REQUEST FOR TENDER

Department of Planning and Infrastructure

Construction

TENDER:	VICTORIA HIGHWAY PROJECT
NUMBER:	
CLOSING:	2:00 PM CST **(Late Tenders Will Not Be Accepted)**

LODGEMENT OF TENDERS TO:
The Tender Box
Department of Corporate and Information Services

By Hand:
Department of Corporate and Information Services
Ground Floor Enterprise House
28-30 Knuckey Street
Darwin NT 0800
or
Department of Corporate and Information Services
1st Floor, Herbarium (Gaymark Plaza)
4 Mansfield Street
Palmerston NT 0830

By Post:
GPO Box 1551
Darwin NT 0801

By Facsimile:
(08) 8999 1935

By Electronic Delivery
Via the electronic lodgement facility at www.nt.gov.au/tenders
OR Via the e-mail link supplied where the selected RFT is available from an e-mail link.
Note: no other form of e-mail or electronic delivery is acceptable.

Northern Territory Government

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PROJECT NUMBER:	
RFT NUMBER:	
RFT TITLE:	VICTORIA HIGHWAY FLOOD PLAN

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RESPONSE SCHEDULES ARE PROVIDED SEPARATELY FROM THIS REQUEST FOR TENDER DOCUMENT
DRAWINGS BOUND IN THE RFT

PREPARED BY:

Department of Planning and Infrastructure

This is the specification marked "A" referred to in the Annexed Agreement with the Principal.

Dated this		day of		2006

Signature	

Witness	

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1. PRELIMINARY CLAUSES

1.1 SITE OF WORKS

Victoria Highway between Chainage 184KM and 220KM.

1.2 EXISTING STRUCTURES AND SERVICES

Any connection, disconnection or interference with existing shall be carried out under the supervision of the Superintendent to whom reasonable notice shall be given by the Contractor of his intention.

1.3 SURVEYS AND SETTING OUT

The Contractor shall be responsible for all setting out required for the proper execution of the Works. The design lines have not been pegged. Survey stations sufficient to establish the design line have been placed at the coordinates and levels shown in the drawings.

Prior to setting out the Works the Contractor shall verify the assigned coordinates and levels of all control stations. Differences outside the tolerances listed below, along with an assessment of the possible source of the problem and a proposed solution, shall be reported to the Superintendent for resolution, acceptance or guidance as to the method to be used for minimising or correcting adverse effects.

The precision of the x, y and z values of an adjacent control mark, as determined from the occupied control mark, are not to exceed the greater of the following:

x : ± 5 mm or ± 25 ppm
y : ± 5 mm or ± 25 ppm
z : ± 12 mm √ kilometre

The Contractor shall take care not to disturb or cause any damage to land survey pegs and he shall be responsible for the payment of all fines, legal expenses, cost of re-erection and any other claims arising

1.4 SCHEDULE OF DRAWINGS

The following drawings shall form part of the Contract.

DRAWING NO.	SUBJECT

1.5 DRAWINGS FOR INFORMATION

The following drawings are made available for the information of Tenderers; they shall not form part of the Contract.

DRAWING NO.	SUBJECT

1.6 INTERPRETATION OF DRAWINGS

The Contractor shall check all relevant dimensions on site before proceeding with the work under the Contract.

The layout of plant and equipment as shown on the drawings shall be taken as diagrammatic only and all measurements and other information required to carry out the works specified shall be obtained by the Contractor on the site. No claim for extras arising from failure to obtain measurements and other information on site will be recognised.

1.7 GEOTECHNICAL INFORMATION

The following reports are made available for the information of Tenderers. They shall not form part of the Contract.

REPORT NO.	SUBJECT

The reports have been prepared for purposes of design and documentation of the project but are not intended to be a complete and exhaustive statement of all relevant material on the particular topics referred to therein.

Without limiting the generality of the provisions of Clause 12 of the General Conditions of Contract, the reports referred to above are provided on the basis that each Tenderer shall inform himself of all particulars concerning the performance of every part of the Works contained in the Technical Specification, which includes the plans, according to the specific terms and conditions referred to therein and acknowledge that he has not relied upon the Principal, his agents, employees or consultants to assemble and transmit such information.

1.8 NATURE OF EXCAVATIONS

The Contractor shall be deemed to have judged for himself the nature of the material to be excavated and to have made due allowance in his tender for excavation in material of whatever nature may be encountered.

No cost variation will be considered regardless of nature of material encountered.

1.9 MATERIAL TO BE SUPPLIED BY THE PRINCIPAL

The following material will be supplied free by the Principal to the Contractor for use only in execution of the work under the Contract:

aaa

The Contractor shall obtain the materials under the following conditions:

a) On acceptance of tender, the Contractor shall submit a written request for such materials, and on receiving the Superintendent's written authority, he shall take delivery of the materials at aaaa.

b) Before taking delivery of any material, the Contractor shall check that it is in a satisfactory condition and in the quantity described. No claim will be admitted for replacement of material alleged to be found defective or deficient in quantity after delivery.

c) The quantities stated are not necessarily adequate for the execution of the work under the contract and supply of any additional quantities shall be arranged by the Contractor.

d) Prior to submitting the written request to the Superintendent, the Contractor shall check that the material is in a satisfactory condition and is in the quantity necessary to carry out the work under this Contract.

e) Should the Contractor prove to the satisfaction of the Superintendent that the materials are deficient in quality and/ or quantity, the Principal shall arrange for the provision of such additional materials considered by the Superintendent to be necessary for the completion of the work.

f) No claim will be admitted for replacement of material alleged to be found defective or deficient in quantity after the Superintendent has granted authority to take delivery.

g) Any materials found surplus to requirements after completion of the work under the Contract, shall remain the property of the Principal.

1.10 SALVAGED MATERIALS

Unless otherwise specified and subject to the provisions of sub-clause 27.6 of the General Conditions of Contract, materials, plant, equipment, fixtures and other things salvaged from the site of the works shall become the property of the Contractor and shall be removed by him from the site.

1.11 DIAL BEFORE YOU DIG

Dial Before You Dig (DBYD) is a community service that provides information on underground pipes and cables from all underground service providers in the area. There is no cost to the user for this service; however, some asset owners reserve the right to make a modest charge for some plans.

Contact DBYD at least 2 working days before you plan to excavate and obtain the plans of the underground services before commencing excavation.

Provide a written notice to the Superintendent stating that the plans have been received and include the DBYD sequence number.

DBYD can by contacted at the following numbers;

Telephone:	1100	8am to 5pm weekdays, excluding public holidays
Facsimile:	1300 652 077	anytime – a standard form is available
Internet:	www.dialbeforeyoudig.com.au	

1.12 WORK IN THE VICINITY OF TELSTRA UNDERGROUND CABLES

Prior to commencing any excavation, boring of holes, blasting, rock breaking, soil compaction or similar activity in the vicinity of Telstra underground cables, whether fibre optic or copper, the Contractor shall obtain the location of the cables from Telstra's accredited plant locater, and pay all fees. The Contractor shall follow all directions and instructions issued by Telstra in relation to work in the vicinity of such cables.

1.13 LIGHT AND POWER

The Contractor shall install any temporary electric light and power installations, including metering, required for executing the work under the Contract all in accordance with the relevant regulations, and shall pay all costs and charges in connection with the installation and use of such services.

1.14 WATER

The Contractor shall arrange for the supply of all water required for executing the works under the Contract and pay all incidental charges, including cost of water so used.

1.15 SANITARY ACCOMMODATION

The Contractor shall provide adequate and clean sanitary accommodation for use of all persons employed upon the works and clear away and remove such accommodation from the site on completion of the contract.

1.16 OPENING AND REINSTATEMENT OF ROADS

Before a road opening is made by the Contractor or by one of his Sub-Contractors the Contractor shall apply to the appropriate authority for permission to open the road, shall pay the necessary fee, and shall conform to the requirements of that authority.

1.17 ABSTRACT OF PROVISIONAL QUANTITIES AND MONETARY PROVISIONS

(a) NOMINATED SUB-CONTRACTORS

NIL

(b) PROVISIONAL QUANTITIES

NIL

(c) OTHER PROVISIONAL SUM

NIL

2. ENVIRONMENTAL MANAGEMENT

2.1 GENERAL

This section specifies the requirements for the environmental management of this project, including general environmental controls, the Environmental Management Plan, if required, heritage and cultural clearances, materials extraction approvals and specific requirements with regard to soil erosion and weed management.

2.2 RESPONSIBILITY

The Contractor is responsible for ensuring that the provisions of this section and any other environmental protection provisions in the Contract are complied with and that the requirements of any statute by-law, standard and the like related to environmental protection are observed.

2.3 DEFINITIONS

Environment;	means the natural and built environment and all aspects of surroundings of human beings, including physical, biological and aesthetic aspects.
Pollution Incident;	means an incident or set of circumstances during or as a consequence of which there is, or is likely to be a leak, spill or other escape of a substance as a result of which pollution has occurred, is occurring or is likely to occur.
Contamination of land;	is the presence of a substance in, on or under the land at a concentration above that which is normally found in that locality, such that there presents a risk of harm to human health or to the environment.
Clearances;	Any formal certificate, approval or condition issued by a statutory authority to allow work to be carried out in a particular area.
Clearance Authority;	Any Authority covering statutory requirements relating to the project and requiring clearances for work in that particular area.
Weed;	A plant declared to be a declared weed under Section 7 of the Weeds Management Act 2001.

2.4 STATUTORY REQUIREMENTS

GENERAL

Comply with the following as applicable;

- Aboriginal Sacred Sites Act
- Bushfires Act
- Dangerous Goods Act
- Environmental Assessment Act
- Environmental Offences and Penalties Act
- Environment Protection and Biodiversity Conservation Act
- Heritage Conservation Act
- Soil Conservation and Land Utilisation Act
- Territory Parks and Wildlife Conservation Act
- Waste Management and Pollution Control Act
- Water Act

– Weeds Management Act

REFERENCE GUIDELINES
Managing Urban Stormwater, Soils and Construction – Vol 1, 4th Edition, Landcom

This document is available at www.landcom.nsw.gov.au

Roads and the Environment - DIPE Road Network document published in 2004

2.5 ENVIRONMENTAL MANAGEMENT PLAN

2.5.1 Submission

Complete the Environmental Management Plan Proposal in the RFT Response Schedules and submit as part of the tender documentation.

Address all of the questions outlined in the EMP Proposal and include sufficient detail to allow assessment of the intent of the proposed EMP document.

Submit the completed Environmental Management Plan for the project within 7 days of the awarding of the Contract and before any work is commenced on site.

2.5.2 Details Required

Address, as a minimum requirement, the following topics in the Environmental Management Plan;

– Assignment of responsibility for environmental controls;

– Conditions of approvals, licences and permits to meet statutory requirements;

– Details of potential environmental impacts and operational control measures which are to be implemented. As a minimum address the following;

  - Water pollution
  - Noise and vibration
  - Soil disturbance and vibration
  - Air pollution
  - Flora and fauna disturbance
  - Waste management
  - Heritage
  - Community consultation

– Details of how the environment will be protected for each Subcontractor's activities

– Locations of environmental controls and environmentally sensitive areas;

– Supplementary plans for environmental protection, including as a minimum;

  - Soil erosion and sediment control plan
  - Waste management plan
  - Weed management plan

– Non-conformance control and corrective action procedures for all of the control measures that are to be implemented.

– Communication procedures

– Emergency response procedures

– Environmental training plan and procedures

– Environmental auditing program

– Any other items necessary to protect the surrounding environment.

Address the three distinct phases of activity in the Environmental Management Plan, as appropriate;

- Before construction and site establishment;
- During construction; and
- After construction, including rehabilitation activities and maintenance of erosion and sedimentation controls.

An outline Environmental Management Plan is provided on the DPI Technical Specifications internet site at – www.dpi.nt.gov.au/whatwedo/techspecs

2.5.3 Environmental Monitoring

Ensure that the requirements of the Environmental Management section are being complied with by carrying out continuous environmental monitoring during the Contract.

Provide documented procedures describing how internal environmental monitoring is to be planned, implemented and recorded.

Maintain records of the results of environmental monitoring including the effectiveness of any remedial action taken.

2.5.4 Liability of Principal Limited

Receipt of the Environmental Management Plan will in no way relieve the Contractor of responsibility under the Contract to ensure compliance with environmental legislation and any approvals issued by other authorities as may be required in respect to work under the Contract.

2.5.5 Superintendent's Audits

The Superintendent will undertake scheduled and unscheduled audits of the Environmental Management Plan and its implementation.

Audits will generally be scheduled for every two calendar months with 5 working days notice being given to the Contractor. Unscheduled audits may be conducted with 1 working days notice.

Provide access and co-operation and all necessary documentation to allow the audit team to conduct the audit.

2.6 GENERAL ENVIRONMENTAL CONTROLS

2.6.1 Submit Proposals – Hold Point

Hold Point - Submit to the Superintendent the proposal for traffic movement, temporary structures (including lamps) cleaning up (including burning off) erosion control, demolition and the like prior to any work commencing on the site.

After the Superintendent has agreed to the proposals, the Contractor will be responsible for ensuring that the agreed proposals are observed.

Any changes to the agreed proposals are to be requested by the Contractor and be subject to the agreement of the Superintendent.

2.6.2 Site Control

Do not form any new tracks, alter any existing tracks, erect any camps, remove any trees or shrubs, cut any fences or water, sewer, power or telecommunications lines or perform other activities not specified or indicated on the drawings or otherwise required under the Contract without the prior approval of the Superintendent.

2.6.3 Site Clearing

Contain the extent of site clearing to the limits specified or indicated on the drawings or otherwise approved by the Superintendent.

If any areas of vegetation within the limits of clearing are to be retained, fence off with temporary fencing.

In urban areas remove the cleared vegetation and other material, excluding weeds, from the site and chip and mulch for re-use off-site, as directed by the Superintendent. Dispose of unwanted mulch at a council waste disposal site and pay all fees and charges.

In rural areas cleared vegetation, excluding weeds, may be chipped for reuse as mulch on site in conjunction with environmental control measures, if suitable. Remove excess, or unwanted material from the site and dispose in accordance with local authority requirements and guidelines.

2.6.4 Lighting of Fires

Do not light fires under any circumstances whatsoever, before permission is gained from the Superintendent.

Where fires are accidentally started, it is the responsibility of the Contractor to extinguish the fire.

2.6.5 Solid, Liquid and Gaseous Contaminants

Take responsibility for the proper disposal of all solid, liquid and gaseous contaminants in accordance with the statutory and contractual requirements, including the provisions of this section.

Do not dispose of liquid paint materials or other hazardous materials by flushing down any sewer, stormwater system or natural waterway.

2.6.6 Dust and water

Protect adjoining owners, residents and the public against dust, dirt and water nuisance. Use dust screens and watering to reduce the dust nuisance.

2.6.7 Soil Conservation

Take effective precautions to prevent erosion of soil from all lands used or occupied by the Contractor for the execution of the works under the Contract.

2.6.8 Vegetation

Do not destroy, remove or clear vegetation to an extent greater than is necessary for the execution of the work under the Contract.

Identify all areas to be cleared and clearly mark the extent of clearing work. Obtain the Superintendent's approval before any clearing is carried out.

If any areas of vegetation within the limits of clearing are to be retained, fence off with temporary fencing.

Penalties exist for over clearing or destruction of trees.

2.6.9 Fauna

All native wildlife must be protected. All trees to be removed should first be inspected to establish whether nesting native fauna are present. If present, disturbance should only proceed with advice from the Department of Natural Resources, Environment and the Arts (NRETA) - Bio Parks.

2.6.10 Trucking

Load all trucks leaving the site with earth materials or loose debris in a manner that will prevent the dropping of materials on public roads and provide suitable tarpaulins fastened over the load before leaving the site. Ensure that trucks bringing earth materials to the site are similarly loaded and covered.

Ensure that the wheels, tracks and body surfaces of all vehicles and plant leaving the site are free of mud and that mud is not carried on to adjacent paved streets and other areas.

2.6.11 Preserve Visual Values

Maintain the visual amenity of adjacent land owners at all times during the construction of the work under the Contract. Keep the site neat and tidy at all times.

Design and erect temporary lighting, including compound security lighting, in such a way that it minimises nuisance to residents, but conforms to the safety requirements for the illumination of the site. Ensure that adjoining residents or passing traffic are not affected by glare.

2.7 COMMUNITY LIAISON

2.7.1 Notify Residents

Notify local residents and businesses, including Aboriginal communities, about new or changed construction activities which will affect access to their properties or otherwise significantly disrupt resident's or occupiers use of their premises. Such notification must be at least 5 working days before commencing the work affecting residents, unless the work is of an urgent nature for safety reasons and must advise of the following;

- the nature of the work
- why it is necessary

- the expected duration
- changes to arrangements for traffic or property access
- the name and 24 hour contact telephone number of the Contractor's representative who can respond to resident concerns.

The Superintendent will provide a contact point for Aboriginal communities.

2.7.2 Complaints

Within 1 working day of receiving a complaint about any environmental issue, including pollution, supply a written report to the Superintendent detailing the complaint and action taken to alleviate the problem. Keep a register of all environmental complaints and action taken.

2.8 WASTE MANAGEMENT

2.8.1 Waste Management Generally

Comply with the requirements of the Waste Management and Pollution Control Act.

Remove from the site and dispose of all waste materials, including green waste, food scraps and the like, construction waste, chemicals and effluent in an appropriate manner. Recycle waste materials where appropriate.

Handle all refuse and waste materials in a manner so as to confine the material completely and prevent dust emission.

2.8.2 Waste Management Plan

Include a Waste Management Plan in the Environmental Management Plan. The Waste Management Plan, as a minimum must address the following items;

– Identify major waste streams that will be generated during the Contract including;
  - green waste
  - construction waste, including;
    - spoil
    - demolition waste
    - asphalt or bitumen
    - concrete and metal
    - grease, oils and fuels
    - paint materials
  - office waste
  - kitchen waste
  - sewage effluent;

– For each waste stream indicate how and where the waste is to be reused, recycled, treated or disposed of.

– How the waste will be transported between the site and point of reuse, recycling, stockpiling or disposal and who will be responsible.

– Methods for monitoring the Waste Management Plan.

Maintain records to demonstrate that all surplus materials are reused, recycled or disposed of in accordance with statutory requirements.

2.8.3 Illegal Dumping

Do not litter or dump or dispose of unwanted waste or dispose of surplus construction materials including bitumen, asphalt or concrete or permit such activities on any land on or around the site.

Comply with the requirements of the Waste Management and Pollution Control Act and dispose of at a place that can legally accept the waste.

2.9 WEED MANAGEMENT

2.9.1 Control of Weeds

Control or eradicate weeds within the site in accordance with the DPI Weeds Management Plan for the particular area and in accordance with the Weeds Management Act.

Ensure that no declared weeds are spread within the site for the duration of the Contract. Methods for the control of weeds may include physical, biological or chemical eradication.

2.9.2 Weed Management Plan

Detail procedures to prevent the importation of noxious and declared weeds and to identify and dispose of noxious and declared weeds.

2.9.3 Cleaning of Vehicles and Plant

To prevent the spread of noxious weeds, steam clean or high pressure water clean all vehicles and mechanical plant of earth and organic matter before entering Arnhem Land or any Park, Reserve or Protected Area.

Notice: Provide the Superintendent with a signed statement each time vehicles or mechanical plant are taken into Arnhem Land or any Park, Reserve or Nominated Area, certifying that cleaning took place and including the following information:

- Vehicle or Plant Identification Number
- Method of Cleaning
- The time and date carried out
- The location of cleaning operations
- The name of the cleaning operator.

Collect and dispose of the removed earth and organic material by a method that will ensure that it does not infest any river, stream, wetland or property. Comply with the Northern Territory Weeds Management Act.

2.10 CULTURAL HERITAGE

2.10.1 Protect Artefacts

Should any item be encountered which is suspected to be an artefact of heritage value or any relic, artefact or material suspected of being of Aboriginal origin, cease all construction work that might affect the item and protect the item from damage or disturbance. Notify the Superintendent immediately, who will then arrange for appropriate specialists and community representatives to inspect the site.

Ensure that all personnel working on site have received training regarding their responsibilities regarding cultural heritage and are made aware of any sites/areas which must be avoided. Such sites/areas must be identified on a site map and made available to all relevant personnel during the works.

2.11 CLEARANCES

2.11.1 Terminology

Refer to the DEFINITIONS clause for explanatory notes on the terms Clearances and Clearance Authority.

Clearance Authorities include the following;

- Aboriginal Areas Protection Authority
- Land Councils
- NRETA – Office of Environment and Heritage – Environmental Assessment Branch
- NRETA – Office of Environment and Heritage – Heritage Conservation Services
- NRETA – Natural Resource Management
- Parks Australia

– Service Authorities.

2.12 SACRED SITES PROTECTION

2.12.1 Sacred Sites Protection Conditions

The Principal will apply for and obtain certificates under the Northern Territory Aboriginal Sacred Sites Act (NTASSA) for the proposed road works to enable the Contractor to undertake the works. Copies of Certificates are included in the specification.

If the Contractor elects to work outside of the areas covered by the Certificates provided, the Contractor must apply for and obtain Certificates for those works under the NTASSA.

The costs associated with obtaining Certificates are to be determined in accordance with the Regulations of the NTASSA.

Prior to work commencing the Contractor will develop a plan for the adequate protection of any identified sacred sites potentially affected by the work and consistent with the conditions attached to the Certificate. This plan may include, as the occasion requires, placing coloured tape, plastic mesh, bollards and/or temporary fencing around the sites and restriction areas. Submit the plan to the Superintendent for approval prior to its implementation. Once the Superintendent's written approval is given, the Contractor will implement the plan.

Once the protective measures are in place and prior to work commencing, the Contractor will ensure and submit in writing to the Superintendent, that the protective measures have been completed in accordance with the plan and Authority Certificates.

Prior to work commencing, the Superintendent will conduct a protection of sacred sites briefing session for all on-site employees and on-site sub-contractors regarding the protection of the sites during construction. The conditions applying to the protection of the sites will be reinforced, as will the principle that responsibility for the restoration of any damage to these sites rests with the Contractor. The Aboriginal Areas protection Authority (AAPA) will be given the opportunity to attend such briefings. The Principal will bear the cost of the AAPA expenses associated with attending the meeting.

The Contractor will ensure that all relevant documentation, including work plans, clearly show all sites and restricted areas identified on the Certificate.

The Contractor will be responsible for any failure to comply with the conditions of the AAPA Certificate in accordance with the Breach of Sacred Site Protection Conditions clauses.

2.12.2 Breach of Sacred Site Protection Conditions

If AAPA notifies the Superintendent that a Certificate condition applying to the protection of a sacred site has allegedly been breached, the Superintendent will instruct the Contractor to stop work in the near vicinity of the affected site or to undertake essential works to maintain public access then stop work until the Superintendent is advised by the AAPA that the breach has been resolved and the Superintendent issues an instruction to advise work can recommence.

The Superintendent will arrange for a meeting between custodians, the Contractor and AAPA to be held for the following purposes:

– To view the affected site;

– To discuss when work might resume in the vicinity of the sacred site; and

– Agree to any restorative measures that may be needed.

Following this meeting occurring, the Superintendent will document and issue a letter to all parties specifying the restorative measures, if any, which have been agreed upon at the meeting referred to above and which are to be implemented together with a timetable for implementation. All parties will respond to the letter to confirm agreement, then the Superintendent will instruct the Contractor on the restorative measures, if any, to be undertaken.

The Contractor will meet the reasonable costs of:

– AAPA representatives and the custodians to attend the site meeting in accordance with Clause 19G of the Northern Territory Aboriginal Sacred Sites Act 1989 (NTASSA) and Regulation 8 of the Northern Territory Aboriginal Sacred Sites Regulations, Regulation 6 Guidelines as to Charges that may apply for non-standard Application or Conference;

– Any restorative measures agreed upon between AAPA and the custodians; and

– Any costs of the Principal.

A breach of the conditions will be a factor taken into account in the Contractor's Performance Report rating for "Contract Relations/Administration" and "Environmental Protection" in the awarding of future contracts by the Northern Territory, and will also influence future rating by Contractor Accreditation Ltd.

AAPA will independently investigate whether a prosecution should also be pursued under the NTASSA.

2.12.3 Approval to Draw Water

Apply to the Department of Natural Resources Environment and the Arts (NRETA) Natural Resource Management for approval to draw water from any surface or sub-surface body, or to the relevant authority (generally Power and Water Corporation) for approval to draw water from a reticulated supply.

Allow up to 3 weeks for a permit from NRETA – Natural Resource Management.

Permits from Power Water are generally available immediately.

The preferred option for the supply of water is through a dedicated work supply point located throughout major urban centres and the Darwin rural area. These supply points are accessed through a Power and Water swipe-card.

Where such supply points are not available, Power and Water may issue a portable meter, which requires a deposit, to extract water from fire hydrants.

Provide evidence to the Superintendent of the approval to draw water from the appropriate authority.

2.12.4 Approvals for Borrow Pits

Prior to commencing any work on or in borrow pits, either new or existing, or using any water sources, provide documented evidence from the following that extraction and other approvals have been obtained:

– Aboriginal Areas Protection Authority.

– NRETA – Office of Environment and Heritage – Environmental Assessment Branch

– NRETA – Office of Environment and Heritage - Heritage Conservation Services.

– Relevant Land Councils.

– Land owner (freehold) or lessee of any land affected.

– Service Authorities.

– Any other approvals required.

The Principal has neither sought nor obtained and has no control in obtaining the requisite clearances and approvals, and there may be delays in obtaining them. Take all reasonable steps to avoid any delays to the work due to obtaining the requisite clearances and approvals.

The Principal has located borrow pits for this contract and has obtained the requisite clearances and approvals. Copies of these documents are provided with the tender documents.

2.12.5 Compliance with Clearances and Permits

Comply with the requirements of any clearances or permits, whether obtained by the Contractor or obtained by the Principal for the particular work and ensure the protection of the sites from interference.

2.13 SOIL EROSION MANAGEMENT

2.13.1 Generally

Undertake all work under the Contract to avoid erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.

Refer to the publication, Managing Urban Stormwater, Soils and Construction Vol 1, 4th Edition, Landcom for advice regarding design and application of control measures to suit the local environment.

2.13.2 Soil Erosion Management Plan

As part of the Environmental Management Plan for the Contract prepare a Soil Erosion and Sedimentation Control Plan to provide details of the following, where applicable;

– Staging of operations and sequence of work under the Contract

- Diversion of upstream water around the site;
- Provision of temporary drains and catch drains;
- Application of diversion, dispersal and/or retention measures to concentrate flows to control and dissipate stormwater through the site without damage;
- Spreader banks or other structures to disperse concentrated runoff;
- Silt traps and silt fencing to prevent discharge sediment materials to downstream areas;
- Temporary grassing or other treatments such as contour ploughing or bunding to disturbed areas and long term stockpiles;
- Restoration of disturbed areas in progress with the work under the Contract; and
- Use of mulch materials to protect disturbed or exposed areas where suitable

The Soil Erosion and Sedimentation Control Plan should include all site areas including access and haulage tracks, borrow pits, stockpile and storage areas and compound areas.

2.13.3 Maintenance

Continually inspect and maintain control measures throughout the course of the work under the Contract and particularly following each incidence of rain.

Rearrange and reposition control measures as required to maintain their efficiency.
Handle and dispose of sediment collected by control measures in an approved manner.

2.13.4 Removal

Remove all temporary control measures following rehabilitation or when otherwise no longer required.

2.14 RISK ASSESSMENT

2.14.1 Provide Solutions

Identify the risks on the project and provide solutions to minimise these risks.

2.15 PROJECT SPECIFIC REQUIREMENTS

3. MISCELLANEOUS PROVISIONS

3.1 STANDARDS

Conform to the following Standards, Acts and Publications unless specified otherwise:

AS 1348	Road and traffic engineering - Glossary of terms.
AS 1742	Manual of Uniform Traffic Control Devices.
AS 2187.1	Explosives - Storage, Transport and Use - Storage.
AS 2187.2	Explosives - Storage, Transport and Use - Use of Explosives.
NTTM	Materials Testing Manual including NTCP (Northern Territory Codes Of Practice) Aboriginal Land Rights (NT) Act. Mining Act and Mine Safety Control Act (MSCA). Work Health Act and Regulations. Dangerous Goods Act and Regulations. Railways of Australia (ROA) Code - Installation of Other Parties Services and Pipelines Within Railway Boundaries. The Water Act The Energy Pipelines Act (NT Gas).
ACA	Australian Communications Authority - any Standards, Acts, controls specifically required. Refer to ACA directly.

3.1.1 Standards in Conflict

Where conflict arises between a referenced standard and particular clauses of this specification the specification prevails.

3.1.2 Overseas Standards

Where no Australian Standard exists standards published by the British Standards Institute (BSI) or the American Society for Testing Materials are referenced.

3.2 DEFINITIONS

The terms used in this specification are in accordance with the definitions laid down in AS 1348 unless specified otherwise in the Definitions clauses.

BORROW PIT:	An excavation outside the formation limits for obtaining fill, gravel, rock and rubble.
DRY DENSITY RATIO:	The percentage ratio of the field dry density of a material to the modified maximum dry density of that material. This property is also termed Relative Compaction.
WITNESS POINT:	Give the Superintendent sufficient prior notice, in writing, of an action so that that part of the works may be inspected.
HOLD POINT:	Obtain the Superintendent's written approval for that particular part of the works.

3.3 ESTABLISHMENT

3.3.1 General

Allow in the tender for establishment on site, including, but not necessarily limited to, the following:

MOBILISATION:	Transportation and establishment on site, of all the requirements to complete the work.
DEMOBILISATION:	Removal and transportation from site of all temporary and construction facilities and equipment. Restoration of the site, on Practical Completion of the works, compatible with environs.
ONGOING COSTS:	All indirect costs associated with the contract. Provide, on request, details substantiating the amount shown in the Schedule of Rates.

3.3.2 Camp Site/Compound/Workshop – Hold point

Hold Point - Obtain written permission from the owner or lessee of the land.

Pay all costs associated with the use of the site(s).

Maintain all facilities in good condition.

Remove all facilities, unless otherwise agreed in writing with owner or lessee of land, and restore the site to a clean and tidy condition upon completion of the works.

Assume all responsibility for any current and consequential damage caused to the site as a result of occupation.

3.4 BORROW PITS AND WATER SOURCES

3.4.1 Borrow Pit Locations

Borrow pits will not be allowed adjacent to the works.

Borrow pits adjacent to the works will be allowed provided that all the clearances and approvals listed in the APPROVALS FOR BORROW PITS clause in the ENVIRONMENTAL MANAGEMENT section are obtained.

3.4.2 Administration

Take responsibility for locating, selecting, operating and rehabilitating all borrow pits and water sources.

3.4.3 Crushing or Screening – Hold point

Submit the nomination of a Mine Manager to the Department of Primary Industry Fisheries and Mines and allow 14 days for assessment of the nomination and assessment of the proposed crushing or screening plant.

Hold Point - Commence crushing or screening operations only after a DPIFM, Mines Inspector has certified that the plant is in safe working order.

3.4.4 Operation of Borrow Pits

ACCESS

Construct only one access road to each pit.

Confine all transport operations to the access road.

Provide and maintain adequate road drainage.

EXTRACTION

Strip 100 mm minimum depth top layer throughout the area of operation.

Stockpile stripped material clear of drainage courses to a maximum height of 2 m.

Ensure that side slopes of sand or gravel are not steeper than one vertical to two horizontal at any time when the excavation is unattended.

Remove or bury by-products of the excavation operations unless otherwise required.

LIMIT OF EXCAVATION

- Not within 6 m of any fence line or utility service.
- Not within sight of road traffic.
- Not within 125 m of any road or railway centre line.
- Not within 25 m of a water course.
- Maximum area: 1 ha. Align the long side with the contour.
- Maximum width: 50 m.
- Maximum depth: 2 m.
- Leave natural vegetation strips 25 m width between pits.

Stockpile cleared vegetation and subsequently spread over the surface of the extraction area.

Existing pits within 125 m of a public road may be used provided:

- No significant revegetation exists.
- Extension proceeds away from the road.
- Site is rehabilitated after use.

3.4.5 Rehabilitation of Borrow Pits

Progressively rehabilitate new borrow pits.

- Backfill all test pits.
- Respread unused material and rip 1 m deep at 3 m spacing along the contours.
- Remove or bury all rubbish and debris.
- Replace stockpiled topsoil and cleared vegetation uniformly over the extraction area.
- Batter walls at three horizontal to one vertical where excavation is less than 1 m depth, and six horizontal to one vertical where depth exceeds 1 m.
- Rehabilitate the access road.

3.4.6 Stream Sites

Contact NRETA Natural Resource Management prior to conducting any work in a stream site.

EXCAVATION LIMITS

- Not within 200 m upstream or downstream of any road structure, pipeline or gauging station.
- Not in a manner liable to cause erosion or further disturbance to the watercourse.
- Not within 15 m of the trunk of a tree and not under the branches of any tree.

CONDITIONS

- Leave sizeable islands to ensure groupings of trees that will withstand stream bed erosion.
- Maximum batter slope: Two horizontal to one vertical.

3.4.7 Inspection

Allow authorised personnel from the Department of Natural resources, Environment and the Arts (NRETA) to enter the site at any time.

3.4.8 Records

Provide the following details on completion:

- List of areas used.
- Chainages of area along the public road.
- Direction and length of haul road.
- Approximate volume of material removed from each site.

Provide suitable forms for such records to the Superintendent.

3.5 EXPLOSIVES – HOLD POINT

Provide evidence of the following requirements of NT WorkSafe and DBERD:

- Licence to carry and store explosives.
- Vehicle licensed to carry explosives.
- Shot Firer's Certificate.

Inspect and record the condition of all structures and services subject to possible effect by use of explosives before and after blasting operations.

Hold Point - Obtain approval from Superintendent before commencing blasting operations.

3.6 SAFETY

3.6.1 Safety Officer – Witness Point

Witness Point - Appoint a Safety Officer and notify the Superintendent of the officer's name.

Ensure the Safety Officer is capable and available at all times as required by the Standards.

The Superintendent retains the right to revoke the appointment of the Safety Officer at any time, and direct that another person be appointed.

3.6.2 Safety Practice

Provide safety equipment, protective clothing and devices and first aid facilities.

Ensure that employees are instructed concerning hazards and how to avoid injury.

Observe good safety practices throughout the Contract.

3.6.3 Safety Helmets

Adhere to the requirements of the Construction Safety Act.

3.7 FENCING AND SHORING OF OPEN EXCAVATIONS

Design, construct and maintain the excavation and shoring in a safe and satisfactory condition.

Support trenches in saturated or unstable ground with close timbered shoring or similar.

3.8 WORK ON RAILWAY SITES – HOLD POINT

Carry out work within railway sites to the approval of the owner / operator of the rail system, Freightlink Pty Ltd.

Comply with the DIPE / Freightlink interface agreement for work within the railway sites.

Give 14 days written notice to the owner / operator of intent to commence work and provide a work plan showing safe working conditions for the site.

Hold Point - Do not commence work until the work plan has been approved by the owner / operator of the rail system.

If work is required to be carried out within 3 metres of the actual rail line, this work must be co-ordinated through the Superintendent.

3.9 WORK IN THE VICINITY OF TRAFFIC COUNTING STATIONS – HOLD POINT

Prior To commencing any excavation, boring of holes, blasting, rock breaking, soil compaction or similar activity in the vicinity of traffic counter station detector loops, obtain the location of the cables from the Department of Planning and Infrastructure, Road Network Division, Data Contracts Officer and pay all fees.

Follow all directions and instructions issued by the Road Network Division in relation to work in the vicinity of such cables.

3.10 PROJECT NOTICE BOARDS

Supply, erect and maintain Project Notice Boards, at locations nominated by the Superintendent and in accordance with the ROAD FURNITURE AND TRAFFIC CONTROL DEVICES Section, within 2 weeks of establishment on site.

Design the Project Notice Boards in accordance with standard drawing >

Include the following project specific wording on the boards;

>

>

Remove the boards within 2 weeks after the Certificate of Practical Completion has been issued.

Remove the boards 52 weeks after the Certificate of Practical Completion has been issued.

3.11 LEVEL CHECKING

Check levels of subgrade and final surface at 25 m intervals.

Check levels at centre line and to edges of pavement.

Check levels of intersections and parking areas at appropriate intervals.

Check levels using an independent and competent surveyor who is eligible for membership of the Institution of Surveyors Australia or the Institution of Engineering and Mining Surveyors Australia.

3.12 LEVEL AUDITING

The Superintendent may choose to audit any level survey submitted to show conformance with the specified tolerances.

Provide an experienced survey assistant when requested by the Superintendent to assist in audit checking.

3.13 CONTROL STATION CHECK SURVEY – WITNESS POINT

Refer to the Preliminary Clause SURVEYS AND SETTING OUT.

Witness Point - Where results exceed the quoted tolerance notify the Superintendent and obtain directions.

3.14 AS CONSTRUCTED INFORMATION - WITNESS POINT

Record all changes and variations of the design as the work proceeds, particularly items that are covered or become inaccessible.

Mark up the changes in red pen on paper hardcopies of the drawings in A1 size format and provide this data to the Superintendent progressively as the work proceeds.

Witness Point - Submit to the Superintendent before the work commences a proposed procedure for recording and submitting the recorded data.

Use an independent surveyor who is eligible for membership of the Institution of Surveyors Australia or the Institution of Engineering and Mining Surveyors Australia to record the changes and variations.

The Principal will use the submitted data to prepare as constructed drawings of the project.

4. PROVISION FOR TRAFFIC

4.1 STANDARDS

Conform to the following Standards and Publications unless specified otherwise:

AS 1742.3 Manual of uniform traffic control devices - Traffic control devices for works on roads.
AS/NZS 3845 Road safety barrier systems.

NTTM Materials Testing Manual.
AUSTROADS Guide to the Geometric Design of Rural Roads.
AUSTROADS Bridge Design Code.

4.2 GENERAL

Minimise obstruction and inconvenience to the public.

Assume responsibility for the safe conduct of traffic through or around the works, 24 hours a day, from possession of the site to completion of all works.

4.3 WORK IN URBAN AREAS

4.3.1 Working Times

Program work and install signs accordingly so that traffic is not impeded during the following hours:

0700 hours to 0900 hours.

1600 hours to 1730 hours.

Remove or cover signs as appropriate to stop confusion during these hours.

4.3.2 Traffic Lanes

Maintain at least > lanes open to traffic at all times.

Program work so that the closure of turning lanes is minimised.

Obtain prior written approval from Council if traffic is to be detoured onto their road network.

Provide a copy of the approval with the traffic management plan.

4.4 TRAFFIC MANAGEMENT PLAN – WITNESS POINT

Witness point - Submit the Traffic Management Plan to the Superintendent a minimum of 2 working days before the commencement of work.

The Traffic Management Plan must be designed, modified and supervised by persons who have passed a nationally accredited course for Traffic Management at work sites.

Design the Traffic Management Plan in accordance with AS 1742, Manual of uniform traffic control devices Part 3: Traffic control devices for works on roads. Produce the plan by electronic means, eg. Computer Aided Drafting (CAD) and submit the plan to the Superintendent via electronic means, eg. E-mail, computer disc etc.

Include the following details on the Traffic Management Plan:

- The name of the Traffic Management Plan designer.
- The name of the Traffic Management Plan supervisor.
- The registration number and expiry date of the Traffic Management Plan designer's and supervisor's accreditation.
- Address all of the issues relevant to traffic conditions at the work site. The Superintendent reserves the right to request modifications to the plan during the works.

As a minimum address the following issues:

- The work zone speed limit.
- Restrictions to existing lane use.
- Changes to existing lane use.
- Works being carried out under traffic.
- The need for detours and side tracks.
- Night work and work site illumination.
- Separation of traffic and work areas.
- Sign spacing.
- Advance warning of the works.
- How to maintain and control the "Daily Routine Tasks and Record Keeping" – Appendix A of AS 1742.3
- Development of traffic management as the work site develops.
- Separate traffic plans for discrete work elements, for example, lane closure arrangements for each stage of a multi lane rehabilitation project to be carried out under traffic.

4.4.1 Traffic Management Plan Audits

A copy of the Traffic Management Plan and any amendments will be retained in a central register under the control of the Department of Planning and Infrastructure, Road Projects, Construction Division.

Inspecting Officers from Road Projects will perform random audits of traffic management at work sites as part of their daily routine duties.

These audits will include assessment of the Traffic Management Plan in progress and observation of the routine daily tasks and record keeping for traffic control at the work site, including modifications to the Traffic Management Plan.

If traffic control is not being carried out in accordance with the Traffic Management Plan or the Inspecting Officer deems modifications to the Plan necessary, the Superintendent will arrange for corrections to be carried out immediately.

4.5 WARNING DEVICES

Take care when placing warning signs, work signs, traffic management devices, or plant and equipment within the road reserve to ensure that these do not interfere or restrict sight lines, particularly at intersections, or are obscured by trees.

Road work signs should reflect the current conditions of the site. Australian Standard AS 1742, Part 3 provides guidance on appropriate use of these signs.

4.5.1 Works in Progress Signs

Whilst works are in progress display signs, sized 1200 x 900mm with 100mm high black helvetica medium lettering on a white background displaying the following details:

- The Contractor's business name.
- The Contractor's business phone number.
- The Contractor's after hours phone number.

Display these signs prominently at the extremities of all works in progress and in addition to the work signs requirement. They will remain the Contractor's property.

Place advisory works signs at the start and end of the works next to the project notice boards.

4.6 NT SPECIFIC DIRECTIONS FOR ROAD WORK SIGNS

4.6.1 Advance warning distances

Where there is more than one advance sign position, place the advance signs nearest the work "2D" from the transition area. "D" is the distance in metres and is equivalent to the approach speed prior to the installation of the workzone. Place other advanced sign positions at spacings of "D" further in advance of the work.

4.6.2 Star pickets

Do not use star pickets for support of road work signs. Issues of sign stability can be addressed by prudent use of sand bags. Do not use star pickets or items such as steel drums for delineation purposes within 5m of the edge of the traffic lane. Bollards and flagging are appropriate alternatives. Star pickets may be used for fencing support within the work site, provided appropriate action is taken to reduce any associated hazard for workers within the site.

4.6.3 Non standard signs

Obtain specific approval from the Superintendent before using signs not included in the current Australian Standard for Traffic control devices for works on roads.

4.6.4 Variable message boards (VMB)

The Superintendent will provide electronic variable message boards for use as follows. Collect the VMB trailers from > following the Superintendent's approval to use.

Assume full responsibility for the safe location of the variable message boards and the pick up and return of the trailers from and to the specified locations.

Erect electronic variable message boards in the following situations a minimum of 2 days before any changes occur;

– At all approaches to intersections

– At approaches to detours and / or

– At approaches to major works alterations

Erect variable message boards on all approaches 7 days before "turn on" of new traffic signals.

Use electronic variable message boards with a minimum message screen size of 2800 x 1900mm containing at least 3 lines with a minimum of 8 characters per line.

The Superintendent will provide details of the messages to be displayed and the locations of the variable message boards.

4.6.5 Work Zone Speed Limits

Where work zone speed limits are approved by the Superintendent, erect speed limit signs on "Oz-Post Spike" poles installed in accordance with the manufacturer's recommendations. Position the signs to the locations and heights nominated in AS 1742.3 clause 2.5.2.

Submit proposals to alter speed limits to the Superintendent 2 working days prior to the erection of signs, for approval under the Control of Roads Act.

Design the Traffic Management Plan so that speed limits lower than the following absolute limits are not required;

-	Urban or built up areas.	40 km/h
-	Bridge works, when restricting traffic to one lane and only in conjunction with a stop-traffic situation. A safety barrier complying with Test Level 0 of AS/NZS 3845 must also be used.	40 km/h
-	All other rural works, including the Stuart Highway.	60 km/h

4.6.6 Safety Barriers

Where safety barriers are to be used ensure that they comply with the relevant work zone speed limit proposed in the Traffic Management Plan.

Provide safety barriers that comply with Test Level > of AS/NZS 3845.

4.7 TRAFFIC CONTROL

Carry out the works using traffic control as defined by the Traffic Management Plan under the supervision of an accredited Traffic Management Controller.

Modify the Traffic Management Plan during the works to suit site conditions if required or requested by the Superintendent. The Superintendent must endorse all changes to the Traffic Management Plan.

If an incident occurs within, on approach to or departure from the work site a photographic record of the traffic control should be made as soon as practical. Advise the Superintendent of the incident as soon as possible.

Single lane operation of two-way traffic will only be permitted when traffic is directed by traffic controllers, signs or portable traffic signals, dependant on the site conditions.

Organise police control as required, or as requested by the Northern Territory Police.

4.8 SIDE TRACKS FOR DETOURS

4.8.1 Construction

Provide side tracks for detours when it is impractical to provide for traffic on the existing road system.

Design and construct side tracks to comply with AUSTROADS "Guide to the Geometric Design of Rural Roads" and the following minimum standards:

	NATIONAL HIGHWAY	SECONDARY HIGHWAY	LOCAL ROAD
Carriageway Width	10 m	8 m	6 m
Design Speed	80 km/h	60 km/h	40 km/h
Horizontal Curve radius with 3% superelevation	250 m	150 m	50 m
Vertical Curve radius (crest)	2,500 m	1,000 m	400 m
Vertical Curve radius (sag)	1,000 m	600 m	400 m
Pavement Width	8 m	6 m	4 m
Gravel Pavement Thickness (when specified)	150 mm	100 mm	50 mm
Lateral Clearance to Obstruction (from edge of carriageway)	2.5 m	1.2 m	1.0 m

Signs/Warning Devices: As in Traffic Control Plan.

Guideposts: At all fills, curves and crests.

Flood Gauge Posts: At all floodways.

Total Length at any one time: 5 km max.

Side Track Type; >

Construct side tracks with a finished surface level crown height 250 mm above the natural surface.

Compact top 150 mm to 95% relative compaction.

Match side tracks neatly to the existing road system.

Provide sufficient resources to direct and assist traffic, when side tracks become restricted.

Carry out immediate remedial works when traffic is delayed by poor side track conditions or surface condition is dangerous.

Provide and maintain adequate drainage.

Sealed side tracks to be primer sealed with 7 mm aggregate as specified in the SPRAY SEALING Section.

4.8.2 Maintenance

Maintain the existing road network, and all side tracks, in use by the public.

Sealed Surfaces: Patch and repair all surfaces. Grade and roll shoulders.
Unsealed Surfaces: Regrade and roll to maintain a comfortable riding quality at design speed.

Prevent dust nuisance by water spraying at regular intervals to keep surface moist.

Do not use waste oil as a dust suppressant.

Remove debris and rubbish.

Maintain road signs and guide posts in a clean state.

4.9 ACCESS TO ADJACENT PROPERTIES AND SIDE ROADS

Maintain access to adjacent properties and side roads at all times to a level appropriate for the type and frequency of traffic.

Provide and erect signs detailing alternative access.

Ensure adequate access is maintained for pedestrians and cyclists as required, including delineated access if paths are closed.

4.10 TEMPORARY BRIDGING

Design and construct any temporary bridging in accordance with the "AUSTROADS" Bridge Design Code.

Provide and erect fence or guard rail to prevent accidental access to the feature being bridged.

4.11 CONTRACTOR'S PLANT AND EQUIPMENT

Provide public traffic right of way at all times unless traffic control is in use.

Keep parking and materials storage clear of trafficked areas.

Do not leave equipment or tools unattended as a hazard to the public.

Floodlight the road and area within 50 m of the site when working at night, to a ground level illuminance of 10 lux minimum.

4.11.1 Rotating Beacons on Plant

Provide a rotating yellow beacon on the roof of all plant and equipment, fitted with a minimum 55 watt globe or equivalent strobe light.

Ensure that the light is operational whenever the plant or equipment is working on the roadway.

Ensure that the light is visible from all approaches and not obscured by exhaust stacks, back hoe arms etc., or covered in dust.

Protect the lights from damage by scrub etc.

Fit service vehicles with vehicle mounted warning devices in accordance with AS 1742.3.

4.12 RESTORATION

Upon completion of works:

- Remove all temporary warning devices and traffic control measures.
- Remove all temporary works and detours and reinstate the areas to reflect their natural state, including removal and disposal of seal and dragging windrows and debris back across the detour carriageway.

- Comply with the requirements of the Environmental Clearances issued by the Department of Natural Resources, Environment and the Arts, (NRETA) Office of Environment and Heritage, Environmental Assessment Branch, for the project.
- Reinstate permanent traffic control devices temporarily removed during the works.

5. CLEARING, GRUBBING AND REHABILITATION

5.1 GENERAL

SPECIFICATION REFERENCE; Refer to the Environmental clauses in the Environmental Management section.

BURNING; Do not light fires or burn any demolished material or vegetation either on or off the site.

5.2 CLEARING

DEMOLITION; Remove fencing, buildings, kerbing, debris, drainage structures, old road surfaces and other structures as required.

REMOVAL; Except for materials to be salvaged and retained by the Superintendent take possession of demolished materials and remove them from the site.

SALVAGED ITEMS; >

EXTENT; Clear the site only to the extent shown on the drawings and specified in this section.

ACCESS; Allow 3 metre wide cleared access ways around proposed culverts, gravel pits and stockpiles.

EXCESS CLEARING; Where excess clearing has taken place beyond that specified or shown on the drawings pay compensation for the damage and rehabilitate the areas in accordance with the Reinstatement clause.

COMPENSATION; Pay compensation (To be charged as a negative variation to the Contract) for excess clearing at the rate of $5 per square metre.

5.3 TREES TO BE RETAINED

Retain selected trees shown on the drawings or as directed.

PROTECTION; Protect from damage trees which are required to be retained. Do not remove topsoil from the areas within the dripline of the trees and keep the area free of construction equipment and materials.

DAMAGE; If a tree, which is marked to be retained, is damaged and repair work is considered impractical, or is attempted and fails, remove the tree and the root system, if so directed. Replace the tree with a tree of the same species and similar condition and size or pay compensation.

Compensation for damage to existing vegetation shall be borne by the Contractor as a negative variation to the Contract and determined as follows:

Tree valuation rate: $10 per cm. of tree circumference at a height 1 m above the ground.

Maximum valuation: $2500 per tree

Minimum valuation: $250 per tree

5.4 MULCHING

GENERAL; Mulch all cleared vegetative matter in mechanical brush chippers to a maximum size of 100mm as the clearing work proceeds. Do not stockpile cleared material for later mulching.

STUMPS; Stumps and other material unsuitable for mulching may be buried in disused gravel pits during rehabilitation of the pits.

GRASSES; Do not mulch grass clods, roots or other components containing viable propagules. This material may be buried in disused gravel pits.

STOCKPILES; Stockpile mulched material on the site at a maximum height of 2m for use during reinstatement work.

URBAN AREAS; Stockpile mulch on the site for reuse and deliver surplus mulch as directed by the Superintendent (within 10 kms of the site) for use in local landscaping projects.

RURAL AREAS; Stockpile mulch on the site for reuse and power blow surplus mulch into the adjacent natural vegetated areas adjacent to the works.

5.5 STRIPPING OF TOP LAYER

EXTENT; Strip the top layer of natural material to a depth of 100 mm, for the full formation width.

Stockpile stripped material at sites within 1 km of the point of origin. Stockpile heights not to exceed 2.0 m.

Spread stripped material on areas to be landscaped and/or on road batters, following completion of earthworks.

5.6 TREATMENT OF EXISTING SEALED SURFACE

Rip the existing sealed surface.

Conform to the following:

SPECIFIED COVER OVER EXISTING SEAL	MAXIMUM SEAL FRAGMENT SIZE
Fill depth 500 mm or greater	1 m2.
Fill depth less than 500 mm	Remove seal from site.
Pavement resheeting only	Remove seal from site and replace with similar volume of pavement.

5.7 SCARIFYING OF EXISTING ROADS

Remove seal from site. Alternatively, demolished seal may be buried in table drains with approval. Provide 200mm cover to buried material.

Scarify, both longitudinally and laterally, for the full width of the formation by ripping to a depth of 250 mm resulting in a maximum size of demolished seal of 100mm.

Tyne spacing to be 500 mm maximum.

5.8 GRUBBING

Grub out and remove from the site all vegetation to a depth of 200mm below subgrade surface in cut and 200mm below natural surface under fills.

Fill grub holes and other excavations as required with standard fill material compacted to the density of the surrounding soil.

5.9 REINSTATEMENT

Reinstate any clearing undertaken during the contract to rehabilitate the area back consistent with its untouched surrounds. This includes seeding, planting, watering or other measures necessary to rehabilitate the area.

MULCH; Spread mulched material over the rehabilitated area, including batters and verges, to a uniform cover of 50mm thickness.

DETOURS; Where detours are specified in the Provision For Traffic section or otherwise agreed to, rehabilitate the detour areas in accordance with the requirements of this section.

5.10 CLEANING UP

Remove all excess fill, rubble and other debris from the site.

6. EARTHWORKS

6.1 STANDARDS

Conform to the following Standard and Publication unless specified otherwise:

AS 1289 Methods of Testing Soils for Engineering Purposes.

NTTM Materials Testing Manual.

6.2 DEFINITIONS

OFFLET DRAIN:	Also described as a Table Drain Offlet. Provides relief at regular intervals of run off concentration in Table Drain. Drains water from Table Drain away from formation for dispersal into catchments.
SUBGRADE SURFACE:	The prepared surface immediately beneath the pavement and shoulder layers.
	Also extends under footpaths, kerb and gutter, and surface structures.
SUBGRADE:	Top > mm of material below subgrade surface.
UNPAVED AREAS:	Those areas within the road boundary which are not part of the road pavement, including any medians not paved, but excluding footpaths and vehicle access strips.
FORMATION WIDTH:	Width of cut or fill including table drain(s), and out to the points of any batters.
SURFACE FORMATION:	The formation of a road from material generally cut from the table drains.
CARRIAGEWAY:	That portion of a road for the use of vehides including shoulders and auxiliary lanes.

6.3 EARTHWORKS IN CUT

6.3.1 Description

Operations necessary for excavation, irrespective of the type of material and subsurface conditions, including:

- working cuttings so that material meeting standard fill requirements is used for the subgrade;
- disposal of excess excavated material;
- compaction of material below the subgrade surface; and
- shaping and trimming of formation within cuttings.

6.3.2 Excess Material

Haul and dump and spread excess material:

- Not less than 125 metres from the new road centre line.
- To spoil dump sites specified. Clear site of organic material/topsoil prior to stockpiling material.
- Spread excess material and sheet with topsoil as specified.

Dumped material remains the property of the Principal.

Ensure dumps shall not dam surface water and streams or damage the works or other property.

Ensure dumping is not in streams.

6.3.3 Rock in Subgrade – Hold Point

Hold point - Obtain agreement from the Superintendent to the extent of the excavation.

Excavate rock encountered in the subgrade.

Avoid forming pockets of shattered material below the level of the excavation.

Remove all loose material.

Trim the excavation to shed water.

Replace excavated material with select fill compacted to 95 per cent relative compaction.

6.3.4 Unsuitable Material Below Subgrade Surface other than Rock – Hold Point

Hold point - Obtain directions from the Superintendent before works commence.

Excavate subgrade material which does not conform to the properties of standard fill as specified.

Dry out material with excessive moisture content to achieve a moisture content which permits specified compaction.

Replace excavated material with standard fill compacted to 90% relative compaction.

Floodways: Replace unsuitable material with material conforming with the following:

Angular or broken rock, free from organic matter and lumps of clay, complying with the following:

GRADING

Maximum size: 100 mm.

AS SIEVE (mm)	PERCENTAGE PASSING
75.0	40 - 100
19.0	15 - 50
2.36	0 - 25

Plasticity Index: 10 maximum.

Linear Shrinkage: 5.0 maximum.

6.3.5 Blasting and Overbreak

Ensure blasting is not excessive. There will be no payment for overbreak beyond the limits of excavation specified.

6.3.6 Stability of Works, Rock Cuttings

Remove all loose material and rock which has been rendered unstable.

6.4 EARTHWORKS IN FILL

6.4.1 Description

Earthworks in fill includes winning, hauling, placing and compacting material on all prepared areas including holes, pits and other depressions.

6.4.2 Preparation Prior to Filling

Subsequent to stripping of topsoil, apply a minimum of three passes with maximum mass compaction equipment.

6.4.3 Benching

Cut a bench at the toe of the lower side batter when natural surface inclines at steeper than eight horizontal to one vertical.

Ensure the bench slopes downwards towards the centre line of the road and is 3 metres wide to provide a sound key for the toe of the fill.

Terrace the existing surface where side slopes are steeper than three horizontal to one vertical to provide a key for the fill.

6.4.4 Unsuitable Material Beneath Fill – Hold point

Hold point - Obtain directions from the Superintendent before works commence.

Remove unsuitable foundation material as directed before the fill is placed.

Replace excavated material with standard fill compacted to 90% relative compaction.

6.4.5 Construction Methods

Fill by either the "Compacted Layer", "Rocky Material" or "Rock Fill" method.

Select appropriate method(s).

COMPACTED LAYER METHOD

Use where material generally does not contain cobbles, boulders or broken rock.

– Deposit and spread the material in uniform level layers to a maximum thickness of 250 mm loose measurement for the full width of fill.

– Compact each layer to the specified compaction (refer Table - Dry Density Ratios for Conformance) before placing the next layer.

– Use standard fill for the subgrade.

ROCKY MATERIAL METHOD

Use where material contains some cobbles and boulders (maximum size 600 mm) with sufficient fines for the work to be free of voids.

– Break up rocks bridging between adjacent material to prevent cavities being formed.

– Maximum rock dimension: 600 mm or one-half the height of fill at the section where the rock is placed.

– Spread material in layers approximately equal to the maximum rock size.

– Work the rocky material in each layer until it is firm and unyielding.

– Construct to the bottom of the subgrade layer.

ROCKFILL METHOD

Use where material is predominantly cobbles or boulders with insufficient fines to fill voids.

– Place and work the material until interlock is achieved.

– Advance the fill by full width construction. Side dumping shall not be undertaken. The construction face shall be concave, with the shoulder face well in advance of the centre, except when filling in swamps or soft material when the advancing face ends shall be convex.

– Rock Dimensions.

Maximum vertical dimension: one-third of the height of fill being placed.

Maximum horizontal dimension: one-half of the height of the fill being placed.

– Construct to 300 mm below the bottom of the subgrade layer. Within 300 mm of the bottom of the subgrade layer use the Compacted Layer Method or Rocky Material Method, with a maximum particle size of 150 mm.

6.5 FILL MATERIAL

6.5.1 General Fill

Use the best locally available material.

Use fill material, whether cut or borrow, that is free of organic matter and has a minimum soaked CBR at 90% MMDD of 10%, at 2.5 mm penetration, and a plasticity index between 2% and 15%.

6.5.2 Standard Fill

Conform to the following properties:

CBR 4 day soaked at 95% MMDD at 2.5 mm penetration:	> minimum	[15]
Maximum Particle Size:	> mm	[100]
Plasticity Index:	>	[2% - 15%]

6.5.3 Select Fill

Select fill shall be comprised of gravel, decomposed rock or broken rock, free from organic matter and lumps of clay.

Conform to the following:

GRADING

AS SIEVE (mm)	% PASSING (DRY WEIGHT)
75.00	100
9.50	30 - 100
2.36	15 - 65
0.075	5 - 25

PROPERTIES

CBR, 4 day soaked at 95% MMDD at 2.5 mm penetration:	30 minimum.
Plasticity Index:	2 - 15% maximum.
Linear Shrinkage:	2 - 6%.

6.5.4 Sand Clay Fill

Sand clay (clayey sand) may be used as an alternative to Select Fill.

Conform to the following:

GRADING

AS SIEVE (mm)	% PASSING (DRY WEIGHT)
4.75	80 - 100
2.36	60 - 100
0.425	30 - 60
0.075	14 - 28

PROPERTIES

CBR, 4 day soaked and 95% MMDD at 2.5 mm penetration:	30 minimum.
Plasticity Index:	15% maximum.
Linear Shrinkage:	1 - 8%.

6.6 PREPARATION AND MAINTENANCE OF SUBGRADE SURFACE

Trim surface to the compliance tolerances specified free of depressions and free draining.

Maintain and repair any damage to the prepared surface prior to placing further material.

6.7 EARTHWORKS FOR DRAINAGE

6.7.1 Stream Diversions

Excavate stream diversions as shown on the drawings.

Fill existing watercourses as shown on the drawings.

Divert streams temporarily where it is necessary for the construction of the work.

Ensure that existing waterways are not filled, altered, or diverted except where specified.

6.7.2 Levees

Construct using standard fill with a Plasticity Index of 6% minimum.

Compact in layers not exceeding 150 mm compacted thickness.

Construct in locations, and to dimensions shown on the drawings.

6.7.3 Table Drains

Construct to the dimensions shown on the drawings.

Grade to prevent ponding of water.

Discharge into culverts, offlet drains or watercourses.

6.7.4 Table Drain Offlets

Divert table drains into offlet drains:

– at intervals not exceeding 150 m.

– as specified.

Ensure the capacity of the offlet is not less than the capacity of the table drain, and is of similar cross section.

Align and grade offlet so that the water drains away without scour and damage to disperse as sheet flow or into natural watercourses.

6.7.5 Table Drain Blocks

Block table drains at offlets.

Construct blocks from standard fill conforming to the following requirements:

Plasticity Index:	6% minimum.
Length:	To extend from edge of shoulder to top of outer table drain batter.
Width:	3 metre minimum measured parallel to the road centre line.
Height:	To edge of shoulders.
Compaction:	Layers not exceeding 150 mm compacted thickness.

6.7.6 Catch Drains

Construct catch drains prior to earthworks in cut.

Depth: 500 mm (minimum) into solid ground.

Gradients:	Ensure free flow, prevent ponding of water, prevent scour.
Outlets:	As terrain permits construct at frequent intervals to reduce scour. Construct a block on continuous grades to divert water into culverts or drains.
Offset:	2 m (minimum) and 4 m (maximum) beyond the edge of the cutting.

Divert the drain neatly around large rocks and trees.

6.8 WIDENING OF EXISTING FORMATION

Cut back the existing formation and pavement as shown on the drawings by not less than 150 mm on each edge to sound densely compacted material to form a uniform edge (curved or straight where applicable).

Construct the widening by cutting and filling as specified.

6.9 TRIM AND COMPACT UNPAVED AREAS

Shape, grade and compact as specified.

6.10 SURFACE FORMATION

6.10.1 General

Form the road generally with material cut from the table drains, in accordance with the typical cross section.

Allow for construction to the specified height above natural surface, either by local widening of table drains or importation of standard fill.

6.10.2 Pastoral Access Roads

For in situ pavement materials comply with the following:

CBR 4 day soaked at 95% MMDD (2.5 mm penetration):	30 minimum.
Maximum particle size:	37.5 mm.
Plasticity Index:	4 - 12%.

Alternatively sheet the in situ material with 150 mm imported material complying with the above, compacted to 95% relative compaction.

6.11 BATTER PROTECTION BY GRASSING

Fill batters to have a surface layer 100 mm minimum thickness of stripped material.

6.11.1 Grassing

Batters to be treated from ch. > to ch. > .

6.11.2 Seed Mixture and Fertiliser

Provide certified seed complying with the requirements in the LANDSCAPE Section.

Fertiliser to comply with the TABLE - FERTILISERS in the LANDSCAPE Section.

Apply at rate of > kg/ha.

6.11.3 Grass Seed Application Technique

Conform to the LANDSCAPE Section.

Fabric protection to be used for all slopes steeper than 3:1. Fabric protection may consist of using jute mesh or equivalent in conjunction with hydromulching or the use of matting.

Smooth batters.

Form drains to control stormwater and prevent erosion until batter is grassed.

Place "top layer" soil from clearing operations over the batters to a depth of 50 mm.

Apply seed mixture, fertiliser, and protection. Establish grass and keep damp by watering until flowering stage is reached.

Repair any erosion.

Reseed areas until establishment is achieved.

6.11.4 Acceptance

– Establishment shall be uniform.

– Coverage rate: 98% minimum of total area.

6.12 BRIDGE FOUNDATIONS

6.12.1 Conditions

The data shown on the drawings as to the character and depths of the various strata are approximate only, and no warranty, expressed or implied, is given by the Principal that the same or similar materials will be encountered during the progress of work.

Tenderers are advised to inspect copies of the bore logs and the original core samples.

Original samples are available for inspection at > .

6.12.2 Excavation – Hold point

GENERAL

The extent of foundations is specified by dimension and reduced level.

Excavate to the required lines and levels.

Dispose of excess material in accordance with EXCESS MATERIAL.

PREPARATION

Inspect and record the condition of all structures and services in the adjacent area prior to using pile drivers.

Hold point - Obtain agreement with Superintendent to current conditions.

Cut foundation to a firm surface either stepped or roughened, as directed.

Remove loose material.

Hold point - Obtain the Superintendent's approval for the foundation surface before placing the blinding concrete.

Place a 50 mm thick layer of blinding concrete.

COFFER-DAMS SHORING AND SHEETING

Design any coffer-dams.

Construct coffer-dams to adequate height and depth and as waterproof as necessary for proper performance.

Provide adequate clearance for:

construction of forms;

inspection of interiors; and

pumping from outside the forms.

Remove shoring and sheeting from inside the excavation.

Remove coffer-dams, sheeting and the like from the site.

Do not damage the finished structure or disturb adjacent in situ material.

Remove obstructions from waterways.

6.12.3 Backfilling

Backfill the excavation up to natural surface level with excavated material or select fill.

The excavated material may be used for backfill provided it is free of wood and other extraneous material.

Place in horizontal layers not exceeding 150 mm compacted thickness.

Compact to the density ratio specified in the table DRY DENSITY RATIOS FOR CONFORMANCE in the Conformance Testing section.

Compact using equipment that will not damage the bridge substructure.

6.13 FILL ADJACENT TO BRIDGE STRUCTURES

GENERAL

Fill includes preparation of the fill area, supply, placing and compacting fill, drainage layers and piping, disposal of unsuitable material and trimming and protection of batters.

Place select fill against structures after 14 days from date of casting or after test results confirm 70% of characteristic concrete strength achieved.

Avoid unbalanced loading on structures.

Do not operate mechanically driven vibrating rollers exceeding 1 tonne within 3 metres of the structures.

ABUTMENTS AND WINGWALLS

Prepare the area as specified.

Compact select fill in horizontal layers not exceeding 150 mm compacted thickness in areas adjacent to abutments and wing walls extending horizontally two times the height of the adjacent structure or as specified.

Prevent water from ponding behind abutments and wing walls.

Provide weep holes and drain pipes as specified.

6.14 COMPACTION

Mix to a homogeneous material and compact with no compaction planes and free of cracking to conform to the Dry Density Ratios specified in the table DRY DENSITY RATIOS FOR CONFORMANCE in the CONFORMANCE TESTING section and the following:

6.15 CONFORMANCE – WITNESS POINT

6.15.1 Existing Surface Levels

Witness point - Obtain inspections of any disputed existing surface levels with the Superintendent prior to any stripping or earthworks operations.

Quantities are based on the existing surface levels prior to the stripping of the top layer.

Allow for suitable material to replace the stripped layer (Cut and Fill) in the items for the EARTHWORKS Section.

6.15.2 Tolerances

Finish earthworks to a smooth compacted and uniform surface within the following limits:

Formation Width:	Not less than specified.
Subgrade Surface:	Maximum 25 mm below and not above specified level.
Subgrade Width:	Not less than specified. Extend 150 mm minimum beyond the back of kerb.
Batter:	Not steeper than the specified slope.
	Maximum variation at any point from specified plane of batter shall be 150 mm in earth and 300 mm in rock.
Unpaved Areas/ Table Drain Invert:	Maximum 75 mm above or below specified level, free of depressions capable of ponding water.

Maximum 40 mm adjacent to kerbs.

6.15.3 Proof Rolling – Witness Point – Hold point

Proof roll all areas and obtain satisfactory results before ordering conformance testing of those areas.

Hold point - submit a proof rolling procedure to the Superintendent for approval including the method of preparing an area and the extent of proof rolling.

Witness point - Give the Superintendent not less than 24 hours notice of the location and commencement time for the proof rolling.

Plant Requirements; use plant in proof rolling procedures that comply with the following requirements:

Static smooth wheeled rollers with a mass of not less than 12 tonnes and a load intensity under either the front or rear wheels of not less than 6 tonnes per metre width of wheel.

Pneumatic tyred plant with a mass of not less than 20 tonnes and with a ground contact pressure under either the front or rear wheels of not less than 450 kPa per tyre and a ground contact area of not less than .035 sq.m. per tyre.

Check areas for level tolerance and layer thickness before proof rolling.

Proof roll each layer immediately following completion of compaction. If proof rolling is carried out at a later time, water the surface and roll with the test roller prior to commencement of proof rolling.

Compliance; the proof rolling requirements are deemed to comply when an area withstands proof rolling without visible deformation or springing.

Remedial work; remove and reconstruct areas that deform or break up.

6.15.4 Conformance Testing – Hold point

Ordering procedures; refer to the CONFORMANCE TESTING section for testing requirements and test ordering procedures.

General Fill

Conformance testing will be carried out on each layer of fill.

Subgrade

Subgrade surface will be tested only when it is within level tolerance and conforms to proof rolling.

Check subgrade surface levels prior to testing.

Hold point – obtain the Superintendent's approval of subgrade conformance prior to placing further material.

7. PAVEMENTS AND SHOULDERS

7.1 STANDARDS

Conform to the following Standards and Publication unless specified otherwise:

AS 1141 Methods for Sampling and Testing Aggregates.
AS 1289 Methods of Testing Soils for Engineering Purposes.

NTTM Materials Testing Manual.

7.2 DEFINITIONS

SUB-BASE: One or more layers of material placed over the subgrade and below the basecourse and shoulders.

BASE: That layer of pavement immediately above the subgrade or sub-base and/or below the bituminous surfacing extending for the full width of the pavement.

ROUGHNESS: The roughness of the finished road surface in counts/km as measured by a NAASRA Roughness Meter.

SHOULDER: That layer of material immediately above the sub-base or subgrade and adjacent to the pavement.

7.3 MATERIALS

7.3.1 Gravel

Obtain material from sources of naturally occurring deposits.

Produce required properties by crushing, screening, mixing or other processes necessary.

Ensure particles are tough, durable and of a tightly binding nature free of organic or other deleterious matter.

Conform to the tables GRAVEL PARTICLE SIZES and GRAVEL PROPERTIES.

7.3.2 Table - Gravel Particle Sizes

AS SIEVE (mm)	PERCENTAGE PASSING			
	1	2	3	4
75.0	100			100
37.5	80 - 100	100		80 - 100
19.0	50 - 80	70 - 100	100	60 - 100
9.5	35 - 65	50 - 80	70 - 100	50 - 95
4.75	25 - 50	35 - 65	50 - 80	40 - 80
2.36	15 - 40	25 - 50	35 - 65	30 - 65
0.425	7 - 20	10 - 30	15 - 35	20 - 50
0.075	3 - 13	4 - 16	6 - 20	5 - 25

Gradings > and > are for Base.

Gradings > and > are for Sub-base.

Gradings > and > are for Shoulder.

7.3.3 Table - Gravel Properties

		SEALED BASE	UNSEALED BASE AND SHOULDER MATERIAL	SUB-BASE
1.	Liquid Limit (LL)	25% maximum (30%)	35% maximum	30% maximum
2.	Plasticity Index (PI)	1 - 6% (1 - 10%)	4 - 12%	1 - 10%
3.	Linear Shrinkage (LS)	0 - 3% (0 - 6%)	2 - 8%	0 - 6%
4.	PI x % passing 0.425 mm Sieve	180 maximum (300 maximum)	400 maximum	400 maximum
5.	California Bearing Ratio (CBR)			
	4 day soaked at 2.5 mm penetration at a relative density of	80 minimum 100% MMDD	50 minimum 95% MMDD	30 minimum 95% MMDD
6.	Los Angeles Abrasion (LAA) Loss	50 maximum	> maximum	60 maximum

7.3.4 Fine Crushed Rock

Manufacture from clean, hard durable rock free from clay, loam or other deleterious substances.

Conform to the tables CRUSHED ROCK SIZES and CRUSHED ROCK PROPERTIES.

7.3.5 Table - Crushed Rock Sizes

AS SIEVE (mm)	PERCENTAGE PASSING
37.5	100
19.0	90 - 100
13.2	75 - 90
9.5	60 - 80
4.75	38 - 60
2.36	25 - 45
0.425	12 - 26
0.075	6 - 14

7.3.6 Table - Crushed Rock Properties

1.	Liquid Limit (LL)		25% maximum
2.	Plasticity Index (PI)		1 - 6%
3.	Linear Shrinkage (LS)		3%
4.	Dust Ratio (DR)		
	(% passing 0.075 mm)/(% passing 0.425 mm) x 100		25 - 50
5.	CBR, 4 day soaked at 100% MMDD at 2.5 mm penetration		100 minimum
6.	Los Angeles Abrasion (LAA) Loss:	coarse grained rock	35 maximum
		fine grained rock	25% maximum
7.	PI x % passing 0.425 mm sieve		180 maximum

7.3.7 Sand Clay

A material complying with the following:

GRADING

AS SIEVE (mm)	PERCENTAGE PASSING
4.75	80 - 100
2.36	60 - 100
0.425	30 - 60
0.075	14 - 28

PROPERTIES

Plasticity Index:	20 maximum for sealed pavements 15 maximum for unsealed pavements.
Linear Shrinkage:	1% - 8%.
CBR, 4 day soaked at 95% MMDD at 2.5 mm penetration:	50 minimum.

7.3.8 Supply to Stockpile

Clear the site.

Ensure the area is free draining.

Spread and compact a 75 mm thick layer of sub-base gravel to 95% relative compaction.

Trim stockpile to a uniform shape for ease of measurement.

7.4 CONSTRUCTION

7.4.1 Mixing and Placing

Place material in uniform layers over subgrade surface or lower layers of the pavement.

Remove segregated and contaminated material from the site.

Do not place material on a previous layer that has

– become waterlogged or cracked; and/or

– otherwise deteriorated.

Mix the material uniformly throughout with water to achieve a moisture content within 2% of the optimum for the specified conforming Dry Density Ratio.

Ensure water is clean and free from oil, alkali, organic or any other deleterious substances, and that the total soluble salts content is less than 3,000 mg/litre (total dissolved salts). Provide evidence of construction water salt contents.

7.4.2 Compaction

Compact in uniform layers not less than 100 mm nor greater than 200 mm compacted thickness.

Achieve a homogeneous mass with no compaction planes.

Conform to the Dry Density Ratios specified in the table DRY DENSITY RATIOS FOR CONFORMANCE in the Conformance Testing Section.

7.4.3 Final Pavement Surface

Finish with a dense textured surface, free of laminations.

Allow pavements to dry back to a degree of saturation equal or less than 65% for FCR and 70% for natural gravel before priming/primer seal.

Degree of saturation is defined as follows:

$$S = \frac{1}{\frac{Pw}{Pd} - \frac{1}{APD}} \times W\%$$

Where S = degree of saturation

APD = Apparent Particle Density

W = Moisture content %

Pw = 1.0 t/m^3 (density of water)

Pd = dry density

The Superintendent will carry out all testing todetermine the degree of saturation.

Remove sticks and any loose material.

Ensure surface is free of cracking.

Do not introduce new material to the surface after final compaction.

Where pavement thickness is 200 mm or greater, scarify to not less than 100 mm depth and recompact where finish not achieved.

Where pavement thickness is less than 200 mm scarify and recompact to full depth where finish not achieved.

7.5 RECONSTRUCTION OF EXISTING PAVEMENTS

7.5.1 Widening

Cut back the existing pavement by not less than 150 mm width on each edge to sound material.

Excavate boxing for widening to the required depth below finished surface.

Construct subgrade as specified in the EARTHWORKS Section.

Construct pavement and shoulder as specified.

7.5.2 Strengthening and Renovating

Remove seal from existing pavements.

Cut across existing pavement at each end of work. Cut shall be vertical and at least 100mm deep to allow smooth transition to new work.

Scarify local high spots to 75 mm below finished surface.

Construct a strengthening layer over the full width of the existing pavement and shoulder and the widening as specified.

7.6 CONFORMANCE

7.6.1 Tolerances

Refer MISCELLANEOUS PROVISIONS, Level Checking and Level Auditing.

Final surfaces shall conform to the following:

Level:

Kerbed or Asphalt:	0 mm to +10 mm.
Otherwise:	-20 mm to +20 mm.
Straight Edge Deviation:	maximum 5 mm in 3 m.
Compacted Thickness:	not less than specified.
Width:	not less than specified.
Sub-base Surface Level:	not higher than specified.
Surface Roughness at 80 km/h:	50 counts/km - maximum.

7.6.2 Proof Rolling - Notice – Hold Point – Witness Point

Proof roll all areas and obtain satisfactory results before ordering conformance testing of those areas.

Hold point; submit a proof rolling procedure to the Superintendent for approval including the method of preparing an area and the extent of proof rolling.

Witness point; Give the Superintendent not less than 24 hours notice of the location and commencement time for the proof rolling.

Plant Requirements; use plant in proof rolling procedures that comply with the following requirements:

Static smooth wheeled rollers with a mass of not less than 12 tonnes and a load intensity under either the front or rear wheels of not less than 6 tonnes per metre width of wheel.

Pneumatic tyred plant with a mass of not less than 20 tonnes and with a ground contact pressure under either the front or rear wheels of not less than 450 kPa per tyre and a ground contact area of not less than .035 m2 per tyre.

Check areas for level tolerance and layer thickness before proof rolling.

Proof roll each layer immediately following completion of compaction. If proof rolling is carried out at a later time, water the surface and roll with the test roller prior to commencement of proof rolling.

Compliance; the proof rolling requirements are deemed to comply when an area withstands proof rolling without visible deformation or springing.

Remedial work; remove and reconstruct areas that deform or break up.

7.6.3 Conformance Testing – Hold Point

Ordering procedures; refer to the CONFORMANCE TESTING section for testing requirements and test ordering procedures.

Only the finished compacted base, sub-base and shoulder conforming to proof rolling, level tolerance and layer thickness will be tested.

Pavements and shoulders will be considered as separate lots.

Hold point – obtain the Superintendent's approval for pavement conformance prior to any surfacing work.

Backfill and compact all test holes with cement stabilised quality material which is the same as the layer being tested.

7.6.4 Rideability

Surface roughness testing will be carried out by the Superintendent, at the discretion of the Superintendent.

8. SPRAY SEALING

8.1 STANDARDS

Conform to the following Standards and Publications unless specified otherwise:

AS 1141	Methods for Sampling and Testing Aggregates.
AS 1160	Bitumen Emulsions for Construction and Maintenance of Pavements.
AS 2008	Residual Bitumen for Pavements.
AS 2157	Cutback Bitumen.
AS NZS 2341	Methods of Testing Bitumen and Related Roadmaking Products.
AS 2758.2	Aggregates and Rock for Engineering Purposes - Aggregate for Sprayed Bituminous Surfacing.
AS 2809.5	Road Tank Vehicles for Dangerous Goods - Tankers for bitumen based products.
AS 3568	Oils for Reducing the Viscosity of Residual Bitumen for Pavements.
AUSTROADS	Bitumen Sprayers.
AUSTROADS	Bituminous Surfacing Sprayed Work January 1989 incorporating Amendments July 1990.
	Noxious Weeds Act.
NTTM	Materials Testing Manual.

8.2 DEFINITIONS

CUTTER:	A light petroleum distillate added to bitumen to temporarily reduce its viscosity.
FLUXING:	A petroleum distillate used to produce a long term reduction in viscosity of a binder.
PRECOATING MATERIAL:	A material used for precoating aggregate to promote adhesion of bitumen.
ADHESION AGENT:	A substance used for the purpose of promoting the adhesion between binder and aggregate.

8.3 DESCRIPTION OF THE W ORK

The work consists of:

- Supply and delivery of materials.
- Sweeping of pavement.
- Heating and application of primer.
- Heating and application of heavy primer for primer seals, with application of cover material.
- Heating and applying binder.
- Heating and applying cut-back binder prepared at source of supply.
- Heating and mixing additives to binder.
- Application of bitumen emulsion.
- Precoating of aggregate.
- Application of aggregate.
- Rolling and incorporation of aggregate.

8.4 MATERIAL REQUIREMENTS

8.4.1 Aggregates

Aggregates shall be clean, hard, durable, skid resistant, dry crushed stone, or gravel of uniform quality free from noxious weeds and other deleterious material, and conform with the properties specified.

Nominate source of aggregate supply.

Conform to the table - AGGREGATE GRADING and AVERAGE LEAST DIMENSION, and to the table - AGGREGATE PROPERTIES

8.4.2 Table Aggregate Grading and Average Least Dimension

Sieve Size (mm)	**% PASSING (DRY MASS)**					
	Nominal Size of Aggregate					
	20 mm	**16 mm**	**14 mm**	**10 mm**	**7 mm**	**5 mm**
26.5	100					
19.0	85 - 100	100				
16.0	-	80 - 100	100			
13.2	0 - 15	0 – 20	85 - 100	100		
9.5	0 - 5	0 – 2	0 - 15	85 - 100	100	
6.7	0 - 2		0 - 5	0 - 15	85 - 100	100
4.75			0 - 2	0 - 5	0 - 15	85 - 100
2.36				0 - 2	0 - 5	0 - 15
1.18					0 - 2	0 - 5
Minimum ALD(mm) To AS1141.20.1, 20.2 (Direct measurement)	12.0	9.5	8.0	5.5	3.5	2.5

8.4.3 Table - Aggregate Properties

	TRAFFIC COUNT (AADT: TWO LANES)		
	LESS THAN 300 VPD	300 TO 6,000 VPD	MORE THAN 6,000 VPD
AS 1141.15 Flakiness Index	35 maximum	30 maximum	25 maximum
AS 1141.23 Los Angeles Abrasion (LAA):			
- Fine Grained Aggregate	30% maximum	25% maximum	20% maximum
- Coarse Grained Aggregate	40% maximum	35% maximum	30% maximum
AS 1141.14 Misshapen Particles: Calliper Ratio 2:1	25% maximum	15% maximum	12% maximum
AS 1141.24 Sulphate Soundness	15% maximum	12% maximum	10% maximum
AS 1141.40/41 Polished Aggregate Friction Value	40 minimum	40 minimum	45 minimum

AS 1141.18: Crushed particles in coarse aggregate derived from gravel. Ensure 80% minimum by mass are classified as crushed particles.

AS 1141.25.1 Degradation factor – Source rock (Washington Degradation Test). Igneous rocks shall have a minimum value of 50.

AS 1141.26 Secondary minerals content in igneous rocks shall not exceed 25%.

AS 1141.29 Accelerated soundness index by reflux. Igneous rocks shall have a minimum value of 94.

AS 1141.50 Resistance to stripping of cover aggregates from binders. The maximum stripping value of precoated aggregate (precoat shall contain 1% adhesion agent.) shall be 10%.

8.4.4 Bitumen

Bitumen utilised for binder to be a straight run bitumen Class 320, conforming to the requirements of AS 2008. Durability Value in accordance with AS 2341.13 – Long-term exposure of bitumen to heat and air shall be a minimum of 7 days with no maximum value.

8.4.5 Cutter and Flux

Cutter to be Kerosene.

Flux to be Distillate.

8.4.6 Cut Back Bitumen/Prime

Designation is by AMC class.

Take samples from the point of delivery.

Conform to the table CUT BACK BITUMEN PROPERTIES.

8.4.7 Table - Cut Back Bitumen Properties

CLASS	VISCOSITY (DYNAMIC) AT 60OC PA.S	APPROXIMATE PARTS BITUMEN TO CUTTER	SPRAYING TEMPERATURE OC
Light			
AMC 00	0.008 - 0.016	100 - 100	Ambient
AMC 0	0.025 - 0.05	100 - 80	35 - 55
AMC 1	0.06 - 0.12	100 - 50	60 - 80
Medium			
AMC 2	0.22 - 0.44	100 - 40	75 - 100
AMC 3	0.55 - 1.10	100 - 30	95 - 115
AMC 4	2.0 - 4.0	100 - 20	110 - 135
Heavy			
AMC 5	5.5 - 11.0	100 - 12	120 - 150
AMC 6	13.0 - 26.0	100 - 7	135 - 160
AMC 7	43.0 - 86.0	100 - 3	150 - 175

8.4.8 Precoat and Adhesion Agents

Take samples from the point of delivery.

Precoat to conform to the following:

Adhesion agent (by volume): minimum 1% precoat.

Bitumen residue (by mass): minimum 25% precoat.

Viscosity (Dynamic) at 60oC: 0.003 to 0.020 Pa.s.

8.4.9 Polymer Modified Binder

A mixture of Class 320 bitumen and polymer additive.

Take samples from the point of delivery.

Conform to the table POLYMER MODIFIED BINDERS.

Table – Class 320 and Polymer Modified Binders (PMBs) for Sprayed Sealing Applications

Comply with the following minimum requirements:

Test Method	Minimum Test Frequency	CLASS	Class 320	S10E	S15E	S20E	S25E	S30E	S35E	S40R	S45R	S50R	S55R	S60R
		NT Specification No.		PMB 1-3	PMB 4	PMB 5	PMB 6	PMB 7	-	-	-	-	-	-
PERFORMANCE RELATED PROPERTIES														
AS 2341.2 AS 2341.3 AS 2341.4	1 per 10,000 L	Viscosity at 60^{0}C,PaS	260-380											
AS2341.12	1 per 10,000 L	Penetration @ 25^{0}C	40min											
DRT-MAT-TP676	1 per 10,000 L	Consistency at 60oC (Pa.s) min.		NA(2)	1000	2000	4500	6000	NA	NA	1800	2600	4000	5000
DRT-MAT-TP676	1 per 10,000 L	Consistency at 45oC (Pa.s) min.		2000	NA	NA	NA	NA	3000	4000	NA	NA	NA	NA
DRT-MAT-TP676	1 per 10,000 L	Stiffness at 15oC (kPa) max. (3)		100	100	100	100	100	100	180	180	180	140	140
MBT25	1 per 3 months	Aggregate retention (%) min. (3)		65 @ 125J	65 @ 125J	65 @ 225J	65 @ 125J	65 @ 17.5J	65 @ 225J	65 @ 125J	65 @ 225J	65 @ 225J	65 @ 125J	65 @ 17.5J
MBT32	1 per 3 months	Compression limit at 70oC, 2 kg (mm) min.		NA	NA	NA	NA	NA	NA	0.2	0.2	0.2	0.2	0.2
INDEX PROPERTIES														
DRT-MAT-TP676	1 per 10,000 L	Elastic Recovery at 60oC, 100 s (%) min.		NA	60	70	85	90	NA	NA	25	35	35	-
DRT-MAT-TP676	1 per 10,000 L	Elastic Recovery at 45oC, 100 s (%)		15-30	NA	NA	NA	NA	10-25	10 min.	NA	NA	NA	NA
DRT-MAT-TP676	1 per	Elastic Recovery at		35	55	70	80	85	25	NA	30	40	50	60

	10,000 L	15oC, 100 s (%) min. (3)												
MBT23	1 per 100,000 L	Toughness at 4oC, 1 m (Nm) min. (3, 5)		6	8	8	8	8	8	-	6	6	8	8

Table Polymer Modified Binders (PMBs) for Sprayed Sealing Applications (cont'd)

Comply with the following minimum requirements:

Test Method	Minimum Test Frequency	CLASS	Class 320	S10E	S15E	S20E	S25E	S30E	S35E	S40R	S45R	S50R	S55R	S60R
		NT Specification No.		PMB 1-3	PMB 4	PMB 5	PMB 6	PMB 7	-	-	-	-	-	-
Test Method	Minimum Test Frequency	CLASS		S10E	S15E	S20E	S25E	S30E	S35E	S40R	S45R	S50R	S55R	S60R
HANDLING PROPERTIES														
MBT09	1 per 100,000 L	Ease of remixing (%) max. (3)		8	8	8	8	8	8	8	8	8	8	8
DRT-MAT-TP677	1 per 10,000 L	Viscosity at 165oC (Pa.s) max. (6)		0.8	0.8	0.8	0.8	0.8	0.8	4.5	4.5	4.5	4.5	4.5
AS 2341.14	1 per 100,000 L	Flash Point (oC) min.		250	250	250	250	250	250	250	250	250	250	250
MBT03	1 per 100,000 L	Loss on heating (% mass) max.		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
PRODUCTION CONTROL PROPERTIES (7)														
DRT-MAT-TP675	1 per 10,000 L	Torsional Recovery at 25oC, 30 s (%) min.		15	35	48	55	70	15	5	25	25	30	50
AS 2341.18	1 per 10,000 L	Softening point (oC) min.		50	60	70	75	77	50	50	55	55	62	72

NOTE 1: Class of PMB: S = Sealing Grade.
E = Elastomeric Polymer.

R = Granulated Crumbed Rubber.

NOTE 2: NA = Not applicable for that PMB class.

NOTE 3: MBT methods are APRG test methods.

NOTE 4: DRT-MAT test methods are from Department of Road Transport, South Australia.

8.4.10 Bitumen Emulsion

Manufactured from Class 320 Bitumen.

Take samples from the point of delivery.

Bitumen emulsion to be > 320 > .

Utilise within 90 days of manufacture.

Spraying temperature: 60% bitumen content 30 to 50oC.

8.5 SPRAYERS AND PERSONNEL

The sprayer to be currently calibrated with a copy of the calibration certificate on the vehicle.

Sprayer calibration to be to Northern Territory Test Method 500.1. A current calibration certificate issued by an Australian State Road Authority will be accepted as an alternative.

Ensure sprayer driver and operator are skilled and trained with an understanding of sprayer calibration and an appreciation of the requirements of the work.

Ensure relevant personnel understand the types and quantities of the various materials and mixtures to be used.

8.6 PREPARATION OF PAVEMENT

Sweep the pavement surface to remove loose stones, dust, dirt and foreign matter immediately before spraying.

Maintain the prepared surface.

Extend sweeping clear of the area to be sealed.

Remove adherent patches of foreign material with a steel scraper.

Dampen the prepared surface lightly, immediately before spraying.

Remove water from the surface of primed or sealed pavements before applying binder.

Do not allow traffic on the prepared surface.

8.7 SETTING OUT

Mark out by string line or paint.

Include pavement widening.

8.8 BINDER COAT REQUIREMENTS

8.8.1 Prime, primer seals and enrichment coats

Provide bitumen class 320 cut back as follows:

Prime: >

Primer Seal: >

Enrichment Coat: >

Cut-back bitumen mixed on site:

Heat bitumen to a temperature appropriate for achieving final spraying temperature making allowance for incorporation of the unheated cutter.

Add unheated cutter to heated bitumen and circulate until a homogeneous mixture is achieved.

Spray immediately circulation is complete.

Allow at least three days to elapse after priming before applying the binder coat.

Keep traffic off the primed surface for this period.

8.8.2 Straight Run Binder Coats

Provide bitumen class 320 as follows:

Initial seal coat

Re-seal coat

Store/hold at temperature below the spraying minimum.

Heat to spraying temperature but do not exceed the maximum.

Avoid heating bitumen in quantities excess to requirements, and do not hold beyond four hours at the spraying temperature.

Heat bitumen to within the range of 150 to 180 degrees C for straight run bitumen.

Prevent foaming.

8.8.3 Polymer Modified Binder Coats

Provide bitumen class 320 blended with the required polymer as follows:

Initial seal coat: PMB class >

Reseal coat: PMB class >

The binder modified with the polymer to conform to the table POLYMER MODIFIED BINDERS. Provide test results from a NATA registered testing facility, or manufacturer's certification, of the properties of the binder modified with the nominated type and quantity of polymer.

Store, mix, heat and spray the polymer modified binder as recommended by the polymer manufacturer.

Use 1% adhesion agent or alternative quantity as recommended by the polymer manufacturer.

Both coats of two coat seals shall contain polymer.

8.9 SUPPLY OF AGGREGATE

Supply and deliver aggregate into stockpiles at the following locations:

DISTANCE (km)	SITE (No.)	AGGREGATE SIZE (mm)	QUANTITY (m3)	REMARKS

Quantity of aggregate delivered to be within 5 per cent or 20 cubic metres of the specified quantity, whichever is the lesser.

8.9.1 Stockpile Sites

Stockpiles in urban areas are not permitted.

Provide a separate site for each aggregate size. Allow 15 metres between adjacent sites.

Ensure sites are well drained and on hard ground. Avoid contamination by dust.

Maintain access roads and stockpile sites.

Avoid sites under trees, telephone lines, overhead transmission lines or where overhead clearance is less than 6 metres.

Clear all vegetation to 5 m beyond stockpile boundary.

Construct gravel foundation for stockpiles with 100 mm compacted thickness. Trim and compact to 95% relative compaction in accordance with the PAVEMENTS AND SHOULDERS Section.

Remove from site any non-conforming aggregate.

Construct stockpiles at least 1 metre high and batter sides 1 vertical to 1.5 horizontal.

Trim neatly to facilitate measurement.

8.10 PRECOATING AGGREGATE

Apply a uniform film of precoating material to the aggregate.

Aggregate which has been excessively precoated will be rejected.

Respray aggregate which has been insufficiently precoated to achieve the rate indicated in the Quality Assurance Procedure for determining application rates.

8.11 ADHESION AGENT

Mix at rates indicated in the procedure into precoat and binder.

Circulate in binder for 20 minutes before spraying.

Store, mix, heat and spray the polymer modified binder as recommended by the polymer manufacturer.

Use 1% adhesion agent or alternative quantity as recommended by the polymer manufacturer.

Include polymer in both coats of two coat seals.

8.12 SPRAYING – WITNESS POINT

Witness point - Give the Superintendent 48 hours notice of intention to spray bitumen.

Bitumen to be removed from the site where

stored/held beyond 48 hours at temperature exceeding 120 deg. C; and

heated to above 190 deg. C for straight run bitumen or above the maximum recommended temperatures specified by the polymer manufacturer.

Store/hold binders at temperature below spraying minimum.

Heat to spraying temperature but do not exceed maximum.

Avoid heating binders in quantities excess to requirement, and do not hold beyond two hours at spraying temperature.

8.12.1 Atmospheric Conditions

Commence spraying only when pavement temperature

– is in excess of 20 deg. C

or

– has been in excess of 15 deg. C for at least one hour.

Cease spraying if rain threatens, or in windy or dusty conditions.

Protect the work in the event of a sudden change in weather by closing the affected section of road or by rigidly controlling traffic speed.

8.12.2 Preparing the Sprayer

Ensure the sprayer has a current calibration certificate.

Circulate the mixture.

Check the horizontal and vertical alignment and the cleanliness of the spraybar and its extensions.

Determine the appropriate number of nozzles for the width to be sprayed. Ensure the end nozzles fitted are the correct type.

Check that the nozzles in use are symmetrical about the sprayer.

Check the alignment and setting of the nozzle to ensure that the fans of material from intermediate nozzles are parallel and at an angle of 30 deg. to the centre line of the spraybar. Ensure that the fans

from the end nozzles are parallel to each other and at an angle of 45 deg. to the centre line of the spraybar.

Set the height of the spraybar so that the lower faces of the nozzles are 250 mm (or that specified on the calibration certificate) above the pavement when the sprayer is full.

Fit an end shield to the spraybar when necessary to prevent spraying material on the kerb, or to counter any wind effects which would compromise uniform spraying.

Position the guide rod to conform to the setting out and edges of spray. Check by making a dummy run.

8.12.3 Spray Rates, Tender Quantities

Spray rates used as a basis for calculating tender quantities are as follows:

Enrichment Coat: > litres/m2.

Prime: > litres/m2.

Primer Seal

(> mm aggregate): > litres/m2.

First Coat

(> mm aggregate): > litres/m2.

Second Coat

(> mm aggregate): > litres/m2.

Reseal

(> mm aggregate): > litres/m2.

8.12.4 Application Spray Rates – Hold Point

Application spray rates shall be determined by the Superintendent.

Supply the following test results to the Superintendent, prior to the planned commencement of sealing, to allow the spray rates to be calculated.

For new seals, supply the ALD of the aggregate to be used and Ball Penetration Values.

For reseals, supply the ALD of the aggregate to be used and the existing surface texture depth.

Hold point - Spraying shall not be commenced until the Contractor is advised of the application spray rates by the Superintendent.

Spray rates to be at 15 deg. C adjusted in accordance with the table BITUMEN EQUIVALENT VOLUMES.

For primers, primer seals and polymer modified binders, the rate of application refers to the whole of the mixture. For enrichments and emulsion seals, the rate of application refers to the residual bitumen.

8.12.5 Preparation for Sprayer Run

Record the volume and temperature of the sprayer contents while it is on level ground.

Determine the length of sprayer run from the available quantity in the sprayer and the application rate. Ensure the area to be sprayed is not greater than the area that can be covered by aggregate in the loaded trucks.

Start and finish each spray run on a protective strip of paper placed on the pavement. The paper to be wide enough to ensure the sprayed material is being discharged correctly over the full width of spray. Place sufficient protective paper to protect road fixtures.

Place paper on the pavement as masking around areas to be sprayed or wherever the sprayer is stationary on the road pavement.

8.12.6 Sprayer Run

Attain uniform spraying speed before spraying commences.

Avoid an excess or deficiency of material due to faulty overlap at longitudinal joints when spraying a road in half-widths.

Overlap to be 300 mm with an intermediate nozzle.

End nozzles are not to be used on an overlap.

Cease spraying before the level of material in the tank falls to a level which reduces the full discharge of the pump.

Remove and dispose of all paper.

Clean off any sprayed material from road fixtures.

8.12.7 Hand Spraying

Plan work to minimise the requirement for the use of a hand sprayer.

Any strips of pavement not adequately covered with sprayed material to be sprayed later with the hand attachment.

8.13 APPLICATION OF AGGREGATE – HOLD POINT

Hold point - Load aggregate into tip trucks using an approved aggregate loader which removes dust, dirt and oversize stone while applying precoat.

Apply aggregate to sprayed binder within:

– 10 minutes where the pavement temperature is 20 deg. C or greater.

– 5 minutes where the pavement temperature is between 15 and 20 deg. C.

Polymer Modified Binders: Apply aggregate within 5 minutes irrespective of pavement temperature.

Apply aggregate to emulsion coat before the emulsion breaks.

Spread the aggregate evenly and uniformly over the sprayed surface.

Use a mechanical spreader.

Rerun or hand cover bare or insufficiently covered places after the first spreading.

Aggregate spread in excess of the application rate designated in the procedure will be removed and stockpiled at full cost to the Contractor.

8.13.1 Rolling Rate

Roll the treated surface with self-propelled rubber tyred rollers with a minimum tyre pressure of 600 kPa and a minimum wheel load of 1 tonne.

After initial slow pass the roller speed shall be between 10 and 25 km/h.

Conform to the following:

– Entire area to receive one roller pass immediately after covering.

– 25% of rolling within 2 hours of covering.

– 50% of rolling within 6 hours of covering.

– 100% of rolling within 12 hours of covering.

Minimum Rolling Rate: 1 roller hour per 2,000 litres of binder.

For two coat treatments when the second coat is to be applied immediately, the total rolling on the first coat shall be double that specified.

Roll in daylight hours only. Sweep the surface after rolling. Ensure a uniform distribution of aggregate.

Adjust drag broom to distribute surplus aggregate, but not to dislodge embedded aggregate. Ensure aggregate on the final surface is uniformly distributed, and firmly held by binder.

Re-roll the surface after sweeping to ensure uniform bedding of aggregate in binder.

8.14 TRAFFIC

Prohibit traffic

– from new work until at least 25% of rolling has taken place; and

– from adjacent strip of roadway during spraying.

Sweep all loose aggregate from the carriageway.

8.15 WASTE MATERIAL

Remove from the site and dispose of all waste material.

Clean and remove all aggregate from the shoulders and verges in urban areas.

8.16 CONFORMANCE

8.16.1 Tolerances

Final surfaces shall conform to the following:

Skid Resistance (by NTTM 304.1): Not less than that specified in NTTM 304.1, Table 2.

Skid resistance testing may be carried out by the Superintendent as directed by the Superintendent.

Non-conforming skid resistance will be rejected. Rectify non-conforming work by methods approved by the Superintendent, at the Contractor's expense, including the cost of testing.

Remove from the site binder which has been overheated or has deteriorated or become contaminated prior to its application to the road.

Binder applied at less than 90% or more than 115% of the rate indicated in the procedure will be rejected.

9. SPECIAL BRIDGEWORKS CLAUSES

9.1 FOUNDATION CONDITIONS

The various data shown on the Drawings as to the character and depths of the various strata are approximate only, and no warranty, expressed or implied, is given by the Principal that the same or similar materials will be encountered during the progress of work.

Assess the nature of the various strata from the exposures at the site, and available geotechnical information.

Use techniques for excavation, drilling, grouting, installation of rock anchors, rock bolts, and prestressing tendons that are appropriate to the materials likely to be encountered; especially consider the variable, fractured, jointed rock structure, the possibility of voids, and the variable nature of the rock weathering and assume all responsibility and risks involved therein.

Acceptance by the Department of the methods of foundation construction and installation does not relieve the Contractor of his responsibilities under the Contract.

9.2 SURVEY

Cross check all survey marks intended to be used in the works.

The topographic information (represented by the contour data) is the best available, but do not rely on it completely. Measure the actual topography prior to commencing work on sites.

Obtain the written approval of the Superintendent prior to making any adjustments to the geometry or dimensions of the structure or its foundations.

Approval to make such variations will not be given unless the Superintendent is in receipt of:

– a written request,

– exact and complete details (in the co-ordinate system of the design and contract drawings) of the proposed variations,

– the Contractor's applicable survey data.

Approval will be given within seven days if the requirements of the specification and design are met.

9.3 CO-OPERATION

The Principal reserves the right to perform work or to award other contracts for work on or adjacent to this project.

The works carried out by the various Contractors or by the Department will be co-ordinated by the Superintendent who will be sole co-ordinator.

Co-operate with all parties so as to avoid delay or hindrance to their work and ensure that all work is performed expeditiously.

Abide by the decision of the Superintendent on these matters of co-ordination.

9.4 FLOOD DAMAGE

Water levels shown on the Drawings are final design levels only. They do not represent expected water levels during the progress of the work.

Accept all risks from damage to the structure or any works connected therewith due to water level variations during construction. Repair such losses and damage at no cost to the Principal.

9.5 SAFETY PROVISIONS

9.5.1 Construction Safety

Comply with the provisions of the Northern Territory Construction Safety Act.

Provide essential safety equipment, protective clothing and devices, and first aid facilities.

Maintain all plant and safety equipment in safe working order.

Comply with applicable Australian Standards.

Thoroughly instruct all employees in the hazards of their work and how to avoid injury.

Ensure that good safety practices are observed throughout the Contract.

Inform the Superintendent promptly of any accident or injury of a serious nature occurring to any person at the site of the works.

9.5.2 Safety Helmets

Provide safety helmets for all employees working in or about the construction site.

Provide sufficient spare helmets at the construction site for issue to visitors.

Ensure that employees wear helmets whilst working on site.

Immediately replace any safety helmet which has been damaged.

Erect signs at each main entrance with clearly painted or printed words, not less than 75 millimetres in height, having the following legend:

– SAFETY HELMET AREA

– HELMETS MUST BE WORN ON THIS SITE

9.5.3 Safety Officer

Where specified by the Contract, statutory requirement or the relevant Australian Standard, appoint a responsible Safety Officer who shall be properly instructed as to his duties and be available at all times.

Give the Safety Officer's name and address to the Superintendent in writing prior to the commencement of the activity for which such appointment is required.

Immediately replace the Safety Officer with an approved person if the Superintendent considers that the Safety Officer failed to discharge his duties in a proper manner.

Provide all required permits and logs.

The provision of a Safety Officer is not measured.

Make allowance for all plant, labour, and materials and all expenses necessary to provide a Safety Officer and comply with the specified requirements for safety.

9.5.4 Erection and Safety Equipment and Construction Plant

Ensure that all tackle, safety harnesses and gear, scaffolding, staging, ladders, winding arrangements, plant, and other appliances used in the works satisfy the requirements of the NT Construction Safety Act, relevant Australian Standards, and current requirements of all relevant statutory regulations dealing with erection equipment and plant.

Remove all non-conforming appliances from the works.

Assume full responsibility should any accident occur, even if the Superintendent approved the Contractor's equipment and plant.

10. EXCAVATION FOR FOUNDATIONS

10.1 GENERAL

This section applies to excavation and backfilling for bridge and structural foundations.

10.2 EXCAVATION

Excavate and remove whatever material is necessary to achieve the lines and levels required of the foundations.

Keep the excavation substantially dry of rainwater and groundwater unless otherwise approved by the Superintendent.

Do not damage adjacent structures and services.

Assume full responsibility for the construction methods and consequences and bear all costs associated with them.

Provide a completely clean and dry founding surface for the Superintendent to inspect.

Do not cast concrete (even blinding concrete) until the founding surface has been inspected and approved. Approval will be given within two working days of receipt of a request if:

- the excavation is complete and in suitable condition for inspection, and
- the founding surface and the dimensions of the excavation meet the requirements of the drawings and specification.

Cast concrete within 6 hours of receipt of written approval.

Do not over-excavate unless approved by the Superintendent.

Dispose of all surplus material.

10.3 PREPARATION OF FOUNDATIONS

Ensure that the founding surface has uniform bearing strength and stiffness: remove all loose and relatively weak material, and pockets and lenses of softer material.

Backfill over-excavation of the founding surface with approved compacted material that will give the required strength and stiffness.

Make the founding surface horizontal or stepped unless shown otherwise on the drawings.

Cast a 50 mm thickness layer of concrete as a working platform upon which to build the concrete works if:

- the founding surface is otherwise likely to deteriorate or be damaged during construction, or,
- when directed by the Superintendent.

10.4 CONTRACT LEVELS

Excavate to the level shown on the drawings or until material is reached which the Superintendent determines to be sufficiently strong to safely carry the foundation pressures.

10.5 COFFER DAMS, TIMBERING, AND SHEETING

Build large enough to:

- clear the forms (if used)
- permit inspection of their interiors, and

– permit pumping from outside the forms.

Do not incorporate (or cast in) any portion of these temporary works in the final structure without approval.

10.6 BACKFILLING

Backfill around and above the completed foundation (up to the finished surface level of the terrain) with an approved material.

Use mass concrete, grouted dumped rock, or ungrouted dumped rock (as directed by the Superintendent) to backfill excessive or unnecessary excavation which:

– potentially reduces the structural support for the foundation, or

– reduces the foundation's scour resistance.

Use the excavated material as backfill provided it is free from lumps of wood or other extraneous material and is compacted to 90 per cent relative dry density unless noted otherwise on the drawings.

Use selected fill or other approved material as backfill if the excavated material is unsuitable.

Use a vibrating roller or mechanical tamper of a type approved by the Superintendent.

Comply with appropriate clauses for compaction standards for fill near pavements.

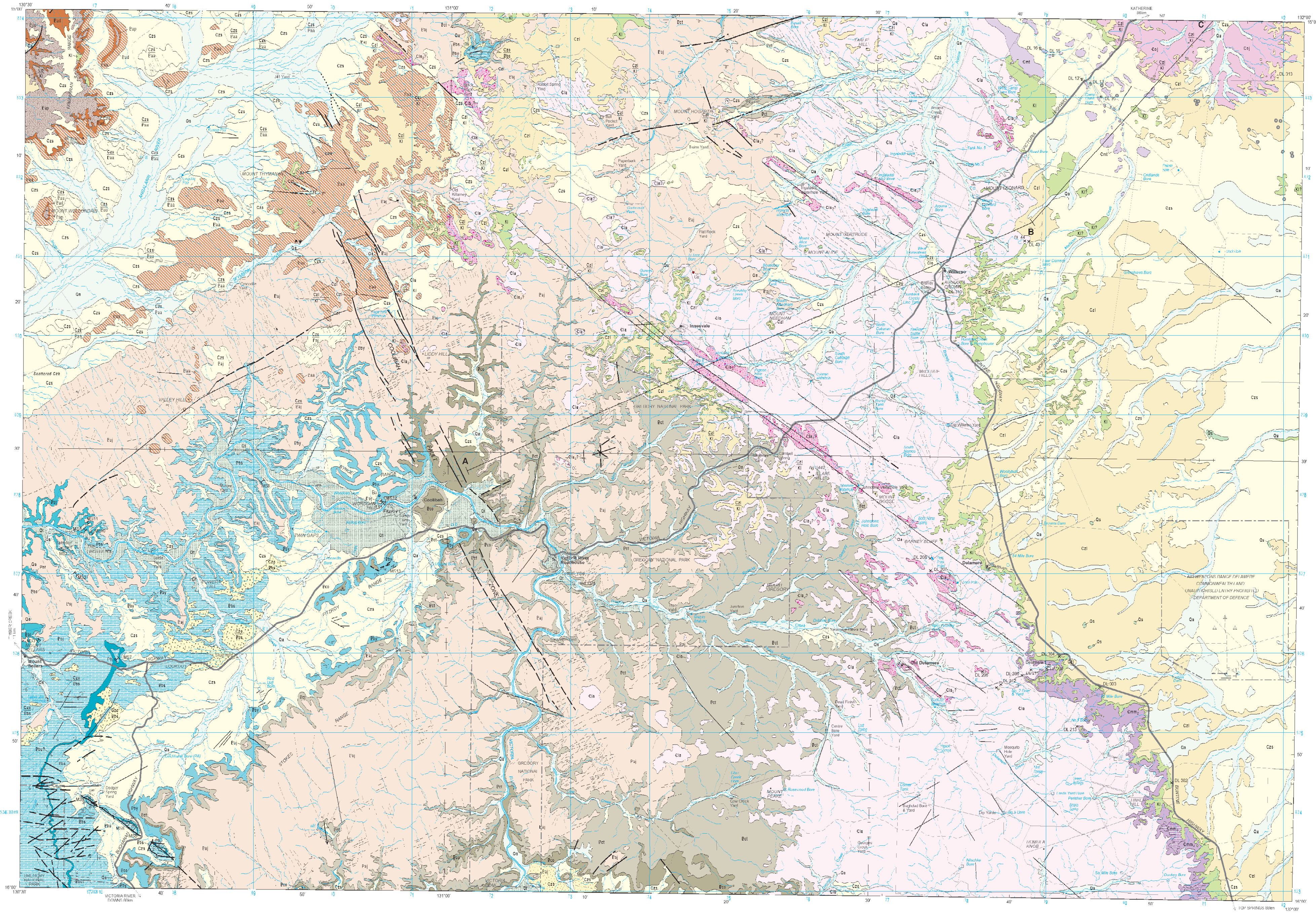
Place and compact in a sequence that minimises unbalanced loading on individual members and the structure as a whole.

AUSTRALIA 1:250 000 GEOLOGICAL SERIES

DELAMERE

NORTHERN TERRITORY

SHEET SD 52-16



SCALE 1:250 000

5 0 5 10 15 20 25 Kilometres

UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 52
GEOCENTRIC DATUM OF AUSTRALIA 1994 (GDA94)
MAP GRID OF AUSTRALIA 1994 (MGA94)

To convert from AGD66 to this map's co-ordinate system, GDA:
INCREASE Eastings by 130 metres.
INCREASE Northings by 162 metres.
INCREASE Longitude by 4.34 seconds.
DECREASE Latitude by 5.12 seconds.

LITHOSTRATIGRAPHIC LEGEND

ERA	PERIOD	BASIN	Unit	Symbol	Lithology
CENOZOIC	QUATERNARY			Qa	River and creek alluvium: sand, silt, clay
				Qs	Sheetwash: silt and clay
				Qt	Terrace deposits: silt, mud, sand
	NEOGENE AND PALAEOGENE			Czs	Sand, soil, colluvium
				Czl	Laterite, lateritic soil
				Czb	Black soil
				Czo	Silcrete, duricrust
MESOZOIC	CRETACEOUS		Undifferentiated Cretaceous	Kl	Claystone, siltstone, sandstone, minor conglomerate
PALAEOZOIC	ORDOVICIAN–CAMBRIAN	DALY AND WISO BASINS (Daly Basin, Daly River Group)	Jinduckin Formation	Ꞓoj	Sandstone, siltstone, marl, carbonate
	CAMBRIAN	DALY AND WISO BASINS (Daly Basin, Daly River Group)	Tindall Limestone	Ꞓmt	Limestone and dolomitic limestone
		DALY AND WISO BASINS (Wiso Basin)	Montejinni Limestone	Ꞓmm₃	Limestone, dolostone
			Montejinni Limestone	Ꞓmm₂	Dolomitic mudstone and argillaceous carbonates, siliceous breccia at base
			Antrim Plateau Volcanics	Ꞓla	Tholeiitic basalt, undifferentiated sandstone and limestone
				Ꞓla₂?	Sandstone, conglomerate, minor chert
PROTEROZOIC	NEOPROTEROZOIC	VICTORIA BASIN (Auvergne Group)	Pinkerton Sandstone	Pap	Quartz sandstone/orthoquartzite, minor siltstone
			Saddle Creek Formation	Pad	Basal sandstone, upper siltstone, minor shale and dolostone
			Angalarri Siltstone	Paa	Siltstone, shale, minor dolostone and sandstone
			Jasper Gorge Sandstone	Paj	Sandstone/orthoquartzite, minor conglomerate and siltstone
	?	VICTORIA BASIN (Tijunna Group)	Stubb Formation	Pct	Siltstone, shale, minor sandstone
	MESOPROTEROZOIC		Wondoan Hill Formation	Pco	Basal sandstone, siltstone, minor dolostone
		VICTORIA BASIN (Bullita Group)	Bynoe Formation	Pby	Siltstone, sandstone, minor dolostone
			Skull Creek Formation	Pbs	Silty and quartzic dolostone, dolomitic sandstone, dolomitic siltstone, dolarenite, dolostone
			Supplejack Dolostone Member	Pbu	Microbial dolostone and dolarenite
			Timber Creek Formation	Pbt	Dolomitic siltstone and sandstone, minor dolostone and chert

Notes: Subsurface lithostratigraphy is not shown. Stratigraphic column does not show lateral equivalence of formations or all unconformable relationships. Superposition of Cenozoic units not shown.

GEOLOGIC AND TOPOGRAPHIC LEGEND

Geological boundary
Disconformity or unconformity (section, legend)

Fault
- Position accurate
- Position approximate
- Position inferred
- Position concealed
- Position inferred concealed

Bedding
- Strike and dip of strata
- Horizontal strata
- Trend

Strike and dip estimated from aerial photography
- Dip 0 to 5°
- Dip 5 to 15°
- Dip 15 to 45°

Lineament
Joint pattern
Strike and dip of joint
Vertical joint

Anticline showing plunge
Syncline

Macrofossil locality
Plant fossil locality

Stratigraphic hole
DL 207 Specimen locality (from 1st Edition)

Minor mineral occurence
- Ba - barite
- Cu - copper
- Pb - lead

Minor alluvial workings

TS1 Type section

TS1	706 300mE	8278 970mN

MS12 Measured section

MS1	665 810mE	8273 110mN
MS2	667 580mE	8269 970mN
MS3	662 830mE	8261 670mN
MS4	666 710mE	8275 590mN
MS5	674 970mE	8237 860mN
MS6	691 110mE	8281 690mN
MS7	672 780mE	8259 260mN
MS8	674 260mE	8238 390mN
MS9	669 190mE	8241 670mN
MS10	669 590mE	8275 170mN
MS11	669 080mE	8276 400mN
MS12	706 410mE	8279 090mN
MS13	707 650mE	8270 910mN

Highway
Secondary road
Vehicular track
Landing ground
Willeroo Homestead
Building
Yard
Fence
WONDOAN HILL Mountain / Hill
Trigonometrical station / Microwave tower
Sinkhole
Bore
Spring
Water Tank / Earth Dam
Waterhole
Reserve boundary

UNIVERSAL GRID REFERENCE

GRID ZONE DESIGNATION: 52L

100 000 METRE SQUARE IDENTIFICATION: FJ, GJ, HJ, FH, GH, HH

IGNORE the SMALLER figures of any grid number; these are for finding the full co-ordinates. Use ONLY the LARGER figures of the grid number; example: 740 000

TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 1000 METRES

SAMPLE POINT: VICTORIA RIVER ROADHOUSE

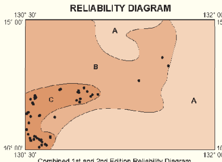
1. Read letters identifying 100 000 metre square in which the point lies: GH
2. Locate first VERTICAL grid line to LEFT of point and read LARGE figures labelling the line either in the top or bottom margin, or on the line itself: 2
3. Estimate tenths from grid line to point: 8
4. Locate first HORIZONTAL grid line BELOW point and read LARGE figures labelling the line in either the left or right margin, or on the line itself: 7
5. Estimate tenths from grid line to point: 2

SAMPLE REFERENCE: GH2872

If reporting beyond 9° N S or 18° E W prefix Grid Zone Designation, as: 52LGH2872

Blue numbered lines are 10 000 metre intervals of the Map Grid of Australia, Zone 52. Grid values are shown in full only at the southwest corner of the map.

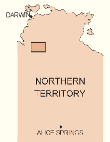
RELIABILITY DIAGRAM



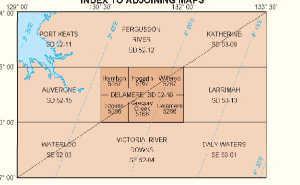
Combined 1st and 2nd Edition Reliability Diagram

A : Regional reconnaissance, air-photo interpretation.
B : Detailed reconnaissance, some traverses and air-photo interpretation.
C : Check-mapping, numerous traverses and detailed air-photo interpretation.
• 2nd Edition Observation Location

MAP LOCALITY

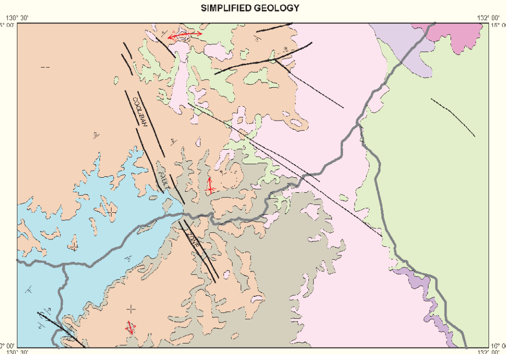


INDEX TO ADJOINING MAPS



MAGNETIC DECLINATION
Blue lines show magnetic declination for epoch 1995 derived from 1995 AGRF model. Annual change is 10.8" per year easterly at the centre of the map. Information is current for 1997.

SIMPLIFIED GEOLOGY



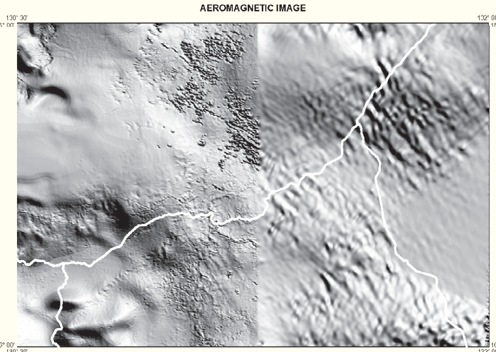
10 0 10 20 30 40 50 km
SCALE 1:1 000 000

Unit	Basin	Era/Period
CRETACEOUS - *Sandstone, siltstone, claystone*		MESOZOIC
JINDUCKIN FORMATION - *Sandstone, siltstone, marl, carbonates*	DALY BASIN	CAMBRIAN
TINDALL LIMESTONE - *Limestone, mudstone* / MONTEJINNI LIMESTONE - *Limestone, mudstone*	DALY BASIN / WISO BASIN	CAMBRIAN
ANTRIM PLATEAU VOLCANICS - *Basalt, sandstone, limestone*	WISO BASIN	CAMBRIAN
AUVERGNE GROUP - *Sandstone, siltstone, dolostone, conglomerate, dolarenite*	VICTORIA BASIN	PROTEROZOIC
TIJUNNA GROUP - *Sandstone, siltstone*	VICTORIA BASIN	PROTEROZOIC
BULLITA GROUP - *Dolostone, siltstone, sandstone*	VICTORIA BASIN	PROTEROZOIC

Fault
Fold - Anticline, Syncline, Plunge direction
Lineament
Trend line
Strike and dip of strata
- dip less than 5°
- dip 5° to 15°
- dip 15° to 45°

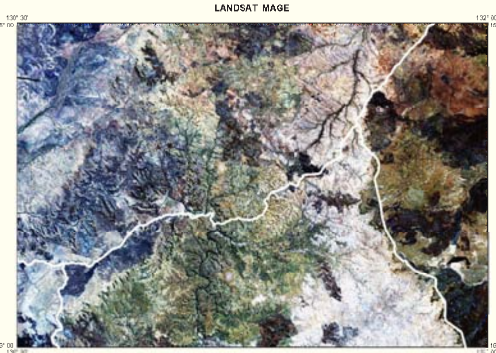
Horizontal strata

AEROMAGNETIC IMAGE

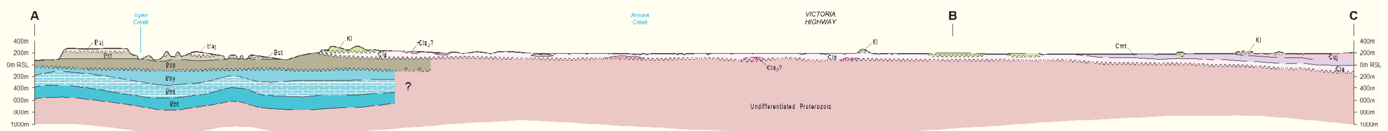


Total magnetic intensity, with sun illumination from 45° azimuth, 45° elevation.
10 0 10 20 30 40 50 km
SCALE 1:1 000 000

LANDSAT IMAGE



Bands 1, 2, 3 displayed as blue, green and red.
10 0 10 20 30 40 50 km
SCALE 1:1 000 000



SCHEMATIC SECTION ABC
Scale : V/H = 5

Geology: 1999-2000: A Cutovinos, PR Beier, JN Dunster, NTGS
Compiled: 2002: A Cutovinos, JN Dunster, NTGS
Design: 2002: R C Poole, GK Andrews, NTGS
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Base map compiled by NTGS from 1:250 000 scale topographic data and LANDSAT 7 satellite imagery supplied by the National Mapping Division, Geoscience Australia, Department of Industry, Tourism and Resources.

This map is accompanied by a text publication: Beier PR, Dunster JN, Cutovinos A and Pietsch BA, 2002. *Delamere, Northern Territory (Second Edition). 1:250 000 geological map series explanatory notes, SD 52-16.* Northern Territory Geological Survey, Darwin.

It is recommended that this map be referred to as: Cutovinos A, Beier PR and Dunster JN, 2002. *Delamere, Northern Territory (Second Edition), 1:250 000 scale geological map, SD 52-16.* Northern Territory Geological Survey, Darwin.

DIGITAL DATA: Map data can be obtained from NTGS as hardcopy plots and digital files in MapInfo and MicroStation formats. Information on formats, release conditions, and costs are available from NTGS Sales Counter, 3rd floor Centrepoint Building, Darwin. Phone (08) 8999 6443, or visit the NTGS web site at www.dbird.nt.gov.au/ntgs.

Northern Territory Geological Survey

Northern Territory Government
Department of Business, Industry and Resource Development

R Dennis Geo Director, Northern Territory Geological Survey

DELAMERE
SHEET SD 52-16
SECOND EDITION 2002

WARNING : Colours will fade with prolonged exposure to light.

Figure B.1

Geological Plan
Delamere