

# **SCOPE OF WORKS**

## **CONTENTS:**

- C0100 Preliminary and General**
  - C0200 Airside Construction**
  - C0201 Site Clearance**
  - C0202 Removal of Structures and Obstructions**
  - C0203 Excavation and filling (Including topsoil and Grassing)**
  - C0204 Drainage and Services**
  - C0206 Erosion Control**
  - C0207 Concrete for Minor Structures and incidental Works**
  - C0209 Sub-basecourse**
  - C0210 Crushed Aggregate Basecourse**
  - C0211 Cement Treated Course – Not in this Contract**
  - C0213 Bitumen Seal Coat**
  - C0214 Dense Grade Asphalt**
  - C0222 Fencing – Not in this Contract**
  - C1100 Airfield Paint Markings – Not in this Contract**
  - C1200 Dayworks**
- 
- Appendix      CC.1    List of Drawings**

## **C0100 – PRELIMINARY AND GENERAL**

### **C0100.1 THE CONTRACT WORKS**

The Contract Works include (but are not necessarily limited to):

Laying basecourse on the runway, taxiway and apron, construction of new chip sealed pavement as follows:

- Saw cut 7m on either side of the runway from centreline
- Excavate 400mm deep and 2500mm width of unsuitable material and dispose to an approved location directed by the Resident Engineer.
- Supply, lay and compact 200mm subbase layer (crushed base class B) and tested in accordance with specifications
- Supply, lay and compact 200mm basecourse layer (crushed base class A) and tested in accordance with specifications
- Prime and chip seal 10mm of 2500mm on either side of the runway.
- Sweep off all loose aggregates from the runway, taxiway and apron to the Resident Engineers satisfaction and approval before the correction course is applied.
- Remove all foreign object debris (FOD) from the runway, taxiway and apron
- Lay maximum 20mm thick AC14 as a correction course along the runway, taxiway and apron.
- Spray emulsion before laying final layer 50mm AC14 on the runway, taxiway and apron.
- Sweep off all loose aggregates from the car park to the Resident Engineers satisfaction and approval before the correction course is applied.
- Lay maximum 20mm thick AC14 as a correction course on the car park area.
- Spray emulsion before laying final layer 50mm AC14 on the car parking area.

Following works are excluded from the Contract:

- Airfield lighting, including electrical distribution.

### **C0100.2 SITE INFORMATION**

The site information is located at Fagalii Village.

The Site shall be accessed by land transport directly to the airport.

There will be a site visit for all Contractors to understand the site and scope of works, however, no warranty is expressed or implied that such information will give an accurate and complete picture of conditions throughout the Site.

The Contractor shall have satisfied himself as to the precise nature of excavation and filling required, so that he will have allowed for everything necessary in connection with this.

### **C0100.3 DOCUMENTS**

The specifications are divided into various sections for convenience and reference only. No claims will be admitted in respect of work not specifically mentioned in a particular section

but which is provided for, expressed or implied elsewhere in the Specifications or the Drawings.

The Drawings forming part of the Contract Documents are as listed at Appendix CC.1.

#### **C0100.4 MATERIALS AND WORKMANSHIP**

All materials shall be new, unless specified and in accordance with the requirements of the specifications. Where a particular Standard is not called for in the Specifications. Materials shall comply with the relevant New Zealand Standards (NZS) or NZS/AS, Australian Standards (AS) or British Standards (BS) where appropriate NZS do not exist. Reference to any Standard in the Specifications shall include any amendment to or substitution for the referenced Standard.

Where reference is made to Transit New Zealand standard specifications (TNZ), these are available as pdf documents on the NZTA website <http://www.nzta.govt.nz/resources>

Where an item is mentioned by a trade name or other specific reference, it shall be deemed to mean the type of item so mentioned, or any other equivalent thereto in quality, finish, durability and serviceability for the purpose intended. The quoting of a trade name shall not be construed as any desire to restrict the use of a competitor's Materials, and the Contractor is at liberty to offer the Engineer's approval any Materials considered by the Contractor to be of equivalent quality. Approval otherwise of offered alternatives shall be at the Engineer's discretion. No warranty is expressed or implied that Materials specified are regularly stocked by merchants.

Where sample approval is specified. Samples of materials shall be provided and the Engineer's approval obtained prior to incorporating such materials in the Contract works. Samples of approved Materials shall be retained on Site for comparison with those built in the Contract Works.

***Tenderers shall provide curriculum vitae for the above nominated staff with the tender submission.***

#### **C0100.5 STRUCTURAL DESIGN INTEGRITY.**

No structural changes shall be made without the Engineer's written approval. Changing or varying structural elements without the specific approval of the Engineer may lead to structures being unable to withstand in part or in whole loadings imposed upon them.

#### **C0100.6 PARTS OF CONTRACT WORKS DESIGNED BY CONTRACTOR - *Not in this Contract.***

#### **C0100.7 COOPERATION WITH THE EMPLOYER**

1. The Contractor shall so plan and execute the Contract Works that interfere with the Employer's activities on and adjacent to the Site is kept to a minimum and all reasonable requests by the Employer to that end are met.

The Airside area shall be defined as the runway strip +/-45m of runway centerline plus a height limit restriction projected at 5 horizontal to 1 vertical (5H:1V) from the 45m offset at the existing or new runway centerline elevation.

The Employer will arrange for all NOTAMs and co-ordination with the airlines operating at Fagalii Airport, if any.

## 2. **AIRFIELD SAFETY OFFICER**

The Employer shall provide a suitably Airfield Safety Officer to be on site during all working hours. The safety of airside workers will have precedence at all times and will be the primary focus of the Airfield Safety Officer.

The Airfield Safety Officer shall co-ordinate with the Contractor's construction, the Employer and the Engineer's Representative and the Contractor without delay, comply with any instructions given by the Aircraft Safety Officer.

### **C0100.8 CONTRACTS INTERFACE**

Should the Contractor consider that the work of or the condition of any surface provided by a separate contractor is not suitable for ensuring a proper finish for the Contractor's own work, the Contractor shall so notify the engineer before any further work is done and shall not proceed until the necessary alteration or improvement has been made. Failing such notice, Contractor shall be deemed to be satisfied with the work of separate contractors to the extent that a proper finish to the Contractor's own work can and shall be achieved.

### **C0100.9 SITE MEETINGS**

Site meetings shall be held at a regular weekly intervals, presided over and minute by the Engineer and attended by the Contractor's site representative. The employer shall have the right to attend. The Contractor shall provide suitable facilities for the holding of such meetings. From time to time, Subcontractors may be required by the Engineer to attend (but this should be rare, since the Contractor is expected to resolve all subcontract matters outside such meetings).

The Engineer may invite attendance by the Employer's separate contractors or interested parties.

### **C0100.10 REPORTING**

Monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in 2 copies hard copies and an e copy. Reports shall be submitted within 7 days from the end of every month during construction. Reporting shall continue until the Contractor has completed all work that is known to be outstanding at the completion date stated in the Performance Certificate of the Contract Works. Each report shall include:

- a. Charts and detailed descriptions of progress, including each construction item, including procurement, delivery to Site, construction, erection, testing and commissioning.
- b. Photographs showing the status of construction and progress on the Site;
- c. For procurement of manufacture of each main item of materials, the name of the manufacturer/supplier, manufacturer/source location, percentage progress, and the actual of expected dates of:
  - I. Commencement of manufacturer/supply.
  - II. Contractor's inspections
  - III. Testing's and Results,

- IV. Shipment and arrival at the Site;
- d. Copies of records of the Contractor's personnel and Plant on Site.
- e. Problems encountered during construction at the Site and proposed solutions.
- f. Copies of quality assurance documents, test results and certificates of materials;
- g. Safety statistics including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- h. Comparisons of actual and planned progress with details of any events or circumstances which may jeopardize the completion in accordance with the Contract Documents, and measures being (or to be) adopted to overcome delays.

#### **C0100.11 RECORDS**

The Contractor shall complete an approved daily record by 10am of each Working day covering activities relating to the previous Working Day, detailing all work carried out including Plant and manpower hours, Subcontractors and day works ordered by the Engineer. Such diary records shall be submitted to the Engineer at the end of each week. The format of such records shall be prepared and approved by the Engineer before work commences on Site.

#### **C0100.12 SITE SAFETY MANAGEMENT SYSTEM**

The Contractor shall establish and maintain a site-specific Safety Management Plan that ensures the safety of all persons on the Site, a copy of which shall be submitted to and accepted by the Engineer before the commencement of any work on the site.

The site-specific safety management plan shall ensure compliance with local Occupational Health and Safety Law (OSH) and shall include, but not be limited to:

- An up to date register of all site hazards and how they are being managed.
- Safety rules and procedures relevant to the Site;
- Contractors safety policy training procedures and recent safety records;
- Requirements for safety equipment. Identification of specialized equipment for specific tasks;
- Requirements for safety meetings as frequently as in necessary and in any event at least weekly;
- Evacuation and emergency procedures.

The Contractor shall provide first aid facilities and personnel with relevant first aid training as required by the relevant laws.

The Contractor shall develop a procedure that complies with the OSH and any other relevant legislation for identifying, assessing, eliminating, isolating and minimizing hazards that are or may exist on the Site.

Data on the Contractors health and safety performance shall be provided as required by the Engineer.

The contractor's Site Safety Officer shall attend all safety audits and safety reviews and shall provide data on the Contractor's health and safety plan.

Without limiting the foregoing the Contractor shall establish and maintain a register of hazards for the Site in which the Contractor shall record any identified hazard the date it was identified and any steps taken to eliminate, mitigate, mark or isolate the hazard. A copy of each revision of the register shall be forwarded to the Engineer and to the party designated with the responsibility for the control of the place of work.

#### **C0100.13 HAZARDOUS SUBSTANCES AND MATERIALS**

Hazardous substances and materials may be specified and used in construction. It is the Contractor's responsibility to ensure that these are stored in accordance with applicable rules and regulations and that all persons who may come in contact with such hazardous substances and materials are adequately protected from unnecessary exposure. This also includes a responsibility to ensure that all persons using hazardous substances and materials are properly trained and are provided with appropriate operating equipment, safety clothing, etc.

The employer is aware of the following hazardous associated with the Contract Works, the Site or special measurements required:

- Underground Services – Storm water, utilities
- Unstable slopes

#### **C0100.14 QUALITY MANAGEMENT**

The Contractor shall carry out the Contract Works in all respects in accordance with the requirements of a quality plan, meeting the Quality system Standard ISO 9001 to demonstrate compliance with the requirements of the contract. Such plan shall be prepared by the Contractor and submitted to the engineer for approval within 2 Weeks of the Date of Acceptance of Tender. Such plan shall identify primarily the Inspection and Test plans (ITPs) covering the checks, inspections and tests to be carried out by or on behalf of the Contractor, in order to ensure proper performance in the carrying out of the Contract Works. No responsibility is assumed by the Employer for any delay in the approval of the Quality Plan to meet the required parameters.

Compliance with the quality plan shall not relieve that Contractor of any of its duties, obligations or responsibilities under the Contract documents.

Details of all procedures and compliance certificates shall be submitted to the Engineer for information before each stage of the Contract Works is commenced. When any document is issued to the engineer, it shall be accompanied by relevant signed quality statements. The Engineer shall be entitled to audit any aspect of the system and require corrective action to be taken.

#### **C0100.15 ENVIRONMENTAL MANAGEMENT**

The contractor shall prepare and submit an environmental Management Plan in accordance with ISO 14001 to the engineer for approval within 2 weeks of the Date of Acceptance of Tender. Such plan shall identify the measures and the sequences of operations to be adopted by the Contractor, in order to satisfy the applicable regulations and constraints. No responsibility is assumed by the Employer for any delay in the approval of the Environmental Management Plan to meet the required parameters.

**C0100.16 HOURS OF WORK**

There will generally be restricted to 6am to 6pm on the hours of work from Monday to Saturday as the site is available to the Contractor.

**C0100.17 CONTRACTOR'S PROGRAMME**

The Contractors programme shall be set out an approved method of programming on a time scale.

Any programme revisions shall be supplied to the Engineer and the Contractor shall maintain an up-to-date in the Site Office through the contract period.

The programme shall show the date(s) when Materials critical to completion on time must be ordered and received.

The Contractor shall on request provide the Engineer with evidence of placing these orders.

The programme shall be updated weekly and such updating shall be submitting at each site meeting as well as with the progress reports as detailed in C0100.10

**C0100.18 CONSTRUCTION RECORD DRAWINGS (AS BUILT DRAWINGS)**

THE Contractor shall undertake a survey of the completed runway, taxiway and apron areas including position and level to an accuracy of  $\pm 5$ mm relative to the site datum shown on the drawings and the position and level of underground services and paint markings installed.

The Contractor shall prepare and submit to the Engineer 2 copies of such drawings, diagrams and schedules as shall provide an adequate record of the constructed or installed works in the Contract Works. Such documents shall be in hard copy (A1 and A3 size drawings) and electronic form (AutoCAD) to the approval of the Engineer in terms of both contents and format and as such shall be received prior to the Engineer issuing the Performance Certificate.

**C0100.19 GUARANTEES – Not in this Contract**

**C0100.20 TEMPORARY FACILITIES**

The contractor shall provide all temporary facilities as may be required, except as noted below. These shall be located towards the western approach.

The Contractor shall provide and upon completion remove all temporary electricity, water, supplies and wastewater collection and/or disposal that may be necessary, to the requirements of the relevant Authorities.

The Contractor shall provide, erect and maintain throughout the contract a single signboard which shall be approved by and located as directed by the Engineer. The Employer will not permit any other sign to be displayed at the Site, except for warning and directional signs.

## **C0100.21 ENGINEER'S OFFICE**

The Contractor shall provide, maintain, clean, and light throughout the contract period and office for the exclusive use of the Engineer at least 6m x 4m plan dimensions, with surface-sealed sheet flooring, internal linings, air conditioning, and adjustable ventilation, removable shutters to the windows, a sink with hot and cold water supply and drainage, and a lock with keys in duplicate. There shall be no spare keys in the possession of any party other than the Engineer. The office shall be furnished with a drawing table, a stool, two chairs, a desk with lockable drawers, and a cupboard.

The Engineer's office shall be located on the western approach or as agreed with the Employer.

The office working environment shall meet the requirements of relevant health and safety legislation and regulations. Office furniture and equipment's shall be consistent with the OSH Approved Code of Practice for the Safe Use of Visual Display Units.

The Contractor is to provide a new, compact, facsimile/photocopy machine and provide the necessary toners and A4/A3 print paper that would be reasonably expected to be utilized for this project. The Contractor is to provide a dedicated internet connection and pay all associated connection charges and monthly charges.

The contractor shall pay all connection charges and monthly charges for the landline, facsimile machine and email charges until 3 months after the issuance of the Certificate of Practical Completion has elapsed. Provide all consumables for the computer, printer and facsimile including paper, toner and cartridges and insure maintenance is carried out if and when required.

This office and its furnishings including phones, photocopy machines that are listed to be provided by the Contractor in above paragraph shall revert to, and be removed from the Site by the Contractor at the completion of the contract.

## **C0100.22 DAMAGE TO PROPERTY**

The Contractor shall record the states of roads, drives and footpath surfaces as well as adjoining premises before the Contract Works commence, shall obtain the adjoining owners agreement in writing as to the existing condition of their properties.

Where the Contractor proposes to import aggregates, details of mitigation and repair of damage to concrete roads from the port to airport shall be provided with tender.

The Contractor shall be responsible for the weather tightness and the security of the Employer's property where this may be affected by the Contract Works operations, and shall take all necessary steps to this end.

Should the Contractor fail to take whatever steps may be necessary to ensure the weather tightness and security of the Employer's property, then the Employer shall be entitled to deduct from money due or becoming due to the Contractor the value of such losses sustained which are attributable to such failure on the Contractor's part. The Employer reserves the right to engage others to make good security and weather tightness where these have been adversely affected by the Contractor, and where the Contractor has failed to undertake immediate effective remedial works to the Employer's approval. Costs arising



from the Employer having to engage others to carry out this work shall be recovered by the Employer from money due or becoming due to the Contractor.

**C0100.23 SURVEY AND SETTING OUT**

The Contractor shall set out the whole of the work in accordance with the Drawings to achieve the finished pavement and ground profiles shown on the Drawings and then agreed on site with the Engineer. Levels shall be taken relative to the Datum shown on the Drawings and as instructed by the Engineer. All setting out and spot leveling shall be done by a Registered Surveyor who shall certify the correctness of this work to the Engineer in writing. The Contractor is responsible for all the undisturbed reference marks and will be responsible for any transfer of these reference marks.

**C0100.24 SECURITY – *Not in this Contract***

**C0100.25 CAR PARKING**

Car parking for the Contractor's and its Subcontractors employee shall be confined to the Contractor's site office and plant areas as directed by the Engineer.

**C0100.26 KEEP ACCESS OPEN**

The Contractor shall keep at least half the width of the public roadway open and passable traffic at all times.

The least possible interference, consistent with the carrying out of the Contract Works shall be inflicted on traffic.

The Contractor shall ensure that access, including temporary vehicular access, is maintained at all times to private properties by the Contract Works.

The Contractor shall maintain appropriate vehicular access to commercial/industrial properties to the Engineers approval at all times, unless essential work is being undertaken immediately at their entrances. In that case, the owners/occupiers shall be notified by the Contractor in writing on Week in advance of the length of time that the entrance are to be closed, and the starting time(s) of the closing(s)

The Contractor shall undertake no work on private property until the Contractor is in receipt of the Engineer's instructions in writing to proceed with that part of the Contract Works. The area of private property involved in the Contract Works is clearly defined in the Drawings. The Contractor is forbidden to work outside such area without the Engineer's instructions in writing.

**C0100.27 CRANEAGE- *Not in this Contract***

**C0200 AIRSIDE CONSTRUCTION**

**C0200.1 CO-OPERATION WITH THE EMPLOYER AND AIRCRAFT SAFETY – Not in this Contract**

**C0200.2 STANDARDS**

This Specification shall be read in conjunction with the following Standards, which are deemed to form a part of this Specification. In the event of this Specification being at variance with any provision of the Standards, the requirements of this Specification take precedence over the provision of the Standards. Reference to any Standard shall include any amendments thereto and any Standard in substitution therefore. All Materials and workmanship shall comply with these Standard unless expressly noted otherwise.

AC139-5 Operational safety during works on aerodromes – Civil Aviation Authority of New Zealand – Rev 1, April 2007

**C0200.3 METHOD OF WORK PLAN (MOWP)**

**Project Management**

Project management structure both on-site and off-site

C.V.s of all management staff including:

**Site Engineer**

- Minimum Qualification Bachelor of Civil Engineering (BE)
- Chartered Professional Engineer (CPENG IPES)
- 10 years' work experience in project management and team leadership roles
- Experience must be in airport construction, road construction, bitumen sealing.
- Progress report writing and daily report writing
- Multiple tasked road construction coordination
- Planning and delivering tool box meetings daily
- Planning and forecasting weekly work plans

- Preparation and adherence to Occupational Health and Safety
- Preparation and adherence to Contractors Environmental Social Management Plan

#### **General Foreman**

- Minimum 10 years' work experience in multiple construction activities
- Must be an exceptional leader to lead multiple teams up to 6 teams
- Experience must be in airport construction, road construction, bitumen sealing.
- Implementation of Occupational Health and Safety
- Implementation of Contractors Environmental Social Management Plan

#### **Health and Safety Manager & Environmental Manager**

- Diploma or equivalent qualifications on relevant field
- Minimum 8 years' work experience in implementation of health and safety and environmental plans on construction sites.
- Must be able to prepare and undertake inductions.
- Reporting on Occupational Health and Safety issues and mitigation
- Reporting on Contractors Environmental Social Management Plan issues and mitigations

#### **Quality Assurance Manager**

- Diploma or equivalent qualifications on relevant field
- Minimum 8 years' work experience in testing Scala, NDM and benklemen beam test.
- Ensure that all materials exceed the required design standards.
- Ensuring that all tests as defined in the specification are carried out, and the test criteria are met or exceeded
- Ensuring that any materials that fail to meet test criteria are removed and such test fails are reported
- the management of the day-to-day quality control of activities – to also include planned and random audits of documentation provided by the Contractor and Sub-Contractors,
- For preparation of all reports as required under the Contract(s)

#### **Proposed Works Programmed**

Proposed works programmed to undertake filled areas on the Eastern Approach, excavation on the Western Approach and the Apron and Taxiway Earthworks concurrently. These three (3) areas have to start construction at the same time.

Proposed quarry operations including positioning of quarry plant.

#### **Proposed Site Security Measures**

Proposed haul road routes and operator training details

#### **Site Safety Procedures**

Proposed safety procedures for carrying out works on the airport

Proposed emergency procedures in case of an accident

Reporting procedures for near misses.

**C0200.4 AIRFIELD SITE SAFETY OFFICER – Not in this Contract**

The Employer shall provide a suitably qualified Airfield Safety Officer

The safety of aircraft operation will have precedence at all times and will be the primary focus of the Airfield Safety Officer

**C0200.5 Not in this Contract**

**C0200.6 CONTRACTOR'S AIRFIELD SAFETY SUPERVISOR**

The Contractor shall provide a suitably qualified Contractors Safety Supervisor to be on site during all working hours. The Employer shall approve the nominated Contractors Safety Supervisor.

The Safety Supervisor shall be based in the field in a supervisory position, where it is possible to monitor Contractor staff.

***Roles of the Safety Supervisor shall include but not be limited to;***

- 1.1 First point of contact for the Engineer for Safety Issues
- 1.2 Comply with all requirements.

**C0200.7 CO-ORDINATION OF SITE CONSTRUCTION WORKS – Not in this Contract**

**C0200.8 IN GROUND SERVICES: AIRFIELD LIGHTING AND NAVIGATIONAL AIDS –Not in this Contract**

**C0200.9 OPERATIONAL NEAR MISS OR INCIDENT – Not in this Contract**

**C0201 SITE CLEARANCE**

**C0201.1 DESCRIPTION**

The work specified in this Section includes clearing, grubbing and removal of all vegetation and debris within the designated limits of the Site and disposal off Site. The existing runway strip has an unbound gravel surface with grass cover.

Except where provided for otherwise, it shall also include the demolition, removal and disposal of any structure or fences that obtrude into or encroach upon obstruct the work.

Vegetation and objects designated to remain shall be preserved free from injury or damage.

**C0201.2 CONSTRUCTION**

**1. Permits and Fees**

- a. The Contractor shall apply for and uplift all permits necessary and pay all fees in connection thereof lawfully demanded by the Territorial or other relevant Authority

**2. Marking**

- a. The Engineer will designate by indication on the Drawings all trees, shrubs, plants, and other objects to be removed. Cut or scarred surfaces of trees or shrubs to remain shall be painted with an approved asphaltic base paint prepared especially for tree surgery.

**3. Clearance**

- a. All coarse vegetation, rubbish and perishable matter shall be cleared from the areas affected by the Contract Works and shall be removed from the Site becoming the property of the Contractor on leaving the site.
- b. The burning of rubbish and vegetation on Site will not be permitted
- c. No stripping or earthworks shall be carried out in any area until clearance has been completed in that area and approved by the Engineer
- d. In fill areas, holes resulting from removal of obstructions shall be backfilled and compacted with suitable material in accordance with C0203

**4. Stripping Topsoil and Stocking**

- a. After the Site has been cleared, topsoil (including grass) shall be stripped as follows and stockpiled in a location agreed to by the Engineer for screening and re-spreading on completion of the earthworks.
- b. In areas affected by the Works all topsoil shall be removed
- c. Topsoil shall be stockpiled in such a manner that the stockpiles and the surrounding areas are well drained and do not pond or cause ponding of storm water.
- d. The Engineer shall inspect all excavated material and advise whether it is suitable for reuse as either topsoil engineering fill or shall be stockpiled in the fill disposal area designated.

**5. Trimming (Grading)**

- a. Where the Contractor specified shall trim areas within the excavation or filling limits. Trimming shall include the removal of brush, roots sod, grass, residue of agricultural crops, sawdust, decayed vegetable matter and other deleterious material from the ground surface.
- b. The trimmed surface of the runway area shall be tested, inspected and approved prior to fill placement.

**C0202            REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

**C0202.1        DESCRIPTION**

The work specified in this Section includes the demolition, removal and disposal of all buildings, fences, structures, pavements, abandoned pipelines or services and other obstructions that are not designated to remain. The work shall include the salvaging of designated materials and backfilling the resulting trenches, holes and pits.

**C0202.2 SCOPE OF WORK**

The work includes the demolition, removal and disposal of the following items

1. Existing unsuitable material or any material matters found along the runway shoulder.

The following materials are to be salvaged and stockpiled as directed on the site or at other specified locations.

1. Excavated cut materials including topsoil stockpile in an area to be advised by the Engineer.
2. Excavated cut materials including base material CBR10 should be stockpile in an area to be advised by the Engineer.

In addition to the general requirement to protect the works, the Contractors attention is drawn to the following specific items which are to be protected from damage at all times

1. Adjacent pavements.
2. Utility services

**C0202.3 STANDARD SPECIFICATIONS – Not in this Contract**

**C0202.4 CONSENTS AND APPROVALS**

Any consents and approvals required for removal of structures and obstructions are to be sourced by the Contractor. All work shall meet these condition.

**C0202.5 Not in this Contract**

**C0202.6 CONSTRUCTION**

**1. Existing Services**

- a. The Contractor shall ensure that all existing services have been disconnected or are isolated prior to any demolition works

**2. Temporary Support**

- a. Where demolition and removal of obstructions removes or weakens support for any other part of the site including structures and services, the Contractor shall be responsible for providing temporary support until it is no longer required.

**3. Removal of Bridges, Culverts and Other Drainage Structures – Not in this Contract**

**4. Removal of Building and Structures – Not in this Contract**

**5. Hazardous Materials - Not in this Contract**

**6. Disposal of Demolished Materials - Not in this Contract**

**7. Making Good**

Wherever the demolitions will result in leaving a surface that will not be covered by or otherwise be the subject of work by a following trade, the Contractor shall make good to match the existing adjacent surfaces. Note that it may be necessary to make good

some areas not otherwise affected by the Contract Works in order to achieve such a match. Pits or cavities formed during the demolition work shall be backfilled and compacted in accordance with C0203.

**8. Stabilization – Not in this Contract**

**C0203 EXCAVATION AND FILLING (including topsoil and grassing)**

**C0203.1 DESCRIPTION**

The work specified in this Section includes the excavation of cuts, including excavation below the final subgrade surface, rock excavation, the excavation of borrow areas benches and surface drainage facilities, the carting of the excavated material to fill, stockpiles or waste, construction of the fills and subgrade, shaping, trimming, grassing and maintaining of the Works all in accordance with the Drawings and Specifications.

**C0203.2 STANDARD SPECIFICATION**

This Specification shall be read in conjunction with the following Standards, which are deemed to form a part of this Specification. In the event of this Specification being at variance with any provision of the Standards, the requirements of this Specification take precedence over the provision of the Standards. Reference to any Standard shall include



any amendments thereto and any Standard in substitution therefor. All materials and workmanship shall comply with these Standards unless expressly noted otherwise.

TNZ F/1:1997 Specification for Earthworks Construction

NZS 4402: 1986 Methods of Soil Testing for Civil Engineering Purpose

NZS 4407: 1991 Methods of Sampling and Testing Road Aggregates

Where reference is made to Transit New Zealand standard specifications (TNZ), these are available as pdf documents on the NZTA website: <https://nzta.govt.nz/resources>

### **C0203.3 DEFINITION OF TERMS**

1. These terms are additional to those specified in TNZ F/1
2. "Unsuitable Materials" is defined as any soil which because of its physical or chemical composition strength and/or moisture content is unsuitable to have fill constructed over it or to have a pavement constructed up it and shall include any highly organic soils or silt expansive clays; clay having a liquid limit exceeding 80 and/or a plasticity index exceeding 55, toxic materials slurry or mud ashes or any materials containing compounds harmful to other elements of construction or the environment.

Any material which exhibits a soaked CBR strength less than the anticipated design value as indicated in the following table shall be deemed unsuitable as sub-grade within the pavement area.

<b>Table 203.1</b>			
<b>Depth Below Subgrade Level (mm)</b>	<b>Area 1 Design CBR %</b>	<b>Area 2 Design CBR %</b>	<b>Area 3 Design CBR %</b>
0 – 400	15	15	10
400 – 1000	10	8	6
Over - 1000	5	5	4

3. "Borrow" excavation shall consist of approved material required for the construction of fill embankment or for other portions of the work in excess of the useable material available from the planned excavations. Borrow may be obtained from widening cuttings (if approved) or from borrow areas within or outside the Site

### **C0203.4 CONSTRUCTION**

Construction of the earthworks shall be carried out in accordance with TNZ F/1

Compaction standards shall comply with table 203.2 following

***The following sub-clauses are additional and supplementary to the requirements of F/1***

## **1. Undercutting Unsuitable Material**

The contractor shall carry out testing to establish the suitability and load bearing capacity of in-situ materials exposed in and underlying excavated surfaces and surfaces of areas stripped of surface soil on which pavements or structures are to be built

Testing shall include Scala penetrometer shear vane proof rolling

The Contractor shall draw the Engineer's attention to any suspected unsuitable material. The Engineer will determine whether the material is unsuitable or not and agree the extent of the unsuitable material with the Contractor

The Contractor shall excavate unsuitable materials from such areas to such depths as specified or instructed. The resulting excavation shall be filled with approved material deposited and compacted as specified herein. The unsuitable material shall be removed to an approved disposal area and shall be laid graded and rolled in uniform layers not exceeding 300mm thickness to result in a self-draining tidy area.

Similarly in areas to be filled where topsoil stripping exposes material unsuitable for foundation of the filling the unsuitable material shall be excavated and replaced with approved material before filling is commenced.

## **2. Borrow Excavation**

### **a. Borrow Areas within the Site**

- The use, depth, location and dimensions of borrow areas within the Site including widening of excavations shall be subject to the approval of the Engineer. The Contractor will be deemed to have satisfied himself before entering into the Contract as to the use of borrow areas within the Site and to have allowed in the rates for the risk of borrow areas not being permitted in areas of uncertainty. Notwithstanding any general advice given by the Engineer before the submission of tenders, borrow areas may be prohibited or restricted in dimensions and depth by the Engineer where:
  - i. They might affect the stability or safety of the pavement or structure
  - j. They may result in adverse environment effects
  - k. They might interface with natural or artificial drainage or irrigation.

### **b. Borrow areas outside the Site not indicated in the Contract Documents.**

- The contractor may use borrow areas outside the site other than those indicated in the Contract Documents. In such cases the Contractor shall be fully and solely responsible for obtaining all consents and approvals and for all expenses incurred and any legal consequences. The Contractor may be required to provide evidence of proper consents and permissions being in place for his use of the borrow material.

### **c. Construction Methods**

- Borrow areas shall be cleared and grubbed and stripped of topsoil as directed by the Engineer in accordance with these Specifications. All suitable materials removed from borrow sources shall be used as indicated on the Drawing or as

directed. During construction the borrow areas shall be kept drained as far as is practicable and the works shall be executed in a neat and workmanlike manner. On completion borrow areas shall be drained and left in a presentable condition with all slopes dressed uniformly and grassed.

### 3. Filling General

- The Contractor shall wet or dry all materials used for filling as necessary to achieve the specified standard of compaction.

<b>Table 203.2 COMPACTION STANDARDS FOR CONSTRUCTION OF STRIP AREA</b>		
<b>Soil Type</b>	<b>MDD Test Method</b>	<b>Minimum Field Density (%MDD)</b>
Cohesive	NZS 4402 Test 4.1.1 (standard compaction)	98%
Cohesionless	NZS 4402 Test 4.1.2/4.1.3 (heavy compaction/ vibrating hammer)	95%

- Laboratory test procedures to establish maximum dry density (MDD) and field compaction standards shall be in accordance with table 203.3

### 4. Filling for Pavement Construction

Within the pavement area only granular fill materials may be used. Refer to C209/C210

### 5. Filling the Runway Strip

The construction of filling for strip areas shall be in accordance with the requirements of TNZ F/1 with either salvaged or imported cohesive or granular (cohesionless) material used.

### 6. Protection of the Subgrade

The Contractor shall be responsible for the protection and care of the subgrade at all times and particularly during wet weather. He shall construct at no extra cost all necessary temporary drains to provide such protection. The whole of the subgrade shall be kept graded at all times to ensure that no areas pond water. The Contractor shall protect the subgrade from damage by laying planks when directed and shall take other precautions as needed. In no case shall vehicles be allowed to travel in a single track. If ruts are formed the subgrade shall be reshaped and compacted. Storage or stockpiling of materials on top of the subgrade shall not be permitted.

***Should the Engineer consider that the Contractor has not fulfilled his obligations to the extent that softening of damage to or failure of the subgrade occurs and that in the opinion of the Engineer remedial measures are necessary to restore the subgrade and any subsequent work to their original condition the Contractor shall carry out such remedial works at no cost to the Employer.***

### 7. Subgrade Testing

The subgrade shall be inspected by the Contractor and tested in accordance with table 203.4 any areas which are not of the typical subgrade material shall be identified and the details forwarded to the Engineer prior to testing.

Immediately before the construction of any sub-base the underlying sub-grade shall be tested by the Contractor for compliance with the specified requirements for strength and surface tolerances and shall be inspected to determine if the surface has loosened been disturbed or has deteriorated. Any areas found to lack the specified accuracy or to have suffered deterioration shall be scarified reshaped by adding removing or replacing material dried watered compacted or otherwise treated until the specified requirements for the sub-grade and its surface are obtained.

For each section of subgrade fill which has been prepared and completed testing shall be carried out in accordance with table 203.4 following and as follows.

**a. Density testing shall comply with the minimum requirements of table 203.2**

Should any area fail to meet the above criteria the Contractor may elect to apply additional compactive effort to the top of the subgrade layer and then perform a second test.

Non complying areas shall be removed and replaced at no cost the Employer

When the Contractor considers that the preparation of the subgrade is complete in accordance with the above criteria and that the condition and strength of the subgrade is suitable for the construction thereon of the sub-base-course and base-course layers he shall request that an inspection of the subgrade be carried out by the Engineer. The Contractor shall supply the results of all subgrade tests to the Engineer prior to the inspection and shall carry out such further tests as the Engineer considers to be necessary to confirm the strength and condition of the subgrade if so directed by the Engineer the Contractor shall test roll the subgrade in the presence of the Engineer. This test rolling shall be by a 10 to 15 tone steel drum roller or a fully loaded truck or similar plant item.

Any yielding or otherwise unsatisfactory performance of areas of the subgrade which become evident during such testing shall be treated in accordance with the Engineers instruction.

The Contractor shall not commence the construction of the subbasecourse layer until the Engineers acceptance of the subgrade is given.

**8. Dump Areas**

The location of dump areas for surplus or unsuitable material shall be agreed with the Engineer. All work in dump areas shall comply with the consent conditions.

**9. Testing**

Testing subgrade fill etc shall be carried out in accordance with the following tables. All testing shall be carried out by the Contractor

<b>Table 203.3 : Soil Tests Before Compaction</b>		
<b>Soil Type</b>	<b>Test</b>	<b>Frequency</b>
Cohesive	Maximum Dry Density	Once per material type
Cohesionless	Maximum Dry Density	Once per material type
	Particle size distribution	Once per material type
All	Moisture content	As required

<b>Table 203.4 Soil Tests during Construction</b>		
<b>Location</b>	<b>Test</b>	<b>Frequency</b>
Bulk Fill	Surface Levels	10m grid
	Density/Moisture Content	1 per 400m <sup>2</sup>
	Scala Penetrometer	10m grid
Existing Subgrade in pavement areas	Surface levels	0, 5, 10 and 15 meter
	Proof rolling	Transverse 10 meter
	Scala Penetrometer	longitudinal intervals continuous 10 m grid

**C0203.5 TOPSOIL SPREADING AND FERTILISING**

Topsoil shall be uplifted from stockpile. It shall be screened free from weeds, sticks, stones and rubbish, spread uniformly over the areas as defined.

A fertilizer mix comprising 3 parts sulphate of ammonia to 1 part superphosphate shall be uniformly spread over the topsoil layer at the rate of 10kg per 100m<sup>2</sup>. The topsoil layer shall then be rotary hoed, levelled and trimmed to a uniform fine open tilth free from lumps, stones and rubbish.

**C0203.6 GRASSING – Not in this Contract**

**C0203.7 STABILISATION – Not in this Contract**

**C0203.8 BLASTING – Not in this Contract**

**C0204 DRAINAGE AND SERVICE**

**C0204.1 PRELIMINARY**

Refer to the Conditions of Contract and Section C0100 of the Specification which shall apply to this section of the Works.

**C0204.2 EXTENT OF WORK**

The work covered by this section includes but is not necessarily limited to the supply of all labor, Materials and Plant for the construction of the following if require;

- a. Piped storm-water drainage systems and associated structures
- b. Piped subsoil drainage systems

**C0204.3 STANDARD SPECIFICATION**

This Specification shall be read in conjunction with the following Standards. Which are deemed to form a part of this Specification

BS 729:1986	Hot-dipped galvanized coatings on Iron and Steel
BS 2494:1987	Elastomeric Joint Tings for Pipework and Pipeline
NZS 3107:1976	Precast Concrete Drainage and Pressure Pipe
NZS 4402:1986	Method of Testing Soils for Civil Engineering Purposes
NZS 4452:1986	Construction of Underground Pipe Sewers and Drains (withdrawn by SNZ 1998)
NZS 7643:1979	Code of Practice for installation of Unplasticised PVC Pipe and system
AS/NZS 1477:1999	UPVC Pressure pipe
NZS 3109:1997	Specification for Concrete Construction
TNZ F/2:2000	Pipe Subsoil Drain Construction

Although NZS 4452:1986 has been withdrawn by Standards NZ it is still part of this contract

Where reference is made to Transit New Zealand standard specifications (TNZ) these are available as pdf documents on the TNZ website: <http://www.transit.govt.nz/technical>

## C0204.4

### MATERIALS

#### 1. Pipes

Pipes for the storm water drainage system shall be reinforced concrete pipes Class Z with rubber ring joints and shall comply with NZS 3107 in all respect.

Subsoil drainage pipes shall be 100mm diameter class PN12 UPVC slotted to TNZ f/2 with solvent welded joints. The pipes shall be laid such that the slots are facing upwards.

#### 2. Rubber Jointing Rings

Rubber jointing rings shall comply with BS 2494 BS EN295 or AS 1693 as applicable and shall be of a type approved by the pipe manufacturer for use with the particular pipe joint.

#### 3. Concrete and Mortar

Concrete shall comply with the requirement of Section C0207 – Concrete Works of this Specification.

Mortar shall consist of two parts of fine sharp graded sand to one part of cement measured by sufficient water to make it slightly moist. It shall be mixed in small quantities as required. Any mortar not used within 30 minutes of mixing shall be discarded.

#### 4. Concrete Pipe Bedding

Unless shown otherwise on the Drawings, granular pipe bedding for concrete pipes shall be clean crushed stone as specified in NZS 4452 evenly graded from 20mm to 2mm. Bedding material shall have a compaction fraction not exceeding 0.1 when tested in accordance with the Compaction Test at Appendix A in NZS 4452.

#### 5. Initial Backfill

Initial backfill of pipes greater than 400mm in diameter and less than three times the pipe diameter below finished surface under aircraft pavements shall be cement treated base-courses containing four percent cement by dry weight and compacted in layers not exceeding 150mm loose thickness to attain a minimum, density of 95 percent of NZS heavy compaction density as determined by NZS 4402 Test No.4.1.2

The initial backfill around and between pipes which cross and are closer than one pipe diameter (i.e. the diameter of the smallest pipe) to each other, shall be 17.5 MPa concrete. The concrete surround shall extend for two meters either side of the cross over point.

Initial backfill for other pipes shall be as specified in C0204.4.4. Above

#### 6. Hard fill

Hard-fill if required shall be GAP 65 sub-base-course material

#### 7. Filter Material for Subsoil Drains

Filter material shall be clean coarse beach sand and geotextile shall comply with TNZ f/7 strength B1 filter Class 1.

## **C0204.5**

### **TRENCH EXCAVATION**

#### **1. General**

Trench excavation shall be carried out to enable pipes to be bedded and laid to the grades and levels as shown on the drawings.

In pavement areas no trench excavation shall occur until the level of the subgrade and/or pavement on both sides of the trench is a minimum level of 150 mm above the top of the pipe.

Where, in the opinion of the Engineer, the ground at the trench invert is unsuitable, it shall be excavated to solid ground or as directed by the Engineer, and backfilled with hard fill.

The Contractor shall ensure that the trench floor is adequately drained such that ponding or flooding does not occur. The Contractor shall make good at no extra cost any softening of the trench floor caused by his activities.

Prior to excavating in sealed areas, which are not scheduled for overlay or reconstruction, sawcuts shall be made 300mm back from the sides of the proposed trench and the existing seal removed to a straight edge to facilitate a neat finish on restitution.

No allowance will be made for over excavation of the trenches unless a written unless variation from the Engineer is issued.

#### **2. Trench Widths for Granular Backfill**

Unless shown otherwise on the Drawings, the maximum trench width from pipe invert to a height of at least 150mm above the top of pipe shall not be greater than the following:

- I. The external diameter of the pipe plus 300mm for pipes less than 600 mm in diameter.
- II. The external diameter of the pipe plus 600mm for pipes greater than 600mm in diameter.

These widths shall be the paylines on which the quantities are measured.

#### **3. Subsoil Water**

Should subsoil water appear in trenches, it shall be kept down the levels of joints or concrete bedding by means of side channels and/or pumping until the concrete has set sufficiently to prevent damage occurring. Sumps and channels shall be backfilled and made good to the Engineer's approval upon completion.

## **C0204.6**

### **BEDDING**



If due to the ground conditions, the Engineer requires another type of bedding than that indicated on the Drawings that shall be a Variation.

Bedding shall be placed, compacted and graded to a smooth even surface conforming exactly to the grades shown on the Drawings.

## **C0204.7**

### **PIPE LAYING AND JOINTING**

#### **1. General**

No pipes shall be placed in areas where the subgrade and or pavement on both sides of the trench is less than 150mm above the top of the pipe.

No pipe laying shall be carried out without the Engineer having been informed so that he may inspect as work proceeds.

Pipes shall be laid to the lines, grades and invert levels indicated on the Drawings. No deviation shall be made without the prior approval for the Engineer. The installed pipeline shall have a uniform gradient and the pipe invert level at any point shall not vary by more than (+) (-) 3mm from the design invert level at that point.

#### **2. Concrete Pipes**

Suitable slings or other tackle shall be provided to lower the pipe into the trench to ensure pipes are not damaged.

Sufficient ties shall be provided to hold the pipe in its exact position during concreting.

Bedding shall be carefully excavated at each pipe collar to ensure pipe barrels are supported uniformly and evenly along their entire length. Pipelaying using timber or other packings under pipe barrels or collars will not be permitted.

After laying and levelling the pipes, additional bedding shall be placed and compacted evenly and carefully on each side to a minimum height of 100mm or one quarter of the outside pipe diameter, whichever is greater.

Joints shall be made in accordance with good practice and the manufacturer's written instructions, using lubricant if required.

The jointing of pipes to a manhole or other structure shall be carried out in accordance with the following requirements:

- Stub connections shall be provided for all pipe connections to a manhole or other structure and shall project not more than 300mm from the structure for pipes up to 350mm bore diameter, and not more than 600mm from the structure for pipes over 350mm bore diameter and up to 600mm diameter.
- Where required by the Engineer due to the likelihood of relative vertical movement in the case of pipes less than 350mm bore diameter, the pipe joined to the stub pipe shall be no longer than one metre and shall be flexibly jointed at both ends.

**C0204.8****BACKFILLING AROUND AND OVER PIPES****1. General**

No backfilling shall be done until laying and jointing of the line has been approved. Backfilling of trenches outside of pavement areas shall be "selected compacted fill" complying with and paced and compacted as specified in Section 12 of NZS 4452. Otherwise granular backfill or cement treated basecourse shall be used.

Heavy equipment shall not be operated over or near the pipes until a minimum cover of 500mm has been achieved for pipes in excess of 150mm dia and 300mm for pipes 150mm dia and less. Any pipe moved or damaged during compaction shall be replaced at the Contractor's expense.

**2. Initial Backfill for Pipes with Granular Backfill (refer C0204.4.5)**

In this case, the initial backfill around the pipe and for a minimum compacted thickness of 300mm above the top of the pipe shall be bedding material as specified in C0204.4.4. The backfill material shall be carefully placed in layers not exceeding 150mm loose thickness and compacted simultaneously on both sides of the pipe by hand-operated compaction equipment to achieve a stiffness equal to that of the neighboring subgrade.

**3. Hardfill Backfill**

Backfill for trenches in existing or future paved areas, shall be hard fill as specified, refer C0204.4.6. Hardfill backfill shall be spread in layers not exceeding 200mm loose thickness and each layer shall be compacted with approved mechanical compaction equipment before the next layer is placed.

**4. Surface Reinstatement in Existing Grassed Areas**

The final 100mm of backfilling shall be topsoil sown with grass seed and fertilizer as specified in Section C1100.

**C0204.9****Not in this Contract****C0204.10****CONCRETE STRUCTURES****1. General**

Concrete work shall be carried out in accordance with CO207 of this Specification and as follows.

**2. Sumps**

Sumps (catchpits) shall be constructed as detailed on the drawings from 20 MPa concrete. The quality of materials, formwork and workmanship shall be such that on completion a smooth even surface is obtained without plastering. The shafts shall be carried up to such height that when cast iron frames are set in position the top of the frame shall be 50mm below the finished surface of the adjacent channel, roadway or existing ground as is appropriate, except where otherwise required. Walls shall not be poured directly against the ground. Precast catch pits of approved manufacture may be

used. Pipe connections shall be haunched and surrounded with concrete to a distance of 150mm from the catch pit wall.

a. Inlet and Outlet Structures

- Inlet and Outlet structures shall be constructed from 20 MPa concrete in accordance with the detail Drawings.

b. Junction and Branch Connections

- Where shown on the Drawings, "Y" junctions shall be laid in the new drainage lines for future connections. All connections shall be fitted with factory sealed stoppers.

-

**3. Concrete Encasing and Capping**

Where concrete encasing or capping is required, 17.5 MPz concrete shall be used. Unless otherwise detailed or directed by the Engineer concrete encasing shall be discontinuous at each pipe joint.

**C0204.11 TESTING**

All pipes and manholes may be tested by the Engineer for truth of level and line. It is a requirement that a sighting through each line between manholes after backfilling shows a full pipe circle at the far end with all pipes concentric.

**C0205.12 SUBSOIL DRAINS**

**1. General**

Subsoil drains shall be constructed in accordance with this Specification and in conformity with the lines grades and typical cross-sections shown in the Drawing. No deviation shall occur without the Engineers prior approval. The Contractor shall ensure that the pipes and the filter aggregate do not become contaminated with clay or soil. Any such contamination shall be removed at the Contractors expense before pipes are laid.

No excavation or laying shall occur until acceptance of the subgrade is completed.

**2. Excavation**

Trenches shall be cut and trimmed true to grade, line and cross-section. The bottom width of the trenches shall be not more than 300mm wide, unless as shown otherwise on the Drawings. The bottom of the trenches shall grade evenly to outfall points.

**3. Materials**

Subsoil pipe shall be constructed in PVC pressure pipe grade PN12

**4. Laying**

All pipes shall be surrounded with clean coarse beach sand. SGC 20-6 scoria drainage material is not acceptable.

The pipes shall place with the slots on top of the pipe.

Subsoil pipes shall be laid to a uniform gradient not flatter than 1 in200 and the installed pipe invert levels at any point shall not vary more the +/-3mm from the design invert level at that point.

**5. Outlet**

Outlets from subsoil collector pipes shall be constructed to discharge into subsoil collector chambers or manholes as detailed on the Drawings. The Contractor shall ensure that subsoil drains are not used for temporary surface drainage. Any malfunctioning or deficiency of the subsoil drains shall be made good at the Contractors expense.

**C0204.13 NOT USED**

**C0204.14 SURPLUS SPOIL**

Surplus spoil shall be stockpiled in the fill disposal area designated by the Engineer on Site.

**C0206 EROSION CONTROL**

**C0206.1 DESCRIPTION**

The work specified in this section includes temporary control measures as provided in the Contract or as ordered by the Engineer during the period of the Contract to control water pollution through the use of geotextile fences, berms, dikes, dams, sediment basins, fibre mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

The temporary pollution control provisions shall be coordinated with the permanent erosion control features specified to an extent practical to ensure economical, effective, and continuous erosion control throughout the construction and post-construction period.

**C0206.2 STANDARD SPECIFICATION**

This Specification shall be read in conjunction with the following standards which are deemed for form a of this Specification. In the event of this Specification being at variance

with any provision of the Standards, the requirements of this Specification shall take precedence over the provision of the Standards. Reference to any Standard shall include any amendments thereto and any Standard in substitution therefore. All materials and workmanship shall comply with the Standards unless expressly noted otherwise.

### **C0206.3**

#### **CONSTRUCTION**

Prior to the start of construction, the Contractor shall submit for acceptance his programmed for construction temporary and permanent erosion control works during clearing and grubbing, excavation and filling building of structures at watercourses miscellaneous construction and paving. The Contractor shall also submit for acceptance his proposed method of erosion control on haul roads, borrow areas and for disposal or waste materials. Work shall not be started until the erosion control programmed and methods of operation for construction have been accepted by the Engineer.

Prior to cleaning and grubbing operations the Contractor shall provide immediate permanent or temporary erosion control measures to prevent contamination of adjacent streams and other watercourses or other areas of water impoundment. The immediate works required are;

- Installation of silt fences along the boundaries of the existing watercourse under the runway

In addition the Contractor shall take any other necessary steps to control erosion. Such steps may involve the construction of temporary berms, dikes, dams, mats, seeding, or other control devices or methods.

The Contractor shall incorporate all permanent erosion control features into the project as outlined in the accepted erosion control programmed. Temporary erosion control measures shall be used to correct conditions that may develop during normal construction practices but are not associated with permanent control features on the project.

Clearing and grubbing operations shall be scheduled and performed so that earthwork operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures may be required between successive construction stages.

If temporary erosion control measures are required as a result of the Contractors negligence carelessness, or failure to install permanent control works as a part of the scheduled work and are ordered by the Engineer the works shall be performed at no expense to the Employer.

Temporary erosion control may include construction work outside the site but where the work is related to the airfield construction such as borrow pit operations, haul roads, and Contractors work site.

The erosion control features installed shall be maintained by the Contractor.

**C0207 CONCRETE FOR MINOR STRUCTURES AND INCIDENTAL WORKS**

**C0207.1 DESCRIPTION**

The work specified in this section includes supplying and placing Portland cement concrete for minor structures and incidental construction and includes reinforcing steel and formwork.

Structures Include.

- Storm water Pipe and culvert headwalls
- Outlet structures

**C0207.2 STANDARD SPECIFICATIONS**

This Specification shall be read in conjunction with the following Standards which are deemed to form a part of this Specification. In the event of this Specification being at variance with any provision of the Standards, the requirements of this Specification take precedence over the provision of the Standard. Reference to any Standard shall include any amendments thereto and any standard in substitution therefor. All materials and workmanship shall comply with these Standards unless expressly noted otherwise.

NZS 3104:2003 Concrete Production

NZS 3112:1986 Methods of test for concrete

Part 1: Tests relating to fresh concrete

Part 2: Test relating to the determination of strength of concrete

NZS 3114:1987	Concrete surface finishes
NZS 3121:1986	Water and aggregate for concrete
NZS 3122:1995	Portland and blended cements
NZS 3124:1987	Concrete Construction for Minor works
AS/NZS 4671:2001	Steel bars for reinforcement of concrete

### **C0207.3**

#### **MATERIALS**

##### **1. Water and Aggregates**

Water and imported aggregate for concrete shall comply with NZS 3121

##### **2. Cement**

Cement shall comply with NZS 3122 Type GP

##### **3. Concrete**

All concrete except site concrete shall be manufactured by an approved ready-mix plant and shall be High or Special grade unless specifically approved otherwise in writing by the Engineer.

Slump shall be in accordance with Table 4 of NZS 3124. The nominal maximum aggregate size shall be 19mm

Concrete for structures shall have a minimum crushing strength of 20 MPa at 28 days except where otherwise specified.

Weak concrete where required shall achieve a minimum 10 MPa at 28 days

##### **4. Mortar**

Mortar shall consist of two parts of fine, sharp, well graded sand to one part of cement measured by dry loose volume well mixed by hand on in a suitable mechanical mixer with just sufficient water to make it slightly moist. It shall be mixed in small quantities as required. Any mortar not used within 30 minutes of mixing shall be discarded.

##### **5. Reinforcing**

Reinforcing shall be grade 300 bars unless otherwise shown. Grade 430 bars shall not be substituted for grade 300 bars without the approval of the Engineer. Welded wire fabric shall comply with AS/NZS 4671.

##### **6. Marine Grade Concrete**

Not in this Contract

### **C0207.4**

#### **CONSTRUCTION**

##### **1. Excavation and Foundation**

Structures shall be constructed on foundations of equal or better strength than specified for subgrade. Excavation including undercut shall be accordance with C0203 EXCAVATION AND FILLING and as directed by the Engineer. Undercut shall be backfilled with compacted hard fill.

##### **2. Formwork**

Formwork shall be to the requirements of NZS 3124 as appropriate for this type of construction

##### **3. Reinforcing**

Reinforcing steel shall be bent and placed in accordance with NZS 3124. Spacers and supports shall be either proprietary or purpose made using 30 MPa concrete. Bricks, wood or concrete masonry shall not be used as spacers or supports.

#### **4. Concreting**

No concrete shall be placed until the formwork and reinforcing has been inspected and approved by the Engineer. One working days' notice shall be given to allow adequate time for inspection.

Concrete shall be placed in accordance with NZS 3124 and as near as possible to its final position. Vibrations shall not be used to move concrete along forms. Vibrator are to be of the of the immersion type unless otherwise approved.

#### **5. Finish**

Surface finished shall be of the following classes defined in NZS 3114

- a. Formed surfaces to be backfilled shall be Class F1
- b. Exposed formed surfaces shall be Class F3
- c. Unformed surfaces to be backfilled shall be Class U1
- d. Unformed surfaces exposed to weathering shall be Class U3

#### **6. Tolerances**

Unless otherwise specified tolerances shall be in accordance with Table 2 of NZS 3124

#### **7. Defective Concrete Finishes**

Concrete that is damaged from any cause and concrete that is honey combed, fractured or otherwise defective and concrete which has surface depressions outside the tolerance specified shall be cut out and replaced. Minor bulges and abrupt irregularities beyond the specified limits shall be reduced by grinding to approve tolerances. Minor depressions and defects may be repaired by filling with the approval of the Engineer. All fillings shall be bonded tightly to the surface of the holes and shall be sound and free from shrinkage cracks and hollow areas after the fillings have been cured and dried.

Repair of defective concrete finish other than that due to minor porosity of the surface shall be carried out y one or more of the following methods as accepted by the Engineer;

- Concrete removal and replacement
- Hand placed cement mortar
- Pneumatically placed cement mortar
- Epoxy Mortar

#### **8. Backfill to Concrete Structures**

All spaces which have been excavated and the volumes of which are not occupied by the concrete structure shall be backfilled with suitable hard fill material compacted in layers in accordance with the provisions of C0203 EXCAVATION AND FILLING or as directed by the Engineer.



**C0209 SUBBASE**

**C0209.1 DESCRIPTION**

The work specified in this Section consists of supplying placing and compacting a granular non-cohesive sub-basecourse material on a prepared and accepted subgrade or underlying course in accordance with these Specifications and the lines, levels, grades, dimensions and cross sections shown on the Drawing.

**C0209.2 STANDARD SPECIFICATION**

This Specification shall be read in conjunction with the following Standards which are deemed to form a part of this Specification. In the event of this Specification being at variance with any provision of these Standards the requirements of this Specification take precedence over the provision of the Standard in substitution therefore All Materials and workmanship shall comply with these Standards unless expressly noted otherwise;

- TNZ B/S:2005 Construction of Unbound Granular Layer
- TNZ M/4:2006 Basecourse Aggregate
- TNZ T/1:1977 Benkelman Beam Deflection Measurement
- NZS 4402:1986 Methods of Testing Soils for Civil Engineering Purpose
- NZS 4407:1991 Methods of Sampling and Testing Road Aggregate

Where reference is made to Transit New Zealand standard specifications (TNZ) these are available as pdf documents on the NZTA website <http://www.nzta.govt.nz/resources>

**C0209.3 MATERIALS**

**1. General**

Sub-base material shall be well graded GAP 65 crushed rock, gravel or concrete and free from deleterious material. The material shall be uniform quality throughout and free from material which may be subject to degradation, organic matter, lumps of clay or other deleterious matter.

**2. Grading**

The sub-base material shall be well graded from coarse to fine, and when determined in accordance with the requirement with the requirements of NZS 4407 Test 3.8.1 (wet sieve) the combined grading shall lie within the limits set out in table 209.1;

Table C0209.1 Grading Limit for Sample of Crushed Rock or Gravel as Sub-base Material	
Sieve Size	Percentage by Weight Passing
65mm	100
37.50mm	68-100
19.0mm	42-76
9.5mm	26-58
4.75mm	16-44
2.36mm	10-33
425um	3-14
75um	1-6

At least 7 days prior to delivery of any aggregate, the Contractor shall submit to the Engineer representative samples (min 40kg) and test results in accordance with sub-clause C0209.03.10 for each grade of sub-base material intended for use in the pavement. The grading curves submitted shall define a single percentage passing for each sieve size and shall fall within the envelope given in Table 209.1. The grading shall not vary from the low limit on one sieve to the high limit on adjacent sieves or vice versa. The amount of the fraction passing the 0.075 mm sieve shall not exceed one half the fraction passing the 0.425 mm sieve.

Approval of a sample shall not constitute approval of all material from the source from which the sample was taken. Material supplied shall conform with the sample supplied and shall comply with the grading limits determined from the sample as specified below and with all other relevant requirements of this specification.

Following approval of a sample, sub-base material shall conform to the submitted grading curve within the tolerances listed in Table 209.2 below.

**Table 209.2 Job Control Grading**

Sieve Size	Tolerance from Approved Grading Curve
37.5mm	+5%
19.0mm	+8%
9.5mm	+6%
4.75mm	+5%
2.36mm	+4%
425µm	+3%
75µm	+2%

The full tolerance will not apply if application of the tolerances results in a job control grading band outside the design range.

**3. Broken Faces**

When produced from gravel, not less than 70% by weight of each of the fractions retained on the 37mm, 19mm, 9.5mm and 4.25mm sieves shall have two or more broken faces. (NZS 4407 Test 3.14)

**Bearing Strength**

When tested in accordance with NZS 4401 Test 3.15, after compaction to 95% of MDD (NZS 4402 Test 4.1.2 or 4.1.3) the aggregate shall have a soaked CBR value not less than shown on the Drawings or, if not shown, not less than 60.

**4. Crushing Resistance**

When tested in accordance with NZS 4407 Test 3.10, the crushing resistance shall not be less than 200kN for sedimentary, and not less than 130kN for other types.

**5. Plasticity Index**

The fraction of aggregate passing the 425 micron sieve shall have a liquid limit of not more than 25, and a plasticity index of not more than 10 when tested in accordance with NZS 4402 Tests 2.2 and 2.4

**6. Maximum Particle Size**

The maximum particle size shall be the lesser of 0.4 times the layer thickness, or 65mm.

**7. Weathering Resistance**

The aggregate shall have a quality index of AA, AB, AC, BA, BB or CA when tested in accordance with Test 3.11 of NZS 4407.

**8. Sampling and Testing**

At least seven working days prior to delivery of sub-base material to Site, the Contractor shall deliver to the Engineer the results of production property tests carried out by a certified laboratory in accordance with the relevant NZ standards to confirm compliance with the requirements specified above. The above tests shall include a minimum of three grading curves, plastic indices and crushing resistances for the sub base material.

Production property sampling and testing shall be carried out in accordance with Section 4 of TNZ M/4 (including Table 1)

At any time during the course of pavement layer construction the Engineer reserves the right to sample aggregate Material, both at the source and at the Site and have tests carried out by a certified laboratory to verify compliance with the requirements specified.

Failure of any aggregate Material to meet the specified requirements will result in the Engineer ordering the removal of such Material from the Site. The Material shall be excavated if required and removed from the site at no cost to the Employer and become the property of the Contractor upon leaving the Site.

The excavated material shall be replaced with material as specified at no additional cost to the Employer.

#### **C0209.4**

#### **CONSTRUCTION**

##### **9. Preparing Underlying Course**

Before any sub-base material is placed, the subgrade shall be prepared and conditioned as required by C0203. The subgrade shall be tested and accepted by the Engineer in accordance with C0203 before placing and spreading operations are started.

Should rain fall on the subgrade between the time of initial acceptance and the commencement of pavement construction, a further inspection of the subgrade surface shall be carried out to confirm that the subgrade is still suitable for sub-basecourse construction to proceed.

Control of levels between edges of the pavement shall be by means of level stakes or steel pins placed in lanes parallel to traffic routes and at intervals which will permit string lines or check boards to be placed between the stakes or pins, or by other means acceptable to the Engineer.

To protect the subgrade and to ensure proper drainage, the spreading of the sub-base material shall begin along the crown of the pavement.

##### **10. Supply, Placement and Compaction**

Supply, placement and compaction of sub-base material shall be in accordance with TNZ B/2.

##### **11. Acceptance for Compaction**

Acceptance for compaction shall be in accordance with TNZ B/2.

##### **12. Surface Shape and Tolerances**

Surface shape and tolerances shall comply with the requirements of TNZ B/2

##### **13. Benkelman Beam Test**

Benkelman Beam testing shall be carried out by the Contractor on top of the sub-basecourse in accordance with TNZ T/1 at 10 metre square intervals over the area of new pavement.

The pavement will be considered acceptable for placing of subsequent layers if the results of the deflection measurements meet the following criteria.

- Not more than 5% of the deflections exceed 1.4mm
- No single deflection exceeds 1.6mm

Should any area fail to meet these criteria the Contractor may elect to apply additional compactive effort to the top of the sub-basecourse layer and then perform a second set of Benkelman beam tests.

#### **14. Remedial Work**

Any yielding or otherwise unsatisfactory areas of the sub-basecourse which become evident shall be treated in accordance with the Engineer's instructions which may include:

- a) Scarifying and re-compaction; or
- b) Excavation and replacement of a complete section of sub-basecourse.

Should in-situ density or other material tests show that the sub-basecourse is not in conformity with this Specification, such treatment work shall be carried out at no additional cost to the Employer. Placement of subsequent layers shall not commence until the underlying layers have been accepted in writing by the Engineer.

### **C0209.5**

#### **MAINTENANCE**

Following the final shaping of the surface, the sub-basecourse shall be maintained to the specified standards until construction of the next course. Should any damage occur to the sub-basecourse, the engineer may direct that the surface be loosened, trimmed and re-compacted at no additional cost to the Employer.

### **C0210**

#### **CRUSHED AGGREGATE BASECOURSE**

#### **C0210.1**

##### **PRELIMINARY**

Refer to the Conditions of Contract Section C0100 of the Specification which shall apply to this section of the Works and C0200 which describes the airport construction requirements

#### **C0210.2**

##### **EXTENT OF WORK**

The work specified in this Section consists of a base of crushed aggregate material placed and compacted on a prepared and accepted subgrade sub-base or other base course in accordance with these Specifications and the lines, level, grades, dimensions and cross sections shown on the Drawings.

**C0210.3 STANDARD SPECIFICATIONS**

This Specification shall be read in conjunction with the following Standards, which are deemed to form a part of this Specification. In the event of this Specification being at variance with any provision of the Standards, the requirements of this Specification take precedence over the provision of the Standards. Reference to any Standard shall include any amendments thereto and any Standard in substitution thereof. All Materials and workmanship shall comply with these Standards unless expressly noted otherwise.

TNZ M/4:2006	Basecourse Aggregate
TNZ B/2:2005	Construction of Unbound Granular Pavement Layers
TNZ/1:1997	Benkleman Beam deflection Measurements
NZS 4402: 1986	Methods of Testing Soils for Civil Engineering Purposes
NZS 4407:1991	Methods of Sampling and Testing Road Aggregates

Where reference is made to Transit New Zealand standards specifications (TNZ), these are available as pdf documents on the NZTA website [www.nzta.govt.nz/resources](http://www.nzta.govt.nz/resources).

**C0210.4 MATERIALS**

1. Crushed Aggregate Basecourse

Crushed aggregate basecourse shall be TNZ M/4 quality of the nominal maximum particle size of 40mm.

Where Local aggregate are to be used, the Contractor shall undertake testing and submit results to the engineer for review. Consideration will be given to local sourced materials which may not meet all TNZ M/4 requirements.

Imported aggregate shall meet all the requirements of TNZ M/4 except where varied by Table 210.1. **Aggregate shall meet the Requirements for sand Equivalent, Clay index and Plasticity Index.**

Source and production property sampling and testing shall be carried out in accordance with the methods and frequencies specified in TNZ M/4.

At least ten working days prior to delivery of basecourse to Site, the Contractor shall deliver to the Engineer the results of all source and production property tests listed in Table 210.1 carried out by an IANZ accredited laboratory to confirm compliance with this specification;

<b>Table 210.1 BASECOURSE AGGREGATE TEST REQUIREMENTS</b>		
<b>TEST PROPERTY</b>	<b>NZS 4407 TEST NO</b>	<b>TEST REQUIREMENT</b>
Weathering Quality Index	3.11	AA, AB, BA, BB, CA
Crushing Resistance	3.10	Not less than 130kN

California Bearing Ratio	3.15	Not less than 100%	
Not less than two Broken Faces	3.14	19-37.5mm 9.5-19.0mm 4.75-9.5mm	Not less than 70%
Sand Equivalent	3.6	Not less than 40	
Clay Index	3.5	Not greater than 3	
Plasticity Index	3.4	Not greater than 5	
Particle Size Distribution (wet sieve) 37.5mm 26.5mm 19.0mm 9.5mm 4.75mm 2.36mm 1.18mm 0.600 0.300 0.150 0.075	3.8.1	AP40 100  66-81 43-57 28-43 19-33 12-25 7-19 3-14 0-10 0-7	
Shape Control 19.0-4.75mm 9.5-2.36mm 4.75-1.18mm 2.36-0.600 1.18-0.300 0.600-0.150		AP40 28-48 14-34 7-27 6-22 3-19 2-14	

## CO210.5 CONSTRUCTION

### 1. Preparing Underlying Course

The sub-basecourse shall be constructed, shaped, compacted and finished in conformity with the provisions of Section 209 of this Specification before placing of basecourse is commenced.

Control of levels between the edges of the pavement shall be by stringing between level stakes or steel pins placed in lanes parallel to traffic routes at intervals not exceeding 20 meters or by means of laser leveling equipment.

### 2. Supply, Placing and Compaction

The supply, placing and compaction of the basecourse layers shall be carried out in strict accordance with TNZ B/2

Placing procedure shall be such that no damage to or rutting of the subgrade or sub-basecourse occurs. Placing of each layer shall begin along the high side of the pavement. Cartage shall be arranged such that trafficking of the subgrade is completely avoided, and trafficking of the sub-basecourse is minimized. Particular care shall be taken that traffic is not concentrated in any area.

### 3. Acceptance Criteria

- a. Compaction testing and acceptance shall be in accordance with TNZ B/2 except that the in situ dry density shall not be less than a mean value of 100% and a minimum value of 98% of maximum dry density. The lot size shall not exceed 1,000m<sup>2</sup>
- b. Surface shape and tolerances shall comply with the requirements of TNZ B/2. Upon completion, the Contractor shall take spot levels on top of the basecourse on a 5 meter square grid. The spot levels shall be plotted on an A1 sheet showing the pavement outline and finished level contours at a scale of 1:500 and forwarded to the Engineer for approval at least one working day prior to placing any overlying layer
- c. Surface finish shall comply with the requirements of TNZ B/2
- d. Benkelman Beam Test

The basecourse is required to meet both the specified densities and deflection criteria

Benkelman beam testing shall be carried out by the Contractor on top of the basecourse in accordance with TNZ T/1 (using a vehicle with an 8 tone, dual wheel axle) at 10 meter square intervals over the area of new pavement

The pavement shall be considered acceptable for surfacing if the results of the deflection measurements meet the following criteria;

- ***Not more than 5 % of the deflections exceed 1.0mm***
- ***No single deflection exceeds 1.2mm***

Should any area fail to meet this criteria the Contractor may elect to apply additional compactive effort to the top of the basecourse layer and then perform a second set of Benkelman beam tests at no additional cost to the Employer.

Should any area still fail to meet the above criteria, a third set of Benkelman beam tests shall be carried out at closer intervals to define the areas of excessive deflection. The Engineer may then direct the Contractor to arrange further testing in the areas to excessive deflection to verify the following;

- ***The actual thicknesses of the pavement layers comply with the design thicknesses shown on the typical cross sections in the Drawings***
- ***The sub-basecourse and basecourse materials comply with the specified requirements for grading and plasticity.***
- ***The in-situ dry density of the sub-basecourse and basecourse conform with the requirements of TNZ B/2***

All work necessary to determine the actual pavement thickness and the obtaining of samples for laboratory tests shall be undertaken by the Contractor at no additional cost to the Employer.

Grading, plasticity and in-situ density tests shall be paid by the Contractor.

If the results of these tests verify that the pavement conforms to the Specification in all respects other than deflection, the Engineer may accept the pavement or he may direct the Contractor to excavate and reconstruct a thicker pavement in these areas at the Employers expense.



In addition, the Employer shall pay for the cost of performing the third set of Benkleman beam tests.

If any aspect of the pavement does not confirm to the Specification, the Engineer shall define those sections where he requires sub-basecourse and/or basecourse to be completely excavated and reconstructed in accordance with this Specification. This work shall be undertaken at no additional cost to the Employer. In addition, the costs of any testing performed by the Engineer to investigate non-compliance shall be deducted from the Contract Price.

#### **4. Protection during Construction**

Cartage equipment may be routed over the basecourse provided no damage results and provided that such equipment is routed over the full width of the basecourse to avoid rutting or uneven compaction. However, the Engineer shall have specific authority to stop all cartage over completed or partially completed basecourse when, in his opinion such cartage is causing damage. Any damage to the basecourse caused by the Contractors operations shall be repaired by the Contractor at no additional cost to the Employer.

### **C0210.6**

#### **MAINTENANCE & DEFECTS**

Following the completion of the basecourse the Contractor shall perform all drag brooming, watering, and rolling and other maintenance work necessary to keep the basecourse in a condition satisfactory for surfacing. The surface shall be kept clean and free from foreign material and the Contractor shall ensure that the basecourse surface does not pothole, ravel, rut or become uneven. The basecourse shall be properly drained at all times. Any restitution necessary prior to surfacing shall be performed at no additional cost to the Employer. Such restitution work shall be as directed by the Engineer and shall comprise scarification to a depth of 100mm addition of basecourse aggregate as necessary and shaping and compaction to the requirements of this Specification.

**C0213 BITUMINOUS SEAL COAT**

**C0213.1 DESCRIPTION**

The work specified in this section consists of one or more applications of bituminous material and cover aggregate comprising chips to an existing basecourse, primed or sealed surface.

The first and second coats shall comprise a hot bitumen/chip covered seal coat in accordance with this Specification.

The primer coat maybe used depending on the weather conditions.

**C0213.2 STANDARD SPECIFICATIONS**

This Specification shall be read in conjunction with the following Standards which are deemed to form a part of the Specification. In the event of this Specification being at variance with any provision of the Standards, the requirements of this Specification take precedence over the provision of the Standards. Reference to any Standard shall include any amendments thereto and any Standard in substitution therefor. All Materials and workmanship shall comply with these Standards unless expressly noted otherwise.

AS 2008-1997	Residual Bitumen for pavements
AS1160	Bitumen Emulsion for Construction and Maintenance of Pavement
AS2157-1997	Cutback bitumen
TNZ M/6:2002	Sealing Chip
TNZ M/13:1989	Adhesion Agents
TNZ P/3:1995	First Coat Sealing

TNZ P/4:1995	Resealing
TNZ P5/P:1985	Rubber latex in Reseal Binders
TNZ Q/1:1995	Chip sealing
TNZ T/3:1981	Measurement of Texture by the Sand Circle Method
TNZ T/5:1987	Size, Shape and Grading of Grades 1-4 sealing chips
TNZ-	Bituminous Sealing Manual 1993
TNZ P/17:2002	Performance based Specification for Chip Seals
BCA 9904:2000	Safe Handling of Bituminous Materials used in Roading
NZS 4407:1991	Methods of Sampling and Testing Road Aggregate

### C0213.3

#### MATERIALS

##### 1. Sealing Chips

The sealing chips shall be of the grade specified in Schedule 213. A appended to this Section of the Specification and shall comply with the requirements of TNZ M/6, P/3 and P/4. **Where the chips are to be supplied by the Contractor, the source of supply shall be nominated with the tender.** All material shall be stockpiled in accordance with TNZ P/3 and sampled to ensure compliance with the specifications. **The sampling and testing shall be undertaken by an IANZ accredited laboratory or equivalent.** The Contractor shall meet the cost of testing. **No material shall be delivered to Site until approved by the Engineer and** all material delivered to Site shall be from the approved stockpile.

Only one source of supply shall be used for each grade chip supplied.

##### 2. Bituminous Binder

Bituminous binder shall be in accordance with Schedule 213. A appended to this Section of the Specification and shall comply in all respects with AS 2008-1997

##### 3. Bitumen Emulsion

Bitumen emulsion for use in the bituminous overspray shall be a cationic type, manufactured from in accordance to Table 213.A and complying with the requirements of AS2008 and which with the exception of setting time complies with the requirements of AS1160. The setting time shall be such that the emulsion does not break in less than 5 minutes when applied to the prepared surface in accordance with the requirements of this section of the Specification.

The bitumen emulsion may be diluted with water at a rate of up to but not exceeding 50 parts of water to 100 parts of bitumen emulsion by volume to control the rate of breaking if the weather is in the opinion of the Contract Administrators Representative excessively hot and provided that the water added does not cause the emulsion to break during mixing or spraying or cause the diluted emulsion to run off the sprayed area. The water used for dilution shall be clean, fresh, potable water.

The undiluted or diluted emulsion shall not show any tendency to separate out into its separable components when allowed to stand undisturbed for 48 hours.

**4. Diluents**

Cutting and fluxing diluents shall comply with the requirements of AS 2157-1997. The Contractor shall be responsible for determining the quantity of AGO (if any) and cutter to be added Total diluents shall not exceed the quantities specified in Table 1 of TNZ P/3 or P/4 as applicable.

**5. Adhesion Agent**

An adhesion agent approved and blended in accordance with the requirements of TNZ M/13 Specification for Adhesion Agents shall be incorporated in the sealing binder

**6. Polymer Additive**

A polymer additive shall be incorporated into the binder as specified in Schedule 213.A (appended to this Section of the Specifications)

Full technical details and Specifications for the Polymer additive shall be submitted to the Engineer for approval with the tender.

**7. Blending**

Blending of additives, fluxes and AGO shall be carried out by the Contractor in strict compliance with the manufacturers recommendations and all relevant safety regulations and procedures.

The total quantity of each component incorporated into the sealing binder shall be accurately measured by a volume metering or weighing device certified by the Trade Measurement Unit of the Consumer Affairs Ministry. The binder shall be thoroughly mixed before use.

The Engineer will not supervise this operation. The Contractor shall provide the blending certificates as specified in TNZ P/3 and P/4.

**8. Cover Sand – NOT USED IN THIS CONTRACT**

**9. Sampling and Testing**

All sampling and testing shall be carried out by the Contractor and shall be in accordance with TNZ P/3 or P/4 as applicable and these specifications.

**C0213.4 PLANT**

Construction plant shall comply with the relevant requirements of TN P/3 and TNZ P/4

**C0213.5 CONSTRUCTION**

**1. Sealing Period and Working Hours**

Refer to TNZ P/3 or P/4 as applicable

**2. Edge Definition**

Refer to TNZ P/3 or P/4 as applicable

**3. Surface Preparation**

Surface preparation for sealing or resealing shall be in accordance with TNZ P/3 or P/4 as applicable

**4. Week Killer – Not in this Contract**

**5. Binder Temperatures**

Binder temperatures shall be in accordance with TNZ P/3 or P/4 as applicable

**6. Rate of Application**

It shall be the Contractors responsibility to determine the correct application rate for the sealing chips for the seal coat and the correct application rate and diluent content for the binder and emulsion spray, such that the chips are firmly held and bleeding or flushing does not occur. The following procedure shall be followed;

- a. The Contractor shall calculate the rate of application of sealing chips and binder using the guidelines in the TNZ Bituminous Sealing Manual or other acceptable method and shall submit the design to Engineer prior to application of the seal coat
- b. The contractor shall then construct a test strip using the application rate he has determined. The test strip shall be checked to ensure that the binder application rate is correct. The binder application shall be adjusted as required.
- c. Sealing may then proceed using the adjusted application rate provided that the road surface is not significantly different to that used for the test strip
- d. If the surface texture changes significantly, the sealing rate shall be recalculated and adjusted if necessary.

**7. Sealing Operations**

**a. General**

Sealing operations shall be in accordance with TNZ P/3 or P/4 as applicable and the additional specifications herein

The Contractor shall comply in all respects with Quality Assurance requirements as set out in TNZ Specification Q/1

Set Fig 213.1 appended for illustrations of the following sealing systems



Figure 213.1 shows semi closed windows for first application rate.

**b. Double Layer**

This process comprises 2 separate applications of binder (2 separate applications of sealing chips).

The first application of binder shall be made and the larger-grade sealing chip spread insuring a uniform coverage. A single pass of an approved type roller shall then be made. It is important to ensure that there are semi open windows left to allow for the second application of binder.

Rolling should take 2hours with every 1000litres sprayed.

The first layer shall be thoroughly swept to remove any loose chips before second application of binder is made.

The second application of binder shall then be made. This shall be followed by application of the smaller grade of sealing chip. Once this is completed the total seal surface shall be rolled and finished with approved type rollers.

**8. Bitumen Emulsion for Sanded Bituminous Overspray – Not in this Contract.**

**9. Spreading Cover Aggregate**

The aggregate shall be applied to the seal binder in a uniform single layer immediately after application of the binder at the spreading rate specified by means of the approved self-propelled aggregate spreaders which shall follow the

binder sprayer as closely as safety will permit. The Contractor shall employ every effort to achieve the agreed spread rate without excessive deviation from the specified rate of application of cover aggregate. Under spreading of cover aggregate to the extent that a second cover of aggregate is required will not be permitted.

Overspreading of cover aggregate shall require additional brooming and sweeping during rolling at no additional cost to the Employer to remove the excess and to ensure an even coverage.

**10. Riding Surface**

A smooth and even ride free of bumps and undulations is required for the finished surface.

Any section that fails to meet these requirements shall be rectified using a method approved by the Engineer.

**11. Protection and Repairs**

Protection and repairs to the completed sealcoats shall be in accordance with TNZ P/3 or P/4

**12. Maintenance**

The Contractor shall undertake weekly sweeping of the airside pavement to remove loose chips for a period of 4 weeks after the sealed runway.

**C0213.6 ACCEPTANCE**

Acceptance at the end of the maintenance period shall be on a lot basis. Each lot shall comprise a 200 meter length of pavement. Acceptance shall be based on surface texture and chip retention and shall be in accordance with TNZ P/17.

**C0213.7 SCHEDULE 213.A**

SCHEDULE 213.A	
LOCATION	AIRSIDE
TYPE OF SEALCOAT	
SEALING BINDER - Bitumen	<b>Class 320</b>

<ul style="list-style-type: none"> <li>- Kerosene</li> <li>- AGO</li> <li>- Adhesion Agent</li> <li>- Application rate 1<sup>st</sup> Coat</li>   <li>- Application rate 2<sup>nd</sup> Coat</li>   <li>- Polymer</li> </ul>	<p>Contractor to nominate  Contractor to nominate  Contractor to nominate  <b>Ideally 2.2litres per m2 to 2.6litres per m2.</b>  Contractor to nominate and confirm with trials  <b>Ideally 1.8litres per m2 to 2.4litres per m2.</b>  Contractor to nominate  Contractor to nominate type</p>
<p>SEALING CHIPS</p> <ul style="list-style-type: none"> <li>- Grade of Chip 1<sup>st</sup> Application</li> <li>- Grade of Chip 2<sup>nd</sup> Application</li> <li>- Pre-coating</li> <li>- Supplier</li> <li>- Spread Rate 1<sup>st</sup> Application</li>   <li>- Spread Rate 2<sup>nd</sup> Application</li> </ul>	<p>Grade 3  Grade 5  Yes  Contractor  Contractor to nominate and confirm with trials  Contractor to nominate and confirm with trials</p>



**C0214 DENSE GRADED ASPHALT**

**SPECIFICATION  
DENSE GRADED ASPHALT**

C0214.1	SCOPE.....	51
C0214.2	MATERIALS.....	51
C2014.2.1	General.....	51
C2014.2.2	Binder.....	51
C2014.2.3	Coarse Aggregate.....	51
C2014.2.4	Fine Aggregate.....	51
C2014.2.5	Mineral Filler.....	51
C2014.2.6	Notification of Materials.....	51
C0214.3	MIX DESIGN.....	52
C0214.3.1	Responsibility for Mix Design.....	52
C0214.3.2	Aggregate Grading.....	52
C0214.3.3	Bitumen Content.....	53
C0214.3.4	Job Mix.....	55
C0214.3.5	Permissible Variations from Job Mix.....	55
C0214.4	MIXING STORAGE AND DELIVERY OF MIX.....	56
C0214.4.1	General.....	56
C0214.4.2	Temperatures.....	56
C0214.5	ACCEPTANCE OF ASPHALT SUPPLIED.....	57
C0214.5.1	Testing.....	57
C0214.5.2	Acceptance Criteria.....	57
C0214.5.3	Deductions from Payment for Supply.....	57
C0214.6	PREPARATION OF PAVEMENT.....	59
C0214.6.1	Sweeping.....	59
C0214.6.2	Tack Coat.....	60
C0214.7	SPREADING.....	61
C0214.7.1	Paver.....	61
C0214.7.2	Hand Spreading.....	61
C0214.7.3	Temperatures.....	61
C0214.7.4	Level Control.....	61
C0214.7.5	Joints.....	61
C0214.7.6	Matching with Existing Pavements.....	62
C0214.8	COMPACTION.....	62
C0214.8.1	Compaction Plant.....	62
C0214.8.2	Compaction Procedure.....	62
C0214.8.3	Compaction Level.....	62
C0214.9	ACCEPTANCE OF ASPHALT PLACED.....	62
C0214.9.1	Thickness.....	62
C0214.9.2	Shape of Finished Surface.....	63
C0214.9.3	Deductions from Payment due to Shape Defects.....	63
C0214.9.4	Compaction.....	64
C0214.9.5	Deductions from Payment due to Inadequate Compaction.....	65

C0214.10 FOOTPATHS ..... 65  
C0214.11 BRIDGE DECK JOINTS..... 65  
C0214.12 PROTECTION OF SERVICES..... 66

## **C0214.1 SCOPE**

The work shall consist of the supply and laying of asphalt surfacing on the pavement surface and footpaths in accordance with the requirements of this Specification and the dimensions and limits as shown on the Drawings.

## **C0214.2 MATERIALS**

### **C0214.2.1 General**

The asphalt shall consist of a combination of aggregates and mineral filler, if necessary, uniformly coated and mixed with a bituminous binder.

### **C0214.2.2 Binder**

Unless otherwise specified, the binder shall be Class 170 Residual Bitumen satisfying the requirements of AS 2008 and the additional following requirements:

- i) It shall have a minimum density of 1.00 kg/litre, measured at 15° C, when tested in accordance with AS 2341.7.
- ii) The minimum time to reach the specified apparent viscosity level shall be 9 days.
- iii) Viscosity tests shall be carried out by either DRT Test T61 or AS 2341.13.

### **C0214.2.3 Coarse Aggregate**

Aggregate retained on the 4.75 mm A.S. sieve shall be termed coarse aggregate.

Coarse Aggregate shall be crushed either from clean quarried spalls of fresh rock or from clean, hard gravel or shingle. It shall be free from organic matter, clay, weathered or disintegrated stone or other deleterious matter, shall be uniform in quality, and shall have the following properties.

- (i) Los Angeles Loss not exceeding 25 percent.
- (ii) Flakiness Index not exceeding 35 percent.

### **C0214.2.4 Fine Aggregate**

Fine Aggregate passing the 4.75 mm A.S. Sieve shall consist of crushed rock or natural sand or both. The sand shall be clean and free from cemented lumps, roots or other vegetable matter. Each individual fine aggregate shall have a Sand Equivalent value not less than 45.

### **C0214.2.5 Mineral Filler**

Mineral filler shall be of a non-plastic type complying with the requirements of A.S. 2357.

### **C0214.2.6 Notification of Materials**

Details, including source, of each material proposed for use in the mix shall be advised at the time of submitting the mix design.

During the progress of the work, the Contractor shall not substitute other materials for previously approved constituent materials unless approved by the Engineer.

### **C0214.3 MIX DESIGN**

#### **C0214.3.1 Responsibility for Mix Design**

The Contractor shall submit to the Engineer a mix design to meet the requirements of this Specification together with all supporting calculations and test results at least 5 days prior to its intended use.

#### **C0214.3.2 Aggregate Grading**

The grading of the aggregate blend with filler if required shall comply with the relevant limits shown in Table C0219.1.

#### **TABLE C2014.1**

#### **TARGET GRADINGS FOR COMBINED COARSE AGGREGATE, FINE AGGREGATE AND MINERAL FILLER**

A.S. Sieve Size (mm)	Percent by Mass Passing			
	Nom. Size 20	Nom. Size 14	Nom. Size 10	Nom. Size 7
26.5	100			
19.0	95-100	100		
13.2	70-90	95-100	100	
9.50	60-80	75-90	95-100	100
6.70	50-70	65-80	70-87	95-100
(a) 4.75	43-62	55-70	60-77	75-90
(b) 2.36	30-50	38-55	45-60	50-70
(c) 1.18	22-38	25-40	33-48	35-55
(d) 0.600	15-30	17-32	23-38	25-40
(e) 0.300	10-23	12-26	13-28	16-30
(f) 0.150	5-15	7-15	7-18	7-18
(g) 0.075	2-7	4-7	4-7	4-8

### C0214.3.3 Bitumen Content

The bitumen content of the total mix shall be such that the mix complies with all the relevant properties specified in Table C2019.2.

**TABLE C0214.2**

**PROPERTIES OF MIX**

Property	Nominal Size (mm)			
	20	14	10	7
Bitumen Content (Present by Mass of Total Mix)	4.0 - 6.0	4.7 - 6.5	5.5 - 7.0	5.7 - 7.5
Marshall Test (50 blows)				
(i) Air Voids in Mix (Percent)	3 - 8	2 - 5	3 - 6	4 - 7
(ii) Stability (kN)	5.0 min			
(iii) Flow (mm)	2.0 - 4.0			
(iv) Aggregate Voids Filled with Bitumen (Percent)	65 - 85			
Filler/Bitumen Ratio	1.2 max			
*Thickness of Binder Film (um)	7.0 min			

\*Note: Thickness of Binder Film =  $(4870/S) \times P/(100-P)$

Where P = Bitumen Content (Percent by mass of total mix)

$$\begin{aligned} S = 2.00 &+ 0.02 (a) + 0.04 (b) \\ &+ 0.08 (c) + 0.14 (d) \\ &+ 0.30 (e) + 0.60 (f) \\ &+ 1.60 (g) \end{aligned}$$

(a), (b), (c), etc. = Percent passing A.S. Sieves shown in Table R55.1.

#### **C0214.3.4 Job Mix**

The Contractor shall supply a "target mix" and property results to be used as control samples.

#### **C0214.3.5 Permissible Variations from Job Mix**

The asphalt delivered under this Contract shall be acceptable provided that:

- (i) The bitumen content does not vary from the Job Bitumen Content by more than 0.3 percent by mass of the total mix.
- (ii) The grading of the aggregate does not vary from the Job Mix Grading by more than the amounts shown in Table R55.3.

The limits obtained when the permissible variations are applied to the Job Aggregate Grading and the Job Bitumen Content shall constitute the "Job Mix Control Limits".

Nevertheless if, during the progress of the work, asphalt supplied with a grading and bitumen content falling within the relevant Job Mix Control Limits, does not comply with all the requirements of Table C0219.2 then, the Engineer may cancel his approval of the Job Mix and direct the Contractor to submit a new mix design for consideration.

No claim for delay shall be considered if the Engineer replies to the Contractor's submission within ten (10) working days of it being received.

#### **TABLE C2014.3**

**PERMISSIBLE VARIATIONS FROM JOB MIX GRADING**

A.S. Sieve Size (mm)	Variation by Percent Passing Given A.S. Sieve
	Percent by mass of total aggregate
4.75 and larger *	7
2.36	5
1.18	5
0.600	4
0.300	4
0.150	2.5
0.075	1.5

\* Notwithstanding the permissible variations given in Table C2019.3, not less than 95 percent by mass of total aggregate shall pass the 19.0 mm, 13.2 mm, 9.5 mm and 6.7 mm A.S. Sieve for sizes 20, 14, 10 and 7 respectively.

**C0214.4 MIXING STORAGE AND DELIVERY OF MIX**

**C0214.4.1 General**

Procedures, conditions and equipment used for mixing, storage and delivery of the mix shall conform in general with sections 6, 7 and 8 of AS 2156 - 1978, subject to the following requirements.

**C0214.4.2 Temperatures**

Regular measurements of temperature at the stages of production, storage and delivery of the mix given in Table C0219.4 shall be made and records kept. Temperatures shall be kept within the limits designated.



**TABLE C0214.4**

Material/Occasion	Temperature Limits °C	
	Min	Max
Aggregate on leaving dryer		190
Binder in storage and mixing		160
Asphalt at discharge from mixing plant	140	165*
Asphalt in storage	135	165*

- any material heated to over 170°C shall be rejected.

## **C0214.5 ACCEPTANCE OF ASPHALT SUPPLIED**

### **C0214.5.1 Testing**

One sample shall be taken from each 1000 tonnes of a given mix and tested for properties of the mix listed in Table R55.2, for acceptance of the Job Mix (Clause R55.3.5).

Within each day, each quantity of 200 tonnes shall constitute a standard sampling lot from which one (1) sample shall be taken at random. Jobs and end lots of less than 200 tonnes within that day shall be sampled as if they were standard sampling lots.

### **C0214.5.2 Acceptance Criteria**

Acceptance of the standard sampling lots shall be based upon the results of grading and bitumen content determinations.

A lot shall be considered acceptable if the bitumen content and grading fall within the Job Mix Control Limits.

Any lot not falling within the Job Mix Control Limits may be accepted provided a random sample taken from it satisfies all the requirements of Tables R55.1 and R55.2. Alternatively, the lot may be accepted at a reduced payment according to Clause R55.5.3.

### **C0214.5.3 Deductions from Payment for Supply**

If, in the opinion of the Engineer, the reduced service from a failed lot would be offset by reducing the payment, then the lot may be accepted at a price determined by the Engineer on the basis of the calculations outlined below.

- (i) For each of the Groups of properties given in Table C019.5, an adjustment factor is calculated by summing, for each of the properties, the product of departure interval from the Job Mix Control Limits and points for each departure interval.
- (ii) The adjustment factor to be used for the lot is the greatest of the adjustment factors calculated for the Groups.
- (iii) The relevant tendered rate for the supply and delivery of the asphalt is reduced by a percentage equal to the adjustment factor obtained above.
- (iv) The adjustment is applied to the quantity of material in the lot.

**TABLE C0214.5  
ADJUSTMENT POINTS**

Property	Group	Departure Interval (Percent)	Points for each Departure Interval from Job Mix Control Limits *
Grading A.S. Sieve Size (mm)			
26.5	1	1.0	1
19.0		1.0	1
13.2		1.0	1
9.50		1.0	1
6.70		1.0	1
4.75		1.0	1
2.36	2	1.0	1
1.18		1.0	2
0.600		1.0	2
0.300		1.0	2
0.150		1.0	2
0.075		0.5	2
Bitumen Content	3	0.1	1

\* Applies to each whole departure interval and not to a part of an interval.

## C0214.6 PREPARATION OF PAVEMENT

### C0214.6.1 Sweeping

The pavement shall be dry and shall be thoroughly broomed before any work is undertaken. Any foreign matter adhering to the pavement and not swept off by the broom shall be removed by other means by the Contractor.

## **C0214.6.2 Tack Coat**

The whole of the area to be sheeted with asphalt shall be lightly and evenly tack-coated.

The tack coat shall consist of rapid setting bitumen emulsion or cut back bitumen applied in accordance with AS 2734 - 1984 Section 5. The bitumen emulsion shall be allowed time to break before the asphalt is spread.

Due care shall be taken to ensure that the tack coat is not sprayed on or allowed to coat any concrete structures adjacent to the pavement or shoulder. Any bituminous material so sprayed shall be removed by the Contractor at his expense. Where trucks or other vehicles are likely to move from tack-coated areas onto adjacent finished surfaces, the latter shall be blinded with dust to prevent carryover of binder.

## **C0214.7 SPREADING**

### **C0214.7.1 Paver**

Spreading shall be by a self-propelled paving machine having the features described in AS 2734 Section 4 and an effective spreading capacity of not less than 50 tonnes of asphalt per hour. Machines without such features may be accepted at the discretion of the Engineer.

Any mix, in or under the machine, which has cooled to the extent that rolling can not be started before the temperature has fallen to 120°C shall be removed from the road and a transverse joint shall be formed, as for joining to a previous run, before continuing with the spreading.

### **C0214.7.2 Hand Spreading**

Hand spreading may be carried out where use of the paving machine is not practicable, and shall be in accordance with Clause 7.5 of AS2734.

### **C0214.7.3 Temperatures**

Laying of asphalt shall not proceed when the surface of the road is wet or at a temperature less than 10°C or if cold wind cools the mix to the extent that spreading and compaction are adversely affected.

The temperature of the mix when delivered into the paver shall comply with Table 7.1 AS 2734 -1984.

### **C0214.7.4 Level Control**

The correction course shall be completed to a plane parallel to the finished surface of the asphalt pavement. The Contractor shall mark levels on the surface at appropriate spacings and using these levels the Contractor shall establish a fixed wire or string line from which the levels of the course shall be controlled by sensor and automatic screed control. Where the correction required is minor, a levelling beam at least 9 m long may be used in lieu of a fixed wire.

The wearing course levels shall be automatically controlled by levelling beam at least 9 m long.

### **C0214.7.5 Joints**

Work shall be so arranged as to keep to a minimum the number of longitudinal and transverse joints. Joints shall be constructed as described in AS 2734 - 1984 Section 7.8.

Work shall be arranged to avoid longitudinal joint faces, other than those at the extreme edge of the pavement, being left exposed overnight.

#### **C0214.7.6 Matching with Existing Pavements**

Where the asphalt is required to match into the level of an existing pavement, the level difference shall be made up by a smooth taper constructed over a minimum distance as follows:

Carriageway with speed limit of 75 km/h or less : 4 metres

Carriageway with speed limit of more than 75 km/h : 8 metres

At the feathered end, a "chase" shall be cut into the existing pavement to a depth and width sufficient to ensure that the thickness of the asphalt being laid is at least twice the nominal size of the asphalt.

### **C0214.8 COMPACTION**

#### **C0214.8.1 Compaction Plant**

The compaction plant used shall comply with Section 8.2 of AS 2734 - 1984 and in particular the minimum number of rollers used shall be in accordance with Table 8.1 of AS 2734 - 1984.

#### **C0214.8.2 Compaction Procedure**

The compaction procedure shall comply with Section 8.3 and 8.5 of AS 2734 - 1984.

#### **C0214.8.3 Compaction Level**

Asphalt shall be compacted to a minimum characteristic density of 95% of Marshall density (50 blows) for the mix.

### **C0214.9 ACCEPTANCE OF ASPHALT PLACED**

For acceptance purposes, the maximum lot size shall be a days work in placing asphalt.

#### **C0214.9.1 Thickness**

Each course except correction courses shall be within 5 mm of the thickness specified and the total thickness of asphalt shall be within 5 mm of the overall thickness specified.

In all instances for asphalt adjacent to concrete gutters and drains no negative finished surface tolerance shall be allowed.

At the start of work within any mix, sufficient measurements of loose and compacted thickness of the asphalt shall be taken to establish a relationship which shall allow the compacted thickness of that mix to be controlled by measurement of the loose material behind the screed of the paver.

In areas of kerb and gutter the asphalt shall match the lip of the kerb and gutter.

### **C0214.9.2 Shape of Finished Surface**

The finished surface shall be even and dense and parallel with the designed finished surface.

Acceptance of each lot shall depend on the results of measurements taken with a 3 metre straight edge, laid in any direction on the surface of the asphalt (excluding over the crown but including over joints).

The lot shall be considered acceptable if no surface irregularities under the straight edge exceed the acceptance value in Table R55.6. Any areas within the lot with an irregularity under the straight edge of more than the rejection value in Table R55.6 shall be rejected, and the area reinstated to specified tolerances by reworking, overlaying or planning.

A lot with irregularities under the straight edge falling between the acceptance and rejection limits given in Table R55.6 may be accepted at a reduced price by the Engineer if in his opinion the reduced service life may be offset by the reduced price.

In this event, the reduced payment shall be estimated as described in Clause R55.9.3.

### **C0214.9.3 Deductions from Payment due to Shape Defects**

For each lot, a minimum of 20 measurements (but with at least one per 100m<sup>2</sup> of completed surface) of the maximum irregularity under a 3 metre straight edge shall be made. The measurements shall be evenly distributed over the whole surface of the lot. These measurements shall be made in the presence of the Engineer.

- (i) Areas within the lot with an irregularity greater than the rejection value shall be rejected and excluded from the lot, to be repaired .If there are 4 or more separate such areas in the lot, then the whole lot shall be rejected.
- (ii) Defect points shall be allocated to the measured irregularities as shown in Table C0214.6.

**TABLE C0214.6**  
**SURFACE IRREGULARITY ACCEPTANCE VALUES AND DEFECT POINTS**

MAX SURFACE IRREGULARITY (mm)				
	Highways Main Roads and Urban Arterials (speed limit >60 km/h)	Secondary and other roads including residential streets	Parking Areas Driveways and Handworked areas	Defect Points
Acceptance Value	5	7	10	0
Range	6 - 10	8 - 13	11 - 20	1
Range	11 - 15	14 - 20	21 - 30	2
Rejection value	15	20	30	reject area

- (i) The deduction factor to be used for the lot shall be the sum of the defect points divided by the total number of measurements taken, expressed as a percentage equal to

$$\frac{\text{Sum of defect points}}{\text{Total number of measurements}} \times 100$$

- (ii) The tendered rate for placing and compacting asphalt for the lot shall be reduced by a percentage equal to the calculated deduction factor.

If the deduction factor is greater than 30%, the lot shall be rejected.

#### **C0214.9.4 Compaction**



The density of a lot shall be determined by Nuclear Meter - Backscatter Mode at ten (10) places chosen at random in the lot or by the weighing of cores taken from five (5) places chosen at random in the lot.

The characteristic density (D) for each lot, shall be calculated according to Clause G4.6.1 of Specification G4.

A lot shall be accepted if the characteristic density equals or exceeds 95% of the Marshall density (50 blows compactive effort) for the Job Mix.

#### **C0214.9.5 Deductions from Payment due to Inadequate Compaction**

Any lot of asphalt failing to meet the criterion for density specified above may be rejected. However, if, in the opinion of the Engineer, the reduced service from the failed lot would be offset by reducing payment, then the lot may be accepted at a price to be determined by the Engineer by reducing the tendered rate for placing and rolling the asphalt. The tendered rate shall be reduced by a percentage equal to “6.0 (95-C)” where (C) is the characteristic density expressed as a percentage of the Marshall density (50 blows).

Lots with a characteristic density of less than 90% Marshall density (50 blows) shall not be accepted.

#### **C0214.10 FOOTPATHS**

Asphalt shall be placed in position and spread in one (1) layer using lutes or the back of a rake.

The asphalt shall be compacted using a steel wheeled roller having a mass of not less than 0.5 tonnes.

#### **C0214.11 BRIDGE DECK JOINTS**

The contractor shall construct joints in the asphalt over joints in the decks of bridge structures, according to the following or as shown on the drawings.

The asphalt joint shall be made by the Contractor by firstly making a cut to the full depth of asphalt immediately over the bridge deck joint. The Contractor shall then make a secondary cut a minimum of 25 mm deep and 20 mm from the first cut. The material between the cuts shall be neatly and carefully removed. The joint shall be cleaned of any loose stones, grit, dust, etc. The Contractor shall ensure the cavity is dry before placing a 20 mm wide plastic strip in the bottom of the cavity and immediately applying Hot Melt Megaprene or approved equivalent sealant, in accordance with the manufacturer's instructions.

## **C0214.12 PROTECTION OF SERVICES**

The Contractor shall take all necessary precautions to prevent the mix entering or adhering to road side structures. Before applying asphalt to bridge decks, sections of the superstructure shall be adequately protected by covering with building paper or similar material.

Upon completion of the work, the Contractor shall, at his expense, clean off any such mix adhering to the bridge superstructure and road side structures.

The Contractor shall be held responsible for any machinery damage caused to bridge superstructures and road side structures.

### **C1200 DAYWORKS**

#### **C1200.1 PRELIMINARY**

Refer to the Conditions of Contract and section C0100 of the Specification which shall apply to this section of the Works.

#### **C1200.2 EXTENT OF WORKS**

The work covered by this section includes the supply of all labor, Materials and Plant to carry out unscheduled work as directed by the Engineer.

#### **C1200.3 LABOUR**

All workers on day works shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

#### **C1200.4 MATERIALS**

The Materials used on the day work shall conform to the Specifications and such other requirements as may be advised by the Engineer. Unless otherwise specified such materials that are manufactured or processed shall be new (as compared to used or reprocessed)

In order to expedite the approval of Materials, the Contractor shall on request furnish complete statements to the Engineer as to the origin, composition, and manufacture of

Materials to be used in the work. Such statements shall be furnished prior to delivery of such Materials.

At the Engineers option, Materials may be approved at the source of supply before delivery is started. If it is found after test that sources of supply for previously approved Materials do not produce specified products the Contractors shall furnish conforming Materials from other source.

## **C1200.5**

### **PLANT HIRE**

#### **1. General**

The contractor shall furnish and deliver Plant for hire together with competent operator's supplies and repairs incidental to and necessary for the operation thereof in accordance with the provisions of the contract.

The Plant to be furnished under this contract shall be in first class mechanical condition.

#### **2. Safety of the Plant**

The Contractor shall be responsible for the safety of the Plant and of any accessories or tools or temporary works provided for the maintenance servicing or operation of the Plant

#### **3. Use of the Plant**

Subject to the provisions of the contract, the Engineer shall have the right to decide what Plant in what locality and on what days and for what hours during the continuance of the contract, the Contractor's plant will be required.

#### **4. Maintenance of Equipment and Suspension of Hire**

The Contractor shall keep all Plant in good and substantial repair and shall carry out at his own cost all repairs and maintenance required. Damage to the Plant from whatever cause shall be the sole responsibility of the Contractor.

The Engineer reserves the right to suspend the hire of any Plant not performing satisfactorily for whatsoever reason until the problem is resolved to his satisfaction.

#### **5. Evidence of Hours Worked**

Dockets shall be prepared by the Contractor showing the number of hours worked by each Plant item in accordance with the contract. This docket shall be signed at the end of each day's work by the Engineer and the Contractor and such signatures shall indicate that the docket is a true record of the number of hours working during that day. Should the Engineer dispute any of the figures shown on the docket, he shall prior to signing amend the figures that are in dispute and these amended values shall be taken as the correct hours. Should the Contractor disagree with the amended hours he shall advise the Engineer in writing.