preparation includes health and safety measures in accordance with company requirements.

Range personal protective equipment, hazard identification and control;
may include but is not limited to – signage, traffic management,
R/T.

Outcome 2

Construct forestry roads, tracks, and landings.

Evidence requirements

- 2.1 Site is cleared in accordance with job instructions.

Range may include but is not limited to -- stripping, placement of stumps,
slash.

- 2.2 Forestry roads, tracks, and landings are shaped in accordance with job instructions and company requirements.

Range may include but is not limited to – dimensions, gradient, corner formation, benching, batter slope.

2.3 Drainage is installed in accordance with job instructions and company requirements.

Range culvert, water tables;
may include bunding.

2.4 Construction materials are placed and compacted in accordance with job instructions and company requirements.

Range corner formation, spreading, compaction.

2.5 Machinery is operated in accordance with manufacturer's instructions and company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 2003	31 December 2014
Review	2	17 September 2010	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of soil properties for earthworks		
Level	3	Credits	3

Purpose	People credited with this unit standard are able to demonstrate knowledge of soil properties for earthworks.
----------------	--

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Angle of repose is the angle at which an undisturbed pile is self-supporting.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of soil properties for earthworks.

Evidence requirements

- 1.1 Silts are described in terms of their properties and implications for earthworks.
 Range water control, removal and angle of repose, loading, offloading, moisture content, compaction, civil construction uses, mobile plant.
- 1.2 Clays are described in terms of their properties and implications for earthworks.
 Range water control, removal and angle of repose, loading, haulage, offloading, spreading, moisture content, compaction, civil construction uses, mobile plant.
- 1.3 Rocks are described in terms of their properties and implications for earthworks.
 Range removal and angle of repose, loading, haulage, offloading, compaction, civil construction uses, mobile plant.
- 1.4 Sands are described in terms of their properties and implications for earthworks.
 Range removal and stabilisation, loading, haulage, civil construction uses, mobile plant.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 2003	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Prepare for horizontal directional drilling operations and disestablish the site afterwards		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to: prepare and check the site for the horizontal directional drilling operations; set up equipment and materials for the pilot bore and installation tasks; and disestablish the site after completing horizontal directional drilling operations.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements must be complied with:

Resource Management Act 1991;
Health and Safety in Employment Act 1992;
Local Government Act 2002;
Territorial authority requirements.

The following legislation and other requirements may apply to this unit standard:

Electricity Act 1992;
Gas Act 1992;
Telecommunications Act 2001;
Notices under legislation;
Road controlling authority requirements.

- 2 Assessment against this unit standard must be based on evidence from a workplace context.
- 3 Personal protective equipment, appropriate to job requirements, is to be selected and used in accordance with company requirements and manufacturer's instructions.
- 4 Although excavation is normally required, this unit standard does not include the knowledge and skills of operating a mobile excavator, and road opening and restoration.
- 5 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Job requirements refer to requirements of the job at hand that are not covered by job specifications.

Job specifications, for the purpose of this unit standard, refer to instructions (oral, written, and/or graphic) that specify the result or results to be achieved and/or how the work is to be done, in relation to a specific job.

Manufacturer's instructions may include specifications; installation, handling, use, and maintenance instructions; and safety data sheets.

Pull back may include push back.

Outcomes and evidence requirements

Outcome 1

Prepare and check the site for horizontal directional drilling operations.

Evidence requirements

- 1.1 Public and work area protection is set up as directed by the site supervisor and/or STMS (Site Traffic Management Supervisor).
- 1.2 On-site hazards are identified and reported and/or controlled in accordance with company requirements.
- 1.3 On-site environmental controls are implemented in accordance with job requirements and specifications
- 1.4 General site layout, existing services, and ground conditions are visually inspected, and any possible problems identified for the pilot bore and/or pull back operation or operations are reported, in accordance with company requirements.
- 1.5 Pipe alignments set out is undertaken in accordance with job and company requirements.
- 1.6 Any potential problems with setting up the product pipe ready for installation are identified and reported in accordance with company requirements.
- 1.7 Surfaces are opened and pits excavated as required for entry and exit works and for visual inspection during the pilot bore and pull back operations, in accordance with company requirements.

Outcome 2

Set up equipment and materials for the pilot bore and installation tasks.

Range equipment includes but is not limited to – pilot bore and pull back equipment, hand tools;
materials include but are not limited to – drilling fluid, product to be installed, fuel, water supply.

Evidence requirements

- 2.1 Equipment is checked to establish its fitness for the operation and to identify any faults and maintenance needs. Any problems are reported in accordance with company requirements.
- 2.2 Communication systems are established and confirmed in accordance with company requirements.
- 2.3 Equipment and materials are set up and secured, as required by the site supervisor and manufacturer's instructions.
- 2.4 Set up systems are pre-tested in accordance with manufacturer's instructions, company requirements, and job requirements.

Outcome 3

Disestablish the site after completing horizontal directional drilling operations.

Evidence requirements

- 3.1 Site is disestablished in accordance with job specifications and company requirements, and as required by the site supervisor.

Range site securing devices, removal and/or disposal of materials, removal of plant and equipment.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 December 2003	31 December 2014
Review	2	12 December 2008	31 December 2016
Review	3	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate the drill rig for horizontal directional drilling		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: care for and maintain the horizontal directional drilling equipment; set up for the pilot bore; carry out the pilot bore; assist with changeover from pilot bore to back ream; back ream and pull through the product pipe; and pack up and maintain the drilling equipment.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following legislation and other requirements apply to this unit standard:
Resource Management Act 1991;
Local Government Act 2002;
Health and Safety in Employment Act 1992;
Health and Safety in Employment (Pipelines) Regulations 1999;
Approved Code of Practice for Excavation and Shafts for Foundations, Occupational Safety and Health, 1995, available from
<http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/acop-excavation-and-shafts-for-foundations/excavation-acop.pdf> ;
Territorial authority requirements.

The following legislation and other requirements may apply to this unit standard:

Gas Act 1992;
Telecommunications Act 2001;
Electricity Act 1992;
Electricity Regulations 1997;
NZECP 34:2001 – *New Zealand Electrical Code of Practice for Electrical Safe Distances*, available from <http://www.med.govt.nz/energysafety/legislation-policy/electricity-acts-regulations-codes/standards-and-codes-of-practice/new-zealand-electrical-codes-of-practice>;
Safety Rules SM-EI 2004, Electricity Engineers' Association of New Zealand, available from <http://www.eea.co.nz/MainMenu>;
SNZ HB 2002 Code of Practice for Working in the Road, 2003 and
NZS 5258:2003 – *Gas Distribution Networks*, available from
<http://www.standards.co.nz>;
Notices under legislation;
Road controlling authority requirements.

Any legislation or other requirement superseding any of the above will apply, pending review of this unit standard.

- 2 Assessment against this unit standard must be based on evidence from a workplace context.
- 3 Personal protective equipment, appropriate to job requirements, is to be selected and used in accordance with company requirements and manufacturer's instructions.

4 Definitions

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Horizontal directional drilling includes the pilot bore and pull back operations.

Job requirements refer to requirements of the job at hand that are not covered by job specifications.

Job specifications, for the purpose of this unit standard, refer to instructions (oral, written, and/or graphic) that specify the result or results to be achieved and/or how the work is to be done, in relation to a specific job.

Maintenance (of drilling equipment) refers to pre-start checks and upkeep tasks required of a drill rig operator and does not include repairs.

Manufacturer's instructions may include specifications; installation, handling, use, and maintenance instructions; and safety data sheets.

Pull back may include push back.

Outcomes and evidence requirements

Outcome 1

Care for and maintain the horizontal directional drilling equipment.

Range includes but is not limited to – drill rig, rods, drill heads, tracking equipment, reamers, wrenches, mud mixer, fluid pump.

Evidence requirements

- 1.1 Handling and proper care of the drilling equipment throughout horizontal directional drilling operations are in accordance with manufacturer's instructions and company requirements.

Range unloading and securing, setting up, pilot bore and pull back, packing up.

- 1.2 Scheduled maintenance tasks are carried out in accordance with manufacturer's instructions and company requirements.

Outcome 2

Set up for the pilot bore.

Evidence requirements

- 2.1 Equipment and materials are made ready in accordance with manufacturer's instructions, company requirements, and job requirements.
- Range drilling equipment, fuel, oil, water, gauges, drilling fluid, safety mechanisms.
- 2.2 Communication with other site personnel is established and confirmed in accordance with company requirements.
- 2.3 Confirmation to proceed with operations is obtained from the site supervisor in accordance with company requirements.

Outcome 3

Carry out the pilot bore.

Evidence requirements

- 3.1 Drill is launched as directed by the tracker and in accordance with job requirements.
- 3.2 Operation of the drill is smooth, with minimal strain, with close attention to the task, and with continuity of production.
- 3.3 Rods are lubricated and joined to the drill stem in accordance with manufacturer's instructions.
- 3.4 Communication is maintained and guidance information followed, in accordance with company requirements.
- 3.5 Description of procedures for dealing with loss of signal and with service strikes and strikes with unknown obstacles is consistent with company requirements.
- Range services – gas, power, water supply, sewer, stormwater, telecommunications, signal cables.

Outcome 4

Assist with changeover from pilot bore to back ream.

Evidence requirements

- 4.1 Communication is maintained throughout the changeover in accordance with company requirements.
- 4.2 Drill lock out procedures are adhered to in accordance with company requirements.
- 4.3 Drill power is enabled and drill stem is rotated for removal and fitting purposes only when it is confirmed all persons are clear of the exit hole, in accordance with company requirements.

- 4.4 Advice and assistance are provided as requested with selection and fitting of the backreaming attachment to suit job requirements, in accordance with company requirements.

Outcome 5

Back ream and pull through the product pipe.

Evidence requirements

- 5.1 Fluid is delivered at an optimum rate to suit job requirements and/or as instructed by site supervisor or tracker.
- 5.2 Pull back pressures are monitored and reported to site supervisor as required in accordance with company requirements.
- 5.3 Communication is maintained and site supervisor's directions followed, in accordance with company requirements.
- 5.4 Any problems are immediately communicated in accordance with company requirements.
- 5.5 Description of procedure for dealing with frac-outs, breakages, and unknown obstacles is consistent with company requirements.
- 5.6 Installed pipe is cut and secured in accordance with company requirements and job specifications.

Outcome 6

Pack up and maintain the drilling equipment.

Evidence requirements

- 6.1 Drilling equipment is packed up in accordance with company requirements.
- Range disassembly, cleaning, storage.
- 6.2 Maintenance of drilling equipment is carried out in accordance with manufacturer's instructions and company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 December 2003	31 December 2014
Review	2	12 December 2008	31 December 2016
Review	3	xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Provide tracking for horizontal directional drilling		
Level	4	Credits	15

Purpose	People credited with this unit standard are able to: prepare tracking and communications equipment and verify intended bore path; guide pilot bores; and assist with product installation and record as-built data.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following legislation, regulations, code of practice, and requirements must be complied with:
Resource Management Act 1991;
Local Government Act 2002;
Health and Safety in Employment Act 1992;
Health and Safety in Employment (Pipelines) Regulations 1999;
Approved Code of Practice for Excavation and Shafts for Foundations, Occupational Safety and Health, 1995, available from
<http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/acop-excavation-and-shafts-for-foundations/excavation-acop.pdf> ;
Territorial authority requirements.

The following legislation and other requirements may apply to this unit standard:

Gas Act 1992;
Telecommunications Act 2001;
Electricity Act 1992;
Electricity Regulations 1997;
NZECP 34:2001 – *New Zealand Electrical Code of Practice for Electrical Safe Distances*, available from <http://www.med.govt.nz/energysafety/legislation-policy/electricity-acts-regulations-codes/standards-and-codes-of-practice/new-zealand-electrical-codes-of-practice>;
Safety Rules SM-EI 2004, Electricity Engineers' Association of New Zealand, available from <http://www.eea.co.nz/MainMenu>;
SNZ HB 2002 Code of Practice for Working in the Road, 2003 and
NZECP 5258:2003 – *Gas Distribution Networks*, available from
<http://www.standards.co.nz>;
Notices under legislation;
Road controlling authority requirements.

- Assessment against this unit standard must be based on evidence from a workplace context.

- 3 Personal protective equipment, appropriate to job requirements, is to be selected and used in accordance with company requirements and manufacturer's instructions.

4 Definitions

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Horizontal directional drilling includes the pilot bore and pull back operations.

Job requirements refer to requirements of the job at hand that are not covered by job specifications.

Job specifications, for the purpose of this unit standard, refer to instructions (oral, written, and/or graphic) that specify the result or results to be achieved and/or how the work is to be done, in relation to a specific job.

Pull back may include push back.

Outcomes and evidence requirements

Outcome 1

Prepare tracking and communications equipment and verify intended bore path.

Evidence requirements

- 1.1 Tracking equipment is checked in accordance with company requirements.

Range may include but is not limited to – batteries or power supply, calibration, remote interface.

- 1.2 Design grade is checked in accordance with company requirements and to meet job specifications.

- 1.3 Intended bore path is verified in accordance with company requirements, taking into account drill entrance angle, ground conditions, bending radii of rods and product to be installed, and service clearances required.

- 1.4 Confirmation to proceed with operations is obtained from the site supervisor in accordance with company requirements.

- 1.5 Communications equipment is made ready in accordance with company requirements.

Outcome 2

Guide pilot bores.

Evidence requirements

- 2.1 The drill head is located throughout the pilot bore operations.

- 2.2 Information on the location of the drill head is conveyed to enable the drill head to drill the intended bore path, in accordance with company requirements.
- 2.3 Alignment and depth of bores are marked and/or recorded in accordance with company requirements and job specifications.

Outcome 3

Assist with product installation and record as-built data.

Evidence requirements

- 3.1 Assistance with product installation is provided as required by the site supervisor and/or job requirements.
- 3.2 As-built data is recorded in accordance with company requirements and job specifications.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 December 2003	31 December 2014
Review	2	12 December 2008	31 December 2016
Review	3	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of earthworks in relation to the environment		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to describe environmental implications of earthworks, and environmental controls for earthworks.
----------------	---

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Recommended reference material:

Company environmental management documents;

RMA Guide (Green Book), available from InfraTrain NZ Ltd at: askus@infratrains.co.nz;

A recognised source of best practice for water control, such as the erosion and sediment control guidelines produced by regional councils, including but not limited to – Auckland Regional Council (TP90 *Erosion and sediment control guidelines for land disturbing activities in the Auckland Region*, 1999), Environment Waikato, Environment Bay of Plenty, Wellington Regional Council.

Outcomes and evidence requirements

Outcome 1

Describe environmental implications of earthworks.

Evidence requirements

- | | |
|-------|---|
| 1.1 | Description illustrates negative environmental effects of earthworks if poorly controlled. |
| Range | erosion, contaminated water, sediment, noise, dust, fuel oil, fire, vibration, visual impact, social disruption, penalties, damage to sacred or historical place. |
| 1.2 | Description includes examples to show how environmental management affects the way earthworks are planned and carried out. |
| Range | includes but is not limited to – sequence and processes, timing, location, operator training. |

Outcome 2

Describe environmental controls for earthworks.

Evidence requirements

2.1 Description identifies controls to eliminate or reduce the negative environmental effects from earthworks.

Range erosion, contaminated water, sediment, noise, dust, fuel oil, fire, vibration, visual impact, social disruption, damage to sacred or historical place.

2.2 Water controls are described in terms of purpose and features.

Range may include but is not limited to – drains, culverts, subsoil drains, fluming, fresh water cut-off diversion ponds and drains, dams, water detention ponds; evidence of three is required.

2.3 Erosion and sediment controls are described in terms of purpose and features.

Range may include but is not limited to – hydroseeding, planting, mulching, silt fences, silt traps, sediment retention ponds, silt socks, hay bales, geotextiles; evidence of four is required.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 2003	31 December 2014
Review	2	17 September 2010	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of bulk earthmoving		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to: describe bulk earthmoving processes and bulk earthmoving for a specified site.
----------------	---

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Definition

Bulk earthmoving refers to significant amounts of earth being removed, transported, and placed. Examples of undertakings involving bulk earthmoving are large subdivision development, roadway construction, and surface extraction.

Outcomes and evidence requirements

Outcome 1

Describe bulk earthmoving processes.

Evidence requirements

- 1.1 Description includes winning material for removal purposes.
Range hazards and controls, communication, order of tasks.
- 1.2 Description includes loading operations.
Range loading plant and capabilities, hazards and controls, communication, order of tasks, plant positioning, load rates and timing, structures to leave behind.
- 1.3 Description includes construction and maintenance of haul roads and areas for loading and unloading during bulk earthmoving process.
Range plant and capabilities, hazards and controls, order of tasks, soils, spreading, moisture control, compaction.
- 1.4 Description includes haulage of bulk earth.

Range may include but is not limited to – haulage plant and capabilities, hazards and controls, communication, site road rules.

1.5 Description includes placement of bulk earth.

Range dump, fill, moisture control, compaction, stockpile, hazards and controls, communication.

Outcome 2

Describe bulk earthmoving for a specified site.

Evidence requirements

2.1 Description identifies the site layout.

Range current, planned;
may include but is not limited to – haul roads, loading areas, unloading areas.

2.2 Description identifies earthmoving processes for the site, and identifies the plant and/or equipment used.

Range winning material, loading, haulage, placement.

2.3 Description includes company communication requirements and procedures.

Range may include but is not limited to – warning and emergency, traffic, toolbox meetings.

2.4 Description identifies the site management plans and states their purpose.

Range may include but is not limited to – contract, safety, environmental.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 February 2004	31 December 2014
Review	2	17 September 2010	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a rigid dump truck for bulk earthmoving		
Level	3	Credits	15

Purpose	People credited with this unit standard are able to: demonstrate knowledge of the functions of rigid dump trucks for bulk earthmoving; prepare a rigid dump truck for bulk earthmoving: load, transport, and dump material; describe safe initial response to rigid dump truck immobilisation; and carry out shut down procedures and minor maintenance tasks on dump truck.
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Candidates must hold a minimum of the class of licence required for the vehicle being driven and comply with the requirements of the Land Transport (Driver Licensing) Rule 1999.

Explanatory notes

- The following legislation, regulations, codes and guides must be complied with:
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995;
Operator Safety Manual for Earthmoving Machinery, available from Infrastructure ITO at: askus@infratrains.co.nz; *RMA Guide (Green Book)*, available from Infrastructure ITO at: askus@infratrains.co.nz; *The Official New Zealand Truck Loading Code: Code of Practice for the Safety of Loads on Heavy Vehicles* 2008 available from New Zealand Transport Agency.
- Definitions
Bulk earthmoving refers to significant amounts of earth being removed, transported, and placed. Examples of undertakings involving bulk earthmoving are large subdivision development, roadway construction, and surface extraction.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions refer to the manufacturer's operating manuals.

Rigid dump truck for the purposes of this unit standard, are heavy rigid dump vehicle with load capacity of at least 20 tonnes and used for the purpose of bulk earthmoving.

Walk-around – refers to walking around the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

- 3 Operators must use the hand and horn signals endorsed by their company.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of the functions of rigid dump trucks for bulk earthmoving.

Evidence requirements

- 1.1 Rigid dump trucks are identified and described in terms of their types and components.
- Range types may include but are not limited to – 2WD, 4WD, 6WD, rock deck, wide-body deck, heated deck, coal deck;
evidence of five types is required;
components – power train, hydraulic system, production monitors.
- 1.2 Rigid dump trucks are described in terms of the operations they perform.
- Range civil, extractive.
- 1.3 Rigid dump trucks handling on varying surfaces is described in accordance with company requirements.
- Range laden, unladen, slippery, uneven, uphill, downhill.

Outcome 2

Prepare a rigid dump truck for bulk earthmoving.

Evidence requirements

- 2.1 Job instructions are confirmed in accordance with company requirements.
- 2.2 Walk-around is completed prior to starting work and any adjustments required are made in accordance with manufacturer's instructions and company requirements.
- 2.3 Rigid dump truck operation is checked prior to starting work in accordance with manufacturer's instructions and company requirements.
- Range visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls, engine oil, water, battery fluid, hydraulic oil, fuel, transmission oil, cab cleanliness, grease system, tyre pressure and

condition, engine warm-up, engine oil pressure, transmission oil pressure, park brake, electrical charging, hydraulics operating, braking systems, warning systems, lights, emergency systems, communications equipment;
may include – air tanks, air pressure, rock ejectors.

- 2.4 Surrounding area is checked for hazards, before moving off in accordance with company requirements.

Outcome 3

Load, transport, and dump material.

Evidence requirements

- 3.1 Rigid dump truck is positioned in relation to loading equipment in accordance with manufacturer's instructions and company requirements.

Range queuing, off-side loading, on-side loading, loading through the rear, reversing, communication with loading operator.

- 3.2 Load is transported in a controlled manner in accordance with rigid dump truck capability, company requirements, and site road rules.

Range uphill, downhill.

- 3.3 Tiphead procedures are explained and are demonstrated in accordance with company requirements.

Range approach, visual check, positioning, exit.

- 3.4 Rigid dump truck dumps load in accordance with manufacturer's and site instructions.

Range may include – bin, waste area, stockpile, structural fill.

- 3.5 Unladen rigid dump truck is driven in a controlled manner in accordance with truck capability, company requirements, and site road rules.

Range uphill, downhill.

- 3.6 Emergency braking is demonstrated in accordance with manufacturer's instructions and company requirements.

Range laden, unladen.

Outcome 4

Describe safe initial response to rigid dump truck immobilisation.

Evidence requirements

- 4.1 Safe initial response to rigid dump truck immobilisation is described in accordance with company requirements.

Outcome 5

Carry out shut down procedures and minor maintenance tasks on dump truck.

Evidence requirements

- 5.1 Dump truck is parked and shut down in accordance with manufacturer's instructions and company requirements.

Range may include but is not limited to – engine run-down, checks, refuelling, hoist position, documentation (including reporting any faults).

- 5.2 Scheduled minor maintenance tasks are carried out in accordance with manufacturer's instructions and company requirements.

Range may include but is not limited to – housekeeping, routine servicing, lubrication.

Planned review date	31 December 2014
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 February 2004	31 December 2014
Review	2	17 September 2010	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a water cart for bulk earthmoving		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on a water cart for bulk earthmoving and its watering system; confirm job instructions for water application; apply water to surfaces using a water cart; describe safe initial response to water cart for bulk earthmoving immobilisation; and refuel, park, and inspect a water cart.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Candidates must hold a minimum of the class of licence required for the vehicle being driven and comply with the requirements of the Land Transport (Driver Licensing) Rule 1999.

Explanatory notes

- 1 The following legislation and manual must be complied with:
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995;
The Official New Zealand Truck Loading Code: Code of Practice for the Safety of Loads on Heavy Vehicles 2008, available from New Zealand Transport Agency.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on a water cart for bulk earthmoving and its watering system.

Evidence requirements

- 1.1 Water cart pre-start check is undertaken prior to start-up in accordance with company requirements.
- Range visibility, engine controls and gauges, throttle position, engine oil, water, battery fluid, hydraulic oil, fuel, transmission, cab cleanliness, grease system, tyre pressure and condition, engine warm-up, air pressure, engine oil pressure, park brake, electrical charging, hydraulics operating, braking systems, warning systems, lights, emergency systems, communications equipment, on-road certification;
may include – seat belt, hydraulic controls, air tanks.
- 1.2 Watering system is inspected for correct functioning prior to start-up in accordance with company requirements.
- Range jets, couplings, valves, tank, hoses;
may include but is not limited to – auxiliary motors, control systems.
- 1.3 Field-servicing of water pump is carried out, as required, in accordance with company requirements.
- Range may include but is not limited to – fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.4 Surrounding area is checked for hazards, before moving off in accordance with company requirements.
- 1.5 Water cart is filled in accordance with company requirements.

Outcome 2

Confirm job instructions for water application.

Evidence requirements

- 2.1 Type of surface to be watered is confirmed in accordance with job instructions.
- 2.2 Method and application rate of watering is confirmed in accordance with job instructions.

- 2.3 Watering sequences are confirmed in accordance with contract specifications and company requirements.

Outcome 3

Apply water to surfaces using a water cart.

Evidence requirements

- 3.1 Surface is watered in accordance with contract specifications and company requirements.

Range may include but is not limited to – subgrade, sub-base, base course, running course.

- 3.2 Dust is controlled in accordance with company requirements.

Outcome 4

Describe safe initial response to water cart for bulk earthmoving immobilisation.

Evidence requirements

- 4.1 Safe initial response to water cart immobilisation is described in accordance with company requirements.

Outcome 5

Refuel, park, and inspect a water cart.

Evidence requirements

- 5.1 Water cart is refuelled and oils checked in accordance with company requirements.
- 5.2 Water cart is parked, shut down safely, and secured in accordance with company requirements.
- 5.3 Water cart is inspected and any faults are reported, in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 February 2004	31 December 2014
Review	2	25 September 2006	31 December 2014
Review	3	17 September 2010	31 December 2016
Review	4		N/A

Accreditation and Moderation Action Plan (AMAP) reference	0101
--	------

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Work safely on an infrastructure works site		
Level	3	Credits	7

Purpose	People credited with this unit standard are, on an infrastructure works site, able to: identify and explain health and safety requirements and high risks; and work safely with others.
----------------	---

Classification	Infrastructure Works > Infrastructure Works, Health, Safety, and Environment
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and documents must be complied with:
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995;
Regulations and codes of practice pertaining to the sector of the civil infrastructure industry to which the workplace belongs; documented company health, safety, environmental, and quality procedures.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
For Outcome 3, evidence is required from at least three worksites or three activities on a large worksite. Evidence for requirements 3.7, 3.8, and 3.9 may come from actual and/or simulated situations.
- 3 Definitions
Company procedures refers to all documented policies, procedures and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Industry best practice refers to minimum standards for civil works and services operations as described in relevant codes of practice, guidelines, and manuals. These may include but are not limited to: *Approved Code of Practice for the Management of Substances Hazardous to Health in the Workplace July 1997*, and *Approved Code of Practice for Safety in Excavation and Shafts for Foundations Sept 1995*, both published by Occupational Safety and Health Service; *Operator Safety Manual for Earthmoving Machinery* (also known as Operator Safety Manual), InfraTrain New Zealand, available at www.infratraining.co.nz; *The Bitumen Safety Handbook*, NZ Pavement and Bitumen Contractors' Association Inc., available at www.bitumen.org.nz; and operation manuals for specific equipment.
Infrastructure works site refers to a site with activity relating to any of: the construction and maintenance of infrastructure assets such as road, rail, port, airport,

and utilities; demolition; bulk earthworks; quarrying; asphalt production; and bitumen storage and application.

SDS means the safety data sheets provided by the product manufacturer.

Site safety plan means the comprehensive plan dealing with issues relating to health, safety, and the environment. This plan may be generic or site specific and will include an emergency plan, and may include a hazard register.

Outcomes and evidence requirements

Outcome 1

Identify and explain health and safety requirements on an infrastructure works site.

Evidence requirements

- 1.1 Safe work practices are identified and explained in relation to worksite activities.
- Range: may include but is not limited to – hazard identification, work permit, personal protective equipment, operating procedures.
- 1.2 Communication methods are identified and explained in accordance with site requirements.
- Range traffic control, slinging and lifting, plant, control of on-site plant, spreading chip on-site, loaded vehicle signals.
- 1.3 Hazardous materials and flammable goods are identified and requirements for their safe storage and use are explained in accordance with SDS.

Outcome 2

Identify and explain high risks on an infrastructure works site.

Evidence requirements

- 2.1 High risks associated with infrastructure works activities are identified and explained.
- Range: infrastructure works activities include – confined spaces, working at heights, hot bitumen, lockout and tagout, hot work, excavating around services.

Outcome 3

Work safely with others on an infrastructure works site.

Evidence requirements

- 3.1 Site safety plan is adhered to, and hazards identified on the hazard register are controlled and monitored in accordance with company procedures and candidate level of responsibility.

Range: includes but is not limited to – access, egress, housekeeping.

3.2 Personal protective equipment is used in accordance with industry best practice.

3.3 Communication methods and procedures used comply with site safety requirements, and communication with others on worksite is clear and accurate.

Range: methods may include but are not limited to – oral, written, sign, radio, electronic.

3.4 Hazards arising from changing conditions are identified, assessed, controlled, and monitored in accordance with company procedures and candidate level of responsibility.

3.5 Plant, tools, and equipment are checked for safe operation prior to use, and are operated in accordance with manufacturer's instructions and with regard for the safety of others on worksite.

3.6 Plant, tools, and equipment are maintained and stored in accordance with company procedures and industry best practice.

3.7 Hazardous materials and flammable goods are handled and stored in accordance with legislative requirements and site safety plan.

3.8 An unsafe work practice is identified and corrective action implemented in accordance with industry best practice and candidate level of responsibility.

3.9 Accidents are reported and recorded in accordance with company procedures and industry best practice.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 October 2004	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of emergency response in the infrastructure works industry		
Level	2	Credits	3

Purpose	People credited with this unit standard are able to: demonstrate knowledge of infrastructure works emergency situations and site emergency plans, and explain response to emergencies at an infrastructure works site.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and documents must be complied with:
Civil Defence Emergency Management Act 2002;
Fire Service Act 1975;
Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard may take place in a workplace and/or provider environment.

Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
An emergency is an unforeseen or sudden occurrence of danger demanding immediate remedy or action.
Infrastructure works site refers to a site with activity relating to any of: the construction and maintenance of infrastructure assets such as road, rail, port, airport, and utilities; demolition; bulk earthworks; quarrying; asphalt production; and bitumen storage and application.
Site safety plan means the comprehensive plan dealing with issues relating to health, safety, and the environment. This plan may be generic or site specific and will include and emergency plan, and may include a hazard register.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of infrastructure works emergency situations and site safety plans.

Evidence requirements

- 1.1 Infrastructure works sites are described in terms of potential emergency situations.
- Range: health, safety, environment.
- 1.2 Situations are explained in terms of factors to consider when assessing an emergency and determining response.
- Range: includes but is not limited to – risk to self, risk to others, assistance to injured personnel, damage to property, damage to environment.
- 1.3 Situations are described in terms of on-site communication requirements for different locations.
- Range: locations – urban, rural, remote.
- 1.4 Situations are explained in terms of monitoring requirements.
- 1.5 Site safety plans are explained in terms of the typical information they provide.
- 1.6 Site safety plans are described in terms of procedures for communicating with emergency services.
- Range: sites – urban, rural, remote.

Outcome 2

Explain response to emergencies at an infrastructure works site.

Range: emergencies – personal injury, road crash, fire, personal medical, one other;
other may include but is not limited to – flood, storm, earthquake, explosion, structure collapse, earth collapse, equipment failure, electrical, chemical spill, emissions.

Evidence requirements

- 2.1 Location of site emergency plan is identified.
- 2.2 Means of alerting others at worksite to a danger are explained in accordance with site emergency plan.
- 2.3 Evacuation of people from the danger area is explained in accordance with site emergency plan.
- Range: includes but is not limited to – designated responsibilities.

- 2.4 Requirements for communication with people off site are explained in accordance with site safety plan and company policy.

Range: includes but is not limited to – emergency services, company management.

- 2.5 Control of emergency site is explained in accordance with site safety plan.

Range: control includes but is not limited to – securing emergency site, preserving accident scene, monitoring, designated responsibilities.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 October 2004	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Supervise health and safety requirements on an infrastructure works site		
Level	4	Credits	8

Purpose	<p>This unit standard is for people who supervise safety at an infrastructure works site.</p> <p>People credited with this unit standard are able to: implement hazard controls; monitor and enforce worksite health and safety; and assist with a worksite accident investigation.</p>
----------------	---

Classification	Infrastructure Works > Infrastructure Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and documents must be complied with:
Health and Safety in Employment Act 1992;
Injury Prevention, Rehabilitation, and Compensation Act 2001;
Health and Safety in Employment Regulations 1995;
Regulations and codes of practice pertaining to the sector of the infrastructure works industry to which the workplace belongs; documented company health, safety, environmental, and quality procedures.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
For Outcome 2, evidence is required from at least three different situations or worksites.
- 3 Definitions
Accident means an event that causes any person to be harmed, or might have caused any person to be harmed.
Infrastructure works site refers to a site with activity relating to any of: the construction and maintenance of infrastructure assets such as road, rail, port, airport, and utilities; demolition; bulk earthworks; quarrying; asphalt production; and bitumen storage and application.
Harm means illness, injury, or both.
SDS means safety data sheets provided by the product manufacturer.
Site safety plan means the comprehensive plan dealing with issues relating to health, safety, and the environment. This plan may be generic or site specific and includes an emergency plan, and may include a hazard register.

Outcomes and evidence requirements

Outcome 1

Implement hazard controls on an infrastructure works site.

Evidence requirements

- 1.1 Specified requirements for hazard control are put in place at a worksite in accordance with site safety plan.
- 1.2 Personnel on site are notified of identified hazards and controls in accordance with company procedures.
- 1.3 Subcontractors on site are notified of identified hazards and controls in accordance with company procedures.
- 1.4 Suitable health and safety information is available on site.

Range: may include but is not limited to – hazardous substance labels, access to further information, lockout tags, diagrams, preferred work practice, SDS, emergency procedures.

Outcome 2

Monitor worksite health and safety.

Evidence requirements

- 2.1 Site inspection prior to commencement of work ensures that controls are in place for identified hazards.
- 2.2 Site is monitored to ensure that identified hazards continue to be controlled in compliance with site safety plan.
- 2.3 Monitoring ensures that personnel have the knowledge and skills to perform the tasks expected of them, and that untrained personnel are supervised by a suitably experienced person.

Range: includes but is not limited to – duties of persons responsible for worksite safety.

- 2.4 Monitoring ensures that personnel work in accordance with industry best practice.
- 2.5 Monitoring ensures that health and safety hazards which arise after the initial site inspection are identified and assessed, and suitable controls are established and communicated to people on site in accordance with company procedures and legislative requirements.

Range: assessment – potential harm, significant hazard;

controls – hierarchy, proposed action, implementation date, frequency of monitoring.

- 2.6 Monitoring ensures that on site personnel maintain health and fitness to safely perform worksite duties.

Range: may include but is not limited to – fatigue, stress, hydration, hygiene, effects of drugs, effects of alcohol.

Outcome 3

Enforce worksite health and safety.

Evidence requirements

- 3.1 Unsafe actions are stopped, consequences are explained, and action is taken to modify unsafe behaviour in accordance with company procedures.

Range: action may include but is not limited to – warning, reminder/demonstration of safe procedure, appointment of supervisor, further training; evidence is required of at least three actions.

- 3.2 Unsafe processes are stopped, processes are changed to eliminate the hazard/hazards, and on site personnel are advised of the required changes.

Range: evidence is required of at least two processes.

- 3.3 Unsafe conditions and/or situations are assessed and action is taken to ensure safety in accordance with company procedures.

- 3.4 Enforcement ensures that equipment that is unsafe, or is not fit for purpose, is not used on site.

- 3.5 Feedback on health and safety issues is assessed and actioned in accordance with legislative requirements, company procedures, and project requirements.

Range: feedback may come from health and safety meeting, incident form, or any other source.

- 3.6 Worksite health and safety action is reported in accordance with company procedures and in the format required by the recipient.

Range: any two of – subcontractor, MBIE, local authority, company management, client, engineer.

- 3.7 Accident is reported in accordance with MBIE requirements and company procedures.

- 3.8 Recommendations for corrective actions resulting from an accident investigation are implemented, and assistance is given to inform all those affected by the accident in accordance with industry best practice and company procedures.

Outcome 4

Assist with a worksite accident investigation.

Evidence requirements

- 4.1 Assistance is given in accordance with company procedures and legislative requirements.

Range: may include but not limited to – securing accident scene, scene examination, photograph, sketch or diagram of site, gathering facts from any witness, identifying all hazards involved, identifying all people involved, assessing controls, examining materials, examining equipment, referring to existing records.

- 4.2 Assistance supports the identification of cause/s and underlying factors relating to the accident.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 October 2004	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Take control of an emergency at an infrastructure works site		
Level	4	Credits	6

Purpose	<p>This unit standard is for people responsible for taking control of an emergency at an infrastructure works site.</p> <p>People credited with this unit standard are able to respond to emergencies at an infrastructure works site.</p>
----------------	--

Classification	Infrastructure Works > Infrastructure Works Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following legislation must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- Assessment against this unit standard may take place in a workplace and/or provider environment.

Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

Evidence is required of at least three emergencies relevant to the candidate's workplace. Evidence may come from actual and/or simulated situations.
- Definitions**

An emergency is an unforeseen or sudden occurrence of danger demanding immediate remedy or action.

Company procedures refers to all documented policies, procedures and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality and operations.

Infrastructure works site refers to a site with activity relating to any of: the construction and maintenance of infrastructure assets such as road, rail, port, airport, and utilities; demolition; bulk earthworks; quarrying; asphalt production; and bitumen storage and application.

Site safety plan means the comprehensive plan dealing with issues relating to health, safety, and the environment. This plan may be generic or site specific and will include an emergency plan, and may include a hazard register.

Outcomes and evidence requirements

Outcome 1

Take control of an emergency at an infrastructure works site.

Evidence requirements

- 1.1 Emergency is assessed in accordance with site safety plan.
- 1.2 Communication channels to coordinate and control an emergency event are established and maintained in accordance with company procedures and site safety plan.
- 1.3 Critical actions and steps taken to control the emergency are consistent with the size and nature of the emergency and in accordance with legislative requirements and site safety plan.

Range: includes but is not limited to – alerting others, evacuation, isolation of site, use of emergency equipment, trained personnel, containment.
- 1.4 At an accident, work is stopped safely, victim is attended to, area is secured, hazard is reassessed, and controls are put in place before work recommences.
- 1.5 In a case of serious harm, accident scene is not disturbed except to save life, limit suffering, maintain access to essential service or utility, or prevent serious damage or loss of property.
- 1.6 Supervision ensures that site is reinstated in accordance with legislative requirements and site safety plan.
- 1.7 Documentation is completed and processed in accordance with legislative requirements and site safety plan.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 October 2004	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of slinging, lifting, moving, and placing loads using mobile plant		
Level	2	Credits	5

Purpose	People credited with this unit standard are able to demonstrate knowledge of: the principles for using mobile plant for lifting and moving loads; hazards management associated with slinging, lifting, moving, and placing loads; types and inspection of lifting attachments on mobile plant; lifting and slinging gear used with mobile plant; and communication for slinging, lifting, moving, and placing operations.
----------------	--

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 2 It is recommended that this unit standard is achieved before unit standard 17695.
- 3 Definitions
Capability refers to the ability of the machine to lift a load safely. Capability may be obtained from plant load charts, and manufacturers operators manuals.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Industry best practice refers to minimum standards for works as described in codes of practice, guidelines, and manuals relevant to specific types of work. These may include operation manuals for specific equipment.
Lifting gear means the equipment used to link the object or material being lifted to an attachment on a machine.
Loads are any objects that need to be mechanically lifted and moved. For the purpose of this unit standard, loads do not include loose materials such as aggregates.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of the principles for using mobile plant for lifting and moving loads.

Evidence requirements

- 1.1 The relationship between the size, weight, and configuration of a machine is described in terms of lifting capacity, capability, reach, and stability.
- 1.2 Test lifting is explained in terms of methodology for assessing the lifting capacity of a machine.
- 1.3 Provision of a safe working platform is described in relation to site conditions.
 - Range site conditions – slope, unstable ground, near vertical face, wet ground;
may include – beside trench.
- 1.4 Requirements for a safe working area are described in accordance with industry best practice.
 - Range includes but is not limited to – underground services, overhead obstructions, adjacent structures, traffic, people.
- 1.5 Procedures for walking a load are explained in accordance with industry best practice.

Outcome 2

Demonstrate knowledge of hazards management associated with slinging, lifting, moving, and placing loads.

Evidence requirements

- 2.1 Potential hazards and their methods of control are identified and the procedures and equipment used for elimination, isolation, and/or minimisation of the hazards are described in accordance with company requirements.
 - Range hazards include but are not limited to – instability, crushing, jamming, communication failure, incorrect centre of gravity of load.
- 2.2 Reviewing hazards and their methods of control are described in terms of company requirements and legislative requirements.

Outcome 3

Demonstrate knowledge of types and inspection of lifting attachments on mobile plant.

Evidence requirements

- 3.1 Lifting hooks are described and explained in terms of requirements for rating, mounting, and certification.

Range: lifting hooks may include attachments with lifting hooks

3.2 Lifting beams are described and explained in terms of requirements for rating and certification.

3.3 Visual inspections of hooks, beams, buckets, and attachments, prior to use, is described in accordance with company requirements.

Range: buckets include quick hitches.

Outcome 4

Demonstrate knowledge of lifting and slinging gear used with mobile plant.

Evidence requirements

4.1 Lifting and slinging gear is described in terms of type and use.

Range types – lifting chains, wire rope, strops, hooks, lifting beam, spreader bar, slings, shackles, lifting clutches and eyes.

4.2 Lifting and slinging gear is described in terms of rating for the load being lifted.

4.3 Lifting and slinging gear is described in terms of certification requirements, register, and testing frequency.

4.4 Visual inspection of lifting and slinging gear prior to use is described in accordance with company requirements.

4.5 Methods used to secure objects from moving and swinging are identified and described in accordance with company requirements.

Outcome 5

Demonstrate knowledge of communication for slinging, lifting, moving, and placing operations.

Evidence requirements

5.1 The importance of taking direction from one person when operating plant is explained in accordance with industry best practice.

5.2 Hand signals are described in accordance with industry best practice.

5.3 Audible communication methods are described in accordance with industry best practice.

Range methods may include but are not limited to – radio telecommunication, verbal.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 October 2004	31 December 2012
Review	2	18 February 2011	31 December 2016
Review	3	xx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of working safely at sites under temporary traffic management		
Level	2	Credits	2

Purpose	<p>This unit standard is for people who are required to carry out work and conduct themselves safely at any site where temporary traffic management (TTM) is established, whether or not they are involved in traffic management duties.</p> <p>People credited with this unit standard are able to demonstrate knowledge of working safely at sites under temporary traffic management.</p>
----------------	--

Classification	Infrastructure Works > Infrastructure Works Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation, regulations and rule must be complied with:
Health and Safety in Employment Act 1992;
Health and Safety in Employment Regulations 1995;
Transport Act 1962;
Land Transport Act 1998;
Traffic Regulations 1976;
Land Transport Rule (Rule 54001) (Setting of Speed Limits) 2003.
- 2 Relevant specifications
The current issue of the *Code of Practice for Temporary Traffic Management* (CoPTTM) produced by New Zealand Transport Agency; and such other specifications as are required by the road controlling authority (RCA) on its network are relevant to this unit standard. CoPTTM replaced outdated codes, including the *G/1 Specification for Temporary Traffic Control* (G1). Due to existing contractual arrangements, there may be instances where G1 is still an applicable specification; in such instances CoPTTM in this unit standard is to be read as G1.
- 3 Range
This unit standard applies to any activity that requires temporary traffic management to be established. Examples of activities are road maintenance or construction; utility or service maintenance or construction; public event; slips, flooding, or other emergency response; demolition; tree felling; and surveying.
- 4 Definitions

Company procedures means all documented policies, procedures, and methodologies of the candidate's employer or management of the site at the time of assessment, including but not limited to those relating to health, safety, environment, quality, administration, and operations.

Road reserve refers to the area between legal boundaries, usually fence line to fence line, and dedicated to allow the passage of road users including any safety run-off areas. It also includes 6m airspace directly above the road surface. Where activity takes place outside the road reserve, but has the potential to impact on the road reserve, this activity would be included as a worksite within the road reserve.

Site, for the purpose of this unit standard, includes a worksite within a road reserve.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of working safely at sites under temporary traffic management.

Evidence requirements

- 1.1 Responsibilities for traffic management on a site are stated in general terms.

Range: includes but is not limited to – Site Traffic Management Supervisor (STMS), Traffic Controller.
- 1.2 Requirements for personal protective equipment and for safety measures for night work are described in accordance with company procedures and CoPTTM.
- 1.3 Protected work areas and the surrounding safety zones for a static site are identified in accordance with company procedures and with CoPTTM and/or the traffic management plan for the site.

Range: safety zones – taper, longitudinal, lateral, vertical.
- 1.4 Safe practices for static sites are identified in accordance with company procedures and CoPTTM.

Range: working area, exiting and entering, self-visibility, site visitors, private car parking, work machinery and vehicles not in use.
- 1.5 Safe practices are identified for staying on and getting off a vehicle at mobile sites, in accordance with company procedures and CoPTTM.
- 1.6 Procedures for working at a semi-static site are described in accordance with company procedures.

Range: coned safety space, shadow vehicle roll-ahead zone.
- 1.7 Procedures for reporting hazards and reporting incidents are described in accordance with company procedures.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 October 2004	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a roadsweeper on infrastructure works sites		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on vehicle and ancillary equipment; confirm job instructions for roadsweeper operation; operate a roadsweeper; and shut down vehicle, park, and secure equipment.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Prerequisite: Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; and Traffic Regulations 1976.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on vehicle and ancillary equipment.

Evidence requirements

- 1.1 Vehicle pre-start check is undertaken prior to start-up in accordance with company requirements.
- 1.2 Lights, wing mirrors, and tyres are inspected prior to use.
- 1.3 Ancillary equipment is inspected for operability prior to start-up in accordance with company requirements.
 - Range includes but is not limited to – couplings, valves, holding tank, hoses, auxiliary motors, control system.
- 1.4 Gutter brushes, road brush, water tank and spray system are inspected prior to use.
- 1.5 Vehicle is checked for currency of licence and registration.
 - Range road user charge, certificate of fitness, certificate of loading.
- 1.6 Any faults and omissions are reported in accordance with company requirements.

Outcome 2

Confirm job instructions for roadsweeper operation.

Evidence requirements

- 2.1 Locations to be cleaned are confirmed in accordance with job instructions.
- 2.2 Method of cleaning is confirmed in accordance with job instructions.
 - Range may include but is not limited to – left or right hand operation, manual or automated use, suction hose.

Outcome 3

Operate a roadsweeper.

Evidence requirements

- 3.1 Gutters and road are swept in accordance with contract specifications and company requirements.
 - Range may include but is not limited to – dust, noise, care of brushes, use of suction, use of water.

- 3.2 Waste from roadsweeper is emptied in accordance with local authority and company requirements.
- 3.3 Road detritus and litter beyond the scope of the roadsweeper is reported in accordance with company requirements.

Outcome 4

Shut down vehicle, park, and secure equipment.

Evidence requirements

- 4.1 Vehicle is refuelled and oils checked in accordance with company requirements.
- 4.2 Vehicle is parked, shut down safely and secured in accordance with company requirements.
- 4.3 Vehicle is inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a suction cleaning vehicle on infrastructure works sites		
Level	3	Credits	6

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on vehicle and suction system; confirm job instructions for suction cleaning operation; operate a suction cleaning vehicle; and refuel, park, and inspect a suction cleaning vehicle.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; and Traffic Regulations 1976.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on vehicle and suction system.

Evidence requirements

- 1.1 Vehicle pre-start check is undertaken prior to start-up in accordance with company requirements.
- 1.2 Surrounding area is checked using mirrors in accordance with company requirements.
- 1.3 Suction system is inspected for operability prior to start-up in accordance with company requirements.
- Range couplings, valves, holding tank, water tank, hoses, auxiliary motors, control systems.
- 1.4 Field-servicing of suction system is carried out in accordance with company requirements.
- Range fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.5 Vehicle is checked for currency of licence and registration.
- Range road user charge, certificate of fitness, certificate of loading.

Outcome 2

Confirm job instructions for suction cleaning operation.

Evidence requirements

- 2.1 Locations to be serviced are confirmed in accordance with job instructions.
- Range locations may include but are not limited to – road sumps, traps.
- 2.2 Method of cleaning is confirmed in accordance with job instructions.
- 2.3 Suction sequences are described in accordance with contract specifications and company requirements.

Outcome 3

Operate a suction cleaning vehicle.

Evidence requirements

- 3.1 Suction cleaning vehicle is operated in accordance with manufacturer's instructions, contract specifications and company requirements.

Range may include but is not limited to – back flushing, suction.

3.2 Waste from suction cleaning vehicle is emptied in accordance with company requirements.

3.3 Holding tank is cleaned in accordance with company requirements.

Outcome 4

Refuel, park, and inspect a suction cleaning vehicle.

Evidence requirements

4.1 Vehicle is refuelled and oils checked in accordance with company requirements.

4.2 Vehicle is parked safely, shut down safely, and secured in accordance with company requirements.

4.3 Vehicle is inspected and any faults are reported in accordance with company requirements.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2013
Review	2	20 June 2013	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference

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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

This unit standard is expiring

Title	Operate a reclaimer stabiliser on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on a reclaimer stabiliser; confirm job instructions for road reclaimer stabiliser; mill and mix a pavement layer; and refuel, park, and inspect a reclaimer stabiliser.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on a reclaimer stabiliser.

Evidence requirements

- 1.1 Machine pre-start check is undertaken prior to start-up in accordance with company requirements.
- 1.2 Surrounding area is checked using mirrors in accordance with company requirements.
- 1.3 Reclaimer stabiliser system is inspected for operability prior to start-up in accordance with company requirements.
 - Range may include but is not limited to – drum, holders, tips, drive, hoses, control systems, water tanks.
- 1.4 Field-servicing of reclaimer stabiliser is carried out in accordance with company requirements.
 - Range fuel, oil, water, grease, hydraulic oil, minor repairs.

Outcome 2

Confirm job instructions for road reclaimer stabiliser.

Evidence requirements

- 2.1 Type of surface to be milled and mixed is confirmed in accordance with job instructions.
- 2.2 Reclaimer stabiliser sequences are described in accordance with contract specifications and company requirements.

Outcome 3

Mill and mix a pavement layer.

Evidence requirements

- 3.1 Pavement layer is milled and mixed in accordance with contract specifications and company requirements.
 - Range subgrade, sub-base, base course.
- 3.2 Reclaimer stabiliser machine operation optimises performance of work process.
 - Range depth, line, overlaps, communication, may include additives.

Outcome 4

Refuel, park, and inspect a reclaimer stabiliser.

Evidence requirements

- 4.1 Machine is refuelled and oils checked in accordance with company requirements.
- 4.2 Machine is parked safely and secured in accordance with company requirements.
- 4.3 Any wear on reclaimer stabiliser equipment is reported in accordance with company requirements.
- 4.4 Machine is inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2015
Review	2	20 June 2013	31 December 2016
Rollover	3		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

This unit standard is expiring

Title	Operate a skid steer on infrastructure works sites		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: perform pre-start and field-servicing procedures on a skid steer; confirm job instructions for skid steer operation; operate a skid steer; and refuel, park, and inspect a skid steer.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation, regulations, and manual must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; and *Operator Safety Manual for Earthmoving Machinery, 2002* available from InfraTrain New Zealand <http://www.infratrains.co.nz> and the New Zealand Contractors Federation, <http://www.nzcontractors.co.nz>.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Outcomes and evidence requirements

Outcome 1

Perform pre-start and field-servicing procedures on a skid steer.

Evidence requirements

- 1.1 Machine pre-start check is undertaken prior to start-up in accordance with company requirements.
- 1.2 Skid steer is fitted with attachment in accordance with manufacturer's instructions and company requirements.
- Range attachment may include but is not limited to – bucket, broom, mill.
- 1.3 Attachment is inspected for operability prior to start-up in accordance with company requirements.
- Range attachment may include but is not limited to – bucket, broom, mill.
- 1.4 Field-servicing of skid steer is carried out in accordance with company requirements.
- Range attachment linkages, fuel, oil, water, grease, hydraulic oil, minor repairs.

Outcome 2

Confirm job instructions for skid steer operation.

Evidence requirements

- 2.1 Skid steer task is confirmed in accordance with job instructions.
- 2.2 Skid steer operating sequences are described in accordance with contract specifications and company requirements.

Outcome 3

Operate a skid steer.

Evidence requirements

- 3.1 Skid steer is operated in accordance with contract specifications and company requirements and Operator Safety Manual for Earthmoving Machinery.
- Range operation may include but is not limited to – lines, levels, depths, windrows.
- 3.2 Skid steer is controlled and operated with attachments in accordance with company requirements.
- Range attachments may include but are not limited to two of – mill, broom, bucket, post hole borer, blade, chain digger, back hoe.

Outcome 4

Refuel, park, and inspect a skid steer.

Evidence requirements

- 4.1 Machine is refuelled and oils checked in accordance with company requirements.
- 4.2 Machine is parked, shut down safely, and secured in accordance with company requirements.
- 4.3 Machine is inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a stabilising spreader on infrastructure works sites		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: perform operator checks and maintenance on stabilising spreading system; confirm job instructions for stabilising spreader application; spread material; and refuel, park, secure, and inspect a stabilising spreader.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 This unit standard assesses the operation of the stabilising spreader and excludes the driving of the vehicle to which the spreader is attached.
- 4 **Definitions**
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Outcomes and evidence requirements

Outcome 1

Perform operator checks and maintenance on a stabilising spreading system.

Evidence requirements

- 1.1 Spreader system is inspected for operability prior to start-up in accordance with company requirements.
- Range may include but is not limited to – auger, conveyer, roller, hopper, tank, spreader box, gates, hoses, auxiliary motors, control systems.
- 1.2 Field-servicing of spreader system is carried out in accordance with company requirements.
- Range fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.3 Operator servicing and maintenance are documented in accordance with company requirements.

Outcome 2

Confirm job instructions for stabilising spreader application.

Evidence requirements

- 2.1 Type of material to be spread is confirmed in accordance with job instructions.
- 2.2 Spreader is filled in accordance with company requirements.
- 2.3 Rate of material to be spread is confirmed in accordance with job instructions.
- Range may include but is not limited to – cement, lime.
- 2.4 Spreader sequences are described in accordance with contract specifications and company requirements.
- 2.5 Protection of surrounding areas is described in accordance with contract specifications and company requirements.
- Range may include but is not limited to – waterways, services, buildings.

Outcome 3

Spread material.

Evidence requirements

- 3.1 Weather is assessed on site prior to spreading in accordance with company requirements.
- 3.2 Material is spread in accordance with contract specifications and company requirements.
- 3.3 Dust is controlled in accordance with company requirements.

Outcome 4

Refuel, park, secure, and inspect a stabilising spreader.

Evidence requirements

- 4.1 Stabilising spreader is refuelled and oils are checked in accordance with company requirements.
- 4.2 Stabilising spreader is emptied, cleaned, parked safely and secured in accordance with company requirements.
- 4.3 Stabilising spreader is inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2013
Review	2	20 June 2013	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

This unit standard is expiring

Title	Install traffic service poles, signage, and roadside furniture		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to prepare for and carry out the installation of traffic service poles, signage, and roadside furniture.
----------------	---

Classification	Infrastructure Works> Road Construction
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 This unit standard covers the installation of structures in the road reserve. It does not include mounting gantries on overhead structures that is covered in unit standard C02.
- 4 Definitions
As-built refers to what is actually constructed as opposed to that which was planned.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Prepare for the installation of traffic service poles, signage, and roadside furniture.

Evidence requirements

- 1.1 Locations of proposed fixtures are confirmed in accordance with contract specifications.

- 1.2 Locations of existing services are identified and marked in accordance with service authority plans and records.
- 1.3 Plant and equipment are confirmed in accordance with contract specifications and company requirements.

Outcome 2

Install traffic service poles, signage, and roadside furniture.

Range three of – regulatory signs, advisory signs, roadside furniture, hydrant markers.

Evidence requirements

- 2.1 Foundations are excavated and installed in accordance with contract specifications.
- 2.2 Traffic service poles, signage, and roadside furniture are erected in accordance with contract specifications.
- 2.3 Locations of erected items and services are recorded on as-built plans in accordance with contract specifications.

Replacement information	This unit standard replaced unit standard 12571.
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.org.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of and carry out infrastructure works quality assurance requirements		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: demonstrate knowledge of quality assurance for infrastructure works activities; demonstrate knowledge of the requirements of a quality assurance plan for infrastructure works; and carry out quality assurance requirements for infrastructure works.
----------------	---

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Assessment against this unit standard may take place in a workplace and/or provider environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements. Evidence is required of applying quality assurance in an infrastructure works context.
- Definitions**

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Hold point means the stage of work that requires testing, checking, or certification before work can proceed. This is to be recorded. Hold points not specified in contract documents may be stated or implied in company requirements.

ISO 9001 refers to the ISO 9001 family of quality management documents for which companies gain specific accreditation.

QEST refers to the NZ Contractors Federation integrated management system *Quality Environment Safety and Training* available at www.qest.co.nz;

Quality plan refers to a documented plan for quality assurance that may be contract specific or based on ISO 9001 series, QEST, or TQS series.

To *record*, for this unit standard, means to indicate the construction set-out position on a plan or drawing.

TQS refers to NZ Transport Agency's (previously Transit New Zealand's) quality assurance specification for contracts involving road construction, road maintenance, and structures that assigns quality assurance levels as High (TQS1) or Normal (TQS2), available at <http://www.nzta.govt.nz/resources/index.html>.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of quality assurance for infrastructure works activities.

Evidence requirements

- 1.1 Identify quality assurance, timing, and level of service requirements for supplying a product or service relating to infrastructure works and explain how these can be specified and met.
- 1.2 Explain the impact of individual performance on own and infrastructure works company's professional reputation.
- 1.3 Identify and explain procedures for detecting and reporting defects in infrastructure works plant, materials, and activities.

Outcome 2

Demonstrate knowledge of the requirements of a quality assurance plan for infrastructure works.

Range a quality plan of one of the following types – contract specific, ISO 9001 series, TQS series.

Evidence requirements

- 2.1 Hold points for a project are identified in the plan and actions required when those points are reached are explained.
- 2.2 Infrastructure works testing and certification requirements are identified in the plan and responsibilities for meeting them are explained.
- 2.3 Corrective actions for non-complying infrastructure works test results are explained in accordance with quality plan and company requirements.

Range evidence is required for three non-compliant test results.
- 2.4 Individual inputs and responsibilities for quality assurance are determined from the plan and meeting quality assurance requirements is explained in accordance with company requirements.

Range input and responsibilities may include – test results, compaction, materials, maintenance, reporting, tolerances.

Outcome 3

Carry out quality assurance requirements for infrastructure works.

Evidence requirements

- 3.1 Basic infrastructure works tests are carried out, recorded, and reported in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 17500.
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2012
Review	2	18 February 2011	31 December 2016
Review	3		N/A

Consent and Moderation Requirements (CMR) reference	0101
--	------

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). 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 at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of pavement stabilisation for road works		
Level	4	Credits	8

Purpose	People credited with this unit standard are able to explain reasons for and effects of soil stabilisation, and describe methods of soil stabilisation.
----------------	--

Classification	Infrastructure Works> Generic Road Works
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- The requirements within the following guideline applying to civil construction operations must be complied with as appropriate to the context of assessment for this unit standard: TNZ M/15: *Lime for use in Soil Stabilisation*, Transit New Zealand, 1986. A full listing of New Zealand Transport Agency's principal external manuals, manual amendments and technical documents is available at <http://www.nzta.govt.nz/resources/>
- Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Pavement includes layers from subgrade to finished surface.

Outcomes and evidence requirements

Outcome 1

Explain reasons for and effects of soil stabilisation.

Evidence requirements

- 1.1 Explanation identifies reasons for using stabilising materials in terms of pavement layer improvement.

Range subgrade, sub-base, base course.

- 1.2 Explanation identifies reasons for choice of stabilising materials in terms of soil type.

Range moisture, plasticity, cementation.

- 1.3 Explanation outlines economic reasons for the stabilising of materials.

- 1.4 Explanation outlines tests for the bearing capacity of soils and traffic load on pavements.

Range may include but is not limited to – unconfined compressive test, California Bearing Ratio (CBR), soaked CBR, Clegg hammer, Benkelman beam.

- 1.5 Explanation of stabilising road pavements outlines the strengthening required for each layer and the need for preconditioning.

- 1.6 Explanation identifies climatic and temperature effects on stabilising materials.

Outcome 2

Describe methods of soil stabilisation.

Range stabilisation materials include but are not limited to – cement, lime, foam bitumen.

Evidence requirements

- 2.1 Description of mix-in-place method identifies equipment and materials and outlines process in accordance with company requirements.

Range includes but is not limited to – preshaping, preconditioning, spreading of stabilisation material, hydration, mixing, compaction, shaping, curing.

- 2.2 Description of pre-mix method identifies equipment and materials and outlines process and placement in accordance with company requirements.

- 2.3 Description outlines procedures for construction of joints in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 17323.
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 September 2006	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a telehandler		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: describe control of hazards associated with operating a telehandler; check and prepare telehandler and attachment before use; operate telehandler; and carry out post-operational procedures.
----------------	--

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Candidates must hold a minimum of the class of driver licence and endorsement required for the vehicle.

Explanatory notes

- 1 The following legislation and requirements must be complied with:
Health and Safety in Employment Act 1992;
Land Transport (Driver Licensing) Rule 1999, available from New Zealand Transport Agency;
Guidelines for the Provision of Safety, Health and Accommodation in Agriculture (Wellington: Department of Labour, 1996);
Guarding Farm Machinery – Tractor power take-offs and transmission machinery (Wellington: Department of Labour, 1984);
Approved Code of Practice for Roll Over Protective Structures on Tractors in Agricultural Operations (Wellington: Department of Labour, 2001);
Approved Code of Practice for the Management of Noise in the Workplace (Wellington: Department of Labour, 2002); all available from <http://www.business.govt.nz/worksafe/>;
Manufacturer's instructions.
- 2 Assessment against this unit standard must be based on evidence from a workplace context.
- 3 Personal protective equipment, appropriate for the work being carried out, is to be selected and worn in accordance with company requirements and manufacturer's instructions.
- 4 Definitions

Company requirements refer to all policies, procedures, and methodologies the candidate's organisation has in place including but not limited to those relating to health, safety, environment, quality, and operations.

Manufacturer's instructions may include specifications, installation, handling, use, and maintenance instructions and safety data sheets.

Sloping terrain means terrain that exceeds 20°.

Telehandler attachment may include buckets, forks or crane. It does not include an attachment that is towed e.g. – trailer, hay rake or similar implement used in an agricultural activity.

Walk round means to walk round the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Describe control of hazards associated with operating a telehandler.

Range includes but is not limited to – people, animals, visibility, terrain and obstacles, machine suitability and condition, mounting, dismounting, controls, traction, loading, machine dynamics, braking.

Evidence requirements

1.1 Hazard controls are described in accordance with company requirements.

Outcome 2

Check and prepare telehandler and attachment before use.

Evidence requirements

2.1 Attachment is checked for compatibility and attached and coupled securely, enabling full function and stability of the attachment.

2.2 Machine and attachment are checked for condition, damage, wear, and faults; problems are identified; and corrective action is taken in accordance with manufacturer's instructions and company requirements.

Range nuts and bolts, hydraulics, couplings electrical (if fitted).

2.3 Checks are made and any necessary actions are taken or adjustments made to ensure the telehandler complies with legal and company requirements for operator health and safety.

Range may include but is not limited to – fire extinguisher, first aid equipment, seat, safety belt, mirrors, controls, climate control, communications equipment.

2.4 Tyre pressures are checked and are adjusted to the manufacturers correct tyre pressure.

- 2.5 Oil, water, and fuel levels are inspected and adjusted in accordance with manufacturer's instructions.

Outcome 3

Operate telehandler.

Range driving forwards, reversing, turning, on flat and sloping terrain.

Evidence requirements

- 3.1 Telehandler is driven over prescribed route safely for the task, without harm to people or damage to unit or property structures in accordance with legislation and company requirements.

- 3.2 Telehandler is operated and manoeuvred in a safe, smooth, and stable manner without harm to people or damage to equipment or property structures in accordance with legislation and company requirements.

Range positioning; load lifting, carrying, placement, and correct equipment selected for the task.

- 3.3 Equipment and machinery are monitored during operation for damage, wear, and faults, and are reported in accordance with manufacturer's instructions and company requirements.

Outcome 4

Carry out post-operational procedures.

Evidence requirements

- 4.1 Shut-down procedures are carried out in accordance with manufacturer's instructions.

- 4.2 Equipment is cleaned and treated in accordance with manufacturer's instructions and/or company requirements.

- 4.3 Lubrication is carried out in accordance with manufacturer's instructions.

- 4.4 Any damage or faults including any missing, bent, broken, or loose parts are identified and are repaired, replaced, or reported in accordance with manufacturer's instructions and/or company requirements.

- 4.5 Documentation for the operation is completed in accordance with company and client requirements, and the machine and equipment is stored in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 June 2007	31 December 2012
Revision	2	18 March 2011	31 December 2016
Review	3		N/A

Accreditation and Moderation Action Plan (AMAP) reference

0101

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of damage avoidance, consequences of damage, and damage response for trenchless installations		
Level	4	Credits	4

Purpose	People credited with this unit standard are, for trenchless installations, able to: describe damage avoidance; describe the consequences of damages; and demonstrate knowledge of damage response.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation must be complied with: Resource Management Act 1991; Health and Safety in Employment Act 1992; and Local Government Act 2002.

The following legislation and other requirements may apply to this unit standard:

Gas Act 1992;

Telecommunications Act 2001;

Electricity Act 1992;

Electricity Regulations 1997;

NZEC 34:2001 – *New Zealand Electrical Code of Practice for Electrical Safe Distances*, available from <http://www.med.govt.nz/energysafety/legislation-policy/electricity-acts-regulations-codes/standards-and-codes-of-practice/new-zealand-electrical-codes-of-practice>;

Safety Rules SM-EI 2004, Electricity Engineers' Association of New Zealand, available from <http://www.eea.co.nz/MainMenu>;

SNZ HB 2002 *Code of Practice for Working in the Road*, 2003 and

NZS 5258:2003 – *Gas Distribution Networks*, available from

<http://www.standards.co.nz>;

Road controlling authority requirements.

- 2 Definitions

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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. *Other authority* refers to territorial or other authority designated by the territorial authority with powers and responsibilities, in terms of response to underground damage.

Outcomes and evidence requirements

Outcome 1

Describe damage avoidance for trenchless installations.

Evidence requirements

- 1.1 Damage avoidance relating to adjacent services and structures is described in accordance with company requirements and service providers' requirements.

Range	type and proximity to services and structures, assessment of ground conditions, on-site documentation, service location, on-site instructions and communication, drill path, clearances.
-------	--

Outcome 2

Describe the consequences of damage from trenchless installations.

Evidence requirements

- 2.1 Damages are described in terms of consequences for adjacent services and structures.

Range	services include but are not limited to – gas, power, water supply, sewage pipes, rising sewer mains, stormwater, telecommunications, signal cables; structures include at least two of – walls, buildings, driveways, manholes, other.
-------	--

Outcome 3

Demonstrate knowledge of damage response for trenchless installations.

Evidence requirements

- 3.1 The requirement to have all relevant documentation on site is explained in terms of compliance responsibilities and damage response preparedness.
- 3.2 Damage response is described in accordance with company requirements, service providers' requirements, and requirements of the road controlling authority and/or other authority.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 May 2002	31 December 2014
Review	2	19 September 2008	31 December 2016
Review	3	xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe road construction materials and their compaction		
Level	3	Credits	3

Purpose	People credited with this unit standard are able to describe road construction materials and their compaction.
----------------	--

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Applicable specifications:

TNZ B/02: 2005, *Construction of Unbound Granular Pavement Layers*, and

TNZ M/04: 2006, *Specification for Basecourse Aggregate*; available at

<http://www.nzta.govt.nz/resources/results.html>.

Outcomes and evidence requirements

Outcome 1

Describe road construction materials.

Range materials – clay, silt, sand, gravel; natural, manufactured (where applicable).

Evidence requirements

- 1.1 Materials are described in terms of typical uses in road construction.
- 1.2 Materials are described in terms of particle size.
- 1.3 Materials are described in terms of the relationship between water content and density and suitability for road construction.

Outcome 2

Describe compaction for road construction materials.

Evidence requirements

- 2.1 Primary compaction and secondary compaction are described in terms of order of use and effect on materials.

Range materials – clay, silt, sand, gravel; natural, manufactured (where applicable);

primary compaction includes frequency and amplitude.

- 2.2 Compaction is described in terms of equipment and/or methods used and situations of use.

Range traffic, walk behind rollers, ride on rollers, pneumatic tyre rollers, combination rollers, sheep foot rollers, square foot rollers, dynamic compaction, soil preloading.

- 2.3 Compaction is described in terms of effects on layer thickness and moisture content.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	19 June 2009	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Use a nuclear density meter to measure compaction of soils, sands, or gravels		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: demonstrate basic knowledge of radiation for the purpose of nuclear density meter (NDM) operation; demonstrate knowledge of NDM transportation, storage, and record keeping requirements; and describe and operate an NDM to measure compaction of soils, sands, or gravels.
----------------	---

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable Rules, standards, and code:
Land Transport Rule: Dangerous Goods 2005 (Dangerous Goods Rule);
Road Transport of Radioactive Material: Requirements and Guidance Notes for Drivers and Handlers (NRL transport brochure), available at <http://www.nrl.moh.govt.nz/regulatory/transportbrochure.pdf>.
NZS 4402.1:1986, *Preliminary and General Methods of testing soils for civil engineering purposes* (NZS 4402), available at <http://www.standards.co.nz>;
ISO 9001:2008, *Quality Management Systems (QMS) Requirements* (ISO 9001);
ISO/IEC 17025:2005 – *General Requirements for the Competence of Testing and Calibration Laboratories* (ISO/IEC 17025);
NRL C15, *Code of Safe Practice for the Use of Nuclear Density Meters*, June 2000 (NRL C15), available at <http://www.nrl.moh.govt.nz/regulatory/c15.pdf>.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Handle in SAFE position refers to the handle being locked.
Job specifications refer to instructions (oral, written, and/or graphic) that specify the result or results to be achieved and/or how the work is to be done, in relation to a specific job.
Manufacturer's instructions may include specifications; installation, handling, use, and maintenance instructions; and safety data sheets.
Radiation refers to radioactivity.

Outcomes and evidence requirements

Outcome 1

Demonstrate basic knowledge of radiation for the purpose of nuclear density meter (NDM) operation.

Evidence requirements

- 1.1 Radioactive emissions are described in terms of their penetrative power.
- 1.2 Radiation is described in terms of wet density and moisture measurement.
- 1.3 Radiation safety is described in relation to different types of radiation.

Range alpha, beta, gamma, neutron.

Outcome 2

Demonstrate knowledge of NDM transportation, storage, and record keeping requirements.

Evidence requirements

- 2.1 NDM transportation requirements are identified in accordance with the Dangerous Goods Rule and the NRL transport brochure.
- 2.2 NDM storage requirements are identified in accordance with NRL C15.
- 2.3 NDM record keeping requirements are identified in accordance with NRL C15.

Range transit log book, standard count log.

Outcome 3

Describe and operate an NDM to measure compaction of soils, sands, or gravels.

Evidence requirements

- 3.1 An NDM is described in terms of components and functions.
- 3.2 NDM backscatter and direct transmission procedures are described in terms of their uses.
- 3.3 An NDM is set up and a standard count carried out in accordance with manufacturer's specifications.

- 3.4 Test positions are determined in accordance with job specifications and/or company requirements.
- 3.5 Test procedure is carried out at determined positions in accordance with NZS 4402 and company requirements.
- 3.6 Test results are recorded in accordance with company requirements and an accredited standard.

Range accredited standard may include but is not limited to one of – ISO/IEC 17025, ISO 9001.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	19 June 2009	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of civil construction material compaction, soil mechanics, and testing devices		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: describe compaction of civil construction materials and reason for compaction; demonstrate knowledge of origins and applications of civil construction materials; demonstrate knowledge of basic soil mechanics with regards to compaction; and describe civil construction material testing devices.
----------------	--

Classification	Infrastructure Works > Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable specifications:
 TNZ B/02: 2005, *Construction of Unbound Granular Pavement Layers*,
 TNZ B/05: 2008, *Specification for In-situ Stabilisation of Modified Pavement Layers*,
 TNZ M/04: 2006, *Specification for Basecourse Aggregate*; available at
<http://www.transit.govt.nz/technical/specifications.jsp>.
- 2 For the purpose of this unit standard civil construction materials exclude concrete.
- 3 Definitions
CBR means California Bearing Ratio.
MDD means maximum dry density.
OWC means optimum water content.

Outcomes and evidence requirements

Outcome 1

Describe compaction of civil construction materials and reason for compaction.

Evidence requirements

- 1.1 Compaction is described in terms of its effect on various materials.
 Range cohesive, granular, modified road construction materials.
- 1.2 Reasons for compaction are described in terms of contractual obligations.

Range	actual performance of compacted material compared with contract specifications, implications of poor compaction (contractor reputation, remediation cost).
-------	--

Outcome 2

Demonstrate knowledge of origins and applications of civil construction materials.

Range clays, silts, sands, gravels.

Evidence requirements

- 2.1 Civil construction materials are identified in terms of origin.
- 2.2 Civil construction materials are described in terms of differences in particle size, civil construction properties, and applications.
- 2.3 Particle size distribution is described in terms of the differences and applications of well graded, poorly graded, and gap graded civil construction materials.

Outcome 3

Demonstrate knowledge of basic soil mechanics with regards to compaction.

Evidence requirements

- 3.1 Water content and dry density are explained in terms of their relationships.

Range	OWC, MDD, NZ standard compaction, NZ heavy compaction, NZ vibrating hammer compaction.
-------	--
- 3.2 Density is explained in terms of its importance in civil construction.

Range	wet density, dry density, % compaction, total voids, specific gravity.
-------	--
- 3.3 Field tests used to measure density in civil construction are described in terms of underlying concepts.

Range	replacement tests, tube sampling, nuclear density meters, plateau testing.
-------	--
- 3.4 CBR is described in terms of methods to determine the strength of civil construction materials.

Range	laboratory CBR – soaked, natural; inferred CBR – scala penetrometer, impact soil tester.
-------	---

Outcome 4

Describe civil construction material testing devices.

Evidence requirements

- 4.1 Civil construction material testing devices are described in terms of suitable materials for testing and likely results.

Range scala penetrometer, impact soil tester, handheld shear vane, nuclear density meter.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	19 June 2009	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Carry out infrastructure works contract estimating, tendering, and related procedures		
Level	5	Credits	15

Purpose	<p>A project team member usually undertakes the tasks within this unit standard under supervision and with the approval of the project manager.</p> <p>People credited with this unit standard are able to: recommend a bid/no bid decision for an infrastructure works contract; perform estimating for an infrastructure works contract; prepare tender documentation and submit a tender for an infrastructure works contract; and complete the requirements for a preferred infrastructure works contract tender.</p>
----------------	---

Classification	Infrastructure Works > Infrastructure Works Management
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 All work undertaken for this unit standard is to be done in accordance with company requirements.
- 2 The trainee will have autonomy to undertake the requirements of the unit standard however the trainee's work will be reviewed by their manager who will check the validity of the tender.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
With approval refers to carrying out actions, having received approval from the trainee's manager or delegated authority to proceed, in accordance with company requirements.

Outcomes and evidence requirements

Outcome 1

Recommend a bid/no bid decision for an infrastructure works contract.

Evidence requirements

- 1.1 Bid/no bid recommendation is made on the basis of strategic fit, risk analysis, margin opportunity, competition, and resource availability.

Outcome 2

Perform estimating for an infrastructure works contract.

Evidence requirements

- 2.1 Quantities of required materials are calculated.
- Range calculations include – volume, area, wastage, surpluses.
- 2.2 Rates for labour, plant, materials, and subcontractor work are calculated.
- Range may include but are not limited to labour – work time, holidays, weather, sick leave, overtime, allowances, utilisation, risk, employment costs;
plant – internal rates, external rates, scope, consumables, operator costs;
materials – fixed unit costs, testing costs, delivery discounts, payment terms, duty, royalty, tax, wastage;
subcontractor work – performance allowance, timescale, firm prices, payment terms, special conditions, duties, taxes, risk.
- 2.3 The project costs are estimated in accordance with documents, site visits, and method statements.
- Range may include but are not limited to documents – drawings, specifications, schedule of quantities;
site visits – discussion with designers, site conditions, underground services, obstructions, ground conditions, labour availability, security, site access, topography, facilities, demolition, dumping, temporary works, environmental;
methods statements – labour, plant, materials, techniques, sequences, timescale, planning, weather, site conditions, constraints, material supplies.
- 2.4 Preliminary and general cost components are estimated.
- Range may include but are not limited to – site staff, cleaning and clearing, site transport, false work, accommodation, small plant, temporary services, welfare, first aid, safety, final clearance, handover, defects, liability, staff transport, abnormal overtime, risk.
- 2.5 Total cost is estimated in terms of overhead costs, profit, and risk factors.
- 2.6 An estimator's report is completed.
- Range report may include but are not limited to – project description, construction methods, assumptions, risks, unresolved issues,

assessment of design, status, profitability, main contractor's costs, subcontractors and nominated subcontractors' costs, provisional sums, day works, contingencies, discounts.

Outcome 3

Prepare tender documentation and submit a tender for an infrastructure works contract.

Evidence requirements

- 3.1 Cost estimates are assessed, and adequacy for tender price submission is confirmed.
- Range uplifts, additions for risk, organisational overheads, profit, discount.
- 3.2 The tender, with a priced schedule of quantities, is prepared.
- Range tender includes – mark-ups, global sums, schedule of rates, cash flow.
- 3.3 The tender is submitted in accordance with tender documentation and non-price attributes.
- Range tender submitted is based on – conditions of tendering, general conditions of contract, special conditions of contract, basis of payment, specifications, drawings, appendices, notices to tenderers.

Outcome 4

Complete the requirements for a preferred infrastructure works contract tender.

Evidence requirements

- 4.1 Approval is gained from the client for any post-tender changes.
- 4.2 Handover is performed.
- 4.3 Contract documents are checked against tender documents for any changes prior to sign off by client and/or contractor.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	19 November 2010	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a self-propelled, bladed compactor on infrastructure work sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for self-propelled, bladed compactor for operations; manoeuvre and control a self-propelled, bladed compactor on infrastructure work sites; use a self-propelled, bladed compactor to spread and compact materials on infrastructure work sites; describe safe initial response to a self-propelled, bladed compactor immobilisation; and park and shut down a self-propelled, bladed compactor.
----------------	---

Classification	Infrastructure Works > Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Candidates must hold a minimum of the class of licence required for the vehicle being driven and comply with the requirements of the Land Transport (Driver Licensing) Rule 1999.

Explanatory notes

- 1 The following legislation, regulations, and manual must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; *The Official New Zealand Truck Loading Code: Code of Practice for the Safety of Loads on Heavy Vehicles* 2008 is available from New Zealand Transport Agency.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.

Manufacturer's instructions refer to the manufacturer's operating manuals.

Walk-around – refers to walking around the machine inspecting it and its environment for hazards and removing hazards that may impair start-up.

Outcomes and evidence requirements

Outcome 1

Prepare for self-propelled, bladed compactor for operations..

Evidence requirements

1.1 Job instructions are obtained in accordance with company requirements.

1.2 Walk- around is completed prior to starting work in accordance with company requirements.

Range fluid levels, visibility, seat belt, engine controls and gauges, throttle position, hydraulic controls, pivot points, hot and cold checks; check controls and gauges after warm-up.

Outcome 2

Manoeuvre and control a self-propelled, bladed compactor on infrastructure work sites.

Evidence requirements

2.1 Self-propelled, bladed compactor is manoeuvred in a controlled manner.

2.2 Self-propelled, bladed compactor is controlled on different site conditions in accordance with job instructions.

Range includes but is not limited to – slopes, rough ground.

2.3 When manoeuvring self-propelled, bladed compactor, survey pegs and settings are preserved at all times.

Outcome 3

Use a self-propelled, bladed compactor to spread and compact materials on infrastructure work sites.

Evidence requirements

3.1 Material is spread using the blade to produce a level surface in accordance with job instructions.

3.2 Self-propelled, bladed compactor is used for compaction and overlaps in accordance with job instructions and/or contract specifications.

Range materials may include – cohesive soils, granular materials

- 3.3 Specified requirements for coverage and measurement are met in accordance with contract specifications.
- 3.4 Self-propelled, bladed compactor is used to compact material adjacent to structures, avoiding risk of damage to machine and/or structures.

Outcome 4

Describe safe initial response to a self-propelled, bladed compactor immobilisation.

Evidence requirements

- 4.1 Safe initial response to self-propelled, bladed compactor immobilisation is described in accordance with company requirements.

Outcome 5

Refuel, park and inspect a self-propelled, bladed compactor.

Evidence requirements

- 5.1 Self-propelled, bladed compactor is refuelled and oils checked in accordance with company requirements.
- 5.2 Self-propelled, bladed compactor is parked, shut down safely, and secured in accordance with manufacturer's instructions and company requirements.
- 5.3 Self-propelled, bladed compactor is inspected and any faults reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 September 2010	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe health, safety, and environmental care at an infrastructure works site		
Level	2	Credits	3

Purpose	People credited with this unit standard are able to describe health, safety, and environmental care at an infrastructure works site.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard must take place in a workplace environment.
- 2 Definitions
Infrastructure works site refers to a site with activity relating to the construction, testing, and maintenance of infrastructure assets such as roads, passenger transport facilities, and public utilities.
Site safety plan means the comprehensive plan for caring for health, safety and the environment at the site. This plan can be generic or site specific and must include an emergency plan.

Outcomes and evidence requirements

Outcome 1

Describe health, safety, and environmental care at an infrastructure works site.

Evidence requirements

- 1.1 Methods of informing people who visit or work at the site about any known risks to health, safety, and the environment are described in accordance with the site safety plan.

 Range includes but is not limited to –site induction, safety signage, spoken direction, written instruction, designated areas.
- 1.2 Individual responsibilities for maintaining and improving health and safety on site are described in accordance with the site safety plan.

 Range includes but is not limited to – participation in safety systems, personal protection, reporting.

- 1.3 Protection of others at the site is described in relation to safe work practices, awareness of continual changes to site, and communication with site personnel.
- 1.4 The links between training and achieving positive health and safety outcomes is described in accordance with the site safety plan.
- 1.5 Taking care of and around plant and equipment is described in relation to strategies for maintaining site safety.
- Range includes but is not limited to – mobile plant, traffic, safety equipment, electrical tools.
- 1.6 Taking care near and with infrastructure works material is described in accordance with the site safety plan.
- Range may include – agrichemical, hot bitumen, bulk aggregate, pressurised paint.
- 1.7 Taking care of an existing asset is described in accordance with the site safety plan.
- Range asset may include but is not limited to – natural environment, historic value, cultural significance.
- 1.8 Emergency equipment and procedures are described in accordance with the site safety plan.
- Range first aid, fire, spills.
- 1.9 Identifying and controlling risks to health, safety and the environment are described in accordance with the site safety plan.
- Range four risks – at least one risk to health, one to safety, and one to the environment;
control may include – licence, permit.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 February 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Apply factors relating to a contamination incident at an infrastructure works site		
Level	3	Credits	3

Purpose	People credited with this unit standard are able to: select and use personal protective equipment; identify, mitigate preventative action to environmental damage, and report a contamination incident at an infrastructure works site; and clean the site after a contamination incident.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Health, Safety, and Environment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Where relevant the following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Resource Management Act 1991 (RMA); and Biosecurity Act 1993.
- Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Contamination incident refers to a set of events that may have or did result in an accident.
Infrastructure works site refers to a site with activity relating to any of: the construction and maintenance of infrastructure assets such as road, rail, port, airport, and utilities; demolition; agricultural contracting; bulk earthworks; quarrying; asphalt production; and bitumen storage and application.
Workplace practice refers to the documented procedures specific to a work site which set out the standard and required practices of that workplace.

Outcomes and evidence requirements

Outcome 1

Select and use personal protective equipment.

Evidence requirements

- 1.1 Personal protective equipment relevant to task is selected, fitted, and worn in accordance with manufacturer's instructions and company requirements.

Outcome 2

Identify, mitigate preventative action to environmental damage, and report a contamination incident at an infrastructure works site.

Evidence requirements

- 2.1 Identify a contamination incident in accordance with company requirements.
- 2.2 Mitigate preventative action to environmental damage from a contamination incident.
- Range evidence of three actions required.
- 2.3 Report a contamination incident in accordance with company requirements.

Outcome 3

Clean the site after a contamination incident at an infrastructure worksite.

Evidence requirements

- 3.1 Waste and contaminated materials are disposed of in accordance with legislation, local authority requirements, and contract specifications.
- 3.2 Restore an infrastructure work site in accordance with workplace practice and contract specifications.
- 3.3 Tools and equipment are cleaned and maintained in accordance with company requirements.
- 3.4 Communicate site status to others in accordance with Health and Safety in Employment Regulations 1995.
- Range may include but is not limited to – fellow workers, employees' immediate supervisor on-site.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 June 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of, and apply, quality assurance practices to own work area in an infrastructure works operation		
Level	3	Credits	4

Purpose	People credited with this unit standard are, in an infrastructure works operation, able to: monitor quality of own work; conduct routine inspections of own work area; and demonstrate knowledge of company quality assurance and quality assurance practices in relation to own work area.
----------------	---

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation, code of practice, requirements, and instructions must be complied with:
Health and Safety in Employment Act 1992;
Resource Management Act 1991;
Approved Code of Practice for Safety in Excavation and Shafts for Foundations (Wellington: Department of Labour, 1995) (The Excavation Code), Part 1: *Trenches and Open Excavations*, Sections 4 to 7. The Excavation Code is available from <http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/acop-excavation-and-shafts-for-foundations/excavation-acop.pdf>;
Territorial authority requirements;
Structure manufacturer's installation requirements;
Manufacturer's instructions.
- 2 Assessment against this unit standard must take place in a workplace context.
- 3 Personal protective equipment, appropriate to job requirements, is to be selected and used in accordance with company procedures and manufacturer's instructions.
- 4 Definitions
Company requirements refer to the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements, which may apply across the company or to 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.
Immediate environment refers to the environment in which the work is taking place such as inner city, suburban, or rural, and may include the presence of nearby structures.
Manufacturer's instructions refer to specifications; installation, handling, use, and maintenance instructions; and safety data sheets.

Outcomes and evidence requirements

Outcome 1

Monitor quality of own work in an infrastructure works operation.

Evidence requirements

- 1.1 Control points are monitored to confirm quality of work in accordance with company requirements.

Range monitoring may include but is not limited to – observation, documentation, sampling and testing.

Outcome 2

Conduct routine inspections of own work area in an infrastructure works operation.

Evidence requirements

- 2.1 Materials, equipment, and outputs are inspected in accordance with company requirements and manufacturer's instructions.
- 2.2 Variation or common faults are identified and actioned in accordance with company requirements.
- 2.3 The workplace is kept clear and housekeeping maintained in accordance with company requirements.
- 2.4 Inspection results are recorded in accordance with company requirements.

Outcome 3

Demonstrate knowledge of company quality assurance and quality assurance practices in relation to own work area in an infrastructure works operation.

Evidence requirements

- 3.1 Company quality policy, procedures, and responsibilities are identified in terms of their relationship to own work.
- 3.2 The company's quality policy, procedures, and responsibilities are identified for a specified work area.
- 3.3 The quality assurance personnel in the immediate environment are identified in terms of their respective responsibilities.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	31 December 2016
Review	2	xxxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate compaction equipment for infrastructure works		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to: prepare for operations, perform pre-start checks, and operate compaction equipment for infrastructure works.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
Assessment against a minimum of two types of compaction equipment is required.
- 3 Definitions
Compaction equipment includes static; vibration; impact; kneading. For example, rollers, rammers, and compactors.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions.

Outcomes and evidence requirements

Outcome 1

Prepare for operations.

Evidence requirements

- 1.1 Job instructions are confirmed in accordance with company requirements.
- 1.2 Compaction equipment is loaded, secured, transported, and unloaded without damage to machine, personnel, or property in accordance with company requirements.
- 1.3 Job instructions are confirmed against site conditions in accordance with company requirements.

Outcome 2

Perform pre-start checks on compaction equipment.

Evidence requirements

- 2.1 Compaction equipment is inspected for damage and general operating condition prior to start-up.

Range may include but is not limited to on/off switch, fluid levels, plate.
- 2.2 Damage or operating issues are reported in accordance with company requirements.

Outcome 3

Operate compaction equipment.

Evidence requirements

- 3.1 Compaction equipment is operated smoothly and efficiently and in accordance with manufacturer's instructions.

Range starting, using throttle, manoeuvring, stopping.
- 3.2 Equipment is cleaned and stored in accordance with company requirements.

Replacement information	This unit standard replaced unit standard 6467
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory aggregate source property tests		
Level	4	Credits	8

Purpose	<p>This unit standard is one of a series relating to aggregate testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory aggregate source property test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory aggregate source property test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of three civil engineering laboratory aggregate source property tests, which may include but are not limited to – crushing, weathering, LA - Los Angeles Abrasion, soundness, solid density, density and absorption (fine), density and absorption (coarse), clay index, polished stone value.
- 3 Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory aggregate source property test methods.

Evidence requirements

- 1.1 The test method is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory aggregate source property test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations
- Range may include but is not limited to – uncertainty of measurement, suitability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory aggregate source property tests		
Level	4	Credits	16

Purpose	<p>This unit standard is one of a series relating to aggregate testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory aggregate source property tests; and calculate and report results of civil engineering laboratory aggregate source property tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of three civil engineering laboratory source property tests, which may include but are not limited to – crushing, weathering, LA – Los Angeles Abrasion, soundness, solid density, density and absorption (fine), density and absorption (coarse), clay index, polished stone value.
- Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results. Perform does not include the evaluation or the troubleshooting of tests.
Samples include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory aggregate source property tests.

Evidence requirements

- 1.1 Samples and test equipment are prepared in accordance with organisational requirements.
- 1.2 Tests are performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory aggregate source property tests.

Evidence requirements

- 2.1 Results are accurately recorded and calculations performed in accordance with organisational requirements.

Range may include but is not limited to – sample site, sample description.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory aggregate production tests		
Level	4	Credits	10

Purpose	<p>This unit standard is one of a series relating to aggregate testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory aggregate production test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory aggregate production test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of five civil engineering laboratory aggregate production tests, which may include but are not limited to – California Bearing Ratio, NZ standard, NZ heavy, NZ vibrating hammer, maximum density, minimum density, wet sieve (particle size), dry sieve (particle size), average least dimension, rip rap grading, broken faces, sand equivalent, liquid limit cone, liquid limit casagrande, plastic limit, lightweight, aggregates, unit density.
- 3 Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory aggregate production test methods.

Evidence requirements

- 1.1 The test method is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements of civil engineering laboratory aggregate production test results.

Evidence requirements

Describe reporting requirements and the meaning and applicability of civil engineering laboratory aggregate production test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory aggregate production tests		
Level	4	Credits	18

Purpose	<p>This unit standard is one of a series relating to aggregate testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory aggregate production tests; and calculate and report results of civil engineering laboratory aggregate production tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of five civil engineering laboratory aggregate production tests, which may include but are not limited to – California Bearing Ratio, NZ standard, NZ heavy, NZ vibrating hammer, maximum density, minimum density, wet sieve (particle size), dry sieve (particle size), average least dimension, rip rap grading, broken faces, sand equivalent, liquid limit cone, liquid limit casagrande, plastic limit, lightweight, aggregates, unit density.
- 3 Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; standards and methods customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results.
Perform does not include the evaluation or the troubleshooting of tests.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory aggregate production tests.

Evidence requirements

- 1.1 Samples and equipment are prepared in accordance with organisational requirements.
- 1.2 Test is performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory aggregate production tests.

Evidence requirements

- 2.1 Results are accurately recorded and calculations are performed according to organisational requirements.

Range may include but is not limited to – sample site, sample description.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory aggregate source property tests		
Level	5	Credits	18

Purpose	<p>This unit standard is one of a series relating to aggregate testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory aggregate source property test methods; and the application and reporting requirements of civil engineering laboratory aggregate source property test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26634, <i>Describe civil engineering laboratory aggregate source property tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of three civil engineering laboratory aggregate source property tests, which may include but are not limited to – crushing, weathering, LA – Los Angeles Abrasion, soundness, solid density, density and absorption (fine), density and absorption (coarse), clay index, polished stone value.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level, and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of

measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory aggregate source property test methods.

Evidence requirements

- 1.1 The factors that influence the outcome of the test are explained in accordance with scientific principles and organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – signatories, recording requirements.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory aggregate source property test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.

Range may include but is not limited to – out of specification results, in specification results, reporting.

- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory aggregate source property tests		
Level	5	Credits	14

Purpose	<p>This unit standard is one of a series relating to aggregate testing and senior technician knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory aggregate source property tests; and troubleshoot abnormal civil engineering laboratory aggregate source property test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26635, <i>Perform civil engineering laboratory aggregate source property tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of three civil engineering laboratory aggregate source property tests, which may include but are not limited to – crushing, weathering, LA – Los Angeles Abrasion, soundness, solid density, density and absorption (fine), density and absorption (coarse), clay index, polished stone value.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance,

compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory aggregate source property tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory aggregate source property test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory aggregate production tests		
Level	5	Credits	20

Purpose	<p>This unit standard is one of a series relating to aggregate testing and senior technician knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory aggregate production test methods; and the application and reporting requirements of civil engineering laboratory aggregate production test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26636, <i>Describe civil engineering laboratory aggregate production tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of five civil engineering laboratory aggregate production tests, which may include but are not limited to – California Bearing Ratio, NZ standard, NZ heavy, NZ vibrating hammer, maximum density, minimum density, wet sieve (particle size), dry sieve (particle size), average least dimension, rip rap grading, broken faces, sand equivalent, liquid limit cone, liquid limit casagrande, plastic limit, lightweight, aggregates, unit density.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but

are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory aggregate production test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – signatories, client reporting.

Outcome 2

Explain the application and reporting of civil engineering laboratory aggregate production test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.

Range may include but is not limited to – out of specification results, in specification results, reporting.

- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – quality assurance, equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory aggregate production tests		
Level	5	Credits	14

Purpose	<p>This unit standard is one of a series relating to aggregate testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory aggregate production tests; and troubleshoot abnormal civil engineering laboratory aggregate production test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26637, <i>Perform civil engineering laboratory aggregate production tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of five civil engineering laboratory aggregate production tests, which may include but are not limited to – California Bearing Ratio, NZ standard, NZ heavy, NZ vibrating hammer, maximum density, minimum density, wet sieve (particle size), dry sieve (particle size), average least dimension, rip rap grading, broken faces, sand equivalent, liquid limit cone, liquid limit casagrande, plastic limit, lightweight, aggregates, unit density.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between

tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory aggregate production tests.

Evidence requirements

1.1 The results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory aggregate production test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory soil classification tests		
Level	4	Credits	10

Purpose	<p>This unit standard is one of a series relating to soil testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory soil classification test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory soil classification test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of four civil engineering laboratory soil classification tests, which may include but are not limited to – wet sieve (particle size), dry sieve (particle size), liquid limit cone, liquid limit casagrande, plastic limit, linear shrinkage, moisture content, pinhole dispersion, Allophane, pH, Emerson crumb test, hydrometer (particle size), pipette (particle size), shrink/swell, jar slake.
- Definitions**
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory soil classification test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory soil classification test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification, reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory soil density and compaction tests		
Level	4	Credits	8

Purpose	<p>This unit standard is one of a series relating to soil testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory soil density and compaction test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory soil density and compaction test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory soil density and compaction tests, which may include but are not limited to – NZ standard, NZ heavy, NZ vibrating hammer, solid density (fine), solid density (coarse), maximum density, minimum density.
- Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the work site. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory soil density and compaction test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and meaning and applicability of civil engineering laboratory soil density and compaction test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory soil strength tests		
Level	4	Credits	8

Purpose	<p>This unit standard is one of a series relating to soil testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory soil strength test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory soil strength test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of two civil engineering laboratory soil strength tests, which may include but are not limited to – California Bearing Ratio - remoulded, California Bearing Ratio - undisturbed, unconfined compressive strength - standard, unconfined compressive strength - autographic, laboratory shear vane, point load.
- 3 Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory soil strength test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory soil strength test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory specialist soil tests		
Level	5	Credits	24

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory specialist soil test methods; and the application and reporting requirements of civil engineering laboratory specialist soil test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26643, <i>Describe civil engineering laboratory soil classification tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of three civil engineering laboratory specialist soil tests, which may include but are not limited to – triaxial total, triaxial effective, permeability triaxial, Hoek cell, shear box, ring shear, constant head permeability test, falling head test, 1D consolidation, hydraulic oedometer.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of

measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory specialist soil test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – signatories, recording requirements.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory specialist soil test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.
- Range may include but is not limited to – out of specification results, in specification results, reporting.
- 2.2 The reporting requirements for test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory specialist soil tests		
Level	5	Credits	18

Purpose	<p>This unit standard is one of a series relating to soil testing and senior level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory specialist soil tests; and troubleshoot abnormal civil engineering laboratory specialist soil test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to: ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of three civil engineering laboratory specialist soil tests, which may include but are not limited to – triaxial total, triaxial effective, permeability triaxial, Hoek cell, shear box, ring shear, constant head permeability test, falling head test, 1D consolidation, hydraulic oedometer.
- 3 Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory specialist soil tests.

Evidence requirements

- 1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory specialist soil test scenarios and results.

Evidence requirements

- 2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.
- 2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory soil classification tests		
Level	5	Credits	20

Purpose	<p>This unit standard is one of a series relating to soil testing and senior level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory soil classification test methods; and the application and reporting requirements of civil engineering laboratory soil classification test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments;
ISO 9001:2008 *Quality management systems - Requirements*;
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of four civil engineering laboratory soil classification tests, which may include but are not limited to – wet sieve (particle size), dry sieve (particle size), liquid limit cone, liquid limit casagrande, plastic limit, linear shrinkage, moisture content, pinhole dispersion, Allophane, pH, Emerson crumb test, hydrometer (particle size), pipette (particle size), shrink swell test, jar slake.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and

projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory soil classification test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – signatories, recording requirements.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory soil classification test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.
- Range may include but is not limited to – out of specification results, in specification results, reporting.
- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory soil classification tests		
Level	5	Credits	5

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory soil classification tests; and troubleshoot abnormal civil engineering laboratory soil classification test scenarios and results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26643, <i>Describe civil engineering laboratory soil classification tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO 9001:2008 *Quality management systems - Requirements*;
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of four civil engineering laboratory soil classification tests, which may include but are not limited to – wet sieve (particle size), dry sieve (particle size), liquid limit cone, liquid limit casagrande, plastic limit, linear shrinkage, moisture content, pinhole dispersion, Allophane, pH, Emerson crumb test, hydrometer (particle size), pipette (particle size), shrink swell test, jar slake.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance,

compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory soil classification tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory soil classification test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory soil density and compaction tests		
Level	5	Credits	12

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory soil density and compaction test methods; and the application and reporting requirements of civil engineering laboratory soil density and compaction test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26645, <i>Describe civil engineering laboratory soil density and compaction tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of two civil engineering laboratory soil density and compaction tests, which may include but are not limited to – NZ standard, NZ heavy, NZ vibrating hammer, solid density (fine), solid density (coarse), maximum density, minimum density.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of

measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods, standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory soil density and compaction test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – signatories, recording requirements.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory soil density and compaction test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.
- Range may include but is not limited to – out of specification results, in specification results, reporting.
- 2.2 The reporting requirements for test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory soil density and compaction tests		
Level	5	Credits	6

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory soil density and compaction tests; and troubleshoot abnormal civil engineering laboratory soil density and compaction test scenarios and results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26646, <i>Perform civil engineering laboratory soil density and compaction tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
 ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
 NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory soil density and compaction tests, which may include but are not limited to – NZ standard, NZ heavy, NZ vibrating hammer, solid density (fine), solid density (coarse), maximum density, minimum density.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory soil density and compaction tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory soil density and compaction test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory soil strength tests		
Level	5	Credits	12

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory soil strength test methods; and the application and reporting of civil engineering laboratory soil strength test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26647, <i>Describe civil engineering laboratory soil strength tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory soil strength tests, which may include but are not limited to – California Bearing Ratio - remoulded, California Bearing Ratio - undisturbed, unconfined compressive strength - standard, unconfined compressive strength - autographic, laboratory shear vane, point load.
- Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests.

Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory soil strength test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – signatories, client reporting.

Outcome 2

Explain the application and reporting of civil engineering laboratory soil strength test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.

Range may include but is not limited to – out of specification results, in specification results, reporting.

- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, reagents, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory soil strength tests		
Level	5	Credits	6

Purpose	<p>This unit standard is one of a series relating to soil testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory soil strength tests; and troubleshoot abnormal civil engineering laboratory soil strength test scenarios and results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26648, <i>Perform civil engineering laboratory soil strength tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory soil strength tests, which may include but are not limited to – California Bearing Ratio - remoulded, California Bearing Ratio - undisturbed, unconfined compressive strength - standard, unconfined compressive strength - autographic, laboratory shear vane, point load.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international

standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory soil strength tests.

Evidence requirements

- 1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory soil strength test scenarios and results.

Evidence requirements

- 2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.
- 2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory fresh concrete tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory fresh concrete test methods; and the application and reporting requirements of civil engineering laboratory fresh concrete test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26053, <i>Carry out routine tests on fresh concrete</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>. NZS 3112: Parts 1 - 4:1986 available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of three civil engineering laboratory fresh concrete tests, which may include but are not limited to – Yield, Slump, Air Content, Spread, Unit Mass, Flow.
- Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and

projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory fresh concrete test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, samples, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – sampling plan, test method, recording requirements, proficiencies, equipment checks, calibration.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory fresh concrete test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of material properties.

Range may include but is not limited to – out of specification results, in specification results, sampling, limitations, reporting.

- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory fresh concrete tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory fresh concrete tests; and troubleshoot abnormal civil engineering laboratory fresh concrete test results and scenarios.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26053, <i>Carry out routine tests on fresh concrete</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 3112: Parts 1 - 4:1986 available from <http://www.standards.co.nz>.
- 2 Evidence is required for a minimum of three civil engineering laboratory fresh concrete tests, which may include but are not limited to – Yield, Slump, Air Content, Spread, Unit Mass, Flow.
- 3 Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory fresh concrete tests.

Evidence requirements

- 1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory fresh concrete test results and scenarios.

Evidence requirements

- 2.1 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.
- 2.2 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory non-destructive testing of hardened concrete		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory non-destructive test methods for hardened concrete; and the application and reporting of civil engineering laboratory non-destructive test results for hardened concrete.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 3112 Parts 2-4 available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of three civil engineering laboratory non-destructive tests, which may include but are not limited to – rebound hammer, ultrasonic pulse velocity, electromagnetic covermeter, gamma radiography, internal fracture test.
- Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory non-destructive test methods for hardened concrete.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, samples, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – signatories, recording requirements, proficiencies, equipment checks, calibration.

Outcome 2

Explain the application and reporting of civil engineering laboratory non-destructive test results for hardened concrete.

Evidence requirements

- 2.1 The application of test results is explained in terms of material properties.

Range may include but is not limited to – out of specification results, in specification results, sampling, limitations, reporting.

- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	XXX	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory non-destructive testing of hardened concrete		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory non-destructive tests of hardened concrete; and troubleshoot abnormal results and scenarios for civil engineering laboratory non-destructive tests of hardened concrete.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable standards include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- Evidence is required for a minimum of two civil engineering laboratory non-destructive tests, which may include but are not limited to – rebound hammer, ultrasonic pulse velocity, electromagnetic covermeter, gamma radiography, internal fracture test.
- Definitions**

Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory non-destructive tests of hardened concrete.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal results and scenarios for civil engineering laboratory non-destructive tests of hardened concrete.

Evidence requirements

2.1 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory concrete strength and density tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory concrete strength and density test methods; and the application and reporting of civil engineering laboratory concrete strength and density test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZ 3112, Pt 2- 4, 1986 available from <http://www.standards.co.nz>.
- Definitions**

Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

- 3 Evidence is required for a minimum of two civil engineering laboratory concrete strength and density tests, which may include but are not limited to – flexural strength tests, density, splitting tensile, compression testing.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory concrete strength and density test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – sampling plan, signatories, recording requirements, proficiencies, equipment checks, calibration.

Outcome 2

Explain the application and reporting of civil engineering laboratory concrete strength and density test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of sample properties.
- Range may include but is not limited to – out of specification results, in specification results, sampling, limitations, reporting.
- 2.2 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory concrete strength and density tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to concrete testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory concrete strength and density tests; and troubleshoot abnormal results and situations for civil engineering laboratory concrete strength and density tests.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZ 3112, Pt 2- 4, 1986 available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory concrete strength and density tests, which may include but are not limited to – flexural strength test, density, splitting tensile, compression testing.
- Evidence for Outcome 2 can be from either an actual work scenario or simulated.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international

standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information. *Problem-solving techniques* may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis. *Troubleshoot* refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory concrete strength and density tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – checking for correctness and completeness, validity, comparison to uncertainty, compliance with specifications and test method.

Outcome 2

Troubleshoot abnormal results and scenarios for civil engineering laboratory concrete hardness tests.

Evidence requirements

2.1 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory field investigation tests		
Level	4	Credits	15

Purpose	<p>This unit standard is one of a series relating to field investigation testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory field investigation test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory field investigation test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>;
New Zealand Geotechnical Society (NZGS), *Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes* (December 2005), available from <http://www.nzgeotechsoc.org.nz/guidelines.cfm>.
- Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents
- Evidence is required for a minimum of five civil engineering laboratory field investigation tests, which may include but are not limited to – Nuclear Density Meter, Benkelman beam, Scala penetrometer, shear vane, cone penetrometer test, static penetrometer test, falling weight deflectometer, lightweight deflectometer, impact soil

tester (clegg), sand circle, British pendulum, National Association of Australian State Road Authority (NAASRA), grip tester, sand replacement, balloon densometer, core cutters, in situ California Bearing Ratio, plate bearing, soil and rock logging.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory field investigation test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.

Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.

- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.

Range may include but is not limited to – temperature, humidity, environment condition of sample, size of sample.

- 1.3 The quality assurance of the test is described in accordance with organisational requirements.

Range may include but is not limited to – sampling plan, test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory field investigation test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.

- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.

Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory field investigation tests		
Level	5	Credits	15

Purpose	<p>This unit standard is one of a series relating to field investigation testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory field investigation test methods; and the application and reporting of civil engineering laboratory field investigation test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>; New Zealand Geotechnical Society (NZGS) *Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes* (December 2005), available from <http://www.nzgeotechsoc.org.nz/guidelines.cfm>.
- Definitions**

Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international

standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information. *Samples* may include but are not limited to – prepared materials and test materials such as standards and reagents.

- 3 Evidence is required for a minimum of five civil engineering laboratory field investigation tests, which may include but are not limited to – Nuclear Density Meter, Benkelman beam, shear vane, Scala penetrometer, soil and rock logging, cone penetrometer test, static penetrometer test, falling weight deflectometer, lightweight deflectometer, impact soil tester (clegg), sand circle, British pendulum, National Association of Australian Road Authority (NAASRA), grip tester, sand replacement, balloon densometer, core cutters, in situ California Bearing Ratio, plate bearing.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory field investigation test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – signatories, recording requirements.

- 1.3 Investigation and compliance testing are compared in terms of result use in accordance with organisational requirements.

Range may include but is not limited to – design, specification, verification.

Outcome 2

Explain the application and reporting of civil engineering laboratory field investigation test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of process implications.

Range may include but is not limited to – out of specification results, in specification results, reporting.

- 2.2 The reporting requirements for test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory field investigation tests		
Level	5	Credits	15

Purpose	<p>This unit standard is one of a series relating to field investigation testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory field investigation tests; and troubleshoot abnormal civil engineering laboratory field investigation test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26665, <i>Perform civil engineering laboratory field investigation tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
NZS 4402.1:1986 *Methods of testing soils for civil engineering purposes - Preliminary and general*, available from <http://www.standards.co.nz>.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

- 3 Evidence is required for a minimum of three civil engineering laboratory field investigation tests, which may include but are not limited to – Nuclear Density Meter, Benkelman beam, shear vane, Scala penetrometer, cone penetrometer test, static penetrometer test, falling weight deflectometer, lightweight deflectometer, impact soil tester (clegg), sand circle, British pendulum, National Association of Australian State Road Authority (NAASRA), grip tester, sand replacement, balloon densometer, core cutters, in situ California Bearing Ratio, plate bearing, soil and rock logging.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory field investigation tests.

Evidence requirements

- 1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory field investigation test scenarios and results.

Evidence requirements

- 2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.
- 2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied, and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory asphalt tests		
Level	4	Credits	15

Purpose	People credited with this unit standard are able to describe: civil engineering laboratory asphalt test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory asphalt test results.
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- 2 Evidence is required for civil engineering laboratory asphalt tests under the following three categories:
A minimum of four tests used in asphalt design including but not limited to -- specific gravity and density, maximum specific gravity, specimen compaction, tensile strength ratio, cantabro, fatigue, wheel tracking, resilient modulus.
A minimum of two tests used in asphalt manufacture; including but not limited to -- binder content, grading, maximum specific gravity, air voids.
A minimum of two tests used in asphalt construction including but not limited to -- pavement density (cores and nuclear density meter), NAASRA (ride), permeability, texture.
- 3 Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory asphalt test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory asphalt test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory asphalt tests		
Level	4	Credits	15

Purpose	<p>This unit standard is one of a series relating to asphalt testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory asphalt tests; and calculate and report results of civil engineering laboratory asphalt tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories* available from <http://www.iso.org/iso/store.htm>.
- 2 Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks, from sample and equipment preparation to the calculation and reporting of results.
Perform does not include the evaluation or the troubleshooting of tests.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.
- 3 Evidence is required for civil engineering laboratory asphalt tests under the following three categories:
A minimum of four tests used in asphalt design including but not limited to -- specific gravity and density, maximum specific gravity, specimen compaction, tensile strength ratio, cantabro, fatigue, wheel tracking, resilient modulus.
A minimum of two tests used in asphalt manufacture including but not limited to -- binder content, grading, maximum specific gravity, air voids.
A minimum of two tests used in asphalt construction including but not limited to -- pavement density (cores and nuclear density meter), NAASRA (ride), permeability, texture.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory asphalt tests.

Evidence requirements

- 1.1 Samples and equipment are prepared in accordance with organisational requirements.
- 1.2 Test is performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory asphalt tests.

Evidence requirements

- 2.1 Results are recorded accurately and calculations performed in accordance with organisational requirements.

Range may include but is not limited to – sample site, sample description.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory asphalt tests		
Level	5	Credits	20

Purpose	<p>This unit standard is one of a series relating to asphalt testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory asphalt test methods; and the application and reporting of civil engineering laboratory asphalt test results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26669, <i>Describe civil engineering laboratory asphalt tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- Evidence is required for civil engineering laboratory asphalt tests under the following three categories:
 A minimum of four tests used in asphalt design including but not limited to -- specific gravity and density, maximum specific gravity, specimen compaction, tensile strength ratio, cantabro, fatigue, wheel tracking, resilient modulus.
 A minimum of two tests used in asphalt manufacture including but not limited to -- binder content, grading, maximum specific gravity, air voids.
 A minimum of two tests used in asphalt construction including but not limited to -- pavement density (cores and nuclear density meter), NAASRA (ride), permeability, texture.
- Definitions
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international

standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information. *Explain* refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory asphalt test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – signatories, recording requirements.

Outcome 2

Explain the application and reporting of civil engineering laboratory asphalt test results.

Evidence requirements

- 2.1 The critical limits of test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, suitability, limitations.
- 2.2 The reporting requirements for test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory asphalt tests		
Level	5	Credits	12

Purpose	<p>This unit standard is one of a series relating to asphalt testing and senior technician knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory asphalt tests; and troubleshoot abnormal civil engineering laboratory asphalt test results and scenarios.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26670, <i>Perform civil engineering laboratory asphalt tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- Evidence is required for civil engineering laboratory asphalt tests under the following three categories:
A minimum of four tests used in asphalt design including but not limited to -- specific gravity and density, maximum specific gravity, specimen compaction tensile strength ratio, cantabro, fatigue, wheel tracking, resilient modulus.
A minimum of two tests used in asphalt manufacture including but not limited to -- binder content, grading, maximum specific gravity, air voids.
A minimum of two tests used in asphalt construction including but not limited to -- pavement density (cores and nuclear density meter), NAASRA (ride), permeability, texture.
- Assessment against this unit standard can either be based on evidence from a workplace context or a simulated scenario.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between

tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory asphalt tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory asphalt test results and scenarios.

Evidence requirements

2.1 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2		N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory bitumen or modified bitumen tests		
Level	4	Credits	15

Purpose	<p>This unit standard is one of a series relating to bitumen testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory bitumen or modified bitumen test methods; and the reporting requirements and meaning and applicability of civil engineering laboratory bitumen or modified bitumen test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- Evidence is required for the following civil engineering laboratory bitumen or modified bitumen tests – penetration, softening point, kinematic viscosity. Evidence is also required for a minimum of two additional civil engineering laboratory bitumen or modified bitumen tests, which may include but are not limited to – dynamic viscosity, solubility, flash point (Cleveland open cup), rolling thin film, rheology (dynamic shear), flexural creep (bending beam rheometer), pressure ageing, ductility.
- Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory bitumen or modified bitumen test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcome of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – sample preparation, temperature, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory bitumen or modified bitumen test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory bitumen or modified bitumen tests		
Level	4	Credits	15

Purpose	<p>This unit standard is one in a series relating to bitumen testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory bitumen or modified bitumen tests; and calculate and report results of civil engineering laboratory bitumen or modified bitumen tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to: ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; TNZ M/1:2007 *Specification For Roading Bitumens*, available from <http://www.nzta.govt.nz/resources/>.
- Evidence is required for the following civil engineering laboratory bitumen or modified bitumen tests – penetration, softening point, kinematic viscosity. Evidence is also required for a minimum of two additional civil engineering laboratory bitumen or modified bitumen tests, which may include but are not limited to – dynamic viscosity, solubility, flash point (Cleveland open cup), rolling thin film, rheology (dynamic shear), flexural creep (bending beam rheometer), pressure ageing, ductility.
- Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results. Perform does not include the evaluation or the troubleshooting of tests.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory bitumen or modified bitumen tests.

Evidence requirements

- 1.1 Samples and equipment are prepared in accordance with organisational requirements.
- 1.2 Test is performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory bitumen or modified bitumen tests.

Evidence requirements

- 2.1 Results are recorded accurately and calculations performed in accordance with organisational requirements.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory bitumen emulsion tests		
Level	4	Credits	10

Purpose	<p>This unit standard is one of a series relating to bitumen testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to describe: civil engineering laboratory bitumen emulsion test methods; and reporting requirements and meaning and applicability of civil engineering laboratory bitumen emulsion test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- 2 Evidence is required for civil engineering laboratory bitumen emulsion tests, which may include but are not limited to – viscosity, sieve, binder content, pH.
- 3 Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods, standard operating procedures, specifications, manuals, and manufacturer's information.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory bitumen emulsion test methods.

Evidence requirements

- 1.1 The test is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory bitumen emulsion test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory bitumen emulsion tests		
Level	4	Credits	12

Purpose	<p>This unit standard is one of a series relating to bitumen testing and technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory bitumen emulsion tests; and calculate and report results of civil engineering laboratory bitumen emulsion tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- 2 Evidence is required for civil engineering laboratory bitumen emulsion tests, which include but are not limited to – viscosity, sieve, binder content.
- 3 Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks, from sample and equipment preparation to the calculation and reporting of results. Perform does not include the evaluation or the troubleshooting of tests.
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory bitumen emulsion tests.

Evidence requirements

- 1.1 Samples and equipment are prepared in accordance with organisational requirements.
- 1.2 Test is performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory bitumen emulsion tests.

Evidence requirements

- 2.1 Results are recorded accurately and calculations performed in accordance with organisational requirements.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory bitumen or modified bitumen tests		
Level	5	Credits	20

Purpose	<p>This unit standard is one of a series relating to bitumen testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory bitumen or modified bitumen test methods; and the application and reporting requirements of civil engineering laboratory bitumen or modified bitumen test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26673, <i>Describe civil engineering laboratory bitumen or modified bitumen tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; TNZ M/1:2007 *Specification For Roading Bitumens*, available from <http://www.nzta.govt.nz/resources/>.
- Evidence is required for the following civil engineering laboratory bitumen or modified bitumen tests – penetration, softening point, kinematic viscosity. Evidence is also required for a minimum of two additional civil engineering laboratory bitumen or modified bitumen tests, which may include but are not limited to – dynamic viscosity, solubility, flash point (Cleveland Open Cup), rolling thin film, rheology (dynamic shear), flexural creep (bending beam rheometer), pressure ageing, ductility.
- Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing

the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory bitumen or modified bitumen test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.

Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration,, environment.

- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.

Range may include but is not limited to – sampling plan, signatories, recording requirements.

- 1.3 Bitumen and modified bitumen testing requirements are contrasted in terms of variations.

Range may include but is not limited to – signatories, client reporting.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory bitumen or modified bitumen test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of material properties.

Range may include but is not limited to – out of specification results, in specification results, reporting.

2.2 The reporting requirements for test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory bitumen or modified bitumen tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to bitumen testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory bitumen or modified bitumen tests; and troubleshoot abnormal civil engineering laboratory bitumen or modified bitumen test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26674, <i>Perform civil engineering laboratory bitumen or modified bitumen tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
 ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
 TNZ M/1:2007 *Specification For Roading Bitumens*, available from <http://www.nzta.govt.nz/resources/>.
- Evidence is required for the following civil engineering laboratory bitumen or modified bitumen tests – penetration, softening point, kinematic viscosity. Evidence is also required for a minimum of two additional civil engineering laboratory bitumen or modified bitumen tests, which may include but are not limited to – dynamic viscosity, solubility, flash point (Cleveland Open Cup), rolling thin film, rheology (dynamic shear), flexural creep (bending beam rheometer), pressure ageing, ductility.
- Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance,

compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory bitumen or modified bitumen tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory bitumen or modified bitumen test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference

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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory bitumen emulsion tests		
Level	5	Credits	8

Purpose	<p>This unit standard is one of a series relating to bitumen testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: civil engineering laboratory bitumen emulsion test methods; and the application and reporting requirements of civil engineering laboratory bitumen emulsion test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26676, <i>Describe civil engineering laboratory bitumen emulsion tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to the: Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- 2 Civil engineering laboratory bitumen emulsion tests include but are not limited to – viscosity, sieve, binder content, pH.
- 3 Definitions
Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project the tests are being completed for. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and

projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain civil engineering laboratory bitumen emulsion test methods.

Evidence requirements

- 1.1 The factors that can influence the outcomes of the test are explained in accordance with scientific principles and organisational requirements.
- Range may include but is not limited to – temperature, equipment, apparatus, material, technique, calibration, environment.
- 1.2 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – sampling plan, signatories, reporting requirements.

Outcome 2

Explain the application and reporting requirements of civil engineering laboratory bitumen emulsion test results.

Evidence requirements

- 2.1 The application of test results is explained in terms of material properties.
- Range may include but is not limited to – out of specification results, in specification results, reporting.
- 2.2 The reporting requirements for test results are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Evaluate and troubleshoot civil engineering laboratory bitumen emulsion tests		
Level	5	Credits	7

Purpose	<p>This unit standard is one of a series relating to bitumen testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: evaluate results of civil engineering laboratory bitumen emulsion tests; and troubleshoot abnormal civil engineering laboratory bitumen emulsion test scenarios and results.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26677, <i>Perform civil engineering laboratory bitumen emulsion tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>.
- 2 Civil engineering laboratory bitumen emulsion tests include but are not limited to – viscosity, sieve, binder content, pH.
- 3 Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Problem-solving techniques may include but are not limited to – cause and effect diagrams, hypothesis testing, appreciative enquiry, process flowchart analysis.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Scenario refers to an actual situation with contributing factors; these factors may include environment, conditions, materials, circumstances, location, relevance, site, context, status, work place.

Troubleshoot refers to identifying problems in test scenarios and results, and to applying a problem-solving technique suitable to the problem in terms of the relevant test method, client processes and project to reach a realistic solution.

Outcomes and evidence requirements

Outcome 1

Evaluate results of civil engineering laboratory bitumen emulsion tests.

Evidence requirements

1.1 Results are evaluated in accordance with organisational requirements.

Range may include but is not limited to – non-conformance, corrective action taken.

Outcome 2

Troubleshoot abnormal civil engineering laboratory bitumen emulsion test scenarios and results.

Evidence requirements

2.1 Abnormal test scenarios are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

2.2 Abnormal test results are troubleshoot to identify the nature of the problem, effective problem solving techniques are applied and a valid solution is reached in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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.

Accreditation and Moderation Action Plan (AMAP) reference	0101
--	------

This AMAP 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, or an inter-institutional body with delegated authority for quality assurance, 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.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain civil engineering laboratory bitumen sprayer tests		
Level	5	Credits	10

Purpose	<p>This unit standard is one of a series relating to bitumen sprayer testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to explain: the civil engineering laboratory bitumen sprayer distribution test method; civil engineering laboratory bitumen sprayer verification test methods; and the application and reporting requirements of civil engineering laboratory bitumen sprayer test results.</p>
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
BCA E/2:97 *Performance of Bitumen Distributors (E/2 Specification)*, available from <http://www.roadingnz.org.nz/>.
- Definitions

Explain refers to describing the components within tests at a specialised technical scientific level and the relationships between them. It may also include describing the interaction between tests in the context of the process or project for which the tests are being completed. Components will vary between tests and may include but are not limited to – the project and/or process specifications, sample specifications, equipment requirements, environmental requirements, sequence of tests, units of measurement, limitations, suitability and uncertainty of measurement for the tests. Explanations demonstrate an understanding of the scientific principles underpinning the test and the implications of test results on downstream client processes and projects. Client processes refer to one or more of the client's quality management, construction and production processes.

Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Explain the civil engineering laboratory bitumen sprayer distribution test method.

Evidence requirements

- 1.1 The test is explained in terms of scope, materials, equipment, processes involved and results.
- 1.2 The factors that influence the outcome of the test are explained in accordance with organisational requirements.
- Range may include but is not limited to – sprayer preparation, location, temperature, environment.
- 1.3 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – test method, signatories.

Outcome 2

Explain the civil engineering laboratory bitumen sprayer verification test methods.

Range temperature gauge verification, speed control verification, dipstick verification.

Evidence requirements

- 2.1 Test is explained in terms of scope, equipment, processes involved and results.
- 2.2 The critical factors of the test are explained in accordance with organisational requirements.
- Range may include but is not limited to – preparation, location, environment.
- 2.3 The variables of the test and the methods employed to minimise variability are explained in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.
- 2.4 The quality assurance of the test is explained in accordance with organisational requirements.
- Range may include but is not limited to – signatories, recording requirements.

Outcome 3

Explain the application and reporting requirements of civil engineering laboratory bitumen sprayer test results.

Range sprayer distribution, temperature gauge verification, speed control verification, dipstick verification.

Evidence requirements

3.1 The application of test results is explained in terms of material properties.

Range may include but is not limited to – out of specification results, in specification results, reporting.

3.2 The critical limits of test results are explained in accordance with organisational requirements.

Range may include but is not limited to – uncertainty of measurement, suitability, limitations.

3.3 The reporting requirements for non-conforming test results are explained in accordance with organisational requirements.

Range may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory bitumen sprayer tests		
Level	5	Credits	15

Purpose	<p>This unit standard is one of a series relating to bitumen sprayer testing and senior technician level knowledge and skills.</p> <p>People credited with this unit standard are able to: perform civil engineering laboratory bitumen sprayer tests; and calculate, interpret and report results of civil engineering laboratory bitumen sprayer tests.</p>
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Recommended skills and knowledge	Unit 26682, <i>Explain civil engineering laboratory bitumen sprayer tests</i> , or demonstrate equivalent knowledge and skills.

Explanatory notes

- Applicable rules, standards, and codes include but are not limited to:
ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>;
BCA E/2:97 *Performance of Bitumen Distributors (E/2 Specification)*, available from <http://www.roadingnz.org.nz/>.
- Evidence is required for the civil engineering laboratory bitumen sprayer distribution test. Evidence is also required for a minimum of two additional civil engineering laboratory bitumen sprayer tests, which may include but are not limited to – temperature gauge verification, speed control verification, dipstick verification.
- Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results.
Perform does not include the evaluation or the troubleshooting of tests.

Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory bitumen sprayer tests.

Evidence requirements

- 1.1 Samples and equipment are prepared in accordance with organisational requirements.
- 1.2 Test is performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory bitumen sprayer tests.

Evidence requirements

- 2.1 Results are recorded accurately and calculations performed in accordance with organisational requirements.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 January 2011	31 December 2016
Review	2	Xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of environmental protection and safety for bituminous surfacing production and construction		
Level	4	Credits	10

Purpose	People credited with this unit standard are, for bituminous surfacing production and application, able to demonstrate knowledge of: environmental protection and safety requirements.
----------------	---

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation, codes of practice, and guidelines apply to this unit standard:
 Hazardous Substances (Disposal) Regulations 2001;
 Hazardous Substances (Identification) Regulations 2001;
 Land Transport Rule: Dangerous Goods 2005 (*Rule 45001/1*);
 Code of Practice for Temporary Traffic Management (CoPTTM), New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/code-temp-traffic-management/index.html>
 RNZ 9904, *The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006*, Roding New Zealand, available for purchase at <http://www.roadingnz.org.nz/>;
 AS 2865:2009 *Confined Spaces* available from Freepost 1573, Standards New Zealand, Private Bag 2439, Wellington 6020, Phone (04) 498-5991;
 The Bitumen Safety Handbook, Roding New Zealand, available for purchase at <http://www.roadingnz.org.nz/>;
 Roding New Zealand Emergency Procedure Guide – Transport Card, Roding New Zealand, available on request at <http://www.roadingnz.org.nz/>;
 Hot Work on Tanks and Drums, Occupational Safety and Health Service, available at <http://www.osh.govt.nz/>;
 Local authority requirements for disposal of hazardous substances;
 Product supplier's handling recommendations;
 Site safety plan for bituminous surfacing site.
- 2 Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
PPE means personal protective equipment.
SDS means Safety Data Sheets as provided by the product manufacturer.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of environmental protection for bituminous surfacing production and application.

Evidence requirements

- 1.1 Materials used in the bituminous surfacing industry are identified and described in terms of their potential impacts on the environment.
- Range materials – hot binder, emulsified binder, kerosene, diesel, chemical additives.
- 1.2 Methods for protecting the environment from runoff are described in accordance with company procedures.
- Range examples of methods – weather watch, planning, covering catchpits and sumps, programming high risk areas for low risk times.
- 1.3 Methods for protecting the environment from noise and air pollution are described in accordance with *RNZ 9904:2006* and company procedures.
- Range environment at bituminous – production plant, surfacing site.
- 1.4 Emergency procedures for runoff and spill incidents involving bituminous materials are explained in accordance with *RNZ 9904:2006* and company procedures.
- Range spillage clean up, waterway protection, containment, notification.
- 1.5 Safe disposal of bituminous surfacing products is described in accordance with local authority requirements and company procedures.
- Range consents, permits, approved sites.

Outcome 2

Demonstrate knowledge of safety requirements for bituminous surfacing production and application.

Evidence requirements

- 2.1 Hazards associated with hot bituminous liquids are described in accordance with *The Bitumen Safety Handbook*.
- Range includes but is not limited to – burns, fire, fumes, explosion, water contamination, spills, impact of cutbacks.
- 2.2 Hazards of bituminous surfacing plant and equipment are described in accordance with *The Bitumen Safety Handbook*.

Range includes but is not limited to – hot surfaces, hoses, hose couplings, blockages, pressure expansion, pumping pressure, steam explosion, ignition source, hydraulics, heating equipment, rotating equipment, height, electricity, air pressure, deficient maintenance.

- 2.3 SDS for bituminous surfacings products are described in accordance with the *RNZ 9004:2006*.

Range purpose, content, supplier's obligation to provide, availability.

- 2.4 Control of bituminous surfacing hazards during production and construction is described in accordance with *The Bitumen Safety Handbook*, *RNZ 9004:2006*, company procedures, and SDS.

Range hazards – steam, fire, hot oil, confined space, working at height, handling chemical additives, mechanical plant, moving plant, hotwork, remote marking;
controls include but are not limited to fire-fighting equipment for production plants and mobile plant, PPE.

- 2.5 Safety precautions for protecting the public from bituminous surfacing operations are described in accordance with *The Bitumen Safety Handbook*, *CoPTTM*, and a site safety plan.

Range operations at – production plant, surfacing site.

- 2.6 Safety precautions for maintaining, heating, blending, pumping, and transferring bituminous products are described in accordance with *The Bitumen Safety Handbook*, *RNZ 9004:2006*, *Hot Work on Tanks and Drums*, company procedures, and SDS.

Range PPE, tanks, pipelines, pumps, valves, confined space entry.

- 2.7 Requirements for placarding and tracking tank contents for bituminous materials are described in accordance with Regulations, and Section 7 of *Rule 45001/1*.

Range materials – emulsion, hot bitumen, cutback bitumen, elevated temperature binders.

- 2.8 Emergency procedures for incidents involving bituminous products are described in accordance with company procedures and/or the *Roading New Zealand Emergency Procedure Guide*.

- 2.9 First aid procedures for bitumen burns are described in accordance with the *Bitumen Burns Card* and *The Bitumen Safety Handbook*.

- 2.10 First aid procedures for inhalation, ingestion, and skin absorption of bituminous products, adhesion agents, and additives are described in accordance with SDS.

Range evidence is required of – at least one bituminous product, diesel, kerosene, one adhesion agent.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of bituminous surfacings and their uses		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of bituminous surfacings and their uses.
----------------	--

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
New Zealand Transport Agency specifications available at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roothing Bitumens;
NZTA M6: Specification for Sealing Chip;
NZTA M6 Notes: Notes on Specification for Sealing Chip;
NZTA M10: Specification for Asphaltic Concrete;
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA M13: Specification for Adhesion Agents;
NZTA M13 Notes: Notes to Specification for Adhesion Agents;
NZTA P3: Specification for First Coat Sealing;
NZTA P4: Specification for Resealing;
NZTA P9: Specification for Construction of Asphaltic Concrete Paving;
NZTA P9P (Auckland): Specification for Construction of Asphaltic Concrete Paving;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA P17: Performance Based Specification for Bituminous Reseals;
NZTA P18P: Pilot Performance Based Specification for Hot Mix Asphalt;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>.
- Competence in this unit standard requires candidates to explain which bituminous surfacings are appropriate for the following uses: primes, membranes, sandwich, first coat, second coat, resurfacing, cracked pavement.
- Definitions
OGPA means open graded porous asphalt.
SMA means stone mastic asphalt.
UTA means ultra thin asphalt.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of bituminous surfacings and their uses.

Evidence requirements

- 1.1 Types of bituminous mixes are defined and where and why they are used is explained in accordance with NZTA specifications.
- Range types – dense graded, SMA, OGPA, UTA, tack coat; binders for these mixes.
- 1.2 Types of chipseals are defined and where and why they are used is explained in accordance with NZTA specifications.
- Range types – membrane seals, first coat, reseal, crack seals, texturising, void fills; binders for these seals.
- 1.3 Types of slurry and micro-surfacings are defined and where and why they are used is explained in accordance with NZTA specifications.
- Range types –slurry types 1 to 4, emulsified, sand, cape seal, micro-surfacing; binders for these products; seal used in cape seal and binder design.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of materials used in bituminous surfacing		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of materials used in bituminous surfacing.
----------------	--

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
NZS 4407:1991 Complete set: Methods of sampling and testing road aggregates, Standards New Zealand, at <http://www.standards.co.nz>;
 New Zealand Transport Agency specifications available at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roading Bitumens;
NZTA M6: Specification for Sealing Chip;
NZTA M6 Notes: Notes on Specification for Sealing Chip;
NZTA M10: Specification for Asphaltic Concrete;
NZTA M/10DP Amendment for use with Drum Mixing Plants
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA M13: Specification for Adhesion Agents;
NZTA M13 Notes: Notes to Specification for Adhesion Agents;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roading New Zealand, RNZ 9803:2013, Roading New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;
RNZ 9805, Quality Assurance of Aggregates for Roads RNZ 9805:2009, Roading New Zealand, available at <http://www.roadingnz.org.nz/sites/dev.roadingnz.org.nz/files/QA%20of%20Aggregate%20for%20Roads.pdf>;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>.
- Definitions
 AGO means automotive gas oil.
 ALD means average least dimension of sealing chip.
 PSV means polished stone value.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of materials used in bituminous surfacing.

Evidence requirements

- 1.1 Materials used in bituminous surfacing are identified and their properties and sources are explained in accordance with *Chipsealing in New Zealand*, *NZTA M1*, and *NZTA M6*.
- Range aggregates, bitumen, binders, cutters and fluxes, additives; aggregate types – sealing chips, crusher dust, filler, fly ash, recycled, sand; aggregate properties – ALD, PSV; binders – cutback, emulsion, polymer modified, latex; binder properties – grades, penetration, viscosity, flash point; cutters and fluxes – kerosene, white spirits, AGO; additives – lime, fibre, adhesion agents, cement.
- 1.2 Materials used in bituminous surfacing are explained in terms of where and why they are used.
- Range aggregate grades, sealing chip grades, bitumen grades, cut back binders, emulsions, polymer modified binders, additives.
- 1.3 Bituminous mix production plants are identified and described in terms of the types of mix they produce and how they produce them.
- Range mix types – asphalt, cold mix, warm mix, slurry, micro surfacing.
- 1.4 Static binder production plants are identified and described in terms of the types of mix they produce.
- Range binders – cut back bitumen, emulsion, polymer modified bitumen, polymer modified bituminous emulsion, latex modified emulsion.
- 1.5 Binders modified in bitumen sprayers are identified and described in terms of how they are produced.
- Range cutting back, dosing with adhesion agents, adding latex.
- 1.6 Sampling and testing requirements for materials used in bituminous surfacings are identified and described in accordance with *NZS4407*, *NZTA M1*, *NZTA M10*, and *NZTA P11*, *RNZ 9803* and *RNZ 9805*.
- Range aggregates, bituminous mixes, binders, additives.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of supply chains and plant and equipment for bituminous binder production		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for bituminous binder production, able to demonstrate knowledge of: supply chains, and plant and equipment.
----------------	--

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following code of practice and manual apply to this unit standard:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roving New Zealand, RNZ 9803:2013, Roving New Zealand, available at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/RNZ9803_0513_Final.pdf; Plant operations manual.
- 2 Definition
AGO means automotive gas oil.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of supply chains for bituminous binder production.

Evidence requirements

- 1.1 Bituminous binders are described in terms of current New Zealand supply chains for key binder ingredients.
Range ingredients – bitumen grades, bitumen blending, kerosene, AGO, emulsion, polymer modification, one additive.
- 1.2 Supply chains for bituminous binder ingredients are described in terms of their storage and delivery systems.
Range Marsden Point Oil Refinery, imported bitumen, port installations.

Outcome 2

Demonstrate knowledge of plant and equipment for bituminous binder production.

Evidence requirements

2.1 Binder production is explained in terms of equipment and each process at a bitumen blending plant.

Range suction heaters, bitumen grades, bitumen blending, fluxing, cutting back, dosing adhesion agent, heating, blending, flow meters, calibration sampling, testing.

2.2 Binder production is explained in terms of equipment and each process at an emulsion plant.

Range continuous or batch production, bitumen grades, modified binders, temperatures, mills, flow meters, heat exchangers, static mixers, latex addition, sampling, testing, calibration.

2.3 Binder production is explained in terms of equipment and process at a polymer plant.

Range blending oils, polymer types, polymer mills, flow meters, weigh tanks, temperatures, cutting back, adhesion agents, sampling, testing, calibration.

2.4 Binder production is explained in terms of equipment and each process at a bituminous mix plant.

Range binder tanks, stirrers, weight feeders, volumetric feeders, flow meters, drying drums, pugmills, mechanical mixing, baghouses, cyclone dust extraction, hot mix, warm mix, cold mix, slurry or micro-surfacing, sampling, testing, calibration.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe quality control for manufacturing bituminous surfacing products		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to describe quality control for manufacturing bituminous surfacing products.
----------------	---

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Rounding New Zealand, RNZ 9803:2013, Rounding New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;
RNZ 9805, Quality Assurance of Aggregates for Roads RNZ 9805:2009, Rounding New Zealand, available at <http://www.roadingnz.org.nz/sites/dev.roadingnz.org.nz/files/QA%20of%20Aggregate%20for%20Roads.pdf>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Rounding Bitumens;
NZTA M6: Specification for Sealing Chip;
NZTA M6 Notes: Notes on Specification for Sealing Chip;
NZTA M10: Specification for Asphaltic Concrete;
NZTA M/10DP Amendment for use with Drum Mixing Plants
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA M13: Specification for Adhesion Agents;
NZTA M13 Notes: Notes to Specification for Adhesion Agents;
NZTA P11: Specification for Open Graded Porous Asphalt.
- Definition
APAS refers to the Asphalt Plant Accreditation Scheme managed by Rounding New Zealand.

Outcomes and evidence requirements

Outcome 1

Describe quality control for manufacturing bituminous surfacing products.

Evidence requirements

- 1.1 Quality control for manufacturing products for bituminous surfacing is described in terms of testing.
- Range frequency, sampling methods, testing methods, statistical process control, calibration.
- 1.2 Quality control for manufacturing products for bituminous surfacing is described in terms of record keeping.
- Range recipes, process improvements, computer backup, production records, material usage, APAS.
- 1.3 Quality control for manufacturing products for bituminous surfacing is described in terms of acceptance standards.
- Range job mix formula targets and tolerances, material property ranges, recipe targets, physical and chemical ranges.
- 1.4 Quality control for manufacturing products for bituminous surfacing is described in terms of identifying and documenting non-conformance and corrective actions.
- Range quality assurance systems, hold points, special processes, process improvement.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain and carry out safety procedures and processes for storage and handling of liquid bituminous products		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to: explain storage and handling processes for liquid bituminous products; explain safety procedures for storing and handling liquid bituminous products; carry out safety checks and operator maintenance of liquid bitumen plant and equipment; and carry out processes for receiving, storage, and handling of liquid bituminous products.
----------------	--

Classification	Infrastructure Works >Core Bituminous Surfacing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of and compliance with the current editions of the following legislation and references:
Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992;
Land Transport Act 1998;
Resource Management Act 1991;
Hazardous Substances (Disposal) Regulations 2001;
RNZ 9904, The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006, Roding New Zealand, available for purchase at <http://www.roadngnz.org.nz/>;
Bitumen Emulsion Users Guide, Roding New Zealand, available at http://www.roadngnz.org.nz/sites/roadngnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;
Polymer manufacturer's guidelines;
Technical data sheets;
Dangerous Goods Folder.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Liquid bituminous products means hot straight bitumen, hot cutback bitumen, hot polymer-modified bitumen, and emulsified bitumen.
PPE means personal protective equipment.
SDS means Safety Data Sheets as provided by the product manufacturer.

Outcomes and evidence requirements

Outcome 1

Explain storage and handling processes for liquid bituminous products.

Evidence requirements

- 1.1 Storage of liquid bituminous products is explained in terms of maintaining product quality.
- Range storage – short term, long term, elevated temperature, extended heating, stirring, heating from cold.
- 1.2 Heating of liquid bituminous products is explained in terms of heating systems and energy conservation.
- Range systems - diesel burner, gas burner, electrical, oil heating, stirring.
- 1.3 Process of blending of liquid bituminous products is explained in accordance with *RNZ 9904:2006*.
- Range blending three of – cutter, flux, adhesion agent, antifoaming agent, latex;
redosing after extended heating, circulation time, stirring, mixing.
- 1.4 Handling of liquid bituminous products is explained in terms of pumping and transferring systems and processes.
- Range handling – circulating, discharging;
processes – preparing to operate equipment, in-line blending, loading out.
- 1.5 Automated process control equipment for loading liquid bitumen is described in terms of how it works, safety checks required before loading, and how to rectify problems.
- Range problems may include but are not limited to – blockages, supply of services, product incompatibility.

Outcome 2

Explain safety procedures for storing and handling liquid bituminous products.

Evidence requirements

- 2.1 Safety procedures for storing, heating, blending, and pumping liquid bituminous products are explained in accordance with *RNZ 9904:2006*, and *Bitumen Emulsion Users Guide*, and SDS.
- Range safety – PPE, tanks, pipelines, pumps, valves;
products – cutback bitumen, emulsion, polymer, latex.

- 2.2 Safety procedures for transferring liquid bituminous products are explained in accordance with *RNZ 9904:2006*, *Bitumen Emulsion Users Guide*, and SDS.
- Range safety – PPE, exclusion zones;
products – hot bitumen, cutback bitumen, polymer modified bitumen, emulsion.
- 2.3 Safety procedures for flushing tanks are explained in accordance with *RNZ 9904:2006*, and *Bitumen Emulsion Users Guide*, and SDS.
- Range safety – PPE, exclusion zones, staff numbers.
- 2.4 Safety procedures for work on tanks and pipes are explained in accordance with *RNZ 9904:2006*.
- Range includes but is not limited to – PPE, tank inspection, tank entry, permit, hot work, cold work.
- 2.5 Emergency procedures in the event of a boil-over, spill, explosion, or fire are explained in accordance with *RNZ 9904:2006*, and *Bitumen Emulsion Users Guide*.

Outcome 3

Carry out safety checks and operator maintenance of liquid bitumen plant and equipment.

Evidence requirements

- 3.1 Safety checks of liquid bitumen plant and equipment are carried out in accordance with legislation, *RNZ 9904:2006*, and plant and equipment manufacturers' instructions.
- Range plant inspection (including tank fittings, lagging, vents, coils)
equipment inspection, and testing, calibration, product testing,
environmental impact testing, recording.
- 3.2 Procedures for dealing with water contamination in bitumen tanks and equipment are carried out in accordance with *RNZ 9904:2006*.
- 3.3 Operator servicing and maintenance of bitumen plant and equipment are carried out in accordance with *RNZ 9904:2006* and plant and equipment manufacturers' instructions.
- Range plant and equipment – tank, valves, bitumen pump, pump controls,
pipes, filters, bitumen heating system;
may include – hydraulic system, air tank, air control system.

Outcome 4

Carry out processes for receiving, storage, and handling of liquid bituminous products.

Evidence requirements

- 4.1 Production schedule is received, interpreted, and followed in accordance with company procedures.
- Range customer communication, confirmation of requirements, timing, temperatures, product.
- 4.2 Compatibility of product in tank and product to be loaded is determined from technical and safety data sheets, product quantities are measured, and recipe is adjusted as required in accordance with company procedures.
- Range loading in, loading out.
- 4.3 Automated process control equipment is started up and any potential problems are identified, and rectified and/or reported in accordance with company procedures.
- 4.4 Equipment feedback information is interpreted to assess product output and quality in accordance with company procedures.
- Range information – flows, temperatures, pump speeds.
- 4.5 Any data changes required to equipment are authorised and adjusted in accordance with company procedures.
- Range may include but is not limited to – production settings, ingredient changes.
- 4.6 Any problems in the automated process are identified, and rectified and/or reported in accordance with company procedures.
- Range problems may include but are not limited to – safety, equipment, non-conforming product.
- 4.7 Product is loaded out and records completed in accordance with *RNZ 9904:2006* and company procedures.
- Range product – hot bitumen, emulsified bitumen;
records technical data sheets, dangerous goods documentation.
- 4.8 Waste materials are disposed of in accordance with company procedures and legislation.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Communicate with relevant parties for producing bituminous materials		
Level	4	Credits	3

Purpose	People credited with this unit standard are able to communicate with relevant parties for producing bituminous materials.
----------------	---

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard must take place in a workplace environment.

Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

Evidence is required of communicating in a variety of ways relevant to the occasion including but not limited to spoken (face to face, telephone) written (email, record/form).

- 2 Definition

Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements that may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Communicate with relevant parties for producing bituminous materials.

Range communication – courteous, relevant, technical, timely.

Evidence requirements

- 1.1 Communication with relevant parties clarifies and obtains information for planning bituminous material production schedules in accordance with company procedures.

Range managers, staff, transport, suppliers, customers, laboratory personnel.

- 1.2 Communication with relevant parties determines customer requirements in accordance with company procedures.

Range technical requirements, specifications, advice about product, guidance on product quantity, reference tables for tonnage.

- 1.3 Communication with suppliers and technical personnel is used to request, order, and purchase supplies in accordance with company procedures.

Range technical requirements, specifications, test reports, product quality.

- 1.4 Communication with relevant parties is used to resolve production issues in accordance with company procedures.

Range examples of relevant parties – staff, technical advisor, customers, suppliers, engineer to contract, road controlling authorities;
examples of issues – non-conforming input, recipe adjustment, follow up with customer;
evidence is required of resolving at least three issues.

- 1.5 Communication with relevant parties is used to resolve product delivery issues in accordance with company procedures.

Range examples of relevant parties – staff, paving manager, customers, suppliers, transport managers;
issues – timing, quantities, product type, coordination of bitumen distributors.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe the purpose and function of plant and equipment used in bituminous surfacing construction		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to describe the purpose and function of plant and equipment used in bituminous surfacing construction.
----------------	---

Classification	Infrastructure Works >Bituminous Surfacing Construction
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Recommended reference material includes:

Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
Plant and equipment manufacturer's manuals.

Outcomes and evidence requirements

Outcome 1

Describe the purpose and function of plant and equipment used in bituminous surfacing construction.

Evidence requirements

1.1 Chipseal construction plant is described in terms of its purpose and function.

Range plant – bulk bitumen tanker, bitumen sprayer/distributor, trucks modified for spreading, self propelled spreaders, pneumatic tyred roller, rubber-coated vibrating drum roller, steel wheeled roller, combination roller; tractor or truck mounted broom, suction sweeper;
sprayer equipment – spray bar, calibration, dipstick binder pressure, speed control, temperature measurement, emergency, control system, hand lance;
chip spreader equipment – width adjustment, calibration.

1.2 Asphalt paving construction plant and equipment are described in terms of their purpose and function.

Range plant – mill, tractor or tuck mounted broom, tack coat sprayer, asphalt paver, grader, truck modified for paving, hot bins, static roller, vibrating roller, pneumatic tyred roller; equipment – paver controls, screeds, screed temperature controls, tamping bar, vibrators, profiler.

1.3 Slurry or micro-surfacing production plant is described in terms of its purpose and function.

Range plant – mobile mixing unit; equipment – bins, injectors, flow meters, filters, pug mill, spreader box, hydraulic spreader box, calibration.

1.4 Plant and equipment common to bituminous surfacing construction are described in terms of their purpose and function.

Range plant – loader, suction sweeper, power broom, drag broom, traffic control vehicles, night work equipment and lighting, traffic cones.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of key components of quality management for a bituminous surfacing site		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of key components of quality management for a bituminous surfacing site.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the following New Zealand Transport Agency specifications available at <http://www.nzta.govt.nz/resources/>:
NZTA P3: Specification for First Coat Sealing;
NZTA P4: Specification for Resealing;
NZTA P9: Specification for Construction of Asphaltic Concrete Paving;
NZTA P9P (Auckland): Specification for Construction of Asphaltic Concrete Paving;
NZTA P17: Performance Based Specification for Bituminous Reseals;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
NZTA P26: Specification for Improvement of Pavement Macrottexture;
NZTA T10: Specification for State Highway Skid Resistance Management.
- A contract quality plan based on any of the following must be complied with:
NZTA TQS1: Quality System for Road Construction, Road Maintenance and Structures Physical Works Contracts having a High QA Level; or
NZTA TQS2: Quality System for Road Construction, Road Maintenance and Structures Physical Works Contracts having a Normal QA Level; or
AS/NZS ISO 9000:2006 Quality management systems – Fundamentals and vocabulary available at Standards New Zealand <http://standards.co.nz/default.htm>;
and
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roading New Zealand, RNZ 9803:2013, Roading New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;
and
RNZ 9805, Quality Assurance of Aggregates for Roads RNZ 9805:2009, Roading New Zealand, available at <http://www.roadingnz.org.nz/sites/dev.roadingnz.org.nz/files/QA%20of%20Aggregate%20for%20Roads.pdf>.

3 Definition

Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of key components of quality management for a bituminous surfacing site.

Evidence requirements

- 1.1 Selection of appropriate plant for each process is explained in accordance with the contract quality plan and company procedures.
- 1.2 Selection and handling of materials to ensure quality construction is explained in accordance with the contract quality plan and company procedures.
- 1.3 Quality requirements for construction processes are identified and explained in accordance with the contract quality plan and company procedures.
- Range includes but is not limited to – work instructions, inspection checklists, quality control plan, witness/hold points, internal audits.
- 1.4 Quality requirements for post construction processes are explained in accordance with the contract quality plan and company procedures.
- Range temporary traffic management, clean up, roadmarking, opening to traffic.
- 1.5 Quality requirements for site meetings and records are explained in accordance with the contract quality plan and company procedures.
- 1.6 Quality management is explained in terms of the impact of weather on bituminous surfacing construction.
- Range two examples of impact of weather.
- 1.7 Managing non-conformance is explained in terms of reporting and recording requirements.
- Range reporting –emergency, non urgent;
recording – site records, non conformance report, corrective actions.

Replacement information	This unit standard replaced unit standard nnnnn. [Only appears if populated.]
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.org.nz if you wish to suggest changes to the content of this unit standard.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of bituminous surfacing product manufacturing plants and their processes		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to: describe in general terms the plants used for manufacturing bituminous surfacing products; and demonstrate technical knowledge of the processes used for manufacturing bituminous surfacing products.
----------------	--

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Recommended reference material includes:

The following New Zealand Transport Agency specifications available at

<http://www.nzta.govt.nz/resources/>:

NZTA M1: Specification for Roding Bitumens;

NZTA M6: Specification for Sealing Chip;

NZTA M6 Notes: Notes on Specification for Sealing Chip;

NZTA M10: Specification for Asphaltic Concrete;

NZTA M/10DP Amendment for use with Drum Mixing Plants;

NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete.

The Asphalt Paving Industry A Global Perspective (Second Edition), European Asphalt Pavement Association (EAPA) and the National Asphalt Pavement Association (NAPA) available at <http://www.eapa.org/userfiles/2/Publications/GL101-2nd-Edition.pdf>.

Outcomes and evidence requirements

Outcome 1

Describe in general terms the plants used for manufacturing bituminous surfacing products.

Range plants – asphalt, cold mix, slurry, emulsion, polymer modified bitumen.

Evidence requirements

- 1.1 Plants used for manufacturing bituminous surfacing products are described in terms of their configuration, systems, and components.

Range configuration – stationary, relocatable, wheeled mobile;

systems – aggregate storage, aggregate feed, dust extraction, binder storage, binder heating, weighing, filler storage, filler injection, mixing, discharging, product storage, control systems; components may include – bins, stockpiles, elevators, hoppers, drums, burners, screens, valves, mills, static in line mixers, feed-gates, scrubbers, filters, weigh scales, flow meters, pumps, weigh feeders, volumetric feeders, pressure gauges, tank level controls, weigh tanks.

- 1.2 Plants used for manufacturing bituminous surfacing products are described in terms of their calibration requirements.

Range calibration of – weigh feeder load cells, moisture content measuring system, bitumen pumping system, temperature measuring systems, data recorders.

Outcome 2

Demonstrate technical knowledge of the processes used for manufacturing bituminous surfacing products.

Evidence requirements

- 2.1 Manufacturing of bituminous surfacing products is explained in terms of processes for ensuring raw materials comply with NZTA and contract requirements.

Range materials – aggregates, binder, mineral filler, binder modifier, adhesion agent, diluent, emulsion, fibre, recycled material; processes – verifying and recording source, assessing moisture content, testing for quality requirements, monitoring production consistency.

- 2.2 Manufacturing of bituminous surfacing products is explained in terms of systems and processes.

Range systems – batch, continuous, control; processes – following recipe, calibrating, weigh feeding, volumetric feeding, flow control, dosing, in-line blending, static mixing, milling.

- 2.3 Mixing processes are explained in terms of capacity, material flow, requirements for adding optional inputs, mix times, and regulating inputs and outputs.

Range drum mixer, pugmill; inputs may include – foamed bitumen, fibre, pigment, energy, aggregate, adhesion agent, bitumen, polymer, blending oil, acid, cement, lime flour, fly ash, emulsifier, automotive gas oil, kerosene, white spirits; outputs include – product, waste, emissions, dockets.

- 2.4 Storage of raw material and manufactured product is explained in terms of systems for aggregates, binders, and mix products, and adjustments required for maintaining product quality.

Range aggregate storage– hot bin, cold bin, stockpile;
binder storage – short term, long term, stirrers, temperature, containers, feeders;
systems include but are not limited to – sampling, testing, recording.

- 2.5 Load out processes are explained in terms of conveying, batching, and truck loading.

Range processes – coordinating despatches, weighing, weighbridge, loader weigh cells, certified flow meter, data monitoring.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.org.nz if you wish to suggest changes to the content of this unit standard.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of production planning for manufacturing bituminous surfacing products		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of production planning for manufacturing bituminous surfacing products
----------------	--

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
NZS 4407:1991 Complete set: Methods of sampling and testing road aggregates, Standards New Zealand, at <http://www.standards.co.nz>;
 New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roading Bitumens;
NZTA M10: Specification for Asphaltic Concrete;
NZTA M/10DP Amendment for use with Drum Mixing Plants;
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA P18P: Pilot Performance Based Specification for Hot Mix Asphalt;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
NZTA T10: Specification for State Highway Skid Resistance Management.
AGPT04B-07 Guide to Pavement Technology Part 4B: Asphalt, available at <https://www.onlinepublications.austroads.com.au/items/AGPT04B-07>;
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roading New Zealand, RNZ 9803:2013, Roading New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;
RNZ 9805, Quality Assurance of Aggregates for Roads RNZ 9805:2009, Roading New Zealand, available at <http://www.roadingnz.org.nz/sites/dev.roadingnz.org.nz/files/QA%20of%20Aggregates%20for%20Roads.pdf>;
 Contract quality plans.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Non routine product requires a new or revised product design to be developed and tested by an accredited laboratory.

Routine product means a product that is used frequently and is tested regularly by an accredited laboratory.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of production planning for manufacturing bituminous surfacing products.

Evidence requirements

- | | |
|-------|---|
| 1.1 | Production programme for bituminous products is explained in terms of matching customer requirements to plant schedules. |
| Range | programming – annual, monthly, weekly, daily. |
| 1.2 | Production planning for routine products is explained in terms of confirming job mix formulae and recipes, checking stock, and ordering materials. |
| Range | two products. |
| 1.3 | Production planning for a non routine mix is explained in terms of amending job mix formulae and recipes, checking stock, and ordering materials. |
| Range | checking stock – measuring stockpiles, dipping tanks, material type, quantity, checking suitability for adapting to match job mix formula requirements. |
| 1.4 | Production planning for bituminous products is explained in terms of ensuring sufficient stock of materials is available on time for manufacturing routine mixes. |
| Range | materials – binders, aggregates, additives, filler, polymer, blending oils, emulsifiers, acid. |
| 1.5 | Production planning for bituminous products is explained in terms of scheduling jobs through the plant to achieve maximum efficiency of resources. |
| Range | rescheduling for impact of -- weather, material delays, plant breakdown, product failure, logistical problems, tanks full of wrong material. |
| 1.6 | Production planning for bituminous products is explained in terms of rescheduling. |
| 1.7 | Testing requirements for bituminous products are described in accordance with NZTA specifications, contract requirements, and company procedures. |
| Range | input materials - binders, aggregates, additives, one other; |

aggregate compliance testing - theoretical maximum specific gravity, moisture content;
binder compliance testing;
process control tests – evidence testing, calibrations, statistical;
evidence is required from at least three contracts.

- 1.8 Testing and quality control are explained in terms of using specifications or test methods that comply with specific contract requirements.

Range selection of specifications and/or tests for – three products, two customers.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain mix design fundamentals for bituminous products		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to explain mix design fundamentals for bituminous products.
----------------	--

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Assessment against this unit standard must be based on the fundamental principles of mix designs in the following references:

IG8 *Asphalt Mix Design*, Australian Asphalt Pavement Association, available at

http://www.aapa.asn.au/index.php?r=pubs_implement;

MS-2 *Mix Design Methods*, Asphalt Institute, available for purchase at,

https://memex.asphaltinstitute.org/webapps/displayGroup.htm?code=AC_MANUAL;

AGPT04B-07 *Guide to Pavement Technology Part 4B: Asphalt*, Austroads available at

<https://www.onlinepublications.austroads.com.au/items/AGPT04B-07>;

New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:

NZTA M10: Specification for Asphaltic Concrete;

NZTA M/10DP Amendment for use with Drum Mixing Plants

NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;

NZTA P11: Specification for Open Graded Porous Asphalt;

NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt.

Outcomes and evidence requirements

Outcome 1

Explain mix design fundamentals for bituminous products.

Evidence requirements

- 1.1 The objectives of mix design are explained in terms of making the best use of available materials to produce a surfacing fit for purpose in line with the contract or specification.

Range design envelope, tolerances, numbers of components, aggregate sources, representative samples, number of cold feed bins, traffic criterion, compaction method, design method, binders source.

- 1.2 The process of mix design is described in terms of developing laboratory samples and comparing with product specifications.

Range proportions, aggregate types, aggregate shapes, binder content/bitumen grades, binder types, binder temperature, additives, source properties, grading curves, air voids, mixing temperatures, contract requirements, performance tests such as wheel tracking.

1.3 Methods of mix design are described in terms their differences and current use.

Range methods – Marshall, AGPT04B-07, NZTA M/10, NZTA P/11.

1.4 A laboratory mix design recipe is interpreted to develop a recipe for a bituminous mix manufacturing plant that will ensure the materials are inputted correctly to achieve product specifications.

Range correct – quality, proportions, quantity, temperature, flow rate, materials.

1.5 Scale up trials are described in terms of why they are needed and what is involved in conducting them.

Range quantity of trial mix made, sampling and testing requirements, plant settings, production rate.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Manufacture surfacing products at a bituminous mix plant		
Level	4	Credits	22

Purpose	People credited with this unit standard are able to: prepare for production at a bituminous mix plant; operate a bituminous mix plant to produce surfacing products; and manage environmental protection and plant maintenance at a bituminous mix plant.
----------------	---

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following codes of practice, standards, and specifications apply to this unit standard and must be complied with:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roothing New Zealand, RNZ 9803:2013, Roothing New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf
NZS 4407:1991 Complete set: Methods of sampling and testing road aggregates, Standards New Zealand, at <http://www.standards.co.nz>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roothing Bitumens;
NZTA M10: Specification for Asphaltic Concrete;
NZTA M/10DP Amendment for use with Drum Mixing Plants
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA P18P: Pilot Performance Based Specification for Hot Mix Asphalt;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
NZTA T10: Specification for State Highway Skid Resistance Management;
AGPT04B-07 Guide to Pavement Technology Part 4B: Asphalt, available at <https://www.onlinepublications.austroads.com.au/items/AGPT04B-07>;
AS 1141.32-1995, Methods for sampling and testing aggregates - Weak particles (including clay lumps, soft and friable particles) in coarse aggregates available at <http://infostore.saiglobal.com/store/details.aspx?ProductID=214452>;
ASTM D6307 - 10 Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method ASTM International, available at <http://www.astm.org/Standards/D6307.htm>;
Contract quality plans.

- 2 Assessment against this unit standard must be based on evidence from working at an asphalt, slurry, or cold mix plant and producing bituminous products that are fit for purpose.

Competence in this unit standard requires compliance with the bituminous mix plant operating manual such as is provided by the manufacturer or company.

3 Definitions

Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Operating manuals refers to the plant operating manual and manuals written for specific components or items of plant and equipment that may be published by the manufacturer or the company.

Outcomes and evidence requirements

Outcome 1

Prepare for production at a bituminous mix plant.

Range production of at least three types of mix or two types of slurry;
mixes – stone mastic asphalt, open graded asphalt, asphaltic concrete;
slurry – rut filling , cape seal.

Evidence requirements

1.1 Customers are communicated with and orders taken in accordance with company procedures.

1.2 Job mix formula is checked for material requirements in accordance with company procedures.

Range binder – type, grade, quantity, temperature;
aggregate;
additive – moisture, source, grading.

1.3 Materials in job mix formula are accessed in accordance with company procedures.

Range check types, quality, and quantities of materials in stock;
adapt materials to match job mix formula requirements, check blend;
order additional materials for blend change.

1.4 Sampling and testing plan is developed to ensure that requirements of *RNZ 9803:2013*, *RNZ 9805:2009*, and contract quality plans are met.

Range contact laboratory for testing plan;
aggregates, binders, finished product;
testing plan must contain technical data sheets, tolerances.

- 1.5 Scheduling of production time and load out is determined in accordance with customer delivery requirements.
- 1.6 Bituminous mix plant and feeders are checked and set up before operation in accordance with operating manuals.
- 1.7 Bituminous mix plant is calibrated to consistently produce a uniform mix within the tolerances specified.
- Range mix temperature, production rate, moisture content, mixing aggregates for consistent moisture; adjustments – air flow, fire, fan, water, emulsion.

Outcome 2

Operate a bituminous mix plant to produce surfacing products.

Range at least three mix types, or three slurry types.

Evidence requirements

- 2.1 A bituminous mix plant is operated in accordance with operating manuals.
- Range startup, hazard identification and control, stock checks, plant checks, feeder checks, calibrations, feeder set up, moisture content; for viscosity-graded asphalt – change on the run; for slurry – stop and restart.
- 2.2 Production process is monitored to ensure mix conforms to specifications, and any required actions to maintain tolerances are taken in accordance with company procedures.
- Range tolerances may include but are not limited to – temperature, moisture content, air flow, fire.
- 2.3 All operations are safely completed and workplace and equipment are cleaned in accordance with operating manuals and company procedures.
- Range operations – inventory, machinery check and maintenance, start up, shut down, load out.
- 2.4 Aggregates are protected from weather, segregation, and contamination, and fine aggregates are mixed for consistent moisture in accordance with company procedures.
- 2.5 Binders and additives are safely handled and stored to avoid product deterioration in accordance with operating manuals and technical data sheets.
- Range examples of deterioration include – polymer agglomeration, emulsion setting, skinning.

- 2.6 Materials and product sampling and testing are carried out and documented in accordance with the sampling and testing plan.

Range aggregate (including moisture content and gradation), binder, finished product.

- 2.7 Bituminous mix product meets target properties specified in contract quality plan.

Range examples of target properties – tolerance, binder content, air voids.

- 2.8 All product documentation is completed in accordance with customer requirements, specifications, and contract quality plans.

- 2.9 Products are despatched in accordance with customer requirements and company procedures.

Outcome 3

Manage environmental protection and plant maintenance at a bituminous mix plant.

Evidence requirements

- 3.1 Consents are accessed to confirm requirements for environmental protection in accordance with company procedures.
- 3.2 Environmental protection is planned and emissions are controlled in accordance with consent requirements and operating manuals.
- Range emissions – noise, dust, odour, fumes, steam, run off; control of – load out, air flow, wet scrubber, vacuum pump, settling ponds.
- 3.3 Scheduled downtime and maintenance programmes are allowed for and monitored in relation to production planning.
- 3.4 Routine maintenance is carried out in accordance with operating manuals and specialist maintenance is reported and documented in accordance with company procedures.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of equipment and processes for manufacturing bituminous binders		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for manufacturing bituminous binders, able to: describe the equipment used and demonstrate technical knowledge of processes.
----------------	---

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Recommended reference material includes:

RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roading New Zealand, RNZ 9803:2013, Roading New Zealand, available at

http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;

Bitumen Emulsion Users Guide, Roading New Zealand, at

http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/Bitumen_Emulsion_Users_Guide-Final.pdf;

Chipsealing in New Zealand, New Zealand Transport Agency, available at

<http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;

AAPA Code of Practice: Manufacture, Storage and Handling of Polymer Modified Binders, Guide to the Manufacture Storage and Handling of Polymer Modified Binders, Australian

Asphalt Pavement Association, available at

http://www.aapa.asn.au/index.php?r=pubs_specs.

Outcomes and evidence requirements

Outcome 1

Describe the equipment used for manufacturing bituminous binders.

Evidence requirements

- 1.1 Equipment used for manufacturing bituminous binders and its components are described in terms of their purpose and function.

Range	equipment -- storage tanks, mixers ,filters, mills, pumps, heating systems, process control systems, chemical handling systems, workspace environmental control equipment, energy control systems, weighing, calibrating, packaging. components - tank level controls, valve controls, pump controls, flow meter.
-------	--

- 1.3 Equipment used for manufacturing bituminous binders is described in terms of its calibration requirements.

Range calibration of – weigh feeder load cells, bitumen pumping system, flow meters, mass flow meters, pressure sensors, tank level indicators, temperature measuring systems, data recorders.

Outcome 2

Demonstrate technical knowledge of processes for manufacturing bituminous binders.

Evidence requirements

- 2.1 Delivery processes for materials are explained in terms of meeting contract requirements.

Range materials – hot bitumen, cut back bitumen, polymer, emulsion; processes – verifying and recording source, spot testing.

- 2.2 Storage processes for materials are explained in terms of standard systems and adjustments required for maintaining product quality.

Range storage – temperature, heat stability, short term, long term; materials – hot bitumen, diluents, additives, adhesion agents, latex, blending oils, kerosene, automotive gas oil, LAW /low acid?; standard systems include but are not limited to – sampling, testing, stirring, recording.

- 2.3 Pumping processes are explained in terms of their controls.

Range controls -- flow rate, temperature, variable speed drive, flow control, mass flow meter, flow meters, tank level controls.

- 2.4 Milling processes are explained in terms of formulation and technology.

Range formulation – grade of bitumen, type of polymer, blending oils, latex, addition of diluents, emulsifier type and quantity, percentage of binder, additional additives, soap manufacture, pH testing, pH in line, heat exchangers; technology – grinding, homogenization, multilevel shearing, stirring, in line recycling.

- 2.5 Blending processes are explained in terms of chemical reactions and proportions of ingredients to achieve product requirements.

Range blending – soap manufacture, reaction temperatures, latex addition, cutter, flux, adhesion agent, blending oil, polymer. processes – calibrating, weigh feeding, volumetric dosing, monitoring production consistency, testing.

2.6 Blending processes are explained in terms of adding optional inputs and boiling in line.

Range blending – calculations, capacity, material flow, mix times, back pressure, regulating inputs and outputs, waste;
inputs – cutter, flux, adhesion agent, polymer, energy;
boiling in line – before mill, after mill.

2.7 Load out processes are explained in terms of pumping, conveying, batching, and truck loading.

Range processes – coordinating despatches, weighing, data monitoring.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of production planning for manufacturing bituminous binders		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to demonstrate knowledge of production planning for manufacturing bituminous binders.
----------------	--

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roving New Zealand, RNZ 9803:2013, Roving New Zealand, available at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/RNZ9803_0513_Final.pdf;
 New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roving Bitumens;
NZTA M13: Specification for Adhesion Agents;
NZTA M13 Notes: Notes to Specification for Adhesion Agents;
NZTA Q1: Specification for Quality Assurance for Chipsealing;
Bitumen Emulsion Users Guide, Roving New Zealand, available at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
AAPA Code of Practice: Manufacture, Storage and Handling of Polymer Modified Binders, *Guide to the Manufacture Storage and Handling of Polymer Modified Binders*, Australian Asphalt Pavement Association, available at http://www.aapa.asn.au/index.php?r=pubs_specs;
 Contract quality plans.
- Definition
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of production planning for manufacturing bituminous binders.

Evidence requirements

- 1.1 Production programme for bituminous binders is explained in terms of anticipating customer requirements and ordering bulk supplies of materials.
- Range programming – annual, monthly, daily;
materials – bitumen grades, adhesion agents, emulsifiers, latex, blending oils, chemicals, polymers.
- 1.2 Production planning for manufacturing bituminous binders is explained in terms of obtaining job mix formulae, ensuring sufficient stock of materials is available on time for manufacturing mixes, and obtaining amended job mix formula for new blend using existing stock.
- Range binders – cut back, fluxed, emulsified, polymer modified;
materials – bitumen grades, cutters, fluxes, adhesion agents, emulsifiers, chemicals, latex blending oils, polymers;
stock – check existing for suitability and quantity, order in;
formula for – different grade of bitumen, binder with adhesion agent, redosing adhesion agent or diluent, remilling, diluting PMB, blending bitumen grade.
- 1.3 Production planning for bituminous binders is explained in terms of scheduling jobs through the plant to achieve maximum efficiency of resources while meeting customer requirements for delivery times.
- 1.4 Production planning for bituminous binders is explained in terms of rescheduling.
- Range rescheduling for impact of – weather, material delays, plant breakdown, product failure.
- 1.5 Sampling and testing requirements for bituminous binders are described in accordance with NZTA specifications, contract requirements, and company procedures.
- Range input materials – bitumen grades, cutter, flux, adhesion agent, emulsion, polymer, modified bitumen, cutback bitumen;
process control tests – evidence testing, calibrations, viscosity, temperature, pressure pH, flow rate, tank ullages.
- 1.6 Testing and quality control are explained in terms of selecting specifications or test methods that comply with specific contract requirements.
- Range selection of tests for – three products, two customers.
- 1.7 Production planning for bituminous binders is explained in terms scheduled downtime and planning for maintenance.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain the design fundamentals of bituminous binders		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to explain the design fundamentals of bituminous binders.
----------------	--

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

Recommended reference material includes:

RNZ 9803, *Quality Assurance for Bituminous Binders: A Code of Practice developed by Rounding New Zealand*, RNZ 9803:2013, Rounding New Zealand, available at

http://www.roadngnz.org.nz/sites/roadngnz.org.nz/files/RNZ9803_0513_Final.pdf;

NZTA M1: *Specification for Rounding Bitumens*; New Zealand Transport Agency at

<http://www.nzta.govt.nz/resources/>;

Bitumen Emulsion Users Guide, Rounding New Zealand, available at

http://www.roadngnz.org.nz/sites/roadngnz.org.nz/files/Bitumen_Emulsion_Users_Guide-Final.pdf;

Chipsealing in New Zealand, New Zealand Transport Agency, available at

<http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;

Guide to the Manufacture Storage and Handling of Polymer Modified Binders, (AAPA Code of Practice) June 2004, Australian Asphalt Pavement Association, available at

http://www.aapa.asn.au/index.php?r=pubs_specs.

Outcomes and evidence requirements

Outcome 1

Explain the design fundamentals of bituminous binders.

Evidence requirements

- 1.1 The design of binders is explained in terms of developing binders that meet technical specifications for the finished surfacing and site requirements.

Range technical specifications – viscosity, temperature, break rate;
site requirements – viscosity, cutback level, season.

- 1.2 Binder recipes are explained in terms of factors that affect the physical and rheological properties of the binder, the reasons for using additives, and the impacts of those additives on binder storage and handling requirements.

Range factors – chemistry, cutback, fluxing, pH, binder content, polymer type and level, blending oil, break rate, cure rate, application rate, seal type;
properties – penetration, viscosity, solubility, durability, hardening, emulsification, adhesion, wetting ability;
additives – cutter, flux, solvent, adhesion agent, anti foaming agent, emulsion, polymer, latex.

1.3 Binder recipes are developed that will ensure the raw materials are fed into a bituminous binder plant correctly to achieve product specifications.

Range binders – emulsion, polymer, polymer modified emulsion, cutback bitumen, latex modified emulsion;
the following additives are to be included in any of the recipes – flux, adhesion agent, anti foaming agent;
correct – quality, bitumen grade, quantity, proportions, temperature, flow rate.

1.4 The design of binders is explained in terms of taking into account affects of application on the quality of the seal.

Range affects of – application rate, timing, sequence, process, temperature, viscosity, chemical reactions, seasonal use, evaporation rate, curing, breaking, cooling, wetting, adhesion.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Produce binders at a bituminous binder plant		
Level	4	Credits	22

Purpose	People credited with this unit standard are, at a bituminous binder plant, able to: prepare for production of binders; produce binders for pavement surfacing; and manage environmental protection and plant maintenance.
----------------	---

Classification	Infrastructure Works > Bituminous Product Manufacturing
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following codes of practice, standards, and specifications apply to this unit standard and must be complied with
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roving New Zealand, RNZ 9803:2013, Roving New Zealand, available at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/RNZ9803_0513_Final.pdf;
Bitumen Emulsion Users Guide, Roving New Zealand, at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;
NZTA M1: Specification for Roving Bitumens; New Zealand Transport Agency at <http://www.nzta.govt.nz/resources/>;
Contract quality plans.
- Assessment against this unit standard must be based on evidence from working at a bituminous binder plant.

Competence in this unit standard requires compliance with the bituminous binder plant operating manual such as is provided by the manufacturer or company.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Operating manuals refers to the plant operating manual and manuals written for specific components or items of plant and equipment that may be published by the manufacturer or the company.

Outcomes and evidence requirements

Outcome 1

Prepare for production of binders at a bituminous binder plant.

Range one each of – hot bitumen, cut back binder, emulsified binder, polymer modified binder.

Evidence requirements

1.1 Company technical data sheets are checked for material requirements in accordance with company procedures.

Range materials – bitumen grade, additives, targets, tolerances.

1.2 Materials to match binder recipe are purchased in accordance with company procedures.

Range check recipe, check types of binder, quality, and quantities of materials in stock;
order additional materials.

1.3 Sampling and testing plan is developed to ensure that requirements of *RNZ 9803:2013* and contract quality plans will be met.

Range requirements for – binder, finished product.

1.4 Scheduling of production time and load out is determined in accordance with customer delivery requirements.

1.5 A piece of manufacturing plant is calibrated to consistently produce a uniform binder within the tolerances specified.

Range a flow meter is an example of piece of plant to be calibrated.

Outcome 2

Produce binders for pavement surfacing at a bituminous binder plant.

Range one each of – hot bitumen, cut back, emulsion, polymer modified.

Evidence requirements

2.1 Bituminous binder plant is operated in accordance with operating manuals.

2.2 Production process is monitored to ensure binder conforms to specifications, and any required actions to maintain tolerances are taken and recorded in accordance with company procedures.

Range tolerances may include but are not limited to – temperature, pressures, flow rates, production rate, pH, proportions.

2.3 All operations are safely completed and workplace and equipment are cleaned in accordance with operating manuals and company procedures.

Range operations – inventory, start up, shut down, load out.

- 2.4 Binders are handled and stored to avoid product deterioration in accordance with operating manuals and technical data sheets.
- Range stirring, heating;
examples of deterioration – polymer agglomeration, emulsion settlement.
- 2.5 Materials and product sampling and testing are carried out and documented in accordance with the sampling and testing plan.
- Range base bitumen, emulsion, polymer, finished binder.
- 2.6 Binder product meets target properties specified in contract quality plan.
- Range evidence is required of – understanding test results, conformance, non-conformance, corrective action.
- 2.7 All binder documentation is completed in accordance with customer requirements, specifications, contract quality plans, and company procedures.
- 2.8 Binder is loaded in accordance with operating manual and company procedures and documentation completed in accordance with legislation.
- Range tank space and contents must be checked prior to load out.

Outcome 3

Manage environmental protection and plant maintenance at a bituminous binder plant.

Evidence requirements

- 3.1 Consents for the plant are accessed to confirm requirements for environmental protection in accordance with company procedures.
- 3.2 Environmental protection is planned and emissions are controlled in accordance with consent requirements and operating manuals.
- Range emissions – noise, dust, odour, fumes, steam, run off.
- 3.3 Scheduled downtime and maintenance programmes are allowed for and monitored in relation to production planning.
- 3.4 Routine maintenance is carried out in accordance with operating manuals and specialist maintenance is reported and documented in accordance with company procedures.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of bitumen distributor equipment and blending, and the application of bituminous binders		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to: describe bitumen distributor equipment; demonstrate knowledge of blending binders using a bitumen distributor; and demonstrate knowledge of bituminous binder application processes.
----------------	---

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Recommended reference material includes:
Hazardous Substances and New Organisms Act 1996;
Land Transport Act 1998;
Land Transport Rule: Dangerous Goods 2005 (Rule 45001/1) amendment 2010, 45001/2, and amendment 2011 45001/3;
The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006, Roding New Zealand, available for purchase at <http://www.rodingnz.org.nz/>;
Bitumen Burns Card, Roding New Zealand, at http://www.rodingnz.org.nz/sites/rodingnz.org.nz/files/Burns_card_04-04-2011.pdf;
The Bitumen Safety Handbook, Roding New Zealand, available for purchase at <http://www.rodingnz.org.nz/>;
BCA Emergency Procedure Guide – Transport Card, Roding New Zealand, available on request at <http://www.rodingnz.org.nz/>;
BCA E/2:97 Performance of Bitumen Distributors, Roding New Zealand, available on request at <http://www.rodingnz.org.nz/>;
Bitumen Emulsion Users Guide, Roding New Zealand, at http://www.rodingnz.org.nz/sites/rodingnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resource.s/chipsealing-new-zealand-manual/>;
Bitumen distributor QA manual.
- Definition
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Outcomes and evidence requirements

Outcome 1

Describe bitumen distributor equipment.

Evidence requirements

- 1.1 Bitumen distributor product heating systems are described in terms of their function and controls.
- Range systems– electrical heating, flame tube burners, heat control, level control, backup controller;
controls – exhaust, gauges, data recorders, tanker position, level of binder in tank, thermostatic , automatic, flame out protection.
- 1.2 Bitumen distributor pumping and circulating equipment is described in terms of it function and controls.
- Range equipment – pumps, valves, filters, tachometer, governor, strainer;
controls include but are not limited to – overflow, rollover tank lid.
- 1.3 Bitumen distributor transporting and safety equipment are described in terms of their function.
- Range transporting, – truck, trailer, tank;
safety – control systems, baffles, dipstick, vents, fire extinguisher, water extinguisher, documentation, hand rails, walkways, rollover protection.
- 1.4 Bitumen distributor spraying equipment is described in terms of its function, controls, and how to clear blockages.
- Range equipment – gangbar, handlance, maintenance sprayer, telescopic bar, variable application system;
controls – pressure, speed;
blockage in – jets, filters.

Outcome 2

Demonstrate knowledge of blending binders using a bitumen distributor.

Evidence requirements

- 2.1 Bitumen distributors are described in terms of their blending equipment and its controls.
- Range earth connection, filter, suction system.
- 2.2 Processes for blending binder products in a distributor are described in accordance with distributor QA manual and technical data sheets.
- Range products – cutter, flux, solid adhesion agent, liquid adhesion agent, latex, soap;

circulation times to mix, proportions, measuring additives,
measuring drum ullages.

- 2.3 Blending is explained in terms of calculating quantities for producing cutback binder.
- 2.4 Blending binders in a distributor is explained in terms of requirements for boiling out water, changing products, and dissolving skins.
- Range changes – from emulsion to hot bitumen, from hot bitumen to emulsion;
skins – in tank, on emulsion.

Outcome 3

Demonstrate knowledge of bituminous binder application processes.

Evidence requirements

- 3.1 Process of loading distributor with binder is described in accordance with Chapter 6 in *RNZ 9904:2006* and *BCA E/2:97*.
- 3.2 Transporting of binders is explained in terms of maintaining product quality.
- Range binders – cutback, emulsified, polymer modified;
parameters for heating, effects of incorrect heating, circulating.
- 3.3 Transporting of binder is explained in terms of meeting legal requirements of *BCA E/2:97*, and Rule 45001/1.
- 3.4 Transferring of binder is explained in accordance with *RNZ 9904:2006*.
- 3.5 Binder pumping and circulating systems A, B, and C are described in accordance with *BCA E/2:97* and their functions are described in accordance with Chapter 10 *Chipsealing in New Zealand*.
- 3.6 Spraying binder on pavement surfaces is described in terms of interpreting a spray sheet and setting up a sprayer for a spray run.
- Range nozzle height, nozzle angle, fan shape, distributor speed, selecting transmission gear.
- 3.7 Spraying binder on pavement surfaces is described in terms of spray coverage and application rates and how they are achieved.
- Range coverage – nozzle type and size, nozzle flow rate, overlapping joints, outer edges.
- 3.8 Procedures for dealing with emergencies during binder application processes are explained in accordance with *RNZ 9904:2006* and company procedures.
- Range emergencies – explosion, fire, bitumen spill, equipment failure.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of planning for blending and applying bituminous binders with a bitumen distributor		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of planning for: blending binders in a bitumen distributor, and applying bituminous binders.
----------------	--

Classification	Infrastructure Works > Core Bituminous Surfacing
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roving New Zealand, RNZ 9803:2013, Roving New Zealand, available at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/RNZ9803_0513_Final.pdf;
 New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roving Bitumens;
NZTA M13: Specification for Adhesion Agents;
NZTA M13 Notes: Notes to Specification for Adhesion Agents;
NZTA Q1: Specification for Quality Assurance for Chipsealing;
Bitumen Emulsion Users Guide, Roving New Zealand, at http://www.rovingnz.org.nz/sites/rovingnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
Guide to the Manufacture, Storage and Handling of Polymer Modified Binders (AAPA Code of Practice), June 2004, Australian Asphalt Pavement Association, available at http://www.aapa.asn.au/index.php?r=pubs_specs.
- Definition
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of planning for blending binders in a bitumen distributor.

Evidence requirements

- 1.1 Planning for blending in a bitumen distributor is explained in terms of determining requirements for the blend through communication with relevant parties.
- Range requirements – recipe, technical data, input qualities, quantities required for heating and distribution, delivery times, sealing chip source.
- 1.2 Planning for blending in a bitumen distributor is explained in terms of checking stocks and ordering supplies of materials to ensure that sufficient stock of materials is available on time and on site for blending the required quantity of binder.
- Range planning – weekly, daily;
materials – bitumen grades, cutter, flux, additive, adhesion agent.
- 1.3 Planning for blending bituminous binders is explained in terms of selecting a safe site for operations.
- 1.4 Planning for blending is explained in terms of determining suitability of using tank contents to manufacture a blend for which the formula uses a different grade of bitumen and obtaining an amended blend formula.
- Range calculating what is in tank and what needs to be added to make the new brew.
- 1.5 Sampling and testing requirements for bituminous binders are described in accordance with NZTA specifications, contract requirements, and company procedures.
- Range sampling – bitumen grades, cutter, flux, additive, adhesion agent;
process control tests – evidence testing, calibrations, viscosity, temperature, volumes, weights, tolerances.

Outcome 2

Demonstrate knowledge of planning for applying bituminous binders.

Evidence requirements

- 2.1 Planning for applying bituminous binders is explained in terms of application rates, binder temperatures, and volumes of binder required for seal designs.
- Range three seal designs.
- 2.2 Bituminous binder application is explained in terms of planning runs and minimising downtime.
- Range run patterns, applications rates for each run, coordination with chip trucks;

planning for at least three sites.

- 2.3 Planning for bituminous binder application is explained in terms of inventory controls to maintain quantities for a sealing site.

Range quantities for – heating, distribution.

- 2.4 Planning for bituminous binder application is explained in terms of rescheduling.

Range rescheduling for impact of – weather, material delays, plant breakdown, product failure.

- 2.5 Planning for bituminous binder application is described in terms of scheduling samples and tests to meet contract quality requirements.

Range sampling and testing plans for at least two contracts.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of binder spraying fundamentals		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to demonstrate knowledge of binder spraying fundamentals.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Recommended reference material includes:
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>.
- 2 Definition
OGPA means open graded porous asphalt.
PMB means polymer modified binder.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of binder spraying fundamentals.

Evidence requirements

- 1.1 Spraying is described in terms of how binders respond to different types of surface.

Range granular base, stabilised base, chip seal, asphalt, slurry, cold mix, gap graded asphalts, OGPA, concrete.
- 1.2 Spraying is described in terms of binder qualities for different seal treatments.

Range seal treatments – first coat, second coat, reseal, membrane, tack coat.
- 1.3 Spraying is described in terms of binder qualities for different seal types.

Range single, two coat, racked in, sandwich, void, texturising, enrichment, rejuvenation.

1.4 Binder spraying is described in terms of effects of factors on residual application rates.

Range factors – seal design, road layout, gradient, shade, traffic, size of chip, texture of existing surface, litres of bitumen @15°C, adjustment to application rate for PMB.

1.5 Hot application rates are described in terms of adjusting properties of binder to achieve residual application requirements.

Range properties – binder content, diluent content including adhesion agent, parts per hundred, expansion factors; evidence is required of application rates for – emulsion, cutback, PMB.

1.6 Binder spraying is explained in terms of selecting appropriate binders for different seal types and matching them with the surface and its required treatment.

Range examples of seal types – single, two coat, racked in, sandwich, void, texturising, enrichment, rejuvenation; surfaces – granular base, stabilised base, chip seal, asphalt, slurry, cold mix, gap graded asphalts, OGPA, concrete; seal treatments – first coat, second coat, reseal, membrane, tack coat; appropriate binders must be selected for each surface, and for each seal treatment, and for at least six seal types in any combination.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a bitumen distributor for blending and applying bituminous binders		
Level	4	Credits	22

Purpose	People credited with this unit standard are able to: plan and prepare for application of bituminous binders; inspect and maintain bitumen distributor equipment; apply bituminous binders to pavement surfaces; and prepare for and carry out transfer and blending operations using a bitumen distributor.
----------------	---

*

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following legislation, codes of practice, guidelines, and specifications apply to this unit standard and must be complied with
 Hazardous Substances and New Organisms Act 1996;
 Health and Safety in Employment Act 1992;
 Land Transport Act 1998;
 Resource Management Act 1991;
 Traffic Regulations 1976;
 Land Transport Rule: Dangerous Goods 2005 (Rule 45001/1) amendment 2010, 45001/2, and amendment 2011 45001/3
 NZS 5433:2007 *Transport of Dangerous Goods on Land*, Standards New Zealand at <http://www.standards.co.nz>;
The Official New Zealand Truck Loading Code: Code of Practice for the Safety of Loads on Heavy Vehicles, 2010, New Zealand Transport Authority, available at <http://www.nzta.govt.nz/resources/>;
The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006, Roding New Zealand, available for purchase at <http://www.roadingnz.org.nz/>;
Bitumen Burns Card, Roding New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/Burns_card_04-04-2011.pdf
The Bitumen Safety Handbook, Roding New Zealand, available for purchase at <http://www.roadingnz.org.nz/>;
BCA Emergency Procedure Guide – Transport Card, Roding New Zealand, available on request at <http://www.roadingnz.org.nz/>;
 RNZ E/2:97 *Performance of Bitumen Distributors*, Roding New Zealand, available on request at <http://www.roadingnz.org.nz/>;
 RNZ 9803, *Quality Assurance for Bituminous Binders: A Code of Practice developed by Roding New Zealand*, RNZ 9803:2013, Roding New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ9803_0513_Final.pdf;

Bitumen Emulsion Users Guide, Roothing New Zealand, available at http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/Bitumen_Emulsion_Users_Guide--Final.pdf;

Best practice guidelines for working at height in New Zealand, April 2012, Ministry of Business, Innovation and Employment available at

<http://www.business.govt.nz/healthandsafetygroup/information-guidance/all-guidance-items/best-practice-guidelines-for-working-at-height-in-new-zealand/working-height.pdf>;

NZTA M1: Specification for Roothing Bitumens, New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>;

Bitumen distributor QA manual;

Contract quality plans.

- 2 Assessment against this unit standard must be based on evidence from working with a bitumen distributor of Type A, B, or C as designated by *RNZ E/2:97*.

Competence in this unit standard requires compliance with the bitumen distributor QA manual as provided by the manufacturer or company.

Evidence is required of handling and spraying hot bitumen, emulsion, and PMB binders.

- 3 Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
PMB means polymer modified bitumen.

Outcomes and evidence requirements

Outcome 1

Plan and prepare for applications of bituminous binders.

Evidence requirements

- 1.1 Planning for application of bituminous binder and deployment of resources is carried out in accordance with company procedures.

Range	location, limits, start and finish, binder type and quantity, communication with relevant parties; binder temperature, application rates, run pattern, change on run.
-------	---
- 1.2 Sampling, testing, and quality control to comply with specific contract requirements are planned in accordance company procedures.

Range	samples and quality documentation are prepared for at least two contracts.
-------	--
- 1.3 Following disruption to plan, binder application operations are rescheduled in accordance with company procedures.

Range disruption caused by at least one of – weather, material delays, plant breakdown, surfacing fault; rescheduling must take account of – plugging in, storage temperature, redosing of adhesion agent and/or kerosene.

1.4 Protection of worksite and public from overspray is arranged or confirmed in accordance with company procedures.

1.5 Compatibility of residual binder in tank and binder to be loaded are determined from documentation and/or simple test and/or checking with supplier.

1.6 Binder is loaded in accordance with distributor QA manual and company procedures and documentation completed in accordance with legislation.

Range loaded – at plant, at work site in exclusion zone with signage.

1.7 Binder is transported to work site in accordance with legislation and company procedures.

Range binder temperature and viscosity are monitored to maintain quality required for delivery and application.

Outcome 2

Inspect and maintain bitumen distributor and equipment.

Evidence requirements

2.1 Mandatory bitumen distributor Certificate of Compliance with *RNZ/E2* is sighted and spray application rate chart is confirmed as being current.

2.2 Bitumen distributor is inspected for routine maintenance and this is carried out in accordance with distributor QA manual and recorded in accordance with company procedures.

Range inspection must take place in an exclusion zone and where relevant take account of – confined space, working at height; routine maintenance excludes – hotwork, work inside tank.

2.3 Hoses and couplings are inspected for current certification and for wear and tear, and are replaced if necessary, in accordance with company procedures.

2.4 Tank, equipment, and additive containers are inspected for water contamination and procedures for dealing with this are followed in accordance with *RNZ 9904:2006*.

2.5 Prestart safety check is carried out in accordance with distributor QA manual company procedures and *The Bitumen Safety Handbook*.

Range safety equipment, cleanliness, leaks, fuel, oil, grease, water, engine controls and gauges, equipment controls and instruments.

- 2.6 Spray bar is inspected prior to use in accordance with Chapters 5 and 6 of the *Roading NZ Code of Practice BCA 9904:2006* and distributor QA manual.

Range includes but is not limited to – circulating bar, check for leaks after warmed up.

Outcome 3

Apply bituminous binders to pavement surfaces.

Range first coat, reseal, two coat, racked-in, sandwich, rejuvenation.

Evidence requirements

- 3.1 Pumping and spraying equipment is calibrated to meet contract specification in accordance with spray chart and *RNZ/E2*.

Range provision is made to correct spring deflection and truck body roll.

- 3.2 Binder temperature and volume are measured and recorded in accordance with contract specifications and company procedures.

- 3.3 Timing of spray runs and reloading of binder are coordinated with delivery of chip to optimise resource use in accordance with company procedures.

Range evidence is required of communication with chip trucks and binder plant or tanker.

- 3.4 Binder application rates are calculated, and recorded in accordance with company procedures.

- 3.5 Binder is applied in accordance with bitumen distributor QA manual to meet requirements of contract quality plan.

Range setting and adjusting during spraying – application rate, spray width (number of nozzles), spray bar lateral position relative to the truck;

- 3.6 Hand lance is set up in accordance with operating manual, and used to apply binder evenly to meet target application rate.

- 3.7 Spray starts, finishes, and joints meet parameters in accordance with company procedures.

- 3.8 When operations are safely completed, site and equipment are cleaned in accordance with company procedures and environmental safety requirements.

Outcome 4

Prepare for and carry out transfer and blending operations using a bitumen distributor.

Evidence requirements

- 4.1 Transfer and blending sites are selected in accordance with *RNZ 9904:2006*.
- 4.2 Compatibility of residual binder in tank and binder to be loaded are determined from documentation, and confirmed by a simple mixing test in accordance with company procedures.
- 4.3 Transfer of binder is carried out in accordance with Chapter 6 in *RNZ 9904:2006*, *BCA E/2*, and distributor QA manual.
- Range transfer – from distributor, to distributor, to or from static tank; unauthorised persons are clear of the designated transfer area.
- 4.4 Blending of binders is carried out in accordance with distributor QA manual and *RNZ 9904:2006* and recorded in accordance with legislation and company procedures.
- Range hot bitumen, emulsion, PMB, kerosene, AGO, adhesion agent, latex.
- 4.5 When operations are safely completed, site and equipment are cleaned in accordance with company procedures and environmental safety requirements.
- Range evidence is required of purging distributor transfer equipment of – emulsion before hot binder, hot binder before emulsion, changing from any one other product to any one other product.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of chipseal design fundamentals and treatment selection for chipseals		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to demonstrate knowledge of: chipseal design fundamentals, and treatment selection for chipseals.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
 New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA P3: Specification for First Coat Sealing;
NZTA P3 Notes: Notes for First Coat Sealing;
NZTA P4: Specification for Resealing;
NZTA P4 Notes: Notes for Resealing;
NZTA P17: Performance Based Specification for Bituminous Reseals;
NZTA P17 Notes: Notes for the Specification for Bituminous Reseals;
NZTA T3: Specification for standard test procedure for measurement of texture by the sand circle method;
NZTA T10: Specification for State Highway Skid Resistance Management;
NZTA T10 Notes: Notes to the Specification for State Highway Skid Resistance Management.
- Definition
ELV means equivalent light vehicles.
HCV means heavy traffic vehicles.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of chipseal design fundamentals.

Evidence requirements

- 1.1 The measurement and effect of texture on chipseal design is described in accordance with Chapter 9 in *Chipsealing New Zealand*.

Range measurement – sand circles and their location, laser, void bitumen.

- 1.2 The effect of traffic on chipseal design is described in accordance with Chapter 9 in *Chipsealing New Zealand*.

Range traffic – volume, heavy commercial vehicles, equivalent light vehicles per lane per day, location of traffic on road.

- 1.3 The effects of chip size and shape on chipseal design are described in accordance with Chapter 9 Sections 11 and 12 in *Chipsealing New Zealand*.

- 1.4 The effects of site specific factors on chipseal are described in accordance with Chapter 9 in *Chipsealing New Zealand*.

Range soft substrate, absorptive surface, steep grade, bridge, passing lane, slow lane, parking bay, low volume traffic, very high volume traffic, narrow lane widths.

- 1.5 The effect of chip shape on chipseal is described in accordance with Chapter 9 in *Chipsealing New Zealand*.

- 1.6 The design of residual binder application rates for seals is explained in accordance with the principles described in Chapter 9 in *Chipsealing New Zealand*.

Range seals – void fill, single coat, two coat, racked-in, cape, sandwich, geotextile, combination, precoated chip.

- 1.7 Factors affecting the final treatment selection and design are explained in accordance with Chapter 9 in *Chipsealing New Zealand*.

Range traffic segmentation, traffic volume, texture variation, pavement hardness, high stress sites.

- 1.8 The design of residual binders is described in accordance with Section 9.9 in *Chipsealing New Zealand*.

Range first coat seal – establishing a good bond, temperature, cutter; second coat and reseals – timing of design test, texture testing, grade of bitumen, high temperature, low temperature.

- 1.9 The design of chipseals is explained in terms of the reasons for using additives and the impacts of these additives on binder storage and handling requirements.

Range additives – flux, adhesion agent, emulsion, polymer, latex.

- 1.10 The design of chipseals is explained in terms of affects of construction factors on the quality of the final seal.

Range binder application factors – timing, sequence, process, temperature, viscosity, chemical reactions, seasonal recipe, additives;
traffic factors, – rolling, volumes, speed, management;
climatic factors – wind, evaporation rate.

1.11 The design of chipseals is explained in terms of affects of chip application rates on the quality of the final seals.

Range seals – single coat, void filling, racked in, two coat, sandwich, combination, membrane, geotextile.

Outcome 2

Demonstrate knowledge of treatment selection for chipseals.

Evidence requirements

2.1 Types of pavement surface and their surfacing requirements are described in accordance with *Chipsealing in New Zealand*.

Range types of surface – granular base, stabilised base, chipseal, dense graded asphalt, cold mix, gap graded mix, open graded porous asphalt, slurry seal, concrete.

2.2 Site assessments for chipseal design are described in accordance with *Chipsealing in New Zealand*.

Range traffic usage, size of chip, texture and variation of existing surface, pavement suitability, pavement stresses, pavement shape.

2.3 Reasons for surface treatment selections and their impact on design processes are explained in accordance with *Chipsealing in New Zealand*.

Range surface treatments – first coat, second coat, reseal, texturising, crack-filling, multicoat, racked in, combination, sandwich, void, rejuvenation;
selection of – seal types, binder types, chip types, PSVs or aggregate sources, residual binder application rate, binder application rate, chip spread rate.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of equipment and processes for constructing chipseal surfacings		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for chipseal surfacing, able to demonstrate knowledge of: construction equipment; preconstruction processes; construction processes; post construction processes.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
RNZ 9904, The Safe Handling of Bituminous Materials Used in Roading – Code of Practice RNZ 9904:2006, Roading New Zealand, available for purchase at <http://www.roadingnz.org.nz/>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA P3: Specification for First Coat Sealing;
NZTA P4: Specification for Resealing;
NZTA P17: Performance Based Specification for Bituminous Reseals.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Maintenance period means the period of time from the removal of temporary speed restrictions until final acceptance by the engineer during which time the contractor may have corrective action obligations specified in the contract specifications.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of construction equipment for chipseal surfacing.

Evidence requirements

- Chipseal construction equipment is described in terms of its functions.

Range bulk bitumen tanker, bitumen distributor, rubber-tyred roller, rubber-coated steel drum roller, chip precoating system, roller spreader, chip spreader, chip-carrying truck, rotary broom, loader, suction sweeper.

1.2 Chipseal construction equipment is described in terms of its limitations.

Range limitations of bitumen distributors – tank volume, spraying width, travel speed relative to nozzle output, truck length, truck width, rear axle configuration, accuracy of binder application rate control, length of hand lance hose;
limitations of related equipment – width of spread, number of shutoff gates, controls, size, weight, capacity, roller types.

1.3 Emergency equipment and safety features of bitumen distributors are described in accordance with *RNZ 9904:2006*.

Range equipment – first aid kit, burns kit, water extinguishers, fire extinguishers;
safety features – thermometers, thermostats, bitumen-level sign, signage for safe heating and filling levels, dipstick, tank hatch, tank overflow pipe, internal tank baffles, flashing lights, access platform, guard rails, air controlled spray valves, compliance tags (on hand lance and on transfer hose), placarding.

1.4 Emergency equipment and safety features of other chipseal construction equipment are described in accordance with company procedures.

Range equipment – roller-spreader, loader, rotary broom, transport trailers, bulk bitumen tanker, rubber-tyred roller, rubber-coated steel drum roller, chip precoating system, chip spreader, chip-carrying truck, suction sweeper.

Outcome 2

Demonstrate knowledge of preconstruction processes for chipseal surfacing.

Evidence requirements

2.1 Preconstruction processes are described in terms of checks and repairs required prior to accepting the site for sealing.

Range checks – basecourse, stabilised base, surface, dried back, dust, lichen, engineer, client, pre seal repairs;
seven examples of pre seal repairs are identified.

2.3 Preconstruction processes are described in terms of general site preparation requirements for chipseal surfacing.

Range programming pavement repairs, hazard identification and control, environmental protection, temporary traffic management, stockpile sites, parking and unloading areas, ends and widths marked out,

location on road marked, chip on site is correct type, quality, and quantity.

- 2.4 Preseal preparation for chipsealing is described in accordance with Chapter 7 *Chipsealing in New Zealand*.

Range sweeping;
first coat seal preparation on new or unsealed pavements – base course failure, stabilised failure;
check texture after preseal treatment.

- 2.5 Preconstruction processes are described in terms of determining and confirming plant, equipment, and labour resources for different chipsealing job sizes and types.

Range job sizes – single sprayer, more than three sprayers;
types – first coat, reseal.

- 2.6 Preconstruction processes for chipsealing are described in terms of checking sampling and testing requirements for aggregates and binders.

Range sampling and testing equipment, labels, records.

- 2.7 Preconstruction processes are described in terms of identifying and notifying affected parties.

Range identify at least four affected parties and any four methods of notification.

Outcome 3

Demonstrate knowledge of construction processes for chipseal surfacing.

Evidence requirements

- 3.1 Processes used for constructing chipseal surfacing are described in accordance with Chapter 11 *Chipsealing in New Zealand*.

Range processes – binder application, chip application, compaction, sweeping.

- 3.2 Construction processes are explained in terms of adjustments required to match site requirements.

Range at least two adjustments for each of – binder application, chip application, compaction, sweeping.

- 3.3 Site safety and traffic management are explained in terms of site requirements and adjustments required for each process of chipseal construction.

Outcome 4

Demonstrate knowledge of post construction processes for chipseal surfacing.

Evidence requirements

- 4.1 Chipseal site cleanup processes are explained in accordance with company procedures.
- Range removal of chip, roadmarking, waste disposal.
- 4.2 Protecting the seal from damage during and after construction and opening the sealing site to traffic are explained in accordance with contract requirements and company procedures.
- Range rolling requirements, traffic loads, traffic speed, positive traffic control, sweeping.
- 4.3 Monitoring seal performance for the maintenance period is described in accordance with *NZTA P4* and *NZTA P17* and corrective actions are explained in accordance with company procedures.
- Range monitoring for – chip loss, flushing, texture loss, skid resistance.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Interpret chipseal design instructions and construct chipseal surfacings		
Level	4	Credits	14

Purpose	People credited with this unit standard are able to: interpret chipseal design instructions; prepare to construct chipseal surfacings; and construct chipseal surfacings.
----------------	---

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following requirements apply to this unit standard, and must be complied with:
RNZ 9803, Quality Assurance for Bituminous Binders: A Code of Practice developed by Roding New Zealand, RNZ 9803:2013, Roding New Zealand, available at http://www.rodingnz.org.nz/sites/rodingnz.org.nz/files/RNZ9803_0513_Final.pdf;
RNZ 9904, The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006, Roding New Zealand, available for purchase at <http://www.rodingnz.org.nz/>;
RNZ 9805, Quality Assurance of Aggregates for Roads RNZ 9805:2009, Roding New Zealand, available at <http://www.rodingnz.org.nz/sites/dev.rodingnz.org.nz/files/QA%20of%20Aggregates%20for%20Roads.pdf>
Code of Practice for Temporary Traffic Management (CoPTTM), New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/code-temp-traffic-management/index.html>;
Chipsealing in New Zealand, New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/chipsealing-new-zealand-manual/>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M1: Specification for Roding Bitumens;
NZTA M6: Specification for Sealing Chip;
NZTA M6 Notes: Notes on Specification for Sealing Chip;
NZTA P3: Specification for First Coat Sealing;
NZTA P4: Specification for Resealing;
NZTA P17: Performance Based Specification for Bituminous Reseals;
NZTA T10: Specification for State Highway Skid Resistance Management;
NZTA T10 Notes: Notes to the Specification for State Highway Skid Resistance Management;
Operating manual;
Site safety plan;
Contract quality plan.

- 2 Assessment against this unit standard must be based on evidence from a workplace context.

For Outcome 2 evidence is required of working on at least three contracts covering each of the following surfaces, binders, and seals in any combination:

surfaces – granular, stabilised, chipseal, bituminous mix;

binders – hot bitumen, cut back, emulsion, PMB, polymer modified emulsion, latex modified emulsion;

seals – first coat, two coat, reseal, membrane.

- 3 Definitions

Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Maintenance period means the period of time from the removal of temporary speed restrictions until final acceptance by the engineer during which time the contractor may have corrective action obligations specified in the contract specifications.

Operating manuals refers to the plant operating manual and manuals written for specific components or items of plant and equipment that may be published by the manufacturer or the company.

Protection period means the period of time from the completion of construction until the removal of temporary speed restrictions during which time the contractor may have corrective action obligations specified in the contract specifications.

PMB means polymer modified binder.

PSV means polished stone value.

Outcomes and evidence requirements

Outcome 1

Interpret chipseal design instructions.

Range instructions for at least three sites covering four different surface types such as – granular, stabilised, chipseal, bituminous mix.

Evidence requirements

- 1.1 Chipseal design instructions are interpreted to determine plant, materials, and processes to be used for constructing the chipseal.

Range plant – broom, sprayer, tanker, chip truck, chip spreader type, rollers, transporter equipment;
materials – binders spray rates, binder quantities, chip size, chip source, chip quantities;
processes – stockpile pretreatment, environmental pre construction checks, weather checks, rolling pattern, temporary traffic management, roadmarking.

- 1.2 Binder application rates are determined from chipseal design instructions and checked against site conditions and any adjustments are communicated and recorded in accordance with contract requirements and company procedures.

Range examples of adjustments – application rate, transverse variable, cutters, volatiles, water content of emulsions, PMB; reasons are given for any adjustment.

- 1.3 Compaction requirements and rolling methods are determined from chipseal design instructions and any adjustments are communicated and recorded in accordance with contract requirements and company procedures.

Range requirements – equipment, water, critical timing; methods – number of passes, speed of roller, roller type, number of rollers, rolling pattern; adjustments for – drop in pavement temperature, change in weather.

Outcome 2

Prepare to construct chipseal surfacings.

Evidence requirements

- 2.1 Preconstruction checks are carried out and surface is swept in accordance with company procedures.

Range checks – day's weather, two day forecast, rain radar, pre-seal repairs completed, construction signed off ready for sweeping, start and finish locations, chip condition.

- 2.2 Requirements for site safety, environmental protection, and temporary traffic management are confirmed and implemented in accordance with company procedures.

- 2.3 All objects and surfaces that need protection are either protected or marked and recorded so they can be found and/or reinstated after sealing in accordance with company procedures.

Range examples of objects needing protection – service covers, fire hydrants, adjacent surfaces, roadmarking offsets.

- 2.4 Parties affected by site works are identified and notified in accordance with contract requirements and company procedures.

- 2.5 Spray runs are planned to match seal design, site conditions, seal type, chip stockpile location, and available plant in accordance with company procedures.

Range start and end positions, rate changes, widths, tapers, seal joins, centreline, shoulders; evidence is required of communication with supervisor and chip truck drivers.

- 2.6 Sampling and testing requirements are confirmed in accordance with company procedures.

Outcome 3

Construct chipseal surfacings.

Evidence requirements

- 3.1 First spray run is checked and assessed for compliance with target in accordance with contract quality plan requirements, and any adjustments are made in accordance with company procedures.
- Range checks – length, width, before and after dip, chip depth; chip adhesion, chip cleanness, chip dryness; assessment –visual on road, compare with sprayer data.
- 3.2 After each spray run, checks are made for compliance with quality requirements, samples are taken in accordance with company procedures, and sprayer is reloaded in accordance with company procedures and operating manual.
- Range checks – binder temperature remains within parameters for spraying, no streaking, no binder flow, ambient temperature, dips, binder quantity.
- 3.3 Joints and overlaps are constructed to match contract quality plan requirements and corrections are made in accordance with company procedures.
- Range paper start and finish, staggered start and finish for multicoat seal, centreline, wheelpaths.
- 3.4 Chip spread is checked visually against target photos for each seal type and is corrected as required. Any consequent adjustments to application rates are agreed with engineer in accordance with company procedures.
- Range corrections – chip truck calibration, mat test, ground speed, chip from stockpile, percentage coverage.
- 3.5 Chip spread is monitored visually and adjusted to apply the agreed chip application rate for each section on site.
- 3.6 Compaction is checked for compliance with quality requirements in accordance with company procedures.
- Range checks – compaction started on time, rolling pattern.
- 3.7 Traffic and site protection are monitored and consequent actions taken in accordance with the *CoPTTM*, site safety plan, and company procedures.
- Range monitor – starting traffic on new seal, cones, guidance, traffic speed, traffic rolling.

- 3.8 Hand work is managed to ensure surfacing complies with contract requirements in accordance with *NTZA P3* and *NZTA P4* and company procedures.

Range hand work on areas that cannot be reached by the chipseal machinery – edging, application rate, extent of seal, spreading chip, finishing.

- 3.9 Site tidiness is managed in accordance with site safety plan, *RNZ 9904:2006*, and company procedures.

Range chip stockpiles, loading and unloading of plant and materials, transfer of binder in the field, disposal of waste materials, picking up start and finish paper, flattening piles of chips, cleaning up stockpile site.

- 3.10 Protocols for seeking assistance in the event of uncertainty over technical requirements are followed in accordance with company procedures.

Range examples of uncertainty – wrong seal design, wrong treatment, wrong binder, wrong chips, seal not working, chips not fitting.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Complete records and take samples for chipseal construction		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for chipseal construction, able to complete and store records and take samples.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of and compliance with the current editions of the following references:
NZS 4407:1991 Complete set: Methods of sampling and testing road aggregates, Standards New Zealand, at <http://www.standards.co.nz>;
Quality Assurance for Bituminous Binders: A Code of Practice developed by Roding New Zealand, RNZ 9803:2013, Roding New Zealand, available at http://www.rodingnz.org.nz/sites/rodingnz.org.nz/files/RNZ9803_0513_Final.pdf;
Quality Assurance of Aggregates for Roads RNZ 9805:2009, Roding New Zealand, available at <http://www.rodingnz.org.nz/sites/dev.rodingnz.org.nz/files/QA%20of%20Aggregates%20for%20Roads.pdf>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA T3: Texture by the sand circle method measurement,
NZTA T4: Test locations on highways description,
Contract quality plan.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
PSV means polished stone value.

Outcomes and evidence requirements

Outcome 1

Complete and store records for chipseal construction.

Evidence requirements

- Sealing records are completed and stored in accordance with contract quality plan and company procedures.

Range spray sheets, tank dips, binder type, binder used, blends, loading docket, chip type and source, chip used, dimensions, target application rates, actual application rates, air temperature, ground temperature, weather, traffic, comments on issues, tasks completed.

1.2 Plant and labour records are completed and stored in accordance with company procedures.

Range examples of records – foreman's diary, roller hours.

1.3 Site records are completed and stored in accordance with contract quality plan and company procedures.

Range site instructions, tasks completed;
may include – site conditions, site exceptions, client communication, public communication, site timings such as start, finish, downtime, stoppage, non conformance.

Outcome 2

Take samples for chipseal construction.

Evidence requirements

2.1 Before sealing commences, chip samples are taken from a stockpile in accordance with methods in *NZS 4407:1991* and *RNZ 9805:2009*, in order to confirm compliance with seal design.

Range sampling must– have correct sample size, have correct number of samples, be representative of the pile, be labelled, include source name.

2.2 Chip samples are taken for PSV test in accordance with the contract quality plan.

2.3 A sample is taken of the first binder spray run and assessed for meeting contract requirements in accordance with the contract quality plan.

Range requirements for – consistent spray, appropriate film thickness, binder sticking to chip.

2.4 Binder load samples are taken from a bitumen distributor and recorded in accordance with the contract quality plan and company procedures.

Range load samples for a contract with multiple loads.

2.5 All samples are labelled in accordance with the contract quality plan.

Range samples of – stockpile, chip for PSV, first binder spray run, binder loads;

labelling includes where relevant – date time, sample size, binder type, binder temperature, container type, tanker number, sprayer number, chip grade, chip source, sampler's name, site name, location.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of mix design fundamentals and treatment selection for bituminous mixes		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for bituminous mixes, able to demonstrate knowledge of: mix design fundamentals, and treatment selection.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Assessment against this unit standard must be based on the fundamental principles of treatment selection in the following references:
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA P9: Specification for Construction of Asphaltic Concrete Paving;
NZTA P9P (Auckland): Specification for Construction of Asphaltic Concrete Paving
NZTA M10: Specification for Asphaltic Concrete;
NZTA M/10DP Amendment for use with Drum Mixing Plants;
NZTA M10 Notes: Notes to the Specification for Asphaltic Concrete;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA T10: Specification for State Highway Skid Resistance Management;
NZTA T10 Notes: Notes to the Specification for State Highway Skid Resistance Management.
- Definitions
Job Mix Formula (JMF) is the combined aggregate particle size distribution and total bitumen content that falls within the SME and produces a mix that complies with specified volumetric and mechanical criteria.
OGPA stands for open graded porous asphalt.
SME stands for *Specified Mix Envelope* or the asphaltic concrete particle size distribution and effective bitumen content limits which are set out in Section 5 of *NZTA Specification M10 Specification for Asphaltic Concrete*; available at <http://www.nzta.govt.nz/resources/>.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of mix design fundamentals for bituminous mixes.

Evidence requirements

- 1.1 Components of bituminous mixes are defined in accordance with NZTA M10 and described in terms of their properties for use in road pavements.

Range components – coarse aggregate, fine aggregate, mineral filler, binder, RAP, one other component such as industrial by product; properties – air voids, adhesion, gradation, absorption, cleanness, moisture content, crushing resistance, polished stone value, abrasion.

- 1.2 Mix types are defined in terms of their composition and grades for different courses.

Range mix types – PA20, PA25HV, PA15HS; composition – layer thickness, binder content, VMA, nominal mix size; grades – gap graded, dense graded, open graded; courses – base, wearing, levelling.

- 1.3 Factors that impact on the performance of bituminous mixes are explained in terms of their effects.

Range aggregate absorption, adhesion, moisture susceptibility, traffic volume, traffic type, compaction, voids, texture, skid resistance, thickness, binder content, film thickness, noise reduction.

- 1.4 Tests for volumetric and mechanical properties of mixes are described and adjustments are explained in terms of what is required to achieve job mix formula.

Range three tests including volumetric; adjustments – target gradation, target binder content, tolerances, target air voids.

Outcome 2

Demonstrate knowledge of treatment selection for bituminous mixes.

Evidence requirements

- 2.1 Treatment selection for bituminous mixes is explained in terms of determining site conditions.

Range determining from – records, site visit; ten site conditions.

- 2.2 Treatment selection is explained in terms of appropriate mixes for different courses.

Range courses – base, wearing, levelling; at least two mixes for each course.

- 2.3 Treatment selection is explained in terms of selecting appropriate surface preparations for different mix types.

Range preparations – prelevelling, blinding, membrane seal, tack coat; scabbling, texturing, milling; mix types – PA20, PA25HV, PA15HS.

- 2.4 Treatment selection is explained in terms of selecting combinations of mix type, mix binder, and mix additives for specific requirements.

Range requirements – texture, skid resistance, drainage, permeability, stress resistance, chemical resistance, carpark, container cranes, airport, hardstand, forklifts, high deflection pavement, other.

- 2.5 Treatment selection is explained in terms of mix types for noise reducing surface layers.

Range OGPA, twin layer, noise measurement, voids, permeability, cleaning OGPA.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of equipment and processes for laying bituminous mixes		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for laying bituminous mixes, able to demonstrate knowledge of: equipment used; preconstruction processes; construction processes; and post construction processes.
----------------	---

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M10: Specification for Asphaltic Concrete;
NZTA P9: Specification for Construction of Asphaltic Concrete Paving;
NZTA P9P (Auckland): Specification for Construction of Asphaltic Concrete Paving;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
Paving plan.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Maintenance period means the period of time from the removal of temporary speed restrictions until final acceptance by the engineer during which time the contractor may have corrective action obligations specified in the contract specifications.
Protection period means the period of time from the completion of construction until the removal of temporary speed restrictions during which time the contractor may have corrective action obligations specified in the contract specifications.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of equipment used for laying bituminous mixes.

Evidence requirements

- 1.1 Asphalt paving machine is described in terms of its components and functions.
- Range components – machine controls and gauges, hopper, mix conveyors, feed control gates, augers, screed and screed settings, screed heater, tamper/vibrating bar, level controls and types, extensions;
functions – spreading, planning, levelling, compacting.
- 1.2 Other bituminous mix construction equipment is described in terms of its functions.
- Range rotary broom, mix-carrying truck, loader types, roller types, suction sweeper, tack wagon, sprayer, shuttle buggy.
- 1.3 Bituminous mix construction equipment is described in terms of its suitability and limitations for sealing jobs.
- Range equipment – paving machine, roller types, loader types, truck types, brooms, shuttle buggy;
suitability, where relevant, for – access to site, pavement strength, mix type, layer depth, joint locations, size of contract;
limitations may include – manoeuvrability, vehicle size, vehicle weight and its distribution, capacity such as hopper size or laying width, accuracy of controls, travel speed relative to output.

Outcome 2

Demonstrate knowledge of preconstruction processes for laying bituminous mixes.

Evidence requirements

- 2.1 Checks to be made prior to accepting a site for laying bituminous mixes are explained in terms of meeting contract requirements.
- Range checks – pavement construction complies, surface dried back, pavement levels, surface drainage provided for, membrane seal, preseal repairs completed, off-road drainage in place, site extent marked out, measure and agree levelling quantities;
seven types of preseal repairs are identified;
examples of checks are given from at least two different sites.
- 2.2 Preconstruction processes are described in terms of general site preparation requirements for laying bituminous mixes.
- Range programming pavement repairs, hazard identification and control, environmental protection, temporary traffic management, loading sites, parking and unloading areas, ends and widths marked out, location on road marked.
- 2.3 Preconstruction processes are described in terms of complying with site specific instructions.

Range site safety, public safety, pavement shape, geometric constraints, live load limitations, access, obstructions, radio, drop off area, climate, vibration, location of ancillary services, one other.

- 2.4 Preconstruction processes for laying bituminous mixes are explained in terms of pretreatment types and factors to take into account when determining pretreatment requirements.

Range pretreatment types – milling, cleaning, sweeping, scrub coat, levelling, tack coat, scabbling, texturizing, binder removal; factors – pavement condition, treatment type, site constraints, resources.

- 2.5 Preconstruction processes are described in terms of determining and confirming bituminous mix paving plant, equipment, and labour resources.

Range takes account of – mix design, rolling pattern, compaction monitoring.

- 2.6 Sampling schedule is explained and tests are described in general terms.

Range tests – coring, non destructive, permeability, texture, sand circle, materials, laser, skid resistance.

- 2.7 Preconstruction processes are described in terms of identifying and notifying affected parties.

Range identify at least four affected parties and any four methods of notification.

- 2.8 Preconstruction processes are described in terms of identifying, recording, and protecting service overs, road furniture, and adjacent surfaces.

Outcome 3

Demonstrate knowledge of construction processes for laying bituminous mixes.

Evidence requirements

- 3.1 Transport of bituminous mix plant, equipment, and materials to laying site is explained in terms of logistics.

Range plant – asphalt paving machine, rollers, broom, loaders, transporter, trailers, shuttle buggy; logistics – loading and unloading, number of trucks, timing of trucks, type of trucks, fit paving machine, transport route.

- 3.2 Loading and transporting of mix is explained in terms of avoiding both segregation and cooling.

Range loading mix into – truck, shuttle buggy, paving machine;

requirements – vehicle type, vehicle cleaning, load protection, temperature, truck deck insulation, truck deck detail, release agent, despatch times, travel times, waiting times, site access; mix temperature at – arrival, loading, release into paving machine.

- 3.3 Mix laying is described in terms of coordinating resources and following the paving plan.

Range screed setting, spreading, trimming, hot joints, cold joints, shoulders, level control, depth measurement, mix temperature, joint location, transverse joint detail, longitudinal joint detail, tack coat, joint heaters, wing management, segregation management, compaction adjustment, paving in echelon.

- 3.4 Bituminous mix laying is explained in terms of factors to be taken into account for achieving required compaction of finished surface.

Range factors – timing and temperatures, roller types for different mix types and mix depths, single width rolling procedures, rolling pattern, laydown trial, target density, compacted thickness, finished surface, shape, levels, falls, drainage.

- 3.5 Bituminous mix laying is described in terms of items to be monitored during construction.

Range consistent surface texture, texture, compaction, shape, depth, temperature.

- 3.6 Bituminous mix laying site safety and traffic management are explained in terms of exclusion zones, site access, and adjustments required during construction.

Outcome 4

Demonstrate knowledge of post construction processes for laying bituminous mixes.

Evidence requirements

- 4.1 Bituminous mix construction site cleanup processes are explained in accordance with company procedures.

Range collecting waste mix, roadmarking, removing service protection, waste disposal.

- 4.2 Post construction processes for bituminous mixes are explained in terms of protecting the road mat from damage during curing and during the protection period.

Range timing, traffic loads, traffic speed.

- 4.3 Opening the site to traffic is explained in accordance with contract requirements and company procedures.

- 4.4 Monitoring the newly laid bituminous mix surface for the maintenance period is described in accordance with contract requirements and corrective actions are explained in accordance with company procedures.

Range corrective actions for – traffic damage, loss of texture, unravelling, rutting, loss of shape, faulty compaction.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Interpret paving instructions and construct bituminous mix layers		
Level	4	Credits	14

Purpose	People credited with this unit standard are able to: interpret paving instructions for bituminous mix layers; prepare to construct bituminous mix layers; and construct bituminous mix layers.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following requirements apply to this unit standard, and must be complied with:
The Safe Handling of Bituminous Materials Used in Roding – Code of Practice RNZ 9904:2006, Roding New Zealand, available for purchase at <http://www.rodingnz.org.nz/>;
Code of Practice for Temporary Traffic Management (CoPTTM), New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/code-temp-traffic-management/index.html>;
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA P9: *Specification for Construction of Asphaltic Concrete Paving*;
NZTA P9P (Auckland): *Specification for Construction of Asphaltic Concrete Paving*;
NZTA P23: *Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing*;
Site safety plan;
Contract quality plan;
Paving plan.

- Assessment against this unit standard must be based on evidence from a workplace context.

For Outcomes 2 and 3 evidence is required of preparing and laying each of the following layers and mix types in any combination:

layers – base course, wearing course, levelling;
mix types – M10, M14, M15, M20, M28, M40, SMA, OGPA.

- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Maintenance period means the period of time from the removal of temporary speed restrictions until final acceptance by the engineer during which time the contractor may have corrective action obligations specified in the contract specifications.

OGPA means open graded porous asphalt.

Protection period means the period of time from the completion of construction until the removal of temporary speed restrictions during which time the contractor may have corrective action obligations specified in the contract specifications.

Outcomes and evidence requirements

Outcome 1

Interpret paving instructions for bituminous mix layers.

Range paving instructions may be in contract specifications and/or plans and/or tender documents and/or site instructions;
instructions for at least three jobs with various requirements such as different:
surface layers such as wearing, levelling, base;
clients such as large commercial contract, port, NZTA resurfacing, local authority resurfacing, road reconstruction;
mix types, mix thickness, mix binder;
paving details such as tack coat, application rate, membrane seal, and binder type.

Evidence requirements

1.1 Pretreatment requirements are identified in site instructions and explained in terms of what is required to meet them.

Range pretreatments – milling, patching, levelling, cleaning, sweeping, tack coat.

1.3 Plant and equipment requirements are identified in paving instructions and explained in terms of selecting what is appropriate and available for each job.

Range plant – brooms, loaders, delivery vehicles, trucks, paving machines, rollers;
equipment – levels, hand tools.

1.4 Laying specifications are identified in paving instructions and explained in terms of meeting requirements for each job.

Range specifications relating to – air temperature, ground temperature, paving season, mix temperature, layer thickness, compaction, joint locations, shape, trimming, edges, shoulders.

1.5 Compaction specifications are identified in paving instructions and explained in terms of procedures for meeting requirements for each job.

Range equipment, water, critical timing;
rolling sequence – joints, edges, breakdown, second, finishing;
roller types -- static, vibratory;

compaction adjustment – density, compacted depth, thickness, surface consistency and shape;
compaction tests – non destructive, cores;
texture, target air voids.

1.6 Site safety and environmental protection factors are identified in paving instructions and explained in terms of requirements for each job.

1.7 Sampling and testing requirements for bituminous mix laying are identified in paving instructions and explained in terms of scheduling for the job.

Range density testing, mix sample, tack coat sample, mix temperatures into truck, out of truck into paver, out of paver, mix depths, time arrived, time into paver, rolling pattern completed.

Outcome 2

Prepare to construct bituminous mix layers.

Evidence requirements

2.1 Preconstruction checks are carried out and surface is swept in accordance with company procedures.

Range checks – day's weather, rain radar, three day forecast, temperatures, preseal repairs completed, construction signed off ready for sweeping, start and finish locations.

2.2 Requirements for site safety, environmental protection, and temporary traffic management are implemented in accordance with company procedures.

2.3 All objects and surfaces that need protection are either protected or marked and recorded so they can be found and/or reinstated after paving in accordance with company procedures.

Range examples of objects needing protection – service covers, fire hydrants, adjacent surfaces, roadmarking offsets.

2.4 Parties affected by site works are identified and notified in accordance with contract requirements and company procedures.

Outcome 3

Construct bituminous mix layers.

Evidence requirements

3.1 Mix deliveries are managed in accordance with paving plan and company procedures.

Range changes in requirements are to be communicated to the mix plant in time to avoid over supply and minimise waste.

- 3.2 Laying process is monitored for quality and actions are taken to maintain compliance with the contract quality plan in accordance with company procedures.
- Range temperatures, layer thickness, avoiding segregation, joints.
- 3.3 Compaction techniques and roller patterns are managed in accordance with the paving plan and company procedures.
- Range evidence is required of undertaking preliminary tests to aid in controlling layer thickness.
- 3.4 Hand work is managed to ensure mix layer complies with contract requirements.
- Range hand work – edging, spreading, finishing, areas that cannot be reached by the paving machine; management ensures minimal handling, avoids segregation, and compacts mix as soon as possible.
- 3.5 Traffic and site protection are monitored in accordance with the traffic management and site safety plans.
- 3.6 Actions required in the event of uncertainty over technical requirements are explained and followed in accordance with company procedures.
- Range examples of uncertainty – mix seems different, site not ready for laying, more prelevelling is needed than planned for, membrane seal not done, pre seal repairs not completed.
- 3.7 Weather conditions are monitored and consequent adjustments are made to the work programme as required.
- Range rain radar, three day forecast.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Complete records and take samples and tests for bituminous mix paving construction		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for bituminous mix paving construction, able to: complete and store records and take samples and tests.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of and compliance with the current editions of the following references:
New Zealand Transport Agency specifications at <http://www.nzta.govt.nz/resources/>:
NZTA M10: Specification for Asphaltic Concrete;
NZTA P9: Specification for Construction of Asphaltic Concrete Paving;
NZTA P9P (Auckland): Specification for Construction of Asphaltic Concrete Paving;
NZTA P11: Specification for Open Graded Porous Asphalt;
NZTA P11 Notes: Notes to the Specification for Open Graded Porous Asphalt;
NZTA P23: Performance Based Specification for Hotmix Asphalt Wearing Course Surfacing;
Contract quality plan.
- Definition
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Outcomes and evidence requirements

Outcome 1

Complete and store records for bituminous mix paving construction.

Evidence requirements

- 1.1 Paving records are completed and stored in accordance with contract quality plan and company procedures.

Range	tack coat binder quantities, application rate, bituminous mix tonnage, paved area dimensions, layer thickness, mix
-------	--

temperature, air temperatures, pavement temperatures, roller times, number of roller passes.

- 1.2 Plant and labour records are completed and stored in accordance with company procedures.

Range examples of records – foreman’s diary, check lists, fuel, repairs, tonnages carted.

- 1.3 Site records are completed and stored in accordance with contract quality plan and company procedures.

Range site instructions, tasks completed;
may include – site conditions, site exceptions, client communication, public communication, site timings such as start, finish, downtime, stoppage, non conformance.

Outcome 2

Take samples and tests for bituminous mix paving construction.

Evidence requirements

- 2.1 Core samples are taken from completed compacted pavement for testing total air voids and mix layer thickness and then test holes are refilled in accordance with contract quality plan.

- 2.2 Samples are labelled in accordance with the contract quality plan.

Range labelling may include– date time, load, mix type, sampler, site name, location.

- 2.3 Surface levels, shape, skid resistance, and texture are tested and recorded in accordance with contract quality plan and company procedures.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of mix design fundamentals and treatment selection for slurry surfacings		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for slurry surfacings, able to demonstrate knowledge of: mix design fundamentals, and treatment selection.
----------------	---

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Assessment against this unit standard must be based on the fundamental principles of treatment selection in the following references:
RNZ 9806, Specification for Slurry Surfacings RNZ 9806: June 2010, Roothing New Zealand, available at
<http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ%209806%20Slurry%20Seal%20Specification%20June%202010.pdf>;
ISSA A105 Recommended Performance Guideline for Emulsified Asphalt Slurry Seal A105 (Revised February 2010) International Slurry Surfacing Association available at
<http://slurry.org/downloads/A105.pdf>;
ISSA A143 Recommended Performance Guideline For Micro Surfacing A143 (Revised February 2010), International Slurry Surfacing Association available at
<http://slurry.org/downloads/A143.pdf>.
- Definitions
Job Mix Formula is the combined aggregate particle size distribution and total bitumen content that falls within the SME and produces a mix that complies with specified volumetric and mechanical criteria.
Slurry surfacing is the generic term for a mix of asphalt emulsion binder, crushed aggregate, and stabilising filler. A development of slurry using a polymer modified binder and selected aggregates is known as *micro surfacing*.
SME stands for *Specified Mix Envelope* or the asphaltic concrete particle size distribution and effective bitumen content limits which are set out in Section 5 of *NZTA Specification M10 Specification for Asphaltic Concrete*; available at
<http://www.nzta.govt.nz/resources/>.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of mix design fundamentals for slurry surfacings.

Evidence requirements

- 1.1 Slurry and micro surfacings are defined and their components are described in accordance with *RNZ 9806*.

Range binder content, mineral aggregates, fillers, potable water, additives, modifiers, sand equivalent.

- 1.2 Performance requirements for slurry and micro surfacing design are described in accordance with *RNZ 9806*.

Range wet track abrasion, wet striping, wet cohesion, binder content, gradation.

- 1.3 Slurry and micro surfacing design is explained in terms of factors that affect the performance of these surfacings.

Range grading, aggregate moisture content, residual binder content, application depth, mix and set times, climatic conditions, time of day, weather, wind speed, humidity.

- 1.4 A slurry surfacing Job Mix Formula is described in terms of what it contains and why.

Range recipe, emulsion content, cement content, aggregate content, moisture content, dope content.

Outcome 2

Demonstrate knowledge of treatment selection for slurry surfacings.

Evidence requirements

- 2.1 Treatment selection for slurry surfacings is explained in terms of determining the condition and composition of the existing surface.

Range determining from – records, site visit;
surface conditions – deflections, cracks, flushing, skid resistance requirements, traffic stresses, traffic times, tack coat, rolling, surface shape.

- 2.2 Treatment selection for slurry surfacings is explained in terms of selecting appropriate systems for different situations and specific requirements.

Range systems – slurry, micro surfacing, cape seal, rut filling;
situations – traffic stress, cracking, deflections, traffic loading, rutting, flushing, polishing, unravelling;
specific requirements – texture, skid resistance, colour, noise level.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of equipment and processes for constructing slurry surfacings		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for slurry surfacings, able to demonstrate knowledge of: equipment used; preconstruction processes; construction processes; and post construction processes.
----------------	---

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of the current editions of the following references:
RNZ 9806, Specification for Slurry Surfacings RNZ 9806: June 2010, Roothing New Zealand, available at
<http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ%209806%20Slurry%20Seal%20Specification%20June%202010.pdf>;
ISSA A105 Recommended Performance Guideline for Emulsified Asphalt Slurry Seal A105 (Revised February 2010) International Slurry Surfacing Association available at
<http://slurry.org/downloads/A105.pdf>;
ISSA A143 Recommended Performance Guideline For Micro Surfacing A143 (Revised February 2010), International Slurry Surfacing Association available at
<http://slurry.org/downloads/A143.pdf>.
- Assessment against this unit standard must be based on evidence from a workplace context.

 Evidence is required from working on at least three contracts covering each of the following: slurry, cape seal, rut filling.
- Definitions
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
Maintenance period means the period of time from the removal of temporary speed restrictions until final acceptance by the engineer during which time the contractor may have corrective action obligations specified in the contract specifications.
Operating manuals refers to the plant operating manual and manuals written for specific components or items of plant and equipment that may be published by the manufacturer or the company.

Protection period means the period of time from the completion of construction until the removal of temporary speed restrictions during which time the contractor may have corrective action obligations specified in the contract specifications.

Slurry surfacing is the generic term for a mix of asphalt emulsion binder, crushed aggregate, and stabilising filler. A development of slurry using a polymer modified binder and selected aggregates is known as *micro surfacing*.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of equipment used for constructing slurry surfacings.

Evidence requirements

- 1.1 Slurry machine is described in terms of its components and functions.
- Range components – mixing box, weigh feeders, volumetric feeders, flow meters, fibre dispenser, storage hopper, emulsion tank, dope tank, control system, secondary strike off, rut box, crane, pump augers; functions – loading, proportioning, mixing, spreading, screeding.
- 1.2 Slurry machine is described in terms of effects of machine faults on the quality of the surfacing.
- Range faults – blocked filters, incorrect calibration of feeders, emulsion flows, addition of water, poor mixing, runs into channel too thin;
- 1.3 Slurry machine is described in terms of its limitations and other options where it is not suitable.
- Range limitations – size, weight, width; other options – smaller machine, chute and wheelbarrow, concrete mixer.
- 1.4 Other slurry surfacing equipment is described in terms of when it is needed.
- Range where tack needed, where sprayer needed, where rolling needed, type of roller needed.

Outcome 2

Demonstrate knowledge of preconstruction processes for slurry surfacings.

Evidence requirements

- 2.1 Checks to be made prior to accepting a site for laying bituminous mixes are explained in terms of meeting contract requirements.
- Range checks – pre-seal repairs completed, site suitable for surfacing, site extent marked out; examples of checks are given from at least two different sites.

- 2.2 Preconstruction processes are described in terms of general site preparation requirements for slurry surfacings.
- Range programming pavement repairs, hazard identification and control, environmental protection, temporary traffic management, loading sites, stockpile site, parking and unloading areas, ends and widths marked out, location on road marked.
- 2.3 Preconstruction processes are described in terms of complying with site specific instructions.
- Range site safety, public safety, pavement shape, geometric constraints, live load limitations, access, obstructions, radio, drop off area, location of ancillary services, climate.
- 2.4 Preconstruction processes for slurry surfacing are described in terms of pretreatment types and factors to take into account when determining pretreatment requirements.
- Range pretreatment types – cleaning, sweeping, pre-levelling, tack coat; membrane seal;
factors – pavement condition, treatment type, site constraints, resources.
- 2.5 Preconstruction processes are described in terms of determining and confirming plant, equipment, and labour resources for slurry surfacing.
- Range tack coat applicator, sprayer, slurry machine, loader, roller.
- 2.6 Preconstruction processes for slurry surfacing are described in terms of scheduling sampling and testing to meet contract requirements.
- Range testing – mix design, aggregate, emulsion, slurry, aggregate grading, sand equivalent, aggregate moisture content, binder content, slurry gradation, cement, additives, dope.
- 2.7 Preconstruction processes are described in terms of identifying and notifying affected parties.
- Range identify at least four affected parties and any four methods of notification.
- 2.8 Preconstruction processes are described in terms of identifying, recording, and protecting service overs, road furniture, and adjacent surfaces.

Outcome 3

Demonstrate knowledge of construction processes for slurry surfacings.

Evidence requirements

- 3.1 Transport of slurry surfacing plant, equipment, and materials to laying site is explained in terms of logistics.
- Range aggregate stockpiles, emulsion trailer, emulsion tanker, slurry machine, roller, loader.
- 3.2 Surface preparation is explained in terms of cleaning and masking requirements and methods.
- 3.3 Surface preparation is described in terms of tack coat and membrane seal timing, types, and methods.
- 3.4 Slurry surfacing is described in terms of construction processes, checks, and adjustments.
- Range processes – mixing, starts and stops, butting, lapping, tapering, managing product viscosity, managing screed, control of break and cure with dope;
checks – emulsion quality, aggregate quality, contamination, moisture content of aggregate, stockpile cover, excessive cement;
adjustments – feeder rates, truck speed, feed to high side, auger speeds.
- 3.5 Slurry surfacing construction is described in terms of when hand work is required and hand work methods.
- 3.6 Site safety and traffic management are explained in terms of site requirements, lane closures, and adjustments required during slurry surfacing construction.

Outcome 4

Demonstrate knowledge of post construction processes for slurry surfacings.

Evidence requirements

- 4.1 Slurry site cleanup processes are explained in accordance with company procedures.
- Range roadmarking, removing start finish paper, removing service protection, waste disposal.
- 4.2 Post construction processes are explained in terms of protecting the road surface from damage during the protection period.
- Range timing, traffic loads, traffic speed, positive traffic control.
- 4.3 Monitoring the newly laid surfacing for the maintenance period is described and corrective actions are explained in accordance with company procedures.
- Range monitoring for – aesthetics, texture, abrasion loss, skid resistance, deformation, unravelling, flushing.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Interpret paving instructions and construct slurry surfacings		
Level	4	Credits	14

Purpose	People credited with this unit standard are able to: interpret paving instructions for slurry surfacings; prepare to construct slurry surfacings, and construct slurry surfacings.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- The following requirements apply to this unit standard, and must be complied with:

Code of Practice for Temporary Traffic Management (CoPTTM), New Zealand Transport Agency, available at <http://www.nzta.govt.nz/resources/code-temp-traffic-management/index.html>;

RNZ 9806, Specification for Slurry Surfacings RNZ 9806: June 2010, Roothing New Zealand, available at <http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ%209806%20Slurry%20Seal%20Specification%20June%202010.pdf>;

ISSA A105 Recommended Performance Guideline for Emulsified Asphalt Slurry Seal A105 (Revised February 2010) International Slurry Surfacing Association available at <http://slurry.org/downloads/A105.pdf>;

ISSA A143 Recommended Performance Guideline For Micro Surfacing A143 (Revised February 2010), International Slurry Surfacing Association available at <http://slurry.org/downloads/A143.pdf>;

Site safety plan;

Contract quality plan;

Slurry surfacing plan.
- Assessment against this unit standard must be based on evidence from a workplace context.

For Outcome 3 evidence is required of working on at least three contracts covering each of the following slurry types --1, 2, 3, 4, cape seal, rut fill.
- Definitions**

Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.

Job Mix Formula means the target grading, binder quantity, and properties of the proposed slurry.

Slurry surfacing is the generic term for a mix of asphalt emulsion binder, crushed aggregate, and stabilising filler. A development of slurry using a polymer modified binder and selected aggregates is known as *micro surfacing*.

Outcomes and evidence requirements

Outcome 1

Interpret paving instructions for slurry surfacings.

Range paving instructions may be in contract specifications and/or plans and/or tender documents and/or site instructions;
instructions for at least three jobs with various requirements such as different:
clients such as state highway, runway, local authority street;
slurry types such as rut fill, cape seal.

Evidence requirements

1.1 Pretreatment requirements are identified in site instructions and explained in terms of what is required to meet them.

Range sweeping, tack coat, membrane seal, patching, prelevelling.

1.2 Plant and equipment requirements are identified in paving instructions and explained in terms of selecting what is appropriate and available for each job.

Range delivery vehicles, slurry machine, rut box, surface preparation equipment, broom, loader, hand tools.

1.3 Laying specifications are identified in paving instructions and explained in terms of meeting requirements for each job.

Range specifications relating to – pavement temperature, air temperature, possibility of freezing, rain, mix design, recipe, application rate, thickness, spreading, trimming, joints, edges, shoulders.

1.4 Paving instructions for a parking area are interpreted in terms of compaction requirements and procedures.

Range application rate recipe, roller type and weight, water, critical timing, number of passes.

1.5 Site safety and environmental protection factors are identified in paving instructions and explained in terms of requirements for each job.

1.6 Sampling and testing requirements for slurry surfacings are identified in paving instructions and explained in terms of scheduling for the job.

Range slurry samples, emulsion samples, aggregate samples, binder content, gradation, moisture content, contamination.

Outcome 2

Prepare to construct slurry surfacings.

Evidence requirements

- 2.1 Preconstruction checks are carried out and surface is swept in accordance with company procedures.
- Range checks – day's weather, rain radar, three day forecast, temperatures, preseal repairs completed, construction signed off ready for sweeping, start and finish locations.
- 2.2 Requirements for site safety, environmental protection, and temporary traffic management are implemented in accordance with company procedures.
- 2.3 All objects and surfaces that need protection are either protected or marked and recorded so they can be found and/or reinstated after paving in accordance with company procedures.
- Range examples of objects needing protection – service covers, fire hydrants, adjacent surfaces, roadmarking offsets.
- 2.4 Parties affected by site works are identified and notified in accordance with contract requirements and company procedures.

Outcome 3

Construct slurry surfacings.

Evidence requirements

- 3.1 Material deliveries and slurry machine management are monitored to optimise plant, material, and labour use.
- Range aggregate type, source, and supply, emulsion, cool down, additives, transport, labour, keeping materials dry, avoiding segregation of mix.
- 3.2 Slurry application is monitored for quality and actions are taken to maintain compliance with the slurry surfacing plan in accordance with company procedures.
- Range monitor – controllers, consistency, layer thickness, screed, augers, mixing box, longitudinal joints, transverse joints, build up, uncovered areas, hand work, edges, shoulders, intersections, kerbs.
- 3.3 Hand work is managed in accordance with contract requirements.
- Range edging, spreading, finishing areas that cannot be reached by the slurry machine.

- 3.4 Traffic and site protection are monitored in accordance with the traffic management plan and site safety plan.
- 3.5 Actions required in the event of uncertainty over technical requirements are explained and followed in accordance with company procedures.
- Range examples of uncertainty – mix seems different, site not ready for laying, membrane seal not done, pre seal repairs not completed.
- 3.6 Weather conditions are monitored and consequent adjustments are made to the work programme as required.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Complete records and take samples for slurry surfacing construction		
Level	4	Credits	6

Purpose	People credited with this unit standard are, for slurry surfacing construction, able to: keep and store records, and take samples.
----------------	--

Classification	Infrastructure Works > Bituminous Surfacing Construction
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Competence in this unit standard requires knowledge of and compliance with the current editions of the following references:
RNZ 9806, Specification for Slurry Surfacing RNZ 9806: June 2010, *Roading New Zealand*, available at
<http://www.roadingnz.org.nz/sites/roadingnz.org.nz/files/RNZ%209806%20Slurry%20Seal%20Specification%20June%202010.pdf>;
ISSA A105 Recommended Performance Guideline for Emulsified Asphalt Slurry Seal A105 (Revised February 2010) International Slurry Surfacing Association available at
<http://slurry.org/downloads/A105.pdf>;
ISSA A143 Recommended Performance Guideline For Micro Surfacing A143 (Revised February 2010), International Slurry Surfacing Association available at
<http://slurry.org/downloads/A143.pdf>;
Contract quality plan.
- Definition
Company procedures refers to all documented policies, procedures, and methodologies of the candidate's employer at the time of training including but not limited to those relating to health, safety, environment, quality, and operations.
PSD means particle size distribution.
Slurry surfacing is the generic term for a mix of asphalt emulsion binder, crushed aggregate, and stabilising filler. A development of slurry using a polymer modified binder and selected aggregates is known as *micro surfacing*.

Outcomes and evidence requirements

Outcome 1

Complete and store records for slurry surfacing construction.

Evidence requirements

- 1.1 Construction records are completed and stored in accordance with contract quality plan and company procedures.
- Range tack coat binder quantities, emulsion used, aggregate used, slurry samples, slurry tonnage, dimensions, layer thickness, test strips.
- 1.2 Plant and labour records are completed and stored in accordance with company procedures.
- 1.3 Site records are completed and stored in accordance with contract quality plan and company procedures.
- Range site instructions, tasks completed; may include – site conditions, site exceptions, client communication, public communication, site timings such as start, finish, downtime, stoppage, non conformance, traffic management details, roadmarking completed.

Outcome 2

Take samples for slurry surfacing construction.

Evidence requirements

- 2.1 Samples are taken from aggregate stockpiles and recorded in accordance with contract quality plan.
- Range sand equivalent, moisture content, gradation, conformance testing, mix test.
- 2.2 Samples are taken from emulsion tank and recorded in accordance with contract quality plan.
- Range binder content, sieve test, PSD test, mix test.
- 2.3 Slurry samples are taken and recorded in accordance with contract quality plan.
- Range binder content, gradation.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Interpret infrastructure plans and set-out information		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to: interpret infrastructure plans and set-out information.
----------------	--

Classification	Infrastructure Works>Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
As-built refers to what is actually constructed as opposed to that which was planned.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Set-out means to set out site by survey method using pegs.

Outcomes and evidence requirements

Outcome 1

Interpret infrastructure plans and set-out information.

Evidence requirements

- 1.1 Infrastructure plans are interpreted in terms of the location of various works on site.

Range	civil and roading – earthworks, drainage, underground services, surfacings, in-ground structures;
-------	---

roading may include but is not limited to – intersections, street furniture, bridging, landscaping treatments, footpaths, vehicle parking.

- 1.2 Infrastructure plans are interpreted in terms of specified survey set-out requirements.

Range scope of work, survey control, as-builts, special project needs, tolerances, information projected by others.

- 1.3 Levels are verified on site in relation to infrastructure plans and in accordance with company requirements.

Range may include but is not limited to – visual checks, clear markings, survey protection, set-out sufficiency, practicality.

- 1.4 Positional requirements are confirmed.

Range control points, off sets.

Replacement information	This unit standard replaces unit standards 6428 and 22294.
--------------------------------	--

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Mount gantry signs		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to prepare for and carry out the mounting of gantry signs.
----------------	---

Classification	Infrastructure Works>Infrastructure Civil Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
As-built refers to what is actually constructed as opposed to that which was planned.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Gantry means a traffic sign assembly in which signs are mounted on an overhead support.
Set-out means to set out site by survey method using pegs.

Outcomes and evidence requirements

Outcome 1

Prepare for the mounting of a gantry sign.

Evidence requirements

- 1.1 Location of proposed gantry is identified and marked in accordance with contract specifications.

- 1.2 Locations of existing services are identified and marked in accordance with service authority plans and records.
- 1.3 Plant and equipment are confirmed in accordance with contract specifications and company requirements.

Outcome 2

Carry out the mounting of a sign gantry.

Evidence requirements

- 2.1 Fittings are installed in accordance with contract specifications.
- 2.2 Gantry is erected in accordance with contract specifications.
- 2.3 Locations of erected gantry are recorded on as-built plans in accordance with contract specifications.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	101
--	-----

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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Construct kerb and channel		
Level	4	Credits	8

Purpose	People credited with this unit standard are able to prepare for kerb and channel operations; excavate and prepare foundation material; and set out, form, place, finish, and cure kerb and channel.
----------------	---

Classification	Infrastructure Works> Infrastructure Civil Works
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- 2 Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Set-out means to set out site by survey method using pegs.

Outcomes and evidence requirements

Outcome 1

Prepare for kerb and channel operations.

Evidence requirements

- 1.1 Job instructions and extent of work are confirmed in accordance with contract specifications.

- 1.2 Adjacent landowners and members of the public affected by the specified project are notified in accordance with contract specifications and company requirements.
- Range signs, notices in letterboxes, shifting vehicles, vehicle access, clearing obstructions.
- 1.3 Hazards are identified and controlled in accordance with site safety plan and company requirements.
- 1.4 Resources required to carry out the job are confirmed in accordance with company requirements.
- Range plant, equipment, personnel, materials, tools.
- 1.5 Site is made secure in accordance with site safety plan.
- Range safety barriers, traffic signs, alternate access.
- 1.6 Underground services are identified and protected in accordance with company and service provider requirements.
- 1.7 Site measurements and set-out details are confirmed with supervisor in accordance with contract specifications.
- Range at least three of – offsets, levels and locations, gradients, crossing, stormwater outlet, tie-in.

Outcome 2

Excavate and prepare foundation material.

Evidence requirements

- 2.1 Job is set out in accordance with contract specifications.
- 2.2 Site is excavated to specified width, depth, gradient, and length.
- 2.3 Foundation conditions and stability are confirmed with supervisor in accordance with company requirements.
- 2.4 Foundation is prepared to specified levels, dimensions, and compaction.

Outcome 3

Set out, form, place, finish, and cure kerb and channel.

Evidence requirements

- 3.1 Equipment is set up to achieve specified dimensions and grades.

Range at least two of the following – boxing, stringlines, laser lines, kerb and channel machine;
includes correct mould if kerb and channel machine is used.

- 3.2 Vehicle and pedestrian paraplegic crossings are located as shown on plan.
- 3.3 Stormwater connections are located as shown on plan.
- 3.4 Concrete of specified type and strength is placed and compacted in accordance with contract specifications and company requirements.
- 3.5 Crossing and drainage connections are constructed in accordance with contract specifications.
- 3.6 Concrete is finished in accordance with contract specifications for floating, plastering, brooming, edging, and jointing.
- 3.7 Formation of joints is carried out in accordance with contract specifications.
- 3.8 Concrete is cured in accordance with contract specifications.
- Range appropriate length of time;
one of the following – covering, curing membrane, finely sprayed water.
- 3.9 Site is maintained during curing period in accordance with site safety plan.

Replacement information	This unit standard replaced unit standards 22284 and 22285.
--------------------------------	---

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 Infrastructure ITO at askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Explain pavement failure and restoration		
Level	4	Credits	3

Purpose	People credited with this unit standard are able to explain pavement failure and restoration.
----------------	---

Classification	Infrastructure Works> Road Maintenance
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard may take place in a workplace environment and/or provider environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- 2 Evidence is required for pavement failure in sealed and unsealed roads caused by water, subgrade shape, and traffic; and at least two restoration techniques such as stabilisation, mill and mix, and excavation.
- 3 Definition
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Explain pavement failure and restoration.

Evidence requirements

- 2.1 Pavement failure areas are identified and reasons for the failure are established.
- 2.2 Selection of pavement restoration method is explained in relation to the failure areas identified.
- 2.3 Pavement restoration details of are outlined in accordance with company requirements.

Range must include but is not limited to -- materials, cost, location, plant and equipment, environment.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	101
--	-----

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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Load, secure, and transport infrastructure works materials, small plant, and equipment		
Level	3	Credits	2

Purpose	People credited with this unit standard are able to safely load, secure, and transport materials, small plant, and equipment used for infrastructure works activities.
----------------	--

Classification	Infrastructure Works > Generic Infrastructure Works
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements apply to this unit standard, and must be complied with:
Health and Safety in Employment Act 1992;
Land Transport Act 1998;
Land Transport (Driver Licensing) Rule 1999;
Land Transport (Driver Licensing) Amendment Rule 2006;
Land Transport (Road User) Rule 2004.
- 2 This unit standard does not include the loading, securing, and transport of bulk materials, large plant and equipment, or dangerous goods/hazardous substances.
- 3 Information relating to the maximum permitted vehicle weights and dimensions can be found in Land Transport Rule: Vehicle Dimensions and Mass 2002 and Land Transport NZ Factsheets, 13a (*Heavy Rigid Vehicles*) and 13c (*Towing and Trailers: full, semi, simple, pole, A- and B-train*).
- 4 Assessment against this unit standard must be based on evidence from a workplace context.
- 5 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Load platform is the part of the vehicle designed to carry goods.
Load restraint systems are methods of securing loads to prevent load movement during deceleration in forward or rearward direction, during cornering or while travelling over undulating roads. Normally provided by anchor points, baulking arrangements securely attached to the vehicle, or direct or indirect restraint between the load and the load platform.

Load securing devices are items used to secure loads and may include clamps, chains, webbing straps, rope, head/side boards, and tensioners.

Outcomes and evidence requirements

Outcome 1

Prepare for loading a vehicle with materials, small plant, and equipment for infrastructure works activities.

Evidence requirements

- 1.1 The load weight is determined, and the load width, height, and length are checked in accordance with company requirements.
- 1.2 The vehicle selected is appropriate for the load type, weight, and dimensions.

Outcome 2

Load the vehicle.

Evidence requirements

- 2.1 The load is distributed safely within the load platform to meet legal weight and dimension requirements.
- 2.2 Action is taken to vary the load as required in accordance with company requirements

Outcome 3

Restrain, secure, and protect the load for infrastructure works activities.

Evidence requirements

- 3.1 The load is restrained and secured in accordance with company requirements.
- 3.2 Load restraint systems, and securing devices are used as appropriate to the load and as required by the Truck Loading Code and company requirements.
- 3.3 The load is protected from the environment in accordance with company requirements.

Outcome 4

Transport the load for infrastructure works activities.

Evidence requirements

- 4.1 The load is transported safely in accordance with legal and company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Determine, evaluate, and report on precision and bias in civil engineering laboratory proficiency data		
Level	5	Credits	6

Purpose	People credited with this unit standard are able to determine, evaluate, and report on precision and bias in civil engineering laboratory proficiency data.
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable rules, standards, and codes include but are not limited to: ISO/IEC 17025:2005 General requirements for the competence of testing and calibration *laboratories*, available from <http://www.iso.org/iso/store.htm>; ASTM C802, ASTM D7372, ASTM E691 or ISO 5725-2, ISO 13528 - can be found at <http://www.astm.org/>.
- 2 Assessment against this unit standard must be based on evidence from workplace proficiency data.
- 3 Definitions
Evaluate refers to interpreting test results in terms of the relevant test method, client processes and the project. The evaluation must identify options for corrective action and the scientific basis for these corrective actions. Components will vary between tests and include but are not limited to – the evaluation of task performance, compliance with organisational and test method requirements, from sample and equipment preparation to the calculation and reporting of results.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Proficiency data includes own laboratory's proficiency data in relation to other laboratories.

Outcomes and evidence requirements

Outcome 1

Determine, evaluate, and report on precision and bias in civil engineering laboratory proficiency data.

Evidence requirements

- 1.1 Analysis is carried out to determine precision and bias in accordance with organisational requirements.
- Range may include but is not limited to – repeatability, reproducibility, assigned value, reference value, grand mean, mean.
- 1.2 Precision and bias is evaluated in terms of the accepted true value.
- 1.3 Own laboratory's performance is evaluated in relation to the outcomes of the proficiency data in accordance with organisational requirements.
- Range includes but is not limited to z-scores.
- 1.4 Own laboratory's performance is reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Apply mathematical methods to civil engineering laboratory testing		
Level	3	Credits	4

Purpose	People credited with this unit standard are able to apply mathematical methods to civil engineering laboratory testing.
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against Evidence requirement 1.1 must be based on evidence from a laboratory spreadsheet.
Evidence for the balance of Outcome 1 must include working formulae.
- 2 Definition
Spreadsheet refers to automatically calculating input/output worksheet for example Microsoft Excel, Laboratory Information Management System (LIMS), programmable calculator, or other programmes.

Outcomes and evidence requirements

Outcome 1

Apply mathematical methods to civil engineering laboratory testing.

Evidence requirements

- 1.1 Laboratory spreadsheet data is validated using manual calculations.
Range at least three different test method spreadsheets.
- 1.2 Physical quantities are calculated and expressed in metric and imperial units.
Range physical quantities – area, volume, density, force, stress;
at least four different units showing working formulae.
- 1.3 Calculations of statistical information are performed from inter-lab proficiency test data.
Range statistical information includes but is not limited to – mean, standard deviation, mode, median, range;
at least one inter-lab proficiency test.

- 1.4 A distribution plot is produced from inter-lab proficiency test data.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory fresh and hardened concrete sampling		
Level	4	Credits	6

Purpose	People credited with this unit standard are able to describe civil engineering laboratory fresh and hardened concrete sampling.
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to:
 Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments;
 For fresh concrete:
 NZS 3112: Part 1: 1986 *Fresh concrete methods*, available from <http://www.standards.co.nz>;
 CCANZ publications IB 48, IB 49, IB 50, IB 51, IB 53, IB 72 available from: <http://www.ccanz.org.nz/documents.aspx>.
 For hardened concrete:
 ASTM C42/C42M *Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete* and ASTM C823 / C823M *Standard Practice for Examination and Sampling of Hardened Concrete in Constructions* available from <http://www.astm.org/>;
 ISO1920-6 *Testing of Concrete Part 6: Sampling, preparing and testing of concrete cores* available from <http://www.iso.org/iso/store.htm>.
- Range
 fresh concrete -- snatch and representative samples taken randomly and selected, in two different scenarios;
 hardened concrete -- drilled and sawed sampling techniques.
- Definitions
Describe refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between the tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. *Describe* does not include the explanation of results, the interaction between tests or their scientific basis.
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may

include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.

Samples include

Fresh concrete - snatch or representative samples taken randomly or selected from the following scenarios; placed concrete, agitator, paving mixer, open top container, pump outlet;

Hardened concrete - cylindrical drilled cores, sawed beams, sawed cubes.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory fresh and hardened concrete sampling.

Evidence requirements

- 1.1 The methods of sampling are explained in terms of their procedure, use, limits, and organisational requirements.
- 1.2 The documentation requirements are described in accordance with sampling and organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory concrete sampling		
Level	4	Credits	4

Purpose	People credited with this unit standards are able to perform civil engineering laboratory concrete sampling.
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations, rules, standards and codes include but are not limited to:
 Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments;
 ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>
For fresh concrete:
 NZS 3112: Part 1: 1986 *Fresh concrete methods*, available from <http://www.standards.co.nz>;
 CCANZ publications IB 48, IB 49, IB 50, IB 51, IB 53, IB 72 available from: <http://www.ccanz.org.nz/documents.aspx>.
For hardened concrete:
 ASTM C42/C42M *Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete* and ASTM C823/C823M *Standard Practice for Examination and Sampling of Hardened Concrete in Constructions* available from <http://www.astm.org/>;
 ISO1920-6 *Testing of Concrete Part 6: Sampling, preparing and testing of concrete cores* available from <http://www.iso.org/iso/store.htm>.
- Evidence is required for either fresh or hardened concrete.
- Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results.
 Perform does not include the evaluation or the troubleshooting of tests.

Samples include -- 1. *Fresh concrete*: snatch or representative samples taken randomly or selected from the following scenarios; placed concrete, agitator, paving mixer, open top container, pump outlet; 2. *Hardened concrete*: cylindrical drilled cores, sawed beams, sawed cubes.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory concrete sampling.

Evidence requirements

- 1.1 Sampling is planned in accordance with concrete test and organisational requirements.
- Range may include but is not limited to – curing transport, access to sample site, customer communication.
- 1.2 Samples are taken in accordance with test and organisational requirements.
- 1.3 Samples are labelled and observations are documented in accordance with test and organisational requirements.
- 1.4 Samples are transported to testing location in accordance with test and organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Describe civil engineering laboratory concrete tests		
Level	4	Credits	8

Purpose	People credited with this unit standard are able to describe civil engineering laboratory concrete tests.
----------------	---

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- Applicable legislation, regulations rules, standards and codes include but are not limited to: the Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 3112: Parts 1 - 4:1986 available from <http://www.standards.co.nz>.
- Evidence is required for a minimum of two civil engineering laboratory concrete tests on fresh concrete and a minimum of two civil engineering laboratory concrete tests on hardened concrete.

Concrete tests for fresh concrete may include but are not limited to – Yield, Air Content, Slump, Spread, Unit Mass.

Concrete tests for hardened concrete may include but are not limited to -- Compression Strength, Flexural Strength, Density, Moulding of Cylinders Splitting Tensile for hardened concrete.
- Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information. *Describe* refers to stating the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the sample specifications, equipment requirements, environmental requirements, units of measurement, purpose and scope of the test. Describe does not include the explanation of results, the interaction between tests or their scientific basis.

Outcomes and evidence requirements

Outcome 1

Describe civil engineering laboratory concrete test methods.

Evidence requirements

- 1.1 The test method is described in terms of scope, sample requirements, equipment, processes involved and results.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment.
- 1.2 The factors that can influence the outcomes of the test are described in accordance with organisational requirements.
- Range may include but is not limited to – temperature, humidity, environment, condition of sample, size of sample.
- 1.3 The quality assurance of the test is described in accordance with organisational requirements.
- Range may include but is not limited to – test method, recording requirements, checking.

Outcome 2

Describe the reporting requirements and the meaning and applicability of civil engineering laboratory concrete test results.

Evidence requirements

- 2.1 The reporting requirements for test results are described in accordance with organisational requirements.
- Range may include but is not limited to – equipment, apparatus, samples, technique, calibration, environment, rounding, remarks.
- 2.2 The meaning and applicability of test results are described in accordance with organisational requirements.
- Range may include but is not limited to – uncertainty of measurement, specification reliability, limitations.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference

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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Perform civil engineering laboratory concrete tests		
Level	4	Credits	16

Purpose	People credited with this unit standard are able to: perform civil engineering laboratory concrete tests; and calculate and report results of civil engineering laboratory concrete tests.
----------------	--

Classification	Infrastructure Civil Engineering > Infrastructure Laboratory
-----------------------	--

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Applicable legislation, regulations, rules, standards and codes include but are not limited to: the Health and Safety in Employment Act 1992; Health and Safety in Employment Regulations 1995; Hazardous Substances and New Organisms Act 1996 and their associated regulations and subsequent amendments; ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*, available from <http://www.iso.org/iso/store.htm>; NZS 3112: Parts 1 - 4:1986 available from <http://www.standards.co.nz>.

- 2 Evidence is required for a minimum of two civil engineering laboratory concrete tests on fresh concrete and a minimum of two civil engineering laboratory concrete tests on hardened concrete.

Tests for fresh concrete may include but are not limited to – Yield, Air Content, Slump, Spread, Unit Mass for fresh concrete.

Tests for hardened concrete may include but are not limited to -- Compression Strength, Flexural Strength, Density, Moulding of Cylinders Splitting Tensile.

- 3 Definitions
Organisational requirements refer to instructions to staff on policy and procedures which are formally documented or generally accepted at the worksite. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods; standard operating procedures; specifications; manuals; and manufacturer's information.
Perform refers to completing the individual components of the test sequentially in terms of the relevant test method and organisational requirements. Components will vary between tests and include but are not limited to – the completion of tasks from sample and equipment preparation to the calculation and reporting of results.
Perform does not include the evaluation or the troubleshooting of tests.

Outcomes and evidence requirements

Outcome 1

Perform civil engineering laboratory concrete tests.

Evidence requirements

- 1.1 Samples and test equipment are prepared in accordance with organisational requirements.
- 1.2 Tests are performed in accordance with organisational requirements.
- 1.3 Test measurements are checked to be within precision requirements in accordance with organisational requirements.
- 1.4 Test equipment is maintained and stored in accordance with organisational requirements.

Outcome 2

Calculate and report results of civil engineering laboratory concrete tests.

Evidence requirements

- 2.1 Results are accurately recorded and calculations performed in accordance with organisational requirements.

Range may include but is not limited to – sample site, sample description.
- 2.2 Results are reported in accordance with organisational requirements.

Planned review date	1 June 2018
----------------------------	-------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Confirm alignment and reinstate gravity pipes and structures to correct line and level		
Level	4	Credits	4

Purpose	People credited with this unit standard are able to confirm the alignment of existing gravity pipes and structures and reinstate non-aligned gravity pipes and structures to the correct line and level.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements apply to this unit standard, and must be complied with: Health and Safety in Employment Act 1992; Territorial authority requirements.
- 2 Assessment against this unit standard must be based on evidence from a workplace context.
- 3 For Outcome 2 evidence is required for realigning at least one pipe and one structure. The pipes and structure may be for wastewater, or stormwater systems.
- 4 Definitions
Alignment includes the horizontal line and grade of a pipe, and position and level of a structure. For structures, determining alignment involves identifying what the correct position or level of the structure should be to ensure that the structure is functioning correctly, within the system.
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements, standards and codes of practice, which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Confirm the alignment of existing gravity pipes and structures.

Evidence requirements

- 1.1 The line and level of existing pipes and structures is confirmed in accordance with company requirements.
- 1.2 The extent of non-aligned pipes and structures is determined in accordance with company requirements.
- 1.3 Equipment is identified and described in relation to uses in confirming the alignment of existing gravity pipes and structures.

Range equipment -- laser level, dumpy level, flexible hose, smart level, boning rods, spirit level.

Outcome 2

Reinstate non-aligned gravity pipes and structures to the correct line and level.

Evidence requirements

- 2.1 The method of reinstatement is determined in accordance with company requirements.
- Range remove and replace, repair.
- 2.2 Bedding material is laid, as required, in accordance with contract specifications and company procedures to allow pipes and fittings to be installed in accordance with contract specifications, territorial authority requirements, and manufacturer's instructions.
- 2.3 Pipes and structures are reinstated in accordance with company requirements.
- 2.4 Testing is carried out in accordance with company requirements to determine that installed pipes and fittings function within tolerances in contract specifications and/or territorial authority requirements.
- Range low pressure air tests, water tests, high pressure water test, hydrostatic test, close circuit TV; two types of tests are required.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratraining.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Clean and maintain a pump station		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to clean, perform routine maintenance on, and report on the condition a pump station.
----------------	--

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 The following legislation and requirements apply to this unit standard, and must be complied with: Health and Safety in Employment Act 1992; Territorial authority requirements.
- 2 Assessment against this unit standard must be based on evidence from a workplace context.
- 3 Evidence is required for cleaning a pump station in either a water, or wastewater, or stormwater system.
- 4 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements, standards and codes of practice, which may apply across the company or to 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.

Outcomes and evidence requirements

Outcome 1

Clean a well and its external components.

Range cleaning with either a water blaster or a high-pressure hose.

Evidence requirements

- 1.1 The well is cleaned in accordance with company requirements.
- 1.2 The external pump components are cleaned in accordance with company requirements.

Range guide rails, pedestal, riser pipes, impellers, inlet screen, level control.

Outcome 2

Perform routine maintenance on a pump station.

Evidence requirements

2.1 The well is maintained in accordance with company and client requirements.

Range landings, surfaces, steps, covers/lids, vents, external structures.

2.2 The odour control devices are maintained in accordance with company and client requirements.

Range fans, filters, vents, vent pipes, odour beds, sprinklers.

2.3 The pump and controls are maintained in accordance with company and client requirements.

Range guide rails, pedestal, riser pipes, impellers, inlet screen, level control, motor.

Outcome 3

Monitor and report on condition of a pump station.

Evidence requirements

3.1 Pump stations are monitored and their condition is reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	xxx	N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Demonstrate knowledge of horizontal directional drilling		
Level	4	Credits	5

Purpose	People credited with this unit standard are able to demonstrate knowledge of horizontal directional drilling.
----------------	---

Classification	Infrastructure Works > Infrastructure Works Utilities
-----------------------	---

Available grade	Achieved
------------------------	----------

Explanatory notes

- 1 Assessment against this unit standard may take place in a workplace and/or provider environment.
- 2 Definitions
Drill pipes may be referred to as drill rods.
Forces may be referred to as loads.
Piloting may be referred to as steering.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of the horizontal directional drilling.

Evidence requirements

- 1.1 Horizontal directional drilling equipment is identified and described in terms of selecting appropriate equipment for different sites.
 Range equipment includes drill pipes, drill bits, mud recyclers, mud motors, reamers, swivels, locators, lubricants.
- 1.2 Horizontal directional drilling plant is described in terms of the application of small, medium, mid-range, large and maxi drill rigs, and water/fluid mixing tanks.
- 1.3 Piloting is described in terms of setting out grade, alignment, strike avoidance, rod and pipe bending, and radii tolerances.
- 1.4 Causes and effects of locating and tracking interference are identified and explained.
 Range at least three causes and effects.

- 1.5 Reaming is described in terms of the types and applications of reaming tools; assessment of ground conditions, and bore log information.
- 1.6 Pull back is described in terms of speed, forces, and disposal of returns.
- 1.7 Types of drill fluids are identified and described in terms of their purpose and their application in different ground conditions.

Range ground conditions include -- clay, sandy formations, hard rock.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1		N/A

Consent and Moderation Requirements (CMR) reference	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 (CMR). 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 askus@infratrain.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a hydro-excavator on infrastructure works sites		
Level	3	Credits	20

Purpose	People credited with this unit standard are able to: prepare for hydro excavator operations; operate a hydro excavator for infrastructure works, shut down, park, and secure vehicle.
----------------	---

Classification	Infrastructure Works>Civil Plant Operation
-----------------------	--

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.

Outcomes and evidence requirements

Outcome 1

Prepare for hydro-excavator operations.

Evidence requirements

- 1.1 Locations to be serviced are confirmed in accordance with job instructions.
Range soil type, cover material, access to site, traffic management plan.
- 1.2 Method of hydro-excavation is confirmed in accordance with job instructions.
Range may include but is not limited to – depth of excavation, requirements for shoring.
- 1.3 Sequence of work is confirmed in accordance with contract specifications and company and regulatory requirements.
- 1.4 Surrounding area is checked and location of underground services is verified in accordance with company requirements.
- 1.5 Vehicle is checked for currency of licence and registration.
Range road user charge, certificate of fitness, certificate of loading.
- 1.6 Vehicle and equipment pre-start check is undertaken prior to start-up in accordance with company requirements.
Range fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.7 Hydro-excavator is inspected for operability prior to start-up in accordance with company requirements.
Range couplings, valves, holding tank, water tank, hoses, auxiliary motors, control systems, jetting nozzles.

Outcome 2

Operate a hydro-excavator for infrastructure works.

Evidence requirements

- 2.1 Water tank is filled in accordance with company procedures and regulatory requirements.
Range may include but is not limited to – holding tanks, fire hydrants, water cart.
- 2.2 Hydro-excavator is operated in accordance with manufacturer's instructions, contract specifications and company requirements.
Range may include but is not limited to – suction, disposal, water blasting.

- 2.3 Waste from vehicle is emptied in accordance with company and regulatory requirements.
- 2.4 Holding tank is cleaned in accordance with company requirements.

Outcome 3

Refuel, park, and inspect a hydro-excavator secure equipment.

Evidence requirements

- 3.1 Hydro-excavator is refuelled and oils are checked in accordance with company requirements.
- 3.2 Hydro-excavator is parked, shut down safely, and secured in accordance with company requirements.
- Range securing may include ensuring safety of site for overnight parking.
- 3.3 Hydro-excavator is inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	xxxx	N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.

Title	Operate a water-jet unit for infrastructure works		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: prepare for water-jetting operations; operate a water-jetting unit; and refuel and park vehicle, and secure and inspect vehicle and water-jetting equipment.
----------------	---

Classification	Infrastructure Works>Infrastructure Works Equipment
-----------------------	---

Available grade	Achieved
------------------------	----------

Entry information	
Critical health and safety prerequisites	Class of driver licence appropriate to the vehicle being driven.

Explanatory notes

- The following legislation, regulations, and requirements must be complied with: Health and Safety in Employment Act 1992; The Health Act 1956, Health (Drinking Water) Amendment Act 2007, Health and Safety in Employment Regulations 1995; and Territorial authority requirements.
- Assessment against this unit standard must take place in a workplace environment. Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.
- Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to 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.
Job instructions are those given to the operator prior to undertaking a job. They may include site safety instructions, contract drawings, and written memos.
Manufacturer's instructions may include specifications, installation, handling, use and maintenance instructions and safety data sheets.
Water-jetting may also be referred to as hydro-blasting or flushing.

Outcomes and evidence requirements

Outcome 1

Prepare for water-jetting operations.

Evidence requirements

- 1.1 Locations to be serviced are confirmed in accordance with job instructions.
- Range access to pipework, traffic management plan.
- 1.2 Parties affected by site works are identified and notified in accordance with contract requirements and company procedures.
- 1.3 Method of water-jetting is confirmed in accordance with job instructions.
- Range provision for pipe material, location of other underground services, condition of pipe, maximum pressure.
- 1.4 Sequence of work is described in accordance with contract specifications and company requirements.
- Range may include but is not limited to – working with additional equipment such as CCTV and vacuum trucks, number of passes.
- 1.5 Surrounding area is checked and site is made secure in accordance with company requirements.
- 1.6 Vehicle is checked for currency of licence and registration.
- Range road user charge, certificate of fitness, certificate of loading.
- 1.7 Vehicle and equipment pre-start check is undertaken prior to start-up in accordance with company requirements.
- Range fuel, oil, water, grease, hydraulic oil, minor repairs.
- 1.8 Water-jet unit is inspected for operability prior to start-up in accordance with company requirements.
- Range couplings, valves, holding tank, water tank, hoses, auxiliary motors, control systems, jetting nozzles.

Outcome 2

Operate a water-jetting unit.

Evidence requirements

- 2.1 Water tank is filled in accordance with company procedures and regulatory requirements.

Range may include but is not limited to – holding tanks, fire hydrants, water cart.

2.2 Water-jet is operated in accordance with manufacturer's instructions, contract specifications, and company requirements.

Range includes but is not limited to – selection of correct nozzles, water pressure, capture and removal of debris, safety, cleanliness of the pipe, prevention of back flow.

Outcome 3

Refuel and park vehicle, and secure and inspect vehicle and water-jetting equipment.

Evidence requirements

3.1 Vehicle is refuelled and oils are checked in accordance with company requirements.

3.2 Vehicle is safely parked, and vehicle and water-jetting equipment are secured in accordance with company requirements.

Range securing may include ensuring safety of temporary worksite.

3.3 Vehicle and water-jetting equipment are inspected and any faults are reported in accordance with company requirements.

Planned review date	31 December 2018
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	xxxx	N/A

Consent and Moderation Requirements (CMR) reference	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 askus@infratrains.co.nz if you wish to suggest changes to the content of this unit standard.