



Standard for Inspection, Sampling and Testing

NZTA Z8:2022

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Standard note:

This Standard will be updated periodically to incorporate advances in technology and changes within the industry. Waka Kotahi NZ Transport Agency website should be checked to confirm the most recent edition of the specification.

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1. FOREWORD

This Standard is prepared by Programme and Standards, Transport Services, Waka Kotahi NZ Transport Agency (Waka Kotahi).

The objective of this Standard is to set out requirements for Consultants and Contractors undertaking the inspection, sampling and testing for contract works.

The main changes that have been incorporated into the update of this standard include:

Requirements for quality control activities in terms of inspection, sampling and testing are defined in more detail.

Refinement of the example template attached as Appendix 1.

Readers of this specification must also read and be aware of the contract manuals for professional services, construction and maintenance contracts, as well as the *Waka Kotahi NZTA Standard for Quality Management Plans – Z01*.

2. PURPOSE

There are two primary purposes of this standard:

- (a) To enable the Supplier to integrate the statutory, technical and performance framework requirements of the various forms of Waka Kotahi NZ Contract into their Quality Management Systems (QMS).

This being in the form of an Inspection, Sampling and Testing Schedule (termed “Schedule” for the rest of the document) embedded in their Quality Management Plan.

- (b) To enable the preparation and management of Inspection and Test Plans (termed “ITP” for the rest of the document) in a consistent manner, thereby ensuring the established standard of quality is achieved.

Together with the QMP, this Standard provides a basis for evaluating the effectiveness and efficiency of the Supplier’s Quality Management System (QMS).

2.1 Quality Management

Although suppliers are expected to have quality management systems certified to international quality standards (ISO 9001), the Contractor must have a project specific QMP that covers quality assurance and control requirements as defined in Z01.

Contractors not having quality management systems formally certified to ISO 9001 will at least have a QMP that comply with the requirements set out in Z01.

The Supplier is accountable for meeting the applicable standards and specifications, whether general requirements or other project requirements when delivering the scope of work as defined in the Contract. The Schedule, that meets the requirements defined in this document, must be used to facilitate quality monitoring and tracking of compliance to these requirements.

The purpose of inspection, testing, verification and certification on physical works contracts is to enable the Contractor and Consultant to provide tangible evidence to the Principal that the specified contract works have been delivered successfully by means of an appropriate systematic approach acceptable to all parties.

The Inspection and Test Plan (ITP) is used to ensure inspection, testing, verification and certification on physical works contracts are completed correctly and is the Contractor’s plan for managing quality on site.

2.2 Collaboration

The Principal, Consultant, and Contractor need to work as a team to produce, as a minimum, the required quality in investigation, design and construction that will deliver infrastructure capable of performing its intended function throughout its expected economic life span.

Although contract types and individual accountabilities varies, collaboration between the Principal, Consultants and Contractors is encouraged, starting with mutual access, review, and input to the Schedule. The Principal, Consultants and Contractors are therefore expected to work together to produce an integrated and project specific Schedule.

3. RELATED DOCUMENTS

Quality plans result from specific legal regulations, industry standards, organization policies and procedures, internal guidelines, and good practices need to meet Principal's requirements for products or services.

The Inspection, Sampling and Testing Schedule (Schedule) is referenced from four Waka Kotahi manuals, as follows:

- (a) Professional Services Contract, referenced from the State Highway Professional Services Contract proforma manual (SM030);
- (b) Physical Works Contract or a Maintenance Works Contract is referenced from the State Highway Construction Contract Proforma Manual (SM031), and the State Highway Maintenance Contract Proforma Manual (SM032);
- (c) NZTA Standard Z01, for all Quality Management Plans; and
- (d) NZTA Standard Z19 State highway environmental and social responsibility standard.

There are however further sets of documents that the reader must be aware of when preparing the Schedule and the ITP, some of which follow:

- (a) Waka Kotahi Specifications and Notes in <https://www.nzta.govt.nz/resources/nzta-register-network-standards-guidelines/?category=&subcategory=&audience=&term=register>
- (b) Waka Kotahi quality management requirements as given in <https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/quality-assurance/quality-assurance-documents/>
- (c) Project specifications and project specific requirements; and
- (d) Materials, mix designs and supplier related test methods and specifications.
- (e) Risk assessment on inspection, sampling, testing.

NOTE: This is not an exhaustive list, and readers shall comply with the most current publication of the specification being referenced.

4. DEFINITIONS

The following definitions apply to this Standard:

- **Approval:** A document or drawing, which is to be submitted for approval prior to proceed the activity.
- **Authorised person:** A person(s) who by reason of relevant professional qualifications, practical experience or expertise is delegated for various of inspection, sampling and testing activities, or make decisions as required in terms of this document and the project contract document.
- **Certification:** Certification is the formal confirmation of certain characteristics of materials, mix designs, supplies incorporated in the construction work were in conformity with the approved plans, designs and specifications, and exceptions or departures. This confirmation is often, but not always, provided by an external / independent review, inspection, assessment, or audit by a person qualified, designated or delegated to certify.
- **Consultant:** The definition can mean Designer, Independent Reviewer, Principal's Advisor / Site Representative or Engineer's Representatives, depending on the contract type and activity being undertaken.
- **Contractor:** The Person or Supplier whose tender has been accepted by the Principal or the Person who has been so named in the Contract, and includes the executors, administrators, and successors of the Contractor.
- **Contractor's QA Manager:** A Quality Manager appointed to act independently of day-to-day delivery activities and to ensure that the requirements of the quality plan are implemented and maintained;
- **Hold Point:** A Hold Point is a mandatory verification point beyond which work cannot proceed without approval by the Authorised Person or designated authority, carried out at specified points in the works when certain inspection action(s) have to be completed, as defined by the contract documents. Work cannot proceed until the Hold Point has been released by the person(s) who inspected the work and is designated or delegated as the Authorised Person.

- **IANZ Accredited Laboratory test result:** An IANZ Accredited Laboratory test result, is a test result contained in a test report issued by a laboratory accredited to NZS ISO/IEC 17025 that carries the endorsement of the accreditation agency and is included in the laboratory's Schedule to the Certificate of Accreditation. This term is interchangeable with "test result" or "laboratory test result", unless it is specifically designated as not requiring accreditation.
- **Independent Reviewer:** A delegated person or organisation, who holds a relevant professional qualification, practical experience or expertise which qualifies them to examine or review whether a specific project component is compliant with specifications and other requirements, or whether action is required to remediate or prevent failure or carry out technical reviews that drill down into a specific part of a project.

In the role, they are delegated to:

- Collect project information and data, either from the contract parties or directly from the testing facilities.
- Analyse this data and information and provide a contextual comparison with good practice and specifications.
- Recommend improvements or non-conformances, where appropriate.
- Document findings and recommendations in a report to the Principal or his agent.

The Independent Reviewer shall not be involved in any activities related to the particular job for which the Reviewer is hired. This includes employee of the Supplier or the Partners or the Principal.

- **Inspection:** Inspection is the process of measuring, examining, and testing to gauge one or more characteristics of a product, component or service, and the comparison of these with specified conformance requirements. Inspections are generally related to undertaking and achieving sign-off for contract specific Hold Point activities. Inspections are generally used as part of the verification process.
- **Inspection and Test Plan (ITP):** An Inspection & Test Plan (ITP) is a document detailing a systematic approach to testing a system or product and is aimed at verifying that the contract works could be or have been delivered in compliance with relevant standards and specifications.
- **Inspection, Sampling and Testing Schedule (ISTS):** An ISTS, termed the "Schedule" is a quality management planning tool developed to meet the contract-specific conformance and compliance requirements and, as a minimum, meet the testing and inspection requirements and frequencies of the relevant Waka Kotahi technical specifications, testing specified within this document and other project-specific specifications and standards.
- **NZS ISO/IEC 17025:** ISO 17025 is a quality management standard and the main standard for testing and calibration laboratories to which IANZ testing laboratories are accredited.
- **Key Performance Indicator(s) (KPI):** A Key Performance Indicator is a measurable value that demonstrates how effectively the Supplier or project / alliance team is achieving a contractual requirement outlining the compliance limits for various elements of work.
- **Lessons Learned:** Lessons learned are the learnings gained from the process of performing the project and are experiences distilled from past activities that should be actively considered in future actions and behaviours. Innovative approaches and good work practices can be shared with others.
The lesson may be positive i.e. gained from a success or innovation, or negative, as in a mishap or failure. In all cases, a lesson must be significant in that it has a real or assumed impact on operations; factually valid and technically correct; and applicable in that it identifies a specific design, process, or decision that reduces or eliminates the potential for failures and mishaps or reinforces a positive result.
- **May:** Term used to indicate something that is optional and may be considered for use. "May". verb. a choice to act or not, or a promise of a possibility, as distinguished from "must" or "shall," which makes it imperative.
- **Must:** Term used to indicate something that is mandatory or required by law and is equivalent to "shall". Also, "must not" indicates something is prohibited.
- **Non-conformance reports (NCR):** A report, created by the Supplier as part of their quality system, or instructed by the Principal or Consultant, and issued by the Contractor, that addresses specification deviation or work that fails to meet agreed KPIs, quality standards or performance expectations.

- **Principal/Client:** The person named as such in the Special Conditions and includes its executors, administrators, and successors.
- **Quality Assurance (QA):** The maintenance of a desired level of quality in a service or product, especially by means of attention to every stage of the process of delivery or production. QA concentrates on providing confidence that contract quality requirements will be fulfilled and is a commitment to quality by the Supplier.

Quality Assurance is generally embedded into contracts as part of the Contractor's general obligations as in Clause 5 of NZS 3910: and NZS 3916: or as part of the Principal's Quality Assurance requirements as in NZTA Standard Z01.

- **Quality Audit:** A quality audit is an ad hoc or regular, systematic review of activities to identify whether these activities are performed in line with appropriate practice, processes and procedures. The goal of carrying out a project quality audit is to reveal any missing or inefficient policies, procedures and/or processes that reduce quality levels and increase the probability of project failure.

A Quality Audit may be carried out by an experienced and/or qualified person designated to do so by the Principal, Consultant or Contractor.

- **Quality File (QF):** The Contractors secure document and record control storage and retrieval system holding all information, in agreed digital form(s), from the QMS, ITP, quality assurance and control activities, communications, reports, drawings and files on the quality of the works.

All the information held in the Contract specific QF will remain with the Principal for permanent record.

- **Quality Management Plan (QMP):** A document, or several documents, prepared by the Consultant and/or the Contractor, that together specify quality standards, practices, resources, specifications, and the sequence of activities relevant to a particular product, service, project, or contract. The plan looks at specific areas of a project that could affect quality and outlines the ways to mitigate that risk.

The Quality Management Plan assumes the role of an actionable plan and may be represented by more than one type of document to produce the required quality outcome.

- **Requests for Information (RFI):** Formal requests for specific information made by any party to the Contract to any other party to the Contract.
- **Random sample:** A sample drawn from a lot / source / stockpile in which each increment in the lot has an equal probability of being chosen.
- **Random Verification Testing (RVT):** The random inspection, sampling and testing of the contract works by the Consultant / Principal / Independent Reviewer, to progressively monitor and report on the quality of the works.
- **Sampling:** Taking a small physical quantity of material or a measurement obtained in some manner so that the portion (sample) is representative of the whole.
- **Shall:** Term used to indicate something that is mandatory or required by law. Similar to "must".
- **Should:** Term used to indicate a recommendation based on Principal's requirements. The word "should" does not express a legal requirement.
- **Stratified random sampling:** Stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata. In stratified random sampling, or stratification, the strata are formed based on shared attributes or characteristics of the lot and allows a sample population that best represents the entire population being tested.
- **Supplier:** A legal entity be they a sole proprietorship, partnership, limited liability company or trading trust, engaged to provide the services set out in the contract documents.
- **Services:** To perform work, repair or maintenance for an agreed remuneration a business that offers or is contracted to carry out a particular type of help or work to a government entity / organisation that is responsible for a particular area of activity.
- **Source Documents:** are Waka Kotahi standards, specifications, notes, technical memos and project-specific specifications or requirements, as listed in the Contract.

- **Standard:** The reference document referred in the Contract, whether a Waka Kotahi approved regional or national document, or international document published by a recognised Standards organisation. Standards must be identified by their Standards organisation and number; e.g. AS/NZS 1906.3.
They are generally used to provide a means of compliance with this Standard.
- **Testing Laboratory:** Interchangeable with laboratory, testing facility, test provider, a testing laboratory is a laboratory, or similar setting, that has an acceptable quality management system in place, and has the ability and competence to provide testing conducted under controlled scientific conditions in a laboratory or in the field, producing test results that are accredited to NZS ISO/IEC 17025
- **Verification:** The formal, unbiased act or process of confirming, checking or establishing the truth, accuracy, compliance or validity of a piece of work, material or asset against an agreed KPIs, quality standards or performance expectations, either through research, examination, inspection or testing.
Verification includes information related to investigation, design, construction with assumptions, calculations, estimates, drawings, reports, and quantities and other records (compliant and non-compliant) required to carry out the act or process of verification against the agreed KPIs, design criteria, quality standards / specification or performance expectations, including non-compliant testing, or other non-conforming.
- **Waka Kotahi:** Waka Kotahi in this Contract means the New Zealand Transport Agency established as defined by Section 93 of the Land Transport Management Act 2003 with functions as set out in Section 95 of that Act.
- **Will:** Term used to indicate something that is mandatory or required by law. Similar to “must” and “shall”.

5. RESPONSIBILITIES

There are generally three or four parties involved with the delivery of infrastructure which are the Contractor (and their designer/s), Consultant and Principal. Each party has corresponding responsibilities or tasks involved in the quality chain, which may differ slightly in each contract type. The Quality Management Plan should specify the responsibilities of these parties in relation to the specific contract so they can be referenced at any time and no confusion or ambiguity exists.

5.1 General Responsibilities

General responsibilities of all parties to the Contract include:

- (a) Contractual commitment, ensuring that the project requirements are clear, concise, and appropriate.
- (b) Specification requirement and compliance, ensuring the most appropriate specification to ensure the product will last the design life.
- (c) Statutory obligations, including legal (NZ laws), environmental (Z19, consents, etc), stakeholder agreements, etc.
- (d) Performance, ensuring that the constructed asset is high quality, and will meet the design life.

5.2 Principal's Responsibilities

The Principal is responsible to:

- (a) maintain up to date standard technical specifications for transport infrastructure;
- (b) provide access to these, as well correctly referencing these from within contractual documentation;
- (c) assist the project team in establishing an inspection, sampling and test plan and schedule to see specifications are met;
- (d) engage Independent Reviewer for RVT and for assessment of any areas of failure or ambiguity or dispute, and;
- (e) review remedial plans for non-compliances.

5.3 Designer

The Designer is responsible to ensure infrastructure is designed to meet the Principal's requirements, are constructible and will fulfil the expected life cycle for the delivered assets. The designer may be employed by the Contractor, a Consultant, or the Principal.

5.4 Contractor's Responsibilities

Unless stated otherwise in the Contract documents, the Contractor is accountable for construction quality, i.e. material and constructed elements, ensuring compliance with the design, standards, specifications and other contract requirements. As such the Contractor's responsibilities include:

- (a) Undertake appropriate upfront investigation;
- (b) Constructing the works to the approved design;
- (c) Constructing the works to the required standard and with a high level of integrity;
- (d) Develop and implement quality control processes and procedures;
- (e) Monitoring of the quality and quality of material used in the construction works;
- (f) Submitting ALL test results of the materials (i.e. not only those meeting the requirements) used to the Consultant and Principal for ratification for use within the project; and,
- (g) Ensuring that the construction methodologies lead to compliance with specified requirements.

It is the Contractor's responsibility, based on a visual inspection, reviews, test results, or other methods as deemed appropriate to check compliance with the design and specifications, to ensure the above.

5.5 Consultants Responsibilities

Depending on the contract scope of services, the Consultant has an inspection, design, review, or audit role which includes the review of investigation and other quality related data, random verification testing and auditing requirements. It is required that the Contractor shall support and provide access to the Consultant/ Principal to undertake their obligations and shall give them ample notice for inspections, testing and review to ensure that their responsibilities are carried out comprehensively.

The Consultant / Principal shall have the right to declare the material or element non-compliant to contractual requirements, or unsuitable for use based on these responsibilities.

5.6 Independent monitoring

Responsibilities for Independent Monitoring is defined within Z/1- *Waka Kotahi NZ Transport Agency Standard for Quality Management Plans*.

6. INSPECTION, SAMPLING AND TESTING

6.1 Standard of Inspections (Visual Inspections)

Visual inspections must be carried out in addition to, and in support of, test results throughout the investigation, design, construction and handing over process, as well as any completed work as an integral part of quality control. Visual inspections must be carried out in a formal and structured manner by someone qualified, experienced and appointed. As a prompt to the inspector, and to limit any oversights, a flowchart/ plan/ checklist should be included with the test result analysis sheet and completed and "signed off" for each assessed lot.

Visible signs of distressed areas (in case of existing assets), poor workmanship, excessively variable properties, segregation, and/or any other visual defects constitute sufficient grounds for rejecting the work.

6.2 Standard of Sampling

Unless otherwise approved by the Consultant, the Contractor shall ensure that sampling included in the ISTS (and ITP) is undertaken by personnel certified competent by an IANZ accredited laboratory authorised to do so and signed off by a Laboratory Signatory.

This includes samples obtained from suppliers for the purposes of pre-approval compliance testing, including quarries.

Samples obtained from road layers or stockpiles shall be obtained using recognised stratified random sampling techniques, unless otherwise stated in the standards, specifications, or test methods. For existing roads, primary focus shall be around any distressed areas where test pitting or coring could be undertaken.

6.3 Standard of Testing

All testing of existing assets or physical works shall be carried out by an accredited testing organisation/ laboratory in accordance with the referenced standards and specifications that apply to the Contract, and completed by competent, suitably qualified & experienced personnel, and include as required, all IANZ Accredited Laboratory test results related to the element being inspected (i.e. not only compliant test results). Testing should be an independent process handled by impartial technicians.

The Contract may stipulate further sampling requirements and testing frequencies in addition to those contained in this Standard.

6.4 Random Verification Testing (RVT)

6.4.1 General

The Principal/ Principal's Advisor will use RVT to progressively monitor and if necessary, randomly sample and test the Contract works in accordance with the design, specification and referenced regional, national or international standards. The RVT plan shall be compiled by the Principal's authorised person in collaboration with the Consultants and Contractor and will be risk based.

The Contractor shall support and provide access to the Principal/ Principal's Advisor to undertake RVT as specified in the Contract (RVT schedule) and notified in writing at least 24 hours in advance.

RVT results shall be made available to all interested parties as soon as it is available. Where RVT identifies a non-conformance with specifications or other requirements, the Contractor shall be informed immediately, the affected works shall stop, a non-conformance report shall be raised, and the Contractor shall undertake corrective actions in accordance with the approved QMP.

The affected work shall only restart when written approval is received from the Principal/ Principal's Advisor/ Independent Reviewer.

6.4.2 Performing verification sampling and testing

The Principal, or their Agent's personnel shall perform the random verification sampling and testing. The verification sampling and testing shall not be performed by the Contractor or their sub-contractors.

There are however situations where labour regulations, hazardous conditions, and/or liability issues may dictate some contractor involvement in random verification sampling. In these situations, the involvement of contractor shall be limited to the extent that they are not deemed to be in control of the sampling, and the contractor's personnel may assist in obtaining independent random verification samples when all the following requirements are adhered to:

- (a) The verification sample location or time has been randomly selected by the Principal or their Agent, details of which are given to the contractor immediately prior to sampling;
- (b) The Principal or their Agent controls the sampling process and is directing the taking of the verification sample;
- (c) The Principal or their Agent immediately takes possession of the verification sample;
- (d) The contractor's personnel are used only to provide labour to assist in physically obtaining the verification sample of the material;
- (e) The Principal or their Agent, is present to witness the taking of the verification sample; and
- (f) Both the Principal or their Agent, and contractor labour are *both* qualified sampling personnel.

Random verification sample independence should be maintained when the above requirements are met. However, these situations should be the exception and not the rule. The verification sampling is expected to be performed entirely by STD personnel or their representative in the majority of situations.

6.4.3 Difference in test results

Should one party disagree that a non-conformance exists, or in the event that the test results obtained through RVT contradicts the other party's test results to such an extent that a reduced quality outcome can be reasonably expected, additional testing shall be undertaken where possible.

The third test result shall be used to correlate the '*actual*' test result value with the other two results. If all three test results vary outside the limits for the test result, then the contractor's results shall be taken at face value, and the RVT test discarded. In the event that a third test cannot be undertaken, the RVT test result shall be taken as the '*actual*' value.

If the parties disagree with the Engineer's determination, the parties shall meet to resolve the issue amicably. Should it not be possible for the Parties to reach agreement, the Contractor may choose to Dispute the outcome in accordance with the General Conditions of Contract.

6.5 Test Responsibilities

Test responsibilities outline who will perform the test methods at each stage of the works. This allows test organizations to plan test equipment and other resources necessary to implement the test methods for which they are responsible.

Test responsibilities includes:

- (a) Compilation of Test Plans, including how stratified random sampling and testing will be undertaken on site,
- (b) What test data is to be collected,

- (c) How that data will be stored and reported, and
- (d) How and for how long samples will be retained for further testing.

A test plan shall be a record of the verification of all design specifications and requirements as agreed upon by all parties.

6.6 Ineffective Quality Assurance and/or Control

In cases where the Contractor does not comply with the quality requirements or the contract provisions, their QMS, and/or where the Contractor fails to properly operate and maintain an effective quality system, the Principal, or their Agent may:

- (a) Order the Contractor to identify the root cause/s for failure to operate and maintain an effective quality control system and take remedial action; or
- (b) In the case where the Contractor fails to implement the above, assigns outside professional staff to carry out the functions and operations of the Contractor's approved quality control plan, at the Contractor's own cost.

7. INSPECTION, SAMPLING AND TESTING SCHEDULE

7.1 General

Z08 is a standard document that covers approximately 80% to 90% of the compliance requirements for infrastructure projects. As such, it should be noted that the template included in Appendix 1 is NOT an exhaustive list of testing and other conformance requirements, nor is it a comprehensive list of areas to be covered. Each project will contain several additional items for specific design areas or innovations that need a project special requirement.

The contract-specific Schedule shall be compiled using, as a minimum, requirements listed in the template included in Appendix 1 to this document. This Schedule shall be further developed to meet the testing and inspection requirements and frequencies contained in the project specific technical specifications, requirements, and other detail design specifications.

7.2 Purpose

The overarching purposes of the Schedule are to:

- (a) Ensure conformance to contractual requirements
- (b) Ensure conformance to external and internal standards and procedures
- (c) Facilitate traceability
- (d) Provide objective evidence
- (e) Furnish a basis for future training; and
- (f) Summarise inspections and testing required for the project, allowing resource planning, including test certifications of laboratory and technicians.

7.3 Preparation of the Schedule

The person/s preparing the Schedule shall have a comprehensive understanding of the specific legal regulations, industry standards, organisation policies and procedures, internal guidelines, good practices, and other contractual requirements contained in the Technical Specifications and/or Detail Design Report for the various construction components.

The preparation of a contract-specific Schedule has multiple steps, closely linked to the preparation of the tender documentation as well as the Contractor's QMP. The following steps outline the basic steps required to identify the requirements, and prepare the Schedule:

- (a) During the preparation and approval of the Consultant's QMP, the Principal and Consultant shall confirm and agree on the scope and extent of the Contract-specific Inspection, Sampling and Test Schedule based on the template in Appendix 1.

- (b) The Contract-specific Schedule is produced by the Consultant to provide the Principal and Contractor with an independent review of the physical works outcomes, thereby enabling certification of specified works (or parts thereof).
- (c) The Contractor shall prepare his own Schedule, based on the template in Appendix 1 and the Consultant's Schedule, but aligned to their QMS, and incorporating additional in-house requirements.
- (d) The Principal, Contractor and Consultant shall confirm and agree on the scope and extent of the contract-specific Schedule, which is then incorporated into the QMP.
- (e) The Contractor shall then prepare work specific ITP's based on the Schedule in their QMP.

8. INSPECTION AND TEST PLANS

8.1 General

The Contractor shall prepare Inspection and Test Plans (ITP) for individual packages of work as per work breakdown structure (WBS) or lots plan. ITP's shall be reviewed by the Consultant and approved in accordance with Z01 and the Contractor's QMP before any physical work commences.

The ITP includes a combination of hold points, witness points, on-site inspections, sampling and testing, and regular laboratory testing.

Where projects are divided into separate, individual portions or lots that are substantially completed before the next, either contractually or by design, multiple ITPs shall be used to motivate compliance of the project. These ITPs may or may not be identical for all portions, but since there may be multiple establishments of the same or different specialist teams, they are separable by nature.

This Standard states which columns should be included in the ITP, and it is required that Consultants and Contractors develop their own preferred template. Appendix 2 provides two example templates which may be adapted as required. On occasion, the Principal may specify the use of a particular template in the contract documents.

8.2 Purpose

The ITP is the Contractor's plan for on-site management of the quality of a stage, element or aspect of the agreed works. The purpose of the ITP therefore is to:

- (a) Show the adequacy of the Contractor's systematic approach taken in the delivery of a stage or stages of the works in fulfilment of the design, specification, and other relevant requirements; and

Support progression of works with timely and explicit evidence of compliance and informed decisions.

The ITP is aimed at the construction of consistent quality and compliant physical works as per the required Contract outcomes.

8.3 Preparation of the ITP

The Contractor shall prepare the ITP(s) which shall be reviewed and accepted by the Consultant.

In preparing the ITP, the Contractor shall:

- (a) Review all requirements of the approved contract-specific Schedule as well as the contract programme, technical specifications and test methods which provide further guidance on the requirements. The Contractor shall review each of criteria documents in turn in a systematic manner and pick out the items which need to be listed on the ITP.
- (b) Consider each stage, element or aspect of the contracted works in turn, and provide details of how the criteria will be met, the evidence which will be produced, who should be involved in the assurance activity, and the type of inspection or test required to release a Hold Point.

Once completed, and well before construction starts, the Consultant shall review, comment on, and accept the ITP as part of the construction work package.

No work requiring sign-off (due to inspection and/or hold point restrictions) shall continue until the ITP(s) has been approved, unless approved in writing by the Consultant.

8.3.1 Elements of the ITP

The requirements of the various elements making up the ITP are explained further below.

a. Project element/aspect and/or stage

These are generally aligned to the contract programme i.e. the stages of delivery in chronological order, which are then assigned the Quality Assurance activity (e.g. procurement, temp works, investigation, design, construction activities).

It could be broken down into project stages, physical works elements, specific operations or tasks, or other individual activities as required by the standards and specifications.

b. Task Description

A description of each activity undertaken to ensure compliance of the project element/aspect and/or stage. Although Appendix A, and the contract-specific Schedule is given as Minimum Requirements, there are often addition in-house quality requirements.

The following are a few considerations in preparing these tasks:

- Pre-construction conditions: What needs to be in place before works can commence, e.g. issued for construction documentation, traffic management plans, review and approvals of methodologies, construction risk assessments, etc.
- Material Conformity: What actions need to be completed to ensure the materials are compliant? Do materials need to be approved? How must materials be stored? Do materials need specific certification?
- Site Works: Lists how the physical works on site will be inspected and tested.
- Off Site Manufacture: In cases where a product is manufactured away from site, appropriate consideration shall be given as to how the Contractor will ensure and demonstrate the product is compliant.
- Testing & Commissioning: This is generally the performance related testing of completed works and although pertinent to civil works, is often most significant for mechanical and electrical works.

c. Reference Document(s)

This column describes how compliance will be demonstrated. Reference documents can either be external documents such as test methods, specifications, standards or manuals, or manuals, or the Contractor's own internal in-house documents.

The document and applicable clauses, manual requirements and material's application requirements shall be documented. It is also useful to include details of the source document, including the revision number and physical location of the document.

d. Acceptance or Compliance Criteria

Acceptance criteria refers to a set of predefined requirements that must be met in order to be compliant (e.g. slump value, cylinder strength, density, moisture percentage, deflection etc.). Acceptance Criteria are a set of statements, each with a clear pass/fail result, that specify both functional and non-functional compliance requirements.

Acceptance criteria should be testable, clear and concise and understandable. Acceptance criteria look at the criteria from both the site manager/foreman and Authorised Person's standpoint.

e. Frequency of testing or inspections

The frequency of testing or inspections is the regularity of tests or inspections for a specific material type or construction element, or the environment in which the material is being used and is related to the accuracy of the test method and the risk of failure of that material or construction element. The frequency of testing is therefore context dependent and should be considered the absolute minimum requirement.

The frequency of testing is defined in the tender documentation in the form of Minimum Requirements, Project Requirements, and Specifications.

f. Quality Assurance Activity

Quality Assurance Activities is designed for product evaluation and process monitoring, ensuring that the materials, construction, and associated processes are correctly carried out as per the requirements. These activities include inspections and verifications by designated Authorised Persons.

g. Documentary evidence / Records

Clear indication of what records are collected as evidence that the specific ITP line element has been inspected, sampled, or tested.

8.4 On-site Quality Management and Control

The Contractor's work component, portion, or lot quality plan includes a detailed methodology for each element of the works and the contract-specific Inspection and Testing Schedule. These may be included as references to company specific manuals or standard work practices, or individual methodologies for each element to be investigated, designed, constructed, and included in the ITP(s). If, however, these critical aspects of the works don't be communicated effectively to the work crews, they are of little use.

It is therefore critical that the ITP and the construction methodology be discussed with the work team prior to start of any activities or at the beginning of each day including:

- (a) Work plan with task description
- (b) Mechanical equipment to be used
- (c) Sequence of activities and Hold Points
- (d) Acceptance or compliance criteria
- (e) Quality assurance activity including frequency of testing or inspections
- (f) Documentary evidence / records required

The ITP shall therefore be:

- (a) Held on site by the site engineer / manager, foreman or supervisor,
- (b) Used in planning and executing of the daily works and shall form part of the daily site planning,
- (c) Be kept up to date as a part of the daily quality records so that the quality processes are diligently adhered to on a continuous basis and are available for inspection at any time; and
- (d) Build the quality conformance documentation logically, as the works proceed until completion.

8.5 Verification

Verification activities are done by monitoring, technical reviews and inspections, and can be either part of an inspection or Hold Point, Witness Point or a precursor to one. As such, checklists, or Statements of Verifications, shall be prepared and signed by the QMP designated person (e.g. Site manager/foreman), and shall include as appropriate, IANZ Accredited test results. These shall be included in the Contractor's Inspection Request (IR).

Validation of the adequacy of the compliance of the stage of work being verified shall be based on evidence (both supplied and sought) of monitoring, testing, technical reviews, and inspections.

8.6 Hold Points

8.6.1 General

The hold points as specified in the Contract, ISTS and/or agreed with the Consultant in the ITP shall be the stages in the physical works (or parts thereof) beyond which work shall not proceed until:

- (a) the Contractor's Authorised Person can verify on behalf of the Contractor, based on evidence provided that all parts of the work up to that point meet the requirements of the Contract (Contractor's Hold Point), following which work can proceed to the next Hold Point, or;

- (b) the Consultant’s Authorised Person can certify on behalf of the Consultant (or Principal if so delegated), based on the evidence supplied and sought, that the completed work (or part thereof) meets the requirements of the Contract (Consultant’s Hold Point), following which work can proceed to the next Hold Point.
- (c) In the event that the Principal has specified Principal holds point(s), the Authorised Person on behalf of the Principal can certify, based on the evidence supplied and sought, that the completed work (or part thereof) meets the requirements of the Contract (Principal’s Hold Point), following which work can proceed to the next Hold Point.

Technical specifications may provide further guidance on the requirements for inspection and test schedules and hold points in physical works contracts that must be included in the ISTS.

8.6.2 Release of Hold Points

To release any Hold Point, the works’ compliance must be signed off as complete to a satisfactory standard by a person authorised in agreement with the Principal to do so.

8.6.3 Hold Point Inspections

A Hold Point is a generic term for a mandatory inspection or verification point, beyond which work cannot proceed without approval by the Authorised Person or the designated person and are carried out at specified points in the works or work element.

8.6.4 Types of hold points

There are several types of Hold Points, each with inspection criteria and release criteria, in an Inspection and Test Plan. The following Hold Points shall be used as a minimum requirement:

Hold Point Type	Authorised Person on-site attendance	Release conditions	Conditions for work to proceed
Surveillance (S)	Random attendance at site by Authorised Person	Authorised Person’s signature not required on the Inspection Request (IR) or its accompanying documentation	Contractor is responsible for total quality process and outcome
Witness(W)	Authorised Person attendance at site is expected, but not mandatory	Authorised Person’s signature is required on check sheet of Inspection Request (IR) and Checklist, but the signatory is not necessarily present to sign at the time.	Follow on work may proceed after documentation is completed, and the document(s) signed. Contractor is responsible for total quality process and outcome.
Mandatory Hold Point (HP)	Authorised Person’s on-site attendance is mandatory. This is generally a Consultant or Principal Hold Point.	Authorised Person’s signature is required on the check sheet of Inspection Request at the time of the inspection to release the work.	No work may proceed until release of the Hold Point
Review (R)	No attendance on site required by Authorised Person	Quality and construction documents to be reviewed by the Authorised Person off site.	Follow on work may proceed after documentation is completed, and the document(s) may be signed later.

Hold Point Type	Authorised Person on-site attendance	Release conditions	Conditions for work to proceed
		Authorised Person's signature not required on the Inspection Request or its accompanying documentation	
Records (RE)	No attendance on site required by Authorised Person	Quality documentation / Witness Point(s) to be recorded before proceeding. Authorised Person's signature not required on the Inspection Request or its accompanying documentation	Follow on work may proceed after quality documentation is completed. Contractor is responsible for total quality process and outcome
Commissioning Tests (CT)	This depends on the element being commissioned. Authorised Person's on-site attendance is generally mandatory. This is generally a Consultant or Principal Hold Point		

Table 1: Types of Hold Points

8.6.5 Authorised Person

The Authorised Person approving the Hold Point activity shall be in line with the relevant specification hold point requirements as specified in the Schedule in the QMP and the ITP. Other persons involved may also be noted, although without authority to act. This information is often presented with one column dedicated to each party / person.

8.6.6 Documentary evidence requirement.

Details of the evidence to demonstrate compliance should be provided including information on where it may be located. There are several document types, with the primary ones being discussed below.

- (a) Checklists: As part of their QMS, the Contractor shall have a suite of Checklists pertaining to each stage and element of the works as required. These checklists shall contain the details of what and how the inspection, verification or testing is to be completed and records the outcomes for signoff as required. Checklists are documents that must be controlled.
- (b) Test results: All test results relating to the lot or element being inspected or verified, whether compliant or not, shall be provided to the Authorised Person for their decision making as part of the inspection records for the required inspection.
- (c) Inspection reports: Inspection reports relate to elements and components manufactured off-site. Inspection reports are to be carried out by the person/s authorised by the manufacturer of those elements, e.g. ready-mixed concrete or pre-cast bridge elements.

The evidence received may include interim test reports as the final test results may take a period to be finalised. However, any approvals issued by the Principal or their Agent to proceed that are based on interim records are to be deemed as given at the Contractor's risk, with the Contractor accepting any and all risks associated with any and all work continued prior to obtaining IANZ accredited test reports.

8.6.7 Decision / Sign-off / Release of Hold Points

Work shall not proceed on a work element/stage until the Hold Point has been released by the person(s) authorised, designated or delegated to do so.

Compliance shall be verified, through inspection or provision of proof, and signed off by the Authorised Person as completed to a satisfactory standard, as stated in the Schedule and the ITP.

In this Standard, Hold Points shall only be released by the Authorised Person as follows:

- (a) The Authorised Person is delegated in the QMP by the Contractor to verify on their behalf; or
- (b) The Authorised Person is delegated as such by the Principal or Consultant to verify or certify on their behalf, or on the Principal's behalf, if so delegated. These Authorised Persons shall be listed in the QMP.

In all cases verification or certification shall be based on the evidence supplied and/or sought, that the completed work (or part thereof) meets the compliance requirements, following which work can proceed to the next Hold Point.

Work shall not under any circumstance prior to the quality documentation being completed to a level which will comply with audit requirements.

8.6.8 Dispute on the release of hold points

If the Consultant and Contractor cannot agree on release of a Hold Point, or ongoing review by the Consultant/Principal finds that the available evidence contradicts the Contractor's verification that a Hold Point has been achieved, the matter will be referred to the Principal for determination of that release.

If the Contractor disagrees with the Principal's ruling, the three Parties shall meet and make all reasonable efforts in good faith to resolve the disagreement promptly and in a manner, which minimises any impact on the performance of the Works.

Should it not be possible for the Parties to reach agreement, the Contractor may choose to Dispute the outcome in accordance with the General Conditions of Contract.

9. QUALITY RECORDS

Quality records include amongst others, inspections, tests, supervision reports & records, independent test lab test reports for raw and processed products, photographic evidence in real time, witnessed test results for manufactured products and systems, compliance inspection reports, and/or other certificates of compliance required as per the individual contract. At the end of the contract, the Contractor is required to provide complete evidence of compliance with the drawings and specifications for all items supplied and constructed under the Contract.

As such it is important that this evidence of compliance be compiled as the works are completed, and that it is done systematically.

9.1 Index of Records

The Contractor shall prepare an index of the records that will be accumulated and maintained during the progress of the work, and how decisions on quality will be made independently to the commercial drivers. This includes, as a minimum:

- a) Contract
- b) Element of the work performed
- c) Compliance by Lot / sections of work performed.
- d) Test and inspection reports

9.2 Reports and Forms

Test reports and inspections forms shall include, as a minimum:

- (a) Name of work items inspected or tested
- (b) Date
- (c) Name of inspector/tester (with name of organization or laboratory)
- (d) Hold Point / Inspection / ITP reference (with organization and document ID)

- (e) Specified requirements (Type of test or inspection to be performed)
- (f) Acceptance criteria
- (g) Observations/comments
- (h) Deviations/non-conformances
- (i) Corrective action
- (j) Evaluation of results
- (k) Signature of Authorised Person.

9.3 Provision of records for inspections

Unless otherwise approved by the Principal or Consultant, all test results (whether compliant or not), verification and certification on physical works, shall be submitted to the Authorised Person as part of the inspection records for the required inspection, in an agreed (digital) format, in a reasonable time prior to the inspection so that the Authorised Person may analyse the details thereof in preparation for the inspection.

Test reports and inspections forms shall identify, as a minimum:

- (a) The work accomplished;
- (b) Tests conducted;
- (c) Results of inspection and tests;
- (d) Nature of any defects or non-compliances found;
- (e) Hold point approvals or causes for rejection; and, if required
- (f) Proposed remedial action and corrective actions taken.

9.4 Records availability

All quality records, compliant or not, shall be recorded in the agreed digital format, and be available in real time basis to all parties on a secure website or "cloud" based storage and retrieval system as the Contractor's Quality File (QF).

The Principal and Consultant shall have real-time visibility of all verifications, inspections and test results, including those which are non-compliant, and can at any time query these, even if they are not involved in a hold point.

At the time the Certificate of Practical Completion is issued, the Contractor shall supply a digital archive of all records to Waka Kotahi so that this can be reviewed later in case the road fails prematurely.

9.5 Standard of records

All records shall be directly and fully traceable back to the location and work element at which the quality assurance action was undertaken which shall be established and agreed with the Consultant at the time of contract award, based on the Contractor's QMP. Metadata requirements for these records are:

- (a) The date and time of inspection or testing as required
- (b) A unique project number
- (c) State Highway or road name, Route Station and Route Position
- (d) Road layer, quarry or supplier
- (e) Test specific sequential numbering system or systems
- (f) Name and designation of the sampler and laboratory signatory for sampling
- (g) Name and designation of the test signatory for testing.

10. CERTIFICATION

10.1 Basis of certification

Certification of the compliance of the completed works (or parts thereof) shall be based on evidence (both supplied and sought) from Contractor's quality assurance system, independent monitoring and random verification testing, and includes a statement that the results supplied are representative of all conformance testing (both compliant and non-compliant) carried out on the constructed works/element/aspect being certified.

10.2 Statements of Certification

Statements of certification shall be delivered on ENZ/ACENZ Producer Statements (PS 1 - Design; PS 2 - Design Review; PS 3 – Construction, PS 4 - Construction Review) for works requiring building consent as stipulated in the contract documents.

For work not requiring building consent, design and review certificates, construction certificates and construction review certificates are to be used.

11. NON-CONFORMANCE REPORTS

If a non-conformance to a specification or other compliance requirement is identified during the verification or certification process, either by the Principal, Consultant or Contractor, the Contractor shall raise a Non-Conformance Report (NCR) within their Quality Management System.

11.1 Requirements of Non-Conformance Report

As a minimum, a Non-Conformance Report shall contain:

- (a) The main reason for the NCR and why the work doesn't meet the requirements.
- (b) What went wrong or a description of failure or deviation.
- (c) Explanation of causes (failure mode), corrective actions to be taken, and remediation of parts of the contract works that have not met quality standards, performance expectations or KPI.
- (d) Contractual implications; and
- (e) What can be done to prevent the problem from happening again.

The Contractor shall, after receipt of such notice, immediately take corrective action as required in the Contract.

11.2 Evaluation of non-complying work

NZ Transport Agency's Project Management Manual, SM011, allows for deviation from design or outcome due to economic, physical or other constraints, and *does not apply to works been carried out and not meeting standards*.

Where the proposed action on a nonconformance is a request to "*accept as is*", the request for acceptance shall be submitted by the Contractor to the Principal's Chief Engineer (or their delegate) for determination.

The request to acceptance of the non-compliant work shall be submitted prior to the relevant construction works being covered over, i.e. before another element makes that element of work inaccessible. For example, adding another layer on top of a non-compliant layer, or backfilling behind a non-compliant structure.

The request shall include all the aspects included in the SM011 deviation from standards process but shall also include the discounts and/or additional liabilities offered by the Contractor.

Results from NCR must be incorporated into Lessons Learnt documentation.

11.3 Disagreement with outcome

In the event that an NCR remains unresolved, such that the Consultant and Contractor cannot agree on the way forward, the matter will be referred to the Principal for determination of the way forward.

If the Contractor disagrees with the Principal's ruling, the three Parties shall meet and make all reasonable efforts in good faith to resolve the disagreement promptly and in a manner, which minimises any impact on the performance of the Works.

Should it not be possible for the Parties to reach agreement, the Contractor may choose to Dispute the outcome in accordance with the General Conditions of Contract.

11.4 Non-conformance Log

The Contractor shall develop and maintain a nonconformance log to enable tracking of all non-conformances. This log shall contain the following information, as a minimum:

- (a) Sequential, unique number
- (b) Date issued
- (c) Originator
- (d) System affected, drawing number/serial number
- (e) Description of nonconformance and source (Supplier, Subcontractor, Welder, etc.)
- (f) Recommended actions
- (g) Date closed
- (h) Actions taken
- (i) Principal approval for non-conforming work left in place
- (j) Remarks, as applicable

12. FINAL EVALUATION OF WORKS

12.1 Provision of records prior to Practical Completion

Once the Contractor considers that the construction and installation of works has been completed per the scope of contract, final inspections and tests have been performed, and all the necessary obligations have been fulfilled, the Contractor submits a written request for issuance of the Certificate of Practical Completion.

There are a number of processes and documentation which informs Practical Completion ahead of the defects liability and maintenance period. At this point, prior to the issuance of the Certificate of Practical Completion, these processes and/or documents shall be reviewed, summarised in a report format, submitted to the Engineer for review, and shall remain with the Principal for permanent record.

These contract specific processes and documentation can include, but are not limited to:

- Review of conformance with consents conditions (via CSVue).
- Review of project outcomes in relation to the approved partnership commitments.
- Review of stakeholder agreements and neighbour agreements.
- Review of outcomes sought, for example review against the project specific urban design principles and design framework.
- Review of ITS and monitoring systems related to the operations.
- Asset owner's manual and asset hand over (including where assets are handed over for others to manage).
- Quality assurance documentation in digital format, including the following as a minimum in draft format:
 - As-Built Records: Red-line drawings with all changes as constructed
 - Quality Management Plan, including the ISTS
 - Quality Records: Indexed in a transparent, simple manner, showing compliance of each lot, including:
 - Index of quality assurance lots and constructed sections.

- Signed-off copy of the ITP (multiple ITPs for each logical section completed if constructed in segments).
 - All quality, testing and inspection records relating to the various elements, including non-compliant results or inspections, unless these have been removed and replaced.
 - Completed and signed-off Non-conformance reports.
- Risk mitigation plans, and;
 - Any other information required in terms of the Contract.

The records shall be reviewed by the Principal, their Agent or Consultant for completeness and accuracy prior to release of the Certificate of Practical Completion.

13. APPENDIX 1: EXAMPLE OF PROJECT SPECIFIC ISTS

- Note 1: The following table contains an *example of an ISTS* showing a typical list of areas to be covered and *is not* an exhaustive list of testing required and may not comply with the latest technical specifications. As such it acts as a prompt and minimum start point for the Contract QMP Schedule.
- Note 2: The reader is strongly advised to obtain copies of the current version of the Source Documents to ensure all quality requirements are understood and complied with. Refer to Waka Kotahi web site for the latest versions of all specifications.
- Note 3: The inspection, testing and quality requirements of the Source Documents and their related Project Specifications, take precedence over those listed in the table below. In other words, the table below does not override or supersede any requirements of the Source Document specifications.
- Note 4: The ISTS Schedule is to be developed to meet the Project specific test frequencies, testing and inspection requirements as required by the relevant Waka Kotahi technical specifications and the related Project Specifications, and all processes and procedures within this document.

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
13.1 Earthworks Cut and Fill						
F/1	Fill and structural fill sources	Standard Compaction (including for additives i.e. lime and cement)	1 set (5 points) for each fill material and source (each 5,000m ³ thereafter)	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
		Natural Moisture Content				
		Plasticity Index				
		Particle Size Distribution				
F/1	Fill and culvert subgrade – construction.	Dynamic cone penetrometer to 3m.	1 test per 100m ² or minimum of 3 per section of subgrade excavated per day.	Surveillance (S)	Contractor	Yes, both sampling and testing
		Vane shear strength (Pilcon) to 3m.				
		Surface drainage and proof rolling.	Check for each completed section of subgrade per day.	Surveillance (S)	Contractor	
		Monitor culvert settlement.				
F/1	Structural fill – materials.	Organic content.	Continuous field observation and recording.	Surveillance (S)	Contractor	N/A
		Natural moisture content (laboratory)	Continuous field observation and 1 test set per 400m ³ of material cut.			Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		Vane shear strength (Pilcon)	1 test per 400m ³ of material	Surveillance (S)	Contractor	Yes, both sampling and testing
		Standard Compaction Solid density	1 set (5 points) for each fill material and source (each 5,000m ³ thereafter)	Surveillance (S)	Contractor	Yes, both sampling and testing
F/1	Structural fill - construction.	Standard compaction - Solid density	1 test per 2,000m ³ and at least 5 tests per material type.	Review (R)	Principal / Consultant	Yes, both sampling and testing
		Proof rolling per the Transport Agency's Specification F/1.	100% of completed subgrade area.	Mandatory Hold Point	Principal / Consultant	
		Density (nuclear densometer).	1 test set per 2000m ³ with a minimum of 5 test sets for each lift per area worked each day.	Review (R)	Principal / Consultant	Yes, both sampling and testing
		Water content (laboratory).				
		Air voids.				
		Vane shear strength (Pilcon).				
		Monitor construction pore pressures in fill and foundation settlement.				
F/1	Non-structural fill (landscape fill, noise bunds and dump areas) – construction.	Density (nuclear densometer- Direct Transmission).	1 test per 5000m ³ with a min of 2 tests for each area worked each day.	Mandatory Hold Point	Contractor	Yes, both sampling and testing
		Water content (laboratory).				
		Vane shear strength (Pilcon).				
F/1	Surcharge to structural fill.	<ul style="list-style-type: none"> Settlement monitoring locations at each change of surcharge height and each change of geological profile (but not greater than 50m between locations). Records to include date, level, weather and construction activity. 	Weekly	Witness(W)	Principal / Consultant	
13.2 All Aggregate Materials						
M/3, NZTA M/4	Specification for unbound subbase and basecourse: source rock tests or existing.	<u>Laboratory tests</u> <ul style="list-style-type: none"> NZS 4407, Test 3.10, The Crushing Resistance Test 	<ul style="list-style-type: none"> 2 tests per source, submitted 4 weeks before use in the works – not older than 2 years old. 1 test per 10,000m³ thereafter. 	Mandatory Hold Point (MHP)	Principal / Consultant	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		<ul style="list-style-type: none"> NZS 4407, Test 3.11 Weathering Quality Index Test NZS 4407, Test 3.15 The California Bearing Ratio Test (without a surcharge for at least 4 days). 	<ul style="list-style-type: none"> If the aggregate source or processing method is changed, the source properties shall be tested immediately, and the Engineer informed. Acceptance of basecourse aggregate from the varied process shall be at the discretion of the engineer until the source properties are shown by test to comply with this specification. 			
	Specification for unbound subbase and basecourse production tests (new & existing).	<u>Laboratory tests</u> <ul style="list-style-type: none"> NZS 4407, Test 3.6 Sand Equivalent Test NZS 4407, Test 3.5 Clay Index Test. NZS 4407, Test 3.4 Plasticity Index Test NZS 4407, Test 3.14 Broken Face Test NZS 4407, Test 3.8.1 Wet Sieving Test Table 4 basecourses refer Specification. 	Stockpile size: <ul style="list-style-type: none"> 0 to 400m³ - 2 tests 400 to 1,500m³ - 3 tests 1,500 to 4,000m³ - 4 tests >4,000m³ - 1 test for each additional 1,000m³ 	Mandatory Hold Point (MHP)	Principal / Consultant	Yes, both sampling and testing
T/15	Specification for unbound basecourse materials (new and recycling of existing)	Repeated Triaxial Load (RTL) tests, both wet/undrained, and dry/ drained at a compaction density for the RLT test of 95% of MDD at OMC for that specific material.	<ul style="list-style-type: none"> 1 full test set per M/3, M/4 material supply, prior to acceptance of that supply. Submitted 4 weeks before use in the works – not older than 2 years old. 	Mandatory Hold Point (MHP)	Principal / Consultant	Yes, both sampling and testing
T/19	<ul style="list-style-type: none"> Procedures for design and indirect tensile strength and UCS testing of modified and bound pavement materials (both new and recycling of existing). 	<ul style="list-style-type: none"> Lime Demand/ Cement Demand Value Mix Design Report. 	Every modified or bound Mix Design used in B/5, B/6, B7 or B/9.	Mandatory Hold Point (MHP)	Principal / Consultant	Yes, both sampling and testing
13.3 Pavement Layers						
F/1	Construction - Subgrade cut and fill, Subgrade Improvement Layers.	Subgrade fill as for structural fill – construction.	As for structural fill – construction.	Mandatory Hold Point	Principal / Consultant	
		Scala penetrometer inferred CBR to 1.5m depth.	1 test per 100m ² of prepared subgrade.	Mandatory Hold Point	Principal / Consultant	Yes
		Laboratory 4 day soaked CBR on undisturbed samples (fine grained subgrade materials).	1 test per 3,000m ² on each lift in top 1.0m of the earthwork minimum of 1 test for each area worked each day.	Review (R)	Principal / Consultant	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		Laboratory 4 day soaked CBR on samples re-compacted in the lab to field density (19mm down fraction of weathered greywacke subgrade materials).	1 test per 1,000m ² on each lift in top 1.0m of the earthwork.	Review (R)	Principal / Consultant	Yes, both sampling and testing
		Proof rolling per the Transport Agency's Specification F/1.	100% of completed subgrade area.	Mandatory Hold Point	Principal / Consultant	
		Benkelman beam test.	<i>Subgrade:</i> Two tests spread evenly across the formation every 10m; <i>Granular Pavement Layers:</i> Each lane both wheel tracks on each layer every 20m. <i>(For expressway non- structural pavement areas, one test every 10m per side, with the lateral position of the test coinciding with the likely wheel track of maintenance vehicles).</i>	Review (R)	Principal / Consultant	Yes
		Water content before spreading lime/cement.	1 test per 200m ² of prepared subgrade/SIL.	Surveillance (S)	Contractor	
		Water content after mixing lime/cement.	1 test per 450m ² of prepared subgrade/SIL.	Surveillance (S)	Contractor	
		Lime/cement spread rate.	1 test per 500m ² .	Surveillance (S)	Contractor	
		Stabilised layer thickness.	1 test per 20m.	Review (R)	Contractor	
		Surface shape.	1 test per 20m.	Review (R)	Contractor	
B/2	Unbound sub-base and basecourse construction.	Dimensional tolerances, uniformity, contamination and segregation.	Continuous monitoring.	Witness(W)	Contractor	
		<ul style="list-style-type: none"> NZS 4402, Test 4.1.3 to determine the laboratory Maximum Dry Density at the Optimum Water Content (OWC) of the aggregate used. The Solid Density of the aggregate tested according to NZS 4407, Test 3.7. 	1 test every stockpile or 1 test every 5,000m ³ (in place) whichever is lesser.	Witness(W)	Contractor	Yes, both sampling and testing
		Plateau density tests per the Transport Agency's Specification B/2 (both Back Scatter and Direct Penetration).	1 test per stockpile or a if any of the following conditions are met: <ul style="list-style-type: none"> If the Plateau Test Target Value is lower than 2% less than the specified density for the layer, based on the laboratory tested MDD. In this event, the compaction methodology shall be changed to include heavier compaction equipment with combination of various modes like high, low and static. Change in Source of material. Change in compaction equipment. 	Witness(W)	Principal / Consultant	Yes

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
			<ul style="list-style-type: none"> Visual change in subsurface or subgrade conditions. Change in gradation or type of material. Change in depth of lift, and Change in pavement design. 			
		Pavement layer compaction per the Transport Agency's Specification B/2. NDM with Direct Transmission (Method T23).	5 tests per 1,000m ² for the full depth each lift maximum 150mm to 200mm depending on the allowable maximum aggregate size.	Witness(W)	Principal / Consultant	Yes, both sampling and testing
		Layer thickness.	1 test per 20m.	Witness(W)	Principal / Consultant	
		Basecourse Degree of Saturation.	5 tests per 1,000m ² .	Mandatory Hold Point (MHP)	Principal / Consultant	Yes, both sampling and testing
		Running course quality.	Per Material.	Review (R)	Contractor	
		Basecourse surface preparation.	Pre-sealing inspection.	Mandatory Hold Point (MHP)	Principal / Consultant	
TNZ M/15.	Stabilising agents - Lime	Lime shall comply with TNZ M/15.				
	NZTA M15 Appendix 1 Sampling, Sample Preparation & Testing For Regular Control	Available Lime Index test - Section 28 of ASTM C25-06. Minimum grade for acceptance of quicklime or hydrated lime shall be 85%.	Sampling shall conform to ASTM C50-00 Refer M/15. Frequency of sampling shall be either: (a) A minimum of daily from the production process; or (b) Per truckload of product. Samples shall be at least 1kg for Quicklime and 0.51kg for hydrated lime.	Witness(W)	Principal / Consultant	Yes
	Sampling, sample preparation and testing of a job lot – Appendix 2 M15.	Job lot size & Number of incremental sub-samples	Sampling conforms to ASTM C50-00. 2 samples up to 2t and > 10 for a job lot of 50t with a linear variation between these limits. Sub-samples shall be at least 2kg for Quicklime and 1kg for hydrated lime.	Records (RE)	Contractor	Yes
	Quicklime and hydrated lime Job lot sample Particle Size Distribution. NZTA M15 Appendix 3	Particle Size Distribution BS 410		Records (RE)	Contractor	Yes
ZS 3122 Specification for Portland and blended cements (general and special purpose)	Stabilising agents - Cement	Cement shall comply with NZS 3122 Specification for Portland and blended cements (general and special purpose) for: <ul style="list-style-type: none"> General purpose Portland cement – Type GP General purpose blended cement – Type GB 	Every Batch – not more than 3 months old.	Records (RE)	Contractor	Yes

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result																		
		<ul style="list-style-type: none"> Special purpose low heat cement – Type LH 																						
B/5 <i>In Situ</i> modified subbase and basecourse	Mixing water	Water from sources other than public supply needs to have its suitability established. Include TDS, pH.	Each new non-potable water supply shall be tested.	Records (RE)	Contractor	Yes																		
B/6 Specification for the In-Situ Stabilisation of Bound Sub-base Layers.	Supply of stabilising agents.	Certificate of loading that contains the following information and shall be part of the project quality plan: <ul style="list-style-type: none"> Tanker's identification details including certification number; Product identification; Name of the supplier; Batch number and date of manufacture (if possible); Date, time and place of loading; Comments on the state of the tanker at the time of loading in terms of cleanliness, details of the previous load carried, and whether any residual product from the previous load remains; Details of any chemical or other substance added to the product before, during or after the loading procedure, if any; and, Net weight of product before and after discharge into the mechanical spreaders. 	Each load.	Records (RE)	Contractor																			
B/5 In situ modified subbase and basecourse	Plant for spreading chemical stabilising agents.	Meets requirements of specification. Undertake Mat test.	Every new stabilizing spreader establishment.	Mandatory Hold Point (MHP)	Contractor																			
B/6 Specification for the In-Situ Stabilisation of Bound Sub-base Layers.	Plant for stabilisation (mixing process).	Meets requirements of specification. Check setting of stabiliser for processing to the design depth.	Every new stabilizing spreader establishment.	Mandatory Hold Point (MHP)	Contractor																			
	Weather limitation - Temperature	Work shall not be started if the ambient air temperature is below the temperatures listed in Table 1 of B/5 or above 30°C in the case of B/6 Table 1: Minimum working temperature for the stabilising process <table border="1" data-bbox="555 1203 1019 1401"> <thead> <tr> <th>Stabilising process</th> <th>Component to measure</th> <th>Min. temp. (°C)</th> </tr> </thead> <tbody> <tr> <td>Cement</td> <td>Ambient air temperature</td> <td>5</td> </tr> <tr> <td>Lime</td> <td>Ambient air temperature</td> <td>10</td> </tr> <tr> <td>Cement / Lime</td> <td>Ambient air temperature</td> <td>10</td> </tr> <tr> <td>Bitumen emulsion</td> <td>Stabilised material before compaction</td> <td>20</td> </tr> <tr> <td>Foamed bitumen</td> <td>Stabilised material before compaction</td> <td>20</td> </tr> </tbody> </table>	Stabilising process	Component to measure	Min. temp. (°C)	Cement	Ambient air temperature	5	Lime	Ambient air temperature	10	Cement / Lime	Ambient air temperature	10	Bitumen emulsion	Stabilised material before compaction	20	Foamed bitumen	Stabilised material before compaction	20	Per production lot.	Mandatory Hold Point (MHP)	Contractor	
Stabilising process	Component to measure	Min. temp. (°C)																						
Cement	Ambient air temperature	5																						
Lime	Ambient air temperature	10																						
Cement / Lime	Ambient air temperature	10																						
Bitumen emulsion	Stabilised material before compaction	20																						
Foamed bitumen	Stabilised material before compaction	20																						

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
B/5 <i>In Situ</i> modified subbase and basecourse B/6 Specification for the <i>In-Situ</i> Stabilisation of Bound Sub-base Layers	Weather limitation - rain	No spreading of stabilising agent shall commence if <ul style="list-style-type: none"> it is raining. If rain is likely before the stabilising agent can be thoroughly mixed into the aggregate 	Per production lot.	Witness(W)	Contractor	
	Weather limitation - Dryness, wind	If spreading of the stabilising agent generates a dust problem or when the wind speed exceeds 25 km/hr, unless if the mixing and spreading is carried out in one unit	Per production lot.	Witness(W)	Contractor	
	Time limitations.	Maximum time period from mixing of the materials to completion of primary compaction Cement: <ul style="list-style-type: none"> two (2) hours; Lime: four (4) hours; Bitumen emulsion: before the emulsion breaks; Foamed bitumen: four (4) hours. Final trimming and compaction shall be within four (4) hours of mixing.	Per production lot.	Records (RE)	Contractor	
	Surface preparation.	Meets requirements of specification.	Visual Inspection - Per production lot.	Records (RE)	Contractor	
	Production plan.	Meets requirements of specification.	Per production lot	Witness(W)	Principal / Consultant	
	Supply of aggregate to site.	As per Section 1: ALL AGGREGATES of this Schedule and Project requirements	As per Section 1: ALL AGGREGATES of this Schedule and Project requirements	Witness(W)	Principal / Consultant	Yes, both sampling and testing
	Spreading of lime and/or cement.	Mat tests within ± 0.5 kg/m ² of the specified rate	Every 400 m ² .	Review (R)	Principal / Consultant	Yes
		Average usage test: Compare tons used (from delivery docket) with measured area, within 2.5% of the specified rate	Upon emptying the spreader and bulk tanker.	Records (RE)	Contractor	
	Slaking of burnt lime.	Slaking shall continue until no further reaction with additional water is visible and the slaked lime is completely converted to powdered form.	Inspection as required.	Records (RE)	Contractor	
	Addition of water.	Meets requirements of spec - Nuclear Density Meter testing.	Continuous monitoring.	Records (RE)	Contractor	
	Control of cut depth.	Inspection. <ul style="list-style-type: none"> Maximum variation from the specified depth of cut is -0 mm and +20 mm Depth of cut shall not intrude into a subgrade layer 	Each side of drum - every 200m.	Review (R)	Principal / Consultant	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
B/5 <i>In Situ</i> modified subbase and basecourse B/6 Specification for the In-Situ Stabilisation of Bound Sub-base Layers..	Overlap on longitudinal joints.	Meets requirements of specification. Minimum 200mm.	Continuous monitoring.	Records (RE)	Contractor	
	Continuity of stabilised layer.	Successive cut shall be started 1 m behind mark of previous cut.	At the end of each run.	Records (RE)	Contractor	
	Temperature limits for storage and application of bitumen.	Meets requirements of specification.	Continuous monitoring.	Records (RE)	Contractor	
	Particle size distribution of stabilised material.	Inspection – material to be assessed for excessive breakdown of aggregate. Undertake wet sieving on sample collected from back of the stabiliser.	First 20m of each run and then ongoing as required based on the variability of <i>In Situ</i> materials	Witness(W)	Principal / Consultant	
	Compaction.	<ul style="list-style-type: none"> NZS 4402: test 4.1.3 to determine the Optimum Water Content and Maximum Dry Density targets for the expected stabilisation mixes which include the stabilising agent(s). Solid Density of the representative stabilised material shall be determined according to NZS 4407: test 3.7.1. 	The tests undertaken on modified material taken behind the Stabiliser: <ul style="list-style-type: none"> Minimum frequency of one OWC/MDD test per 5000 m2 of material stabilised. If the aggregate source, the processing method, or the stabilised materials are expected to change then a new OWC and target MDD shall be determined, and the Engineer informed. 	Review (R)	Principal / Consultant	Yes, both sampling and testing
	Plateau density tests for the purpose of determining the minimum, and possibly the maximum, number of roller passes required to achieve the maximum possible target dry density (Plateau with NDM - both Back Scatter and Direct Transmission).	1 test per stockpile or if any of the following conditions are met: <ul style="list-style-type: none"> If the Plateau Test Target Value is lower than 2% less than the specified density for the layer, based on the laboratory tested MDD. In this event, the compaction methodology shall be changed to include heavier compaction equipment. Change in Source of material. Change in compaction equipment. Visual change in subsurface or subgrade conditions. Change in gradation or type of material. Change in depth of lift, and Change in pavement design. 	Witness(W)	Principal / Consultant	Yes	
B/5 <i>In Situ</i> modified subbase and basecourse	Compaction	Pavement layer compaction.as per Table 5: Mean and minimum degree of compaction as a percentage of agreed target MDD as per plateau with Back Scatter & Direct Transmission.	<ul style="list-style-type: none"> The area of a lot shall not exceed 1000 m². Minimum five randomly selected areas and using Direct Transmission to the depth of the layer. Random test positions shall be chosen using a recognized method for random sampling positions for road layers. 	Review (R)	Principal / Consultant	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result									
			Table 5: Mean and minimum degree of compaction as a percentage of agreed target MDD <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Degree of compaction</th> <th>Sub-base pavement layer</th> <th>Basecourse pavement layer</th> </tr> </thead> <tbody> <tr> <td>Mean value</td> <td>≥95%</td> <td>≥98%</td> </tr> <tr> <td>Minimum value</td> <td>≥92%</td> <td>≥95%</td> </tr> </tbody> </table>	Degree of compaction	Sub-base pavement layer	Basecourse pavement layer	Mean value	≥95%	≥98%	Minimum value	≥92%	≥95%			
Degree of compaction	Sub-base pavement layer	Basecourse pavement layer													
Mean value	≥95%	≥98%													
Minimum value	≥92%	≥95%													
	Control testing during and after construction.	Indirect Tensile Strength (ITS) and UCS of the mixed material according to NZTA T/19.	<ul style="list-style-type: none"> Pair (2) representative samples behind the mixing plant per lot, or at a minimum of 2 pairs of representative samples per day. The area of a lot shall not exceed 5000 m² or 250 linear meters of roadway whichever is the least or match with the compaction equipment coverage whichever is appropriate. 	Review (R)	Principal / Consultant	Yes, both sampling and testing									
	Surface shape of the completed pavement layer	Conforms to the shape specified within the tolerances in Table 6: Maximum vertical variations.	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant										
		Variations in the surface varies more than 10 mm from a 3-m straight edge and no area to allow water to pond where lateral or longitudinal fall is greater than 1%	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant										
	Crossfall	Crossfall variation between two points more than 2m apart, transverse to the centreline < 0.5%.	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant										
	Pre-sealing requirements.	Principal's Advisor Hold Point Basecourse Degree of Saturation	5 randomly selected tests per 1,000m ² or part thereof if area smaller than 1000m ²	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing									
		Running Course Quality	Per material.	Records (RE)	Contractor										
		Basecourse Surface Preparation (avoid unevenness >5mm, voids, wet spots, loose aggregates etc)	Pre-sealing inspection.	Mandatory Hold Point	Principal / Consultant										
B/6 Specification for the In-Situ Stabilisation of Bound Sub-base Layers.	Mixed material testing.	Indirect tensile strength (ITS) of the mixed material according to NZTA T/19.	<ul style="list-style-type: none"> Pair (2) representative samples behind the mixing plant per lot or at a minimum of 2 pairs of representative samples per day. The area of a lot shall not exceed 5000 m² or 250 linear meters of roadway whichever is the least. 	Review (R)	Principal / Consultant	Yes, both sampling and testing									
	Compaction	Pavement layer compaction as per Table 2: Mean and minimum degree of compaction.	<ul style="list-style-type: none"> The area of a lot shall not exceed 1000 m². 	Review (R)	Principal / Consultant	Yes, both sampling and testing									

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
			<ul style="list-style-type: none"> Minimum of five randomly selected areas and using Direct Transmission to the depth of the layer. Random test positions shall be chosen using a recognized method for random sampling positions for road layers.			
	Pre-cracking protection, curing and maintenance before overlaying.	Inspection.	Per production lot.	Records (RE)	Contractor	
	Construction Tolerances - Width	Maximum variation from the vertical surface of the completed pavement layer shall be such that, when all loose aggregate is removed, it conforms to the vertical variations specified in Table 3. Table 3: Maximum vertical variations	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	
	Construction Tolerances - Vertical	Maximum variation conforms to the vertical variations specified in Table 3: Maximum vertical variations.	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	
	Crossfall	Crossfall variation between two points more than 2m apart, transverse to the centreline < 0.5%.	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant	
B/7 Specification for the manufacture and construction of plant mixed modified Pavement layers	Chemical stabilising agents	To comply with NZTA M/15 or NZS 3122	Each batch	Records (RE)	Contractor	Yes, both sampling and testing
	Bituminous stabilising agents	Bitumen shall comply with TNZ M/1 and shall be able to achieve a minimum expansion of 10 times its original volume and a minimum half-life of 6 seconds.	Each batch	Records (RE)	Contractor	
	Plant mixed modified subbase and basecourse.	Inspection of B/5 requirements	Each new plant used as per B/7	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
	Plant for batching and mixing.	Meets requirements of specification.	As required.	Records (RE)	Contractor	
	Loading, transportation and discharge.	Meets requirements of specification.	Continuous monitoring.	Records (RE)	Contractor	
B/7 Specification for the manufacture and construction of plant mixed modified	Weather limitation - Temperature	Work shall not be started if the ambient air temperature is below the temperatures listed Table 1: Minimum working temperature for the stabilising process.	Per production lot.	Mandatory Hold Point (MHP)	Contractor	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
B/7 Specification for the manufacture and construction of plant mixed modified Pavement layers	Weather limitation - Dryness, wind	If spreading of the stabilising agent generates a dust problem or when the wind speed exceeds 25 km/hr, unless if the mixing and spreading is carried out in one unit	Per production lot.	Witness(W)	Contractor	
	Time limitations.	Maximum time period from mixing of the materials to completion of primary compaction Cement: <ul style="list-style-type: none"> two (2) hours; Lime: four (4) hours; Bitumen emulsion: before the emulsion breaks; Foamed bitumen: four (4) hours. 	Per production lot.	Records (RE)	Contractor	
	Addition of lime and/or cement	Continuous weigh auger and plant display reading	Continuous by plant operator: Within $\pm 5\%$ of the specified rate	Records (RE)	Contractor	
		Average usage test: Compare tonnes used (from delivery docket) with measured mixed quantity	Upon emptying the bulk tanker, where practical. Within $\pm 5\%$ of the specified rate	Records (RE)	Contractor	
	Addition of bituminous stabilising agents	Addition of bituminous stabilising agent to the tolerances set out in	Table 3: Tolerance for adding bituminous stabilising agents	Records (RE)	Contractor	
	Production plan.	Meets requirements of specification.	Per production lot	Witness(W)	Principal / Consultant	
	Compaction	Pavement layer compaction as per Table 5: Mean and minimum degree of compaction for pavement layers as a percentage of Maximum Dry Density	<ul style="list-style-type: none"> The area of a lot shall not exceed 1000 m². Minimum of five randomly selected areas and using Direct Transmission to the depth of the layer. Random test positions shall be chosen using a recognized method for random sampling positions for road layers.	Review (R)	Principal / Consultant	Yes, both sampling and testing
	Construction Tolerances - Width	The maximum variation from the specified width shall be: <ul style="list-style-type: none"> Unconstrained: -20 mm and + 100 mm Constrained: Zero 	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	
	Construction Tolerances - Vertical	Maximum variation conforms to the vertical variations specified in Table 6: Maximum vertical variations.	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	
	Crossfall	Crossfall variation between two points more than 2m apart, transverse to the centreline $< 0.5\%$.	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant	
Surface finish	Inspection: present a tightly consolidated surface when swept	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant		
Pre-sealing requirements.	Basecourse Degree of Saturation	5 randomly selected tests per 1,000m ² or part thereof if area smaller than 1000m ²	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		Running Course Quality	Per material.	Records (RE)	Contractor	
		Basecourse Surface Preparation	Pre-sealing inspection.	Mandatory Hold Point	Principal / Consultant	
B/8 Specification for the manufacture and construction of plant mixed bound sub-base pavement layers	Chemical stabilising agents	To comply with NZTA M/15 or NZS 3122	Each batch	Records (RE)	Contractor	Yes, both sampling and testing
	Plant for batching and mixing.	Meets requirements of specification.	As required.	Records (RE)	Contractor	
	Loading, transportation and discharge.	Meets requirements of specification.	Continuous monitoring.	Records (RE)	Contractor	
	Weather limitation - Temperature	Work shall not be started if the ambient air temperature is below 5°C or above 30°C.	Per production lot.	Mandatory Hold Point (MHP)	Contractor	
	Weather limitation - Dryness, wind	Transport and laying of plant mixed material shall not be undertaken during weather conditions that result in excessive drying or wetting of the material prior to compaction	Per production lot.	Witness(W)	Contractor	
	Time limitations. Addition of lime and/or cement	Maximum time period from mixing of the materials to completion of primary compaction: two (2) hours; Final trimming and compaction shall be within four (4) hours of mixing.	Per production lot.	Records (RE)	Contractor	
	Addition of cement	Continuous weigh auger and plant display reading	Continuous by plant operator: Within ± 5 % of the specified rate	Records (RE)	Contractor	
		Average usage test: Compare tonnes used (from delivery docket) with measured mixed quantity	Upon emptying the bulk tanker, where practical. Within ± 5 % of the specified rate	Records (RE)	Contractor	
	Mixed material testing	2 pairs of representative samples per day for testing the indirect tensile strength (ITS) of the mixed material according to TNZ T/19.	Volume of lot shall not exceed 1000 m ³ or 250 linear metres of roadway, whichever is the least.	Witness(W)	Principal / Consultant	
	Grading of plant mix	Wet sieve analysis will be completed within 4 hours consist of a minimum of 3 sample bags per lot. The Engineer should then confirm whether any further modification to the stabilised material is required	Volume of lot shall not exceed 1000 m ³ or 250 linear metres of roadway, whichever is the least.	Mandatory Hold Point (MHP)	Principal / Consultant	
B/8 Specification for the manufacture and construction of plant mixed bound sub-base pavement layers	Construction Tolerances - Width	The maximum variation from the specified width shall be: Unconstrained: -20 mm and + 100 mm Constrained: Zero	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	
	Construction Tolerances - Vertical	Maximum variation conforms to the vertical variations specified in Table 3: Maximum vertical variations.	On completion of production lot as part of acceptance control	Mandatory Hold Point	Contractor	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
	Crossfall	Crossfall variation between two points more than 2m apart, transverse to the centreline < 0.5%.	On completion of production lot as part of acceptance control	Review (R)	Principal / Consultant	
T/1	Benkelman Beam tests.	Construction checks on deflection.	<i>Subgrade</i> : Two tests spread evenly across the formation every 10m; <i>Granular Pavement Layers</i> : Each lane both wheel tracks on each layer every 20m. <i>(For expressway non- structural pavement areas, one test every 10m per side, with the lateral position of the test coinciding with the likely wheel track of maintenance vehicles).</i>	Witness(W)	Principal / Consultant	Yes
13.4 Pavement Surfacing						
NZTA M01	Specification for roading bitumen.	All tests in M01 Table 1.	Every refinery batch or import shipment.	Review (R)	Contractor	Yes, both sampling and testing
		NZTA T13 durability.				
		All tests required by NZTA Q05				
NZTA M01-A	Specification for Performance-Graded Asphalt Binder	All tests required by NZTA Q05	Every refinery batch or import shipment.	Review (R)	Contractor	Yes, both sampling and testing
			Every 200 tonnes supplied.			
B/2	Surface finish Crossfall Pre-sealing requirements.	Inspection: present a tightly consolidated surface when swept	On completion of production lot as part of acceptance control. 5 randomly selected tests per 1,000m ² or part thereof if area smaller than 1000m ² Per material.	Review (R) Mandatory Hold Point Records (RE)	Principal / Consultant Principal / Consultant Contractor	Yes, both sampling and testing
		Basecourse Degree of Saturation				
		Running Course Quality				
		Basecourse Surface Preparation	Pre-sealing inspection.	Mandatory Hold Point	Principal / Consultant	
NZTA M06	Specification for sealing chip: source rock tests.	NZS 4407 Test 3.10 crushing resistance.	Every 10,000 m ³ .	Review (R)	Principal / Consultant	Yes, both sampling and testing
		NZS 4407 Test 3.11 weathering resistance.				
	Specification for sealing chip: production properties.	NZS 4407 Test 3.9 cleanness value (G2 – G6).	Every 500 m ³ or part thereof	Review (R)	Principal / Consultant	Yes, both sampling and testing
		NZS 4407 Test 3.13 size and shape (G2 – G5).				
		NZS 4407 Test 3.14 broken faces (G2 – G5).				

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		NZS 4407 Test 3.8.2 PSD (G5 – G6).				
NZTA P03	Specification for first coat sealing.	NZTA T09 Estimation of the kerosene content.	One sample each sprayer load.	Surveillance (S)	Contractor	
NZTA P04	Specification for resealing.	NZTA T09 Estimation of the kerosene content.	One sample each sprayer load.	Surveillance (S)	Contractor	
NZTA P17	Performance-based specification for reseals.	As per P17 Table 2.	Per site.	Review (R)	Contractor	Yes, both sampling and testing
NZTA M10	Specification for dense-graded asphaltic concrete.	CCNZ BPG05 QA for Aggregates	As per BPG05.	Review (R)	Principal / Consultant	Yes, both sampling and testing
		Job Mix validated	Six months or as per M10 clause 3.6.4.	Mandatory Hold Point	Principal / Consultant	
		% RAP and RAP Binder content and corrected particle size distribution.	Every 600 tonnes.	Review (R)	Contractor	
		Asphalt particle size distribution.	Every 200 tonnes (but see M10 5.2).	Review (R)	Contractor	
		Asphalt binder content and volume.				
		Asphalt maximum theoretical SG.	Every 600 tonnes (but see M10 5.2).	Review (R)	Contractor	
		Asphalt air voids.				
		Identification of random core locations.	1 core/300 m ² per lot, 8 mat, 3 joints minimum.	Mandatory Hold Point	Principal / Consultant	
Core height and air voids.						
NZTA M27	Specification for stone mastic asphalt.	CCNZ BPG05 QA for Aggregates	As per BPG05.	Review (R)	Principal / Consultant	Yes, both sampling and testing
		Mix design currency (PA HP).	Six months or as per M27 clause 3.6.4.	Mandatory Hold Point	Principal / Consultant	
		SMA particle size distribution.	Every 200 tonnes (but see M27 5.2).	Review (R)	Contractor	
		SMA binder content.				
		SMA maximum theoretical SG.	Every 600 tonnes (but see M27 5.2).	Review (R)	Contractor	
		SMA air voids.				

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		Identification of random core locations.	1 x core/300 m ² per lot, 8x per mat, 3x joints minimum.	Mandatory Hold Point	Principal / Consultant	
		Core height and air voids.				
NZTA P11, P11E	Specification for open-graded porous asphalt.	Mix design approval (Includes aggregates, Air Voids)	Each new mix used	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
		Coarse aggregate crushing resistance.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
		Coarse aggregate weathering resistance.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
		Coarse aggregate particle shape.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
		Coarse aggregate broken faces.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
		Fine aggregate crushing resistance.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
		OGPA particle size distribution.	Every 200 tonnes.	Surveillance (S)	Contractor	
		OGPA binder content.	Every 200 tonnes.	Surveillance (S)	Contractor	
P40	Specification for noise mitigation.	Visual inspection of low-noise road surfacing to confirm the type and extent of surfacing is in accordance with the final Noise Mitigation Plan and that no defect that may cause noise are present.	All low-noise road surfaces.			
		Close-proximity road surface noise measurements in accordance with the NZ Transport Agency Close proximity (CPX) road surface noise measurement trailer guide.	All low-noise road surfaces (when more than 5 lane km of low-noise road surfaces are installed as part of a project).			
13.5 Landscape Treatments						
P/39	Site preparation, set-out, vegetation protection & vegetation clearance.	<ul style="list-style-type: none"> • Soil test. • Mulch quality sample review. • Product sampling and review. • Sample area and plot assessments. • Defects & Maintenance inspections. 	See P39 specification for Highway Landscape Treatments for details on performance criteria. Note: Sampling is subject to the size of the planting area.	Hold points shall be at each 'stage of contract' for the landscape works to align with the		
	Biosecurity control (for planting).					

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
P/39	Sub soil & topsoil review and testing.	<p>*Note: Eco-sourced plant requirements, signing the code or practice and ethics, and monitoring.</p>		Inspection Requirements, and quality control checks as specified within P/39. The role of the project Landscape Architect (and other advisors to the landscape construction e.g. ecologist) shall be included in the project's inspection and test plan (ITP).		
	Landscape contouring.					
	Mulch review and testing.					
	Weed mat review.					
	Plant selection, procurement and supply* Specimen Tree procurement and supply					
	All landscape planting, grassing and hydroseeding.					
13.6 Geotextiles						
F/7	Geotextile – materials.	Manufacturer's compliance certificate.	Check each lot (1 roll).	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
	Geotextile – construction.	Checklist for directional placement, tensioning laps, spacing, damage.	Continuous and recorded	Witness(W)	Principal / Consultant	
	Vertical drains (wick) – materials.	Manufacturer's compliance certificate.	Check each lot (1 roll).	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
	Vertical drains (wick) – construction.	Checklist for location, spacing and damage.	Continuous and recorded.	Witness(W)	Principal / Consultant	
13.7 Subsurface Drainage						
F/6	Subsurface drainage - aggregate – materials.	Geological rock type,	2 tests per material source	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
		weathering quality index				

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		crushing resistance	1 per source then 1 per 100m ³ loose			
		sand equivalent.	2 tests per material source			
		Particle size distribution.	1 test per source then 1 per 100m ³ loose			
F/2, F/5	Subsurface pipes – materials.	Manufacturer's compliance certificate.	Check each lot (1 roll)	Witness(W)	Principal / Consultant	Yes, both sampling and testing
F/2, F/5, F/6	Subsurface drain – construction.	<ul style="list-style-type: none"> Location. Plateau density correlated with relative density (nuclear densometer). Flow test 	1 test per 100m of subsurface drain constructed with a minimum of 3 tests for each drain completed.	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
F/2, F/5, F/6	Subsurface drain (bored drains) – construction.	<ul style="list-style-type: none"> Location. Drain assembly. Installed length from outlet structure. Log borehole excavation. Outlet (Form, location and photograph) 	1 record per drain. 1 log per 10 drains by an engineering geologist/geotechnical engineer.	Witness(W)	Principal / Consultant	
F/2, F/5, F/6	Subsurface pipes – construction.	<ul style="list-style-type: none"> Location (drawing and GPS) Gradient, Length from outlet structure Damage, Outlet. (Form, location and photograph) 	1 x inspection / check per drain.	Review (R)	Principal / Consultant	

13.8 Geosynthetic Soil Reinforcement

Bridge Manual Section 6.8	Geosynthetic soil reinforcement – materials and supplier.	Approval for material, manufacturers plant and supplier	Each product and type	Mandatory Hold Point	Principal / Consultant	
	Geosynthetic soil reinforcement – materials.	Manufacturer's compliance certificate and quality control tests	Each product type and batch.	Witness(W)	Principal / Consultant	
		Index testing of site delivered materials to ASTM D4759	1 sample for each product type and batch, minimum of 5 samples per batch	Witness(W)	Principal / Consultant	Yes
	Geosynthetic soil reinforcement – construction.	Checklist for directional placement, tensioning laps, spacing, damage.	1 check per 100m ² of material placed with a minimum of 3 for area covered per day.	Records (RE)	Contractor	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
Bridge Manual Section 6.7	Expanded polystyrene blocks	Approval for material, manufacturer and supplier	Each product and type	Mandatory Hold Point	Principal / Consultant	
		Material, production and construction testing	In general accordance with recommended standard set out in NCHRP Report 529	Witness(W)	Principal / Consultant	Yes

13.9 Ground Improvement

Bridge Manual Section 6.3.4	Stone columns – materials.	Geological rock type, weathering and crushing resistance.	2 tests per source 4 weeks before use in the works	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
		Sand equivalent particle size distribution.	Stock size: <ul style="list-style-type: none"> 0 to 400m³ - 2 tests 400 to 1,500m³ - 3 tests 1,500 to 4,000m³ - 4 tests >4,000m³ - 1 test for each additional 1,000m³ 	Mandatory Hold Point	Principal / Consultant	Yes, both sampling and testing
	Stone columns – construction.	Load tests instrumented with settlement tube and surface displacement markers.	1 test with kentledge load per 10 columns	Review (R)	Principal / Consultant	
		Cone penetration tests.	1 test per 100m ² located in natural ground equidistant from adjacent columns.	Review (R)	Principal / Consultant	
		Location.	Continuous and recorded	Records (RE)	Contractor	
	Ground Improvement	In Situ strength or density and/or material classification prior to ground improvement works	1 location per 50m ² for complete treatment depth	Review (R)	Principal / Consultant	
		Strength or density testing after ground improvement	1 location per 50m ² for complete treatment depth	Review (R)	Principal / Consultant	
		For ground improvement reliant on concrete column strength	As for Concrete in Section 16 below.	Review (R)	Principal / Consultant	
		For ground improvement reliant on drainage	Confirm permeability.	Review (R)	Principal / Consultant	

13.10 Retaining Walls

	Mechanically stabilized earth walls and slopes. Walls on strip footing walls.	Visual inspection of subgrade	Each section of foundation prepared prior to concreting.	Mandatory Hold Point	Principal / Consultant	
		Dynamic Cone Penetration to 3m.	1 test per 10m run of wall.	Review (R)		Yes

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		Vane shear strength (Pilcon).			Principal / Consultant	
		Foundation / subgrade testing: Scala penetrometer or shear vane testing to a depth of 2m	5x5m grid across base of excavation.	Review (R)	Principal / Consultant	Yes
		Backfill compliance – Granular Material Particle Size Distribution Crushing Resistance Standard compaction	3 per source then 1 per 1000m ³ 3 per source then 1 per 5000m ³ 2 sets (5 points each)	Mandatory Hold Point	Principal / Consultant	Yes
		Backfill compliance – Cohesive Plasticity Index Standard compaction	1 per 500m ³ sets (5 points) per material type 3 sets (5 points) per material type	Mandatory Hold Point	Principal / Consultant	Yes
		Density (nuclear densometer) Water content (laboratory) Vane shear strength (Pilcon)	1 per 250m ³	Review (R)	Principal / Consultant	Yes
		Monitoring of settlement and horizontal deflection at 25m horizontal intervals	One point per 1.5m height min two points per set and recorded	Review (R)	Principal / Consultant	
AS 2159:2009	Pile walls.	Proof drilling, SPTs at 1.5m centres, core recovery between SPTs.	1 drill hole per 100m run of wall	Mandatory Hold Point	Principal / Consultant	
		Log material excavated.	1 log per pile excavation by an engineering geologist.	Records (RE)	Contractor	
		Pile base clean out inspection, and base proving.	1 inspection per 100m run of wall (if hole is cased and of sufficient diameter).	Witness(W)	Principal / Consultant	
		Pile record including <ul style="list-style-type: none"> • Pile co-ordinates, • Top and base RL (m), • Nominal diameter, • Volume of concrete/m of excavation, • Rebar cage support and • Displacement 	1 record per pile	Records (RE)	Contractor	
		Monitoring of horizontal deflection at 25m horizontal centres	One point at top of wall (x,y,z co-ordinates).	Review (R)	Principal / Consultant	
		Integrity testing (Transient Dynamic Response (TDR) method in accordance with AS 2159:2009)	1 per 10 piles and minimum of 4 per structure.	Review (R)	Principal / Consultant	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
	Tie-back pile walls.	Piles	As for pile walls.			
P40	Specification for noise mitigation.	Visual inspection of noise barriers (walls and bunds) to confirm the type, material, height and extent of barrier is in accordance with the final Noise Mitigation Plan.	All noise barriers.			
		Manufacturers or supplier's test of sound insulation rating of noise walls EN 1793-2: 2012 Road traffic noise reducing devices - Test method for determining the acoustic performance. Part 2: Intrinsic characteristics of airborne sound insulation under diffuse sound field conditions.	Representative noise wall(s) of each material type, which are 2m or greater in height.			
		In-situ test of sound insulation rating of noise walls EN 1793-6: 2012 Road traffic noise reducing devices - Test method for determining the acoustic performance. Part 6: Intrinsic characteristics – In situ values of airborne sound insulation under direct sound field conditions.				

13.11 Ground Anchors and Soil Nails

BS8081 BS EN 1537 FHWA-IF-99-015	Ground anchors	Pull-out test (in accordance with BS8081-1989, Section 11.2)	2 tests per structure as minimum.	Mandatory Hold Point	Principal / Consultant	
		Suitability Testing Ground Anchors	20% working ground anchors	Review (R)	Principal / Consultant	
		Acceptance Testing Ground Anchors	80% working anchors	Review (R)	Principal / Consultant	
		Anchor construction records including: <ul style="list-style-type: none"> • soil / rock type, • hole size and length, • grout volume • anchor assembly • log of anchor hole/excavation • anchor location (x,y,z) 	1 per anchor logged by an engineering geologist/geotechnical engineer		Principal / Consultant	
		Grout strength	1 per anchor	Review (R)	Principal / Consultant	
FHWA-SA-96-069R BS EN 1537	Soil Nails	Soil nail construction records including: <ul style="list-style-type: none"> • soil/rock type, • hole size and length, 	1 per anchor logged by an engineering geologist/geotechnical engineer	Records (RE)	Principal / Consultant	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		<ul style="list-style-type: none"> grout volume, log of hole, soil nail location (x,y,z) 				
		Sacrificial Nail Tests	1 x ultimate bond stress test per soil nail and material type 1 x maximum acceptable creep test per soil nail and material type	Mandatory Hold Point	Principal / Consultant	
		Production Nail Tests	10% working soil nails (in accordance with Standard BS EN 14490)	Review (R)	Principal / Consultant	
		Acceptance Testing Soil Nails	25% working soil nails	Review (R)	Principal / Consultant	
		Grout strength	1 per soil nail	Review (R)	Principal / Consultant	

13.12 Rockfall Protection Structures

	Mesh for slopes, fences, attenuators, and similar structures – materials and supplier.	Approval for material, manufacturer and supplier	Each product and type	Mandatory Hold Point	Principal / Consultant	
	Mesh for slopes, fences, attenuators, and similar structures – materials	Manufacturer's compliance certificate	Each product type and batch	Review (R)	Principal / Consultant	
	Fittings: wire rope clips Mesh to mesh clips Shackles Mesh to top rope clips Mesh to boundary rope clips	Manufacturer's compliance certificate and chain of custody confirming factory of origin	Each fitting type and batch	Review (R)	Principal / Consultant	
	Bunds	As Structural fill -sources, -materials, -construction Geosynthetic soil reinforcement – materials and supplier, -materials, -construction	As for Structural fill -sources, -materials, -construction As for geosynthetic soil reinforcement – materials and supplier, -materials, -construction			
	Ground Anchors	As per Ground Anchors	As for Ground Anchors			

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
13.13 Foundations						
AS 1141, AS 1289, AS 4133	Bored pile foundations – materials.	Casing material and fabrication Suppliers' certificate.	Each casing	Mandatory Hold Point	Principal / Consultant	Yes
	Bored pile foundations – construction.	Log material excavated and observations of groundwater.	1 record per pile	Records (RE)	Contractor	
		Pile base clean out inspection, and base proving.				
		Pile record including <ul style="list-style-type: none"> • Pile co-ordinates, • Top and base RL (m), nominal diameter, • Volume of concrete/m of excavation, • Rebar cage support and • Displacement. 				
		Pile shaft roughness check by remote means, Contractor to demonstrate that drilling tools can consistently achieve a shaft surface roughness consistent with design assumptions.				
		Proof drilling, to at least 5m below pile toe, SPTs at 1.5m centres, 100% core recovery	As required for a minimum of two drill holes per abutment and pier locations	Review (R)	Principal / Consultant	
Driven piles – construction.	Pile driving record including <ul style="list-style-type: none"> • Pile co-ordinates, • Top and base RL (m), • Hammer weight, • drop & efficiency, • Set, • Calculations for minimum depth and pile capacity. 	1 record per pile	Records (RE)	Contractor		
	Pile capacity using a Pile Driving Analyzer (PDA). PDA data shall be correlated with foundation type, ground conditions and pile driving records.	At least 15% of piles shall be tested using a Pile Driving Analyzer (PDA).	Witness(W)	Principal / Consultant		
	Shallow Foundations	Testing and inspection of exposed subgrade to confirm design assumptions. Subgrade Dynamic Cone Penetrometer, or Vane Shear (Pilcon) testing	1 per 2m x 2m grid to minimum depth 2m with minimum of 3 tests per foundation	Review (R)	Principal / Consultant	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
13.14 Traffic Services						
P/24, M/25	Signs.	Test shall be in accordance with the Transport Agency's Manual of Traffic Signs and Markings Part 1 and Part III and/or Traffic Control Devices Manual and presence of retro-reflective sheeting manufacturer's warranty stickers.		Records (RE)	Contractor	Yes
		Test requirements for retro-reflective materials shall be compliance certificates from recognized testing laboratories.		Records (RE)	Contractor	Yes
		Test requirements for overhead sign supports shall be in accordance with the Transport Agency's Bridge Manual.		Records (RE)	Contractor	Yes
M/23	Road Safety Barrier Systems.	<p>All road safety barrier systems (including end treatments and crash cushions):</p> <ul style="list-style-type: none"> System checklists to be completed and co-signed by contractor and Waka Kotahi representative. All faults to be rectified before acceptance into network operations (maintenance manual) and network assets register (and RAMM). 		Mandatory Hold Point	Principal / Consultant	
M23 and System Installation / Maintenance Manual	Wire Rope Safety Barrier (WRSB) Systems	Pull over testing for all foundation types	To be carried out in accordance with System Owner's instructions and Waka Kotahi Specification M23 requirements.	Witness(W)	Principal / Consultant	Yes
M23 Appendix D	Slip Formed Concrete Barriers.					
Clause 9.4.2 of NZS 3109	All batched concrete	Slump test.	One per batch of concrete and when compression test samples are taken.	Records (RE)	Contractor	Yes
Clause 9.5.6 of NZS3109	All batched concrete	Compression test.	<p>The greater of;</p> <p>a) One set of test specimens for each day of pouring.</p> <p>b) One set of test specimens for every 25m³ poured.</p> <p>In addition, one set of test specimens shall be taken;</p> <p>a) if water is added to the mix in accordance with clause 9.4.2.1 of NZS3109 or,</p> <p>b) if the concrete mix or concrete manufacturer is changed.</p>	Records (RE)	Contractor	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
Clause 3.8.2 of NZS3109	Concrete cast against ground	Cover.	Every bar within every pour.	Records (RE)	Contractor	
Clause B6 and B7 of AS/NZS 4671	Precast reinforced barriers	Reinforcing steel.	At commencement of construction and whenever reinforcing bar is sourced from a different manufacturer.	Witness(W)	Principal / Consultant	
M/14	Edge marker posts	01. Deflection 02. Resistance to vehicle run over 03. Safety to road users 04. Cold resistance	01. 3 new posts tested as per Appendix C of M/14. 02. 3 new posts impacted 10 times plus 3 new posts impacted 5 times as per Appendix D of M/14. 03. Same as #2 04. 3 new posts to be bent as per Appendix E of M/12.	Witness(W)	Contractor	
P/12: 2000 (2021 update in draft)	Pavement markings (M07 or M20 approved materials used Plant certified and T08 or T12 compliant Paint thickness compliant Dimensional tolerances compliant Retro reflectivity complies with M20 Skid resistance.	As required by technical specifications As required by technical specifications As required by technical specifications As required by technical specifications As required by technical specifications Within one hour of application	Records (RE) Records Inspection Inspection Testing	Principal/consultant Contractor	
P/14: 1995	Raised Pavement Markers Installation	As per project specification	As required by the Technical Specifications and Standards.	Records (RE)	Contractor	
P/16: 2011	Edge Marker posts installation	As per project specification	As required by the Technical Specifications and Standards.	Records (RE)	Contractor	
P/22: 2006 (2021 update in draft)	Reflectorised Pavement Marking	M07 or M20 approved materials used Plant certified and T08 or T12 compliant Paint thickness compliant Dimensional tolerances compliant Retro reflectivity complies with M20 Skid resistance.	As required by technical specifications As required by technical specifications As required by technical specifications As required by technical specifications As required by technical specifications After one hour but before 1 week of application	Records (RE) Records Inspection Inspection Testing	Principal/consultant Contractor	Yes, both sampling and testing Yes, both sampling and testing
P/28: 2006	Maintenance and Installation of Inductive Loops at Traffic Monitoring Sites	<u>Field Tests</u> 01. Loop inductance. 02. Max. Loop resistance. 03. Min. Loop resistance to ground.	Testing as per AS 2703:1987 prior to sealing.			
P/30: 2009	High Performance Road marking	Retro reflectivity (approved monitoring sites only)	As per retro reflectivity test of M/20.	Review (R)	Principal / Consultant	Yes, both sampling and testing
P/33: 2017	Coloured pavement surfacing	Performance based tests for warranty period (5 years): 01. Skid Resistance 02. Macrotecture	01. SCRIM, T/10 or British Pendulum Test (BPT). 02. As per NZTA T/10.	Review (R)	Principal / Consultant	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		03. Visual performance 04. Colour	03. Visual assessment. 04. Discolouration of no less than 4 using ISO 105-A02:1993 or ISO-A03:1993.			
T/10: 2013	State Highway Skid Resistance		Annual survey of network			
13.15 Lighting						
M/26, M/30	Test Loadings.	Frangible Base testing – only manufacturers whose designs have been approved by the Transport Agency will be accepted.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	Yes
	Electrical work.	All tests and certification procedures as defined by Electrical Code of Practice ECP 11, and Section 6 of AS/NZS 3000 – Wiring Rules and which shall include: <ul style="list-style-type: none"> • Visual and functional test Earth continuity tests • Bonding test. • Earthing test. • Insulation resistance test. • Polarity test. • Earth loop impedance. 	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
13.16 Concrete						
NZS 3104, NZS 3109 Austroads ATS-5343 NZS 3101 NZTA S10 (anti-graffiti) NZS 3112 Parts 1 & 2	Structural concrete work.	All test and certification procedures required by Technical Specifications, NZS 3101 as modified by the Transport Agency's Bridge Manual and the references nominated by both documents for structural concrete, including: <ul style="list-style-type: none"> • Materials and admixtures. • Testing and grading of aggregate. • Production. • Slump test • Compressive strength testing in accordance with specification. • Construction finishing testing. 	As required by the Technical Specifications and Standards. Concrete cylinders for compression testing to be sampled on site. <ul style="list-style-type: none"> • 3 cylinders every pour for structural concrete and every 75m³ thereafter (NZS 3112 Parts 1 & 2). • Compressive strength testing in accordance with specification, likely to include 7- & 28-day samples. 	Review (R)	Principal / Consultant	Yes, both sampling and testing
AS/NZS 4671, NZS 3109, Austroads ATS-5310, AS/NZS 4672, NZS 3109,	Reinforcing and pre-stressing steel.	All test and certification procedures required by NZS 3101, AS/NZS 4671, and AS/NZS 4672 as modified by the Transport Agency's Bridge Manual and the references nominated by these documents for conventional and prestress reinforcement.	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
NZTA Bridge manual, NZS 3101, ISO 15835, ISO 15698, AS/NZS 1314						
13.17 Steelwork						
NZS 3404, AS/NZS 5131, AS/NZS 1554, AS/NZS 2312, AS/NZS TS 3404, NZTA S9, NZTA Bridge manual, NZTA Protective coatings for steel bridges-S10, Austroads ATS-5820, Austroads ATS-5420	Structural steelwork.	All test and certification procedures required by Technical Specifications, NZS 3404 as modified by the Transport Agency's Bridge Manual and the references nominated by both documents for structural steelwork, including associated bolting and welding requirements: <ul style="list-style-type: none"> • Materials Fabrication Erection. • Finishing (for each specific finish system proposed). • Non-destructive testing e.g. welds, fracture toughness 	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
AS5100.4, NZTA Bridge Manual AS 1683, AS 1523, AS 1180.3, AS 1180.7F, AS 1449, AS/NZS 1554, AS 1683.15, AS 1683.13B, AS/NZS 3679 ATS 5350 ATS 5380	Bridge bearings and movement joints.	All test and certification procedures required by Technical Specifications, AS 5100.4 as modified by the Transport Agency's Bridge Manual and the references nominated by both documents for the specific bridge bearing and movement joint systems proposed for the project, including: <ul style="list-style-type: none"> • Materials provision and testing fabrication. • Testing of fabricated assemblies. • Installation. • Waterproofing. • FRP strengthening. • 10-year warranty 	As required by the Technical Specifications and Standards.	Review (R)	Principal / Consultant	
13.18 Drainage, Channels, Nibs and Incidental Works						
NZS 3101	Kerbs, channels, nibs, and other concrete elements.	All test and certification procedures required by NZS 3101.	As required by the standards and designer's specification. Concrete cylinders for compression testing to be sampled on site. Three (3) cylinders	Review (R)	Principal / Consultant	Yes, both sampling and testing

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
			every pour for structural concrete and every 75m ³ thereafter.			
NZTA Stormwater Treatment Standard or Auckland Council GD01 or other regional guidance.	Proprietary stormwater treatment devices.	As specified by manufacturer and/or consenting authority.	As specified by manufacturer and/or consenting authority.			
13.19 Manholes, Catchpits, Inlet and Outlet Structures						
	Subgrade.	Handheld Shear Vane, Scala Penetrometer CBR, and/or Clegg Hammer.	As required by the Technical Specifications and Standards. Minimum of 1 test per element or as required by the designer.	Review (R)	Contractor	
	Backfill around structures.	Percentage of Maximum Dry Density (%MDD) using Nuclear Densometer. Clegg Hammer Impact Values may be used to determine the in-situ %MDD based on a correlation between Clegg Hammer Impact Value and %MDD as determined from prior laboratory testing or field trials and as accepted by the Designer.	As required by the Technical Specifications and Standards. Minimum of 1 test per element or as required by the designer, the Technical Specifications and Standards.	Review (R)	Contractor	Yes, both sampling and testing
	Manholes	Water tightness testing.	As required by the Technical Specifications and Standards.	Mandatory Hold Point (MHP)	Principal / Consultant	
13.20 Culverts, Pipes						
F/3 NZS 4058 NZS 2566.1 NZS 2041 NZS 4406 Austroads ATS-2230 Austroads ATS-2210 Supplier specs	Pipes or culvert.	As specified by relevant standard.	As specified by relevant standard in the Technical Specifications and Standards.	Review (R)	Contractor	
F/3 NZS 3725 NZS 4402 NZS 2566.2	Granular pipe bedding, haunch and size zone material.	<ul style="list-style-type: none"> Grading curves. Maximum and minimum dry density. Minimum crushing resistance of 130kN and a weathering quality index of AA, AB, AC, BA, BB or CA. 	Every 200m ³ (truck measure) of material delivered to site and submitted to the Designer for approval for every source or as specified by relevant standard in the Technical Specifications and Standards.	Review (R)	Principal / Consultant	Yes, both sampling and testing


Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
F/3 NZS 4402 NZS 3725 NZS 2566.2 NZS 3101	CLSM pipe bedding (flowable fill).	Compression testing.	3 cylinders every pour and every 75m ³ thereafter.	Review (R)	Principal / Consultant	Yes, both sampling and testing
F/3 NZS 4402 NZ Geotechnical Society Inc. "Guideline for handheld shear vane", 2001	Trench excavation.	Handheld Shear Vane, Scala Penetrometer CBR, or Clegg Hammer.	As specified by relevant standard in the Technical Specifications and Standards.	Witness(W)	Principal / Consultant	Yes, both sampling and testing
F/3 NZS 3725 NZS 2566.2	Pipe bedding.	Density Index using Nuclear Densometer.	Minimum of one test on both sides of the pipe for every 10m of pipe laid.	Review (R)	Principal / Consultant	Yes, both sampling and testing
	Haunch and side zone.	Clegg Hammer Impact Values may be used to determine the in-situ density index based on a correlation between Clegg Hammer Impact Value and density index as determined from prior laboratory testing or field trials and as accepted by the designer.	Minimum of one test per haunch and one test per side zone, on both sides of the pipe for every 10m of pipe laid. Additional testing for large diameter culverts with multiple haunch and side zone layers may be required by the designer.	Review (R)	Principal / Consultant	Yes, both sampling and testing
	Overlay (normally to height 150mm above pipe).		Under pavement, a minimum of one test for every 10m of pipe laid.	Review (R)	Principal / Consultant	Yes, both sampling and testing
F/3 Concrete Pipe Association of Australasia: Field Testing of Concrete Pipelines and Joints, Section 1.	Pipes.	Pressure testing.	As specified by relevant standard in the Technical Specifications and Standards	Review (R)	Principal / Consultant	Yes, both sampling and testing
New Zealand Fish Passage Guidelines – Although this is not formally specified in NZTA standard, these are typical focus areas	fish passages	Does the fish passage meet the objectives of: <ul style="list-style-type: none"> Continuity of geomorphic processes such as the movement of sediment and debris, and continuity of instream habitats Maintaining water velocities within a range equivalent to adjacent stream reaches Maintaining water depths within a range equivalent to adjacent stream 	On completion of construction	Witness(W)	Principal / Consultant specialist	

Source Document	Construction Component	Test Result or Inspection requirement	Frequency	Hold Point type	Authorised Person	Accredited Sampling & Test Result
		<ul style="list-style-type: none"> reaches Minimising constraints on bank full channel capacity 				

EXAMPLE

14 APPENDIX 2: EXAMPLES OF ITP

		Contractor Logo in here		INSPECTION AND TEST PLAN						ITP No:																
Client: NZTA		Contractor:		Project:	Earthworks (Widening Works)				Date submitted:																	
				Construction Process:					Prepared By:																	
				Specification:					Approved By:																	
Item / Reference	Task/Activity/Description	Inspection/Test				Acceptance Criteria	Record documents	Responsibility	Comments	Checked by																
		Detail of Activity	Action (Hold, Monitor, Witness)	Minimum Test Frequency	Inspection / Test method					NZTA / Eng Rep	Contractor	Date														
302	Setout, Materials and Preparation																									
302.1	Mark out and approve	Set out and mark up of extent of earthworks	MP	All earthworks areas	Visual Inspection	N/A	Contractor's site diary	Contractor																		
302.2	Underground services	Identify and positively locate services	MP	All earthworks areas	Hydoexcavation	N/A	Drawings	Contractor																		
	Subgrade																									
	Determine Embankment / Subgrade Strength	Determine bearing strength of subgrade	R	1 test per 10m	Scala penetrometer test	Technical Specification 302.2 - NZTA F/1 CBR 3blows/50mm min	QA and Scala sheet	Contractor (Designer)																		
	Visual inspection	Visual inspection for soft spots and other issues	W	On completion of bulk cutting	Visual Inspection		Contractor's site diary	Contractor																		
	Proof rolling	Visible deflection below roller	MP	All earthworks areas	Visual Inspection	<7mm deflection	Contractor's site diary	Contractor																		
	Surface Shape	String Surface Area	W	Every 10m			QA - String sheet	Contractor																		
	Structural Fill - (Granular)																									
302.7	Testing of placed material	Strength of placed material	W	Maximum lineal distance between Scalas = 20m	Scala penetrometer test	5 blows / 100mm or CBR not less than 15	Contractor's site diary	Contractor																		
302.8		Density of placed material	W	Maximum lineal distance between NDM tests = 10m	Nuclear Density Meter	Minimum field density of 95% of maximum dry density (MDD) obtained by standard compaction	QA - NDM Sheet	Contractor																		
302.9		Proof roll of placed material	W	All earthworks area	Visual Inspection	No significant visual deformation under the wheel load	QA - Daily diary - signed	Contractor																		
302.7	Surface Shape	String Surface Area	W	Every 10m			QA - String sheet	Contractor																		
	Structural Fill - (Hardfill)																									
302.8	Testing of placed material	Proof roll of placed material	W	All earthworks areas	Visual Inspection	<7mm deflection	Contractor's site diary	Contractor																		
302.9		Density of placed material	R	Maximum lineal distance between NDM tests = 10m	Nuclear Density Meter	Minimum field density of 95% of maximum dry density (MDD) obtained by standard compaction	QA - NDM Sheet	Contractor																		
302.10		Deflection	MP	Every Lane, Every 10m alternate wheel path	Benkleman Beam	90%ile < 2.1mm No single > 2.5mm	QA - IANZ test report	Contractor (Designer)																		
Client Final Inspection - the signature below verifies that this ITP has been completed in accordance with Safe Roads Specifications and verifies lot compliance.							<table border="1"> <thead> <tr> <th colspan="2">Hold Point Types</th> </tr> </thead> <tbody> <tr> <td>Surveillance (S)</td> <td>Random attendance to site by Authorised Person, signature not required.</td> </tr> <tr> <td>Witness(W)</td> <td>Authorised Person expected on site, but not mandatory. Work may proceed after documentation is completed, and signed later.</td> </tr> <tr> <td>Mandatory Hold Point (MP)</td> <td>Authorised Person's on-site attendance is mandatory. No work may proceed until release.</td> </tr> <tr> <td>Review (R)</td> <td>Authorised Person's on-site attendance not mandatory. No work may proceed until release.</td> </tr> <tr> <td>Records (RE)</td> <td>No attendance on site by Authorised Person. Work may proceed after documentation is completed</td> </tr> <tr> <td>Commissioning tests (CT)</td> <td>Specialised items. Authorised Person's on-site attendance is generally mandatory.</td> </tr> </tbody> </table>						Hold Point Types		Surveillance (S)	Random attendance to site by Authorised Person, signature not required.	Witness(W)	Authorised Person expected on site, but not mandatory. Work may proceed after documentation is completed, and signed later.	Mandatory Hold Point (MP)	Authorised Person's on-site attendance is mandatory. No work may proceed until release.	Review (R)	Authorised Person's on-site attendance not mandatory. No work may proceed until release.	Records (RE)	No attendance on site by Authorised Person. Work may proceed after documentation is completed	Commissioning tests (CT)	Specialised items. Authorised Person's on-site attendance is generally mandatory.
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Contractor's Rep Name:		Signature: _____		Date: _____																						
NZTA Engineers Rep Name:		Signature: _____		Date: _____																						

													
Project					ITP No.:								
Work Area	Roading	Chainage	From: N/A	To: N/A									
Description of Work	Earthworks and Pavement												
Client					Revision :								
Prepared By	Dean Breedt				Date:								
INSPECTION AND TEST PLAN - PAVEMENT WORKS													
Operation or Task Category	Task Description <i>(e.g. procurement, temp works, construction activities)</i>	Controlling Documents <i>(e.g. list specifications & clause, drawing)</i>	Acceptance Criteria <i>(e.g. slump value, cylinder strength, etc.)</i>	Inspection or Test			Verifying Document <i>(e.g. test result, pour record, material approval)</i>	Inspection / Test Authority				Hold Point Type S, W, MP, R, RE, CT	
				Method <i>(e.g. visual inspection, slump test)</i>	Frequency	Responsible Person		Conduct	Witness	Produce O&A Records	Approval		
1.0 Pre-Production	1.1 APPROVAL OF PAVEMENT DESIGN		APPROVED FOR CONSTRUCTION			Engineer/MSQA ENGINEER		Contractor	Designer	Contractor	Engineer	MP	
Subbase - AP65/GAP65 (To be supplied by contractor including all the test reports for Source/Production properties)													
2.0 Production	2.1 Source Property Test	MR-9:1999	<10% fines passing 2.36mm sieve under load of 110kN for MR-9	Crushing Resistance	2 per source PR App A02 Table 2.1 Item 1	Construction Project Manager	IANZ Report	Contractor	N/A	Contractor	Engineer	R	
			CA or better	Weathering Quality Index									
	2.2 Production Property Test		Within envelope	Particle Size Distribution	5 per 1000m ³ PR App A02 Table 2.1								
	2.3 Approval of subbase material being supplied by quarry	All above	All above testing compliant	Ongoing monitoring of materials delivered	PER LOT	contractors sign off sheet's	Contractor	N/A	Contractor	Contractor	RE		
	Basecourse - TNZ M4 AP40 (To be supplied by contractor including all the test reports for Source/Production properties)												
2.0 Production	2.4 Source Property Test	M4:2006	<10% fines passing 2.36mm sieve under load of 130kN for M/4	Crushing Resistance	2 per source PR App A02 Table 2.1 Item 1	Construction Project Manager	IANZ Report	Contractor	N/A	Contractor	Engineer	R	
			AA, BB, AC, BA, BB or CA	Weathering Quality Index									
			Table 2 - Envelope Limits	Particle Size Distribution	5/1000m ³ in place								
	2.5 Production Property Test		≥40	Sand Equivalent or									
		≤3	Clay Index or										
	≤5	Plasticity Index											
2.6 Approval of Base material being supplied by quarry	All above	All above testing compliant	Ongoing monitoring of materials delivered	PER LOT	contractors sign off sheet's	Contractor	N/A	Contractor	Contractor	RE			
SUBGRADE													
3.0 Construction	3.1 In-situ CBR	TNZ F/1: 1997	CBR 2blows/100mm min	Scala	1 Test per 1000m ²	Construction Project Manager	Contractor Record Sheet	Contractor	Engineer	Contractor	Engineer	R	
	3.2 Deflection	TNZ F/1: 1997	90%ile < 2.1mm No single > 2.5mm	Benkleman Beam	Every Lane, Every 10m alternate wheel path								Prelim followed by IANZ Report
	3.3 Proof Roll	TNZ F/1: 1997	Visual acceptance	Visual inspection	100% of Subgrade								Contractors Sign Off Sheet
	3.4 Surface Shape	TNZ F/1: 1997	+0mm to -30mm	Survey or Stringline	every 10m								
	3.5 Joint signoff of Subgrade layer/s	ALL ABOVE	ALL TESTING COMPLIANT	SIGN OFF MEETING	PER LOT								Contractor Record Sheet's
Hold Point Types													
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