WOOLLAHRA MUNICIPAL COUNCIL

SPECIFICATION FOR

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

February 2012

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TABLE OF CONTENTS

1	APPLI	CATIONS OF SPECIFICATION	5
	1.01	CERTIFYING OFFICER	5
	1.02	THE PARTIES CARRYING OUT THE WORK	5
	1.03	DESIGNATION OF MATERIALS	6
	1.04	DESCRIPTIONS OF THE WORKS AND OF WORK TO BE CARRIED OUT	6
2	COMP	LIANCE WITH STANDARDS	7
3	SCHEI	DULES OF TECHNICAL DATA	. 10
	3.01	FILLING	. 10
	3.02	CONCRETE	. 10
	3.03	KERBS GUTTERS FOOTPATHS AND MEDIANS	. 11
	3.04	ROADWORKS AND HARDSTANDINGS	. 11
	3.05	STORMWATER DRAINAGE	. 11
4	PRELI	MINARIES	. 12
	4.01	COORDINATION WITH CERTIFYING OFFICER AND WOOLLAHRA MUNICIPAL COUNCIL	. 12
	4.02	PROVISION FOR TRAFFIC	. 12
	4.03	INSPECTION DURING MANUFACTURE	. 13
	4.04	INSPECTION, TESTING & REPORTING GENERALLY	. 13
	4.05	QUALITY ASSURANCE TESTING & REPORTING	. 13
	4.06	MATERIALS/WORK DESIGNATED FOR Q.A. REPORTING	. 13
	4.07	ENVIRONMENTAL MANAGEMENT	. 14
	4.08	OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT	. 14
5	SITE P	REPARATION	. 16
	5.01	GENERAL	. 16
	5.02	REMOVAL OF TOPSOIL AND VEGETATION	. 16
	5.03	SILTATION	. 16
	5.04	PROTECTION OF EXISTING TREES	. 16
6	EXCA	VATION	. 18
	6.01	GENERAL	. 18
	6.02	SAWCUTTING	. 18
	6.03	EXCAVATION FOR FOUNDATIONS	. 18
	6.04	SHORING	. 18
	6.05	UNDERGROUND SERVICES AND BUILDINGS	. 19
	6.06	CONDITIONS BELOW GROUND	. 19
7	FILLIN	IG	. 20
	7.01	BACKFILLING	. 20
	7.02	COMPACTED FILL	. 20
	7.03	FILLING AND BACKFILLING MATERIAL	. 20
	7.04	COMPACTION OF FILL AND BACKFILL	. 20
8	CONC	RETE WORKS	. 22
	8.01	CONCRETE QUALITY	. 22
	8.02	MATERIAL STORAGE	. 22
	8.03	SAMPLING AND TESTING	. 22

	8.04	FORMWORK	23
	8.05	REINFORCEMENT	24
	8.06	CORE HOLES AND EMBEDMENTS	25
	8.07	CONCRETE WORKMANSHIP	25
	8.08	EMERGENCY MEASURES	26
	8.09	JOINTS	26
	8.10	CONCRETE CURING AND PROTECTION	27
	8.11	DEFECTIVE CONCRETE	27
	8.12	SURFACE FINISHES	28
9	KERBS	S, GUTTERS, FOOTPATHS, AND MEDIANS	29
	9.01	GENERAL	29
	9.02	FOUNDATION	29
	9.03	FORMWORK	29
	9.04	CONCRETE FINISH	29
	9.05	JOINTS	30
	9.06	DRAINAGE OUTLETS	30
	9.07	CURING AND PROTECTION	30
	9.08	TOLERANCES	30
10	ROAD	WORKS AND HARDSTANDINGS	31
	10.01	GENERAL	31
	10.02	PREPARATION OF SUB-GRADE	31
	10.03	CRUSHED ROCK SUB-BASE AND BASE COURSES	31
	10.04	CRUSHED OR RIPPED SANDSTONE SUB-BASE COURSES	33
	10.05	SAMPLES FOR TESTING	34
	10.06	SPREADING, COMPACTION AND TRIMMING	34
	10.07	TRAFFIC LIMITATIONS ON BASES	35
	10.08	ASPHALTIC CONCRETE MIXES	35
	10.09	PLACING ASPHALTIC CONCRETE	35
11	PAVIN	IG BRICKS, COBBLESTONES, AND INTERLOCKERS	36
	11.01	GENERAL	36
	11.02	EXCAVATION	36
	11.03	BASE COURSE	36
	11.04	BEDDING SAND	36
	11.05	CRUSHED AND RE-CYCLED CONCRETE	37
	11.06	PAVING UNITS	37
	11.07	LAYING PATTERN	37
	11.08	METHOD OF LAYING	38
	11.09	SERVICE BOXES, AREA LIGHTS, POLES, ETC.	38
	11.10	TREE SITES	38
	11.11	JOINTS	39
	11.12	COMPACTION	39
	11.13	FILLING JOINTS	39
	11.14	EDGE RESTRAINT	40
12	STEEL	WORK	41
	12.01	MATERIALS - GENERAL	41
	12.02	SHOP DRAWINGS	41
	12.03	DIMENSIONS	41
	12.04	FABRICATION	41
	12.05	BOLT HOLES	42
	12.06	SPLICES AND JOINTS	42
	12.07	WELDING.	42
	12.08	BOLTED JOINTS	43
	12.09	DELIVERY AND STORAGE	44
	12.10	ERECTION	44
	12.11	ATTACHMENT TO CONCRETE FOUNDATIONS	45
13	PROTE	ECTIVE COATING FOR STEELWORK	46
	13.01	GENERAL	46
	13.02	PREPARATION AND APPLICATION CONDITIONS	46

	10.00		
	13.03	PROTECTION AND REPAIRS	46
	13.04	SURFACE PREPARATION	47
	13.05	APPLICATION OF COATINGS	47
	13.06	HOT DIP GALVANISING	48
	13.07	CHROME PLATING	48
	13.08	PRIMING	48
	13.09	SURFACES NOT TO BE COATED	48
	13.10	CONNECTIONS	49
	13.11	INSPECTION	49
	13.12	COATING MATERIALS	50
14	BRICK	WORK AND BLOCKWORK	51
	14.01	BRICKS	51
	14.02	CONCRETE MASONRY BLOCKS	51
	14.03	STRUCTURAL BLOCK WORK	51
15	STORM	/WATER DRAINAGE	52
	15.01	MATERIALS	52
	15.02	PRECAST CONCRETE BOX DRAINS	52
	15.03	REINFORCED CONCRETE PIPE DRAINS	53
	15.04	DRAINAGE STRUCTURES	54
16	SUBSC	DIL DRAINS	55
	16.01	PIPES	55
	16.02	FILTER MATERIAL	55
	16.02	TRENCHES	55
	16.03	REDDING I AVING AND IOINTING	55
17	PE CV	CIED MATERIAI S EOR FILLING AND BASES	57
17	17.01	MATERIALS FOR FILLING AND BASES	57
	17.01		59
	17.02		50
10		DACKFILL FOR TRENCIES	50
10			00
10		UENEKAL	00
19	LAND	SOLI C. CENEDAL	01
	19.01	SOILS - GENERAL	01
	19.02	SOIL COMPOSITION	61
	19.03	MULCHES - GENERAL	62
	19.04	MULCHES - COMPOSITION	62
	19.05	COMPOSTS - GENERAL	62
	19.06	COMPOSTS - COMPOSITION	63
	19.07	PLANTS	63
	19.08	PLANT CONTAINERS	64
	19.09	PLANTING - GENERAL	64
	19.10	SOIL SPREADING	64
	19.11	MULCH SPREADING	65
	19.12	STAKES AND TIES - GENERAL	65
	19.13	TURFING - GENERAL	65
	19.14	IRRIGATION	66
	19.15	LANDSCAPE MAINTENANCE PERIOD	66
20	PAVEN	/IENT MARKINGS	67
	20.01	GENERAL	67
21	STREE	T NAME SIGNS	68
	21.01	BLADE	68
	21.02	REFLECTIVE BACKGROUND MATERIAL	68
	21.03	LETTERING & LOGO	68
	21.04	POLE & MOUNTING BRACKETS	68
	21.05	INSTALLATION	69
	21.05	GENERAL	69
	21.00	SIGNLOCATIONS	69
22	STAN	DARD DETAIL DRAWINGS	70
	STUR		10

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

1 APPLICATIONS OF SPECIFICATION

This Specification shall apply to work carried out on assets which are under or will revert to the ownership, care, control or management of WOOLLAHRA MUNICIPAL COUNCIL in connection with:.

- A. Work carried out by Contractors, subcontractors, suppliers etc. engaged or employed by Council for such work, whether by Contract, Purchase Order or other means.
- B. Maintenance work and Capital Works carried out by Council's direct labour organisation.
- C. Work carried out by, or on behalf of, third parties on existing roads, footpaths and other assets belonging to Council and/or the maintenance, reinstatement or creation of such assets or facilities which belong to or will revert to the ownership, care, control or management of Council.

1.01 CERTIFYING OFFICER

For the purposes of this Specification the Certifying Officer is defined as:

- A In the case of work carried out by Contractors, subcontractors, suppliers etc. engaged or employed by Council, the Certifying Officer shall be the person nominated in writing to the respective contractor, subcontractor or supplier etc. as exercising the role of the Certifying Officer. If a Superintendent is appointed pursuant to a contract between Council and a contractor, subcontractor or supplier etc. the Certifying Officer shall be the Superintendent.
- B In the case of maintenance work and Capital Works carried out by Council's direct labour organisation, the Certifying Officer shall be the delegated officer of Council.
- C In the case of works carried out by, or on behalf of, third parties on existing roads, footpaths and other assets belonging to Council and/or the maintenance, reinstatement or creation of such assets or facilities which belong to or will revert to the ownership, care, control or management of Council, the Certifying Officer shall be an Engineer or other professional accredited appropriately under the E.P. & A. Act.

1.02 THE PARTIES CARRYING OUT THE WORK

Where this Specification requires that materials, plant, equipment and/or labour shall be provided and/or expresses or implies that work shall be carried out or provided or that activities shall be carried out, the party responsible for providing the materials, plant, equipment and/or labour and carrying out the work shall be:

- A In the case of work carried out in accordance with "1 A" above, the party shall be the contractor, subcontractor, supplier etc.;
- B In the case of maintenance work and Capital Works carried out in accordance with "1 B" above the party shall be the respective Council employee responsible for such duties;
- C In the case of works carried out in accordance with "1 C" above the party shall be the owner of the third party Works associated with or carried out in connection with the respective work;

except in cases where it is clearly stated that respective goods, services etc. shall be provided by the Certifying Officer or WOOLLAHRA MUNICIPAL COUNCIL.

In each case, the work carried out shall include the supply of all materials, plant, equipment and labour required for the work.

1.03 DESIGNATION OF MATERIALS

Terms and/or trade names used to designate items or materials in the Documents are intended to define the quality and general description of such items or materials, and are not intended to imply that they must be manufactured and/or supplied by specific firms.

Items or materials supplied under alternative brand names or provided by alternative suppliers may be substituted if, in the opinion of the Certifying Officer, the quality is not less that designated. In determining the suitability of alternatives, the Certifying Officer will consider the basic material used in manufacturing the item or the finished material, the quality of finish, durability and appearance (where considered appropriate). The Certifying Officer will also determine whether an item or material proposed as an alternative is manufactured from basic materials and to a standard of workmanship which is suitable for its purpose and is consistent with the nature and character of the Works.

1.04 DESCRIPTIONS OF THE WORKS AND OF WORK TO BE CARRIED OUT

The Drawings and the Specification represent generally the forms, dimensions and descriptions of work to be carried out.

The Specification sections are set out to "trades" or "classes of work" and shall apply individually and severally to all aspects of work required for construction of any item or section of the Works.

Notwithstanding that some sections of the Specification or Drawings describe discrete or specific items of work or parts of the Works, the work shall comply with the more general requirements of other sections in so far as they are applicable. Any requirement therein shall be taken together with other documents describing the work, and any ambiguity discrepancy or inconsistency shall be determined as required by the Certifying Officer.

2 COMPLIANCE WITH STANDARDS

Unless stated otherwise in this Specification, the Drawings or elsewhere in the Documents, work shall comply with the current edition of the relevant Australian Standards and/or RTA Standards.

Any variations or ambiguity between Specifications and other Documents and Australian Standards shall be referred to the Certifying Officer for decision before proceeding with the work.

The following tables indicate which Australian Standards and/or RTA Standards may be applicable to each class of work. These tables are not exhaustive and may not include all Standards which may apply to the work to be undertaken.

PROVISION FOR TRAFFIC		
AS 1742.3	Traffic Control Devices for Works on Roads	

FILLING	
AS 1289.5.2	Soil Compaction and Density Tests
R44	Earthworks (Cut, Fill, Imported Fill and Imported Selected Fill)

CONCRETE WORKS		
AS 3600	Concrete Structures	
AS 1012	Methods of testing Concrete	
AS 1302	Steel Reinforcing Bars for Concrete	
AS 1303	Steel Reinforcing Wire for Concrete	
AS 1304	Welded Wire Reinforcing Fabric for Concrete	
AS 3972	Portland and Blended Cements	
AS 1379	Specification and Supply of Concrete	
AS 3610	Formwork for Concrete	
AS 2758.1	Concrete Aggregates	

KERBS, GUTTERS, FOOTPATHS AND MEDIANS		
AS 2876	Concrete Kerbs and Channels (Gutters) - Manually or Machine Placed	
R15	Kerbs and Gutters	

ROADWORKS AND HARDSTANDINGS		
AS 1289	Methods of testing soils for Engineering Purposes	
R116	Asphalt (Dense Graded and Open Graded	
R106	Sprayed Bituminous Surfacing (with Cutback Bitumen)	

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)	
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PAVING BRICKS, COBBLESTONES AND INTERLOCKERS		
AS 4455	Masonry Units and Segmental Pavers	
AS 4456	Masonry Units and Segmental Pavers - Methods of Test	

STEELWORK	
AS 4100	Steel Structures
AS 1554	Structural Steel Welding
AS 1627	Metal Finishing - Preparation and Pre-Treatment of Metal Surfaces
AS 1657	Fixed Platforms, Walkways, Stairways and Ladders - Design Construction and Installation
AS 2312	Guide to the Protection of Iron and Steel against Exterior Atmospheric Corrosion
AS 1111	ISO Metric Hexagon Commercial Bolts and Screws
AS 1112	ISO Metric Hexagon Nuts, Including Thin Nuts, Slotted Nuts and castle Nuts
AS 1163	Structural Steel Hollow Sections
AS 1214	Hot Dipped Galvanised Coatings on Threaded Fasteners
AS 1252	High Strength Steel Bolts with Associated Nuts and Washers for Structural Engineering
AS 1397	Steel Sheet and Strip -Hot-Dipped Zinc Coated or Aluminium/Zinc Coated
AS 1553	Covered Electrodes for Welding
AS 1553.1	Low Carbon Steel Electrodes for Manual Arc Welding of Carbon Steels and Carbon-Manganese Steels
AS 1553.2	Low & Intermediate Alloy Steel Electrodes for Manual Metal Arc Welding of Carbon Steels and Low and Intermediate Alloy Steels
AS 1167.2	Welding and Brazing - Filler Metal for Welding
AS 1858	Electrodes and Fluxes for Submerged Arc Welding
AS 1594	Hot-Rolled Steel Flat Products
AS 2214	Certification of Welding Supervisors - Structural Steel Welding
AS 3678	Structural Steel Hot Rolled Plates, Floorplates and Slabs
AS 3679	Structural Steel

PROTECTIVE COATING

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

AS 2312	Guide to the Protection of Iron and Steel against Exterior Atmospheric Corrosion
AS 3750	Paints for Steel Structures
AS 1580	Paints and Related Materials - Methods of Testing
AS 4025	Paints for Equipment including Ships

BRICKWORK AND BLOCKWORK	
AS 1617	Refractory Bricks and Shapes
AS 3972	Portland and Blended Cements
AS 1672.1	Limes for Building

STORMWATER DRAINAGE		
AS 4058	Precast Concrete Pipes - Pressure and non-Pressure	
AS 1741	Vitrified Clay Pipes and Fittings with Flexible Joints - Sewer Quality	
AS 1646	Elastomeric Seals for Waterworks Purposes	
AS 1597	Precast Reinforced Concrete Box Culverts	
R11	Stormwater Drainage	
R16	Precast Reinforced Concrete Box Culverts	
R23	UPVC Pipes	

SUBSOIL DRAINS	
R32	Sub-surface Drainage Materials
R33	Trench Drains

LANDSCAPING	
AS 4454	Compost, Soil Conditioners and Mulches
AS 1289	Methods of Testing Soils for Engineering Purposes

3 SCHEDULES OF TECHNICAL DATA

Unless shown otherwise on the Drawings or in other documents the following Technical data shall apply to the respective work.

3.01 FILLING

Material to be used for filling shall comply with the following properties.

FILLING MATERIAL		
Liquid Limit	Maximum 40%	
Plasticity Index	Maximum 20	
Soaked California Bearing Ratio (CBR) (material passing 19mm sieve 90% modified compaction)	Minimum 15%	
P.I. x % passing 0.425mm	Maximum 600	

GRADING	
SIEVE SIZE (mm)	% PASSING
75.0	100
37.5	73 - 100
19.0	57 - 100
4.75	30 - 100
2.36	20 - 100
0.425	10 - 70
0.075	5 - 30

Compaction of filling at optimum moisture content shall be 98% Standard maximum Dry Density.

3.02 CONCRETE

Concrete shall comply with the following properties.

CEMENT CONTENT AND WATER CEMENT RATIO		
COMPRESSIVE STRENGTH AT 28 DAYS (F'c) MPa	MINIMUM CEMENT CONTENT kg/m3	MAXIMUM WATER/CEMENT RATIO
32	380	0.60
25	340	0.60
20	300	0.60

Standard Specification Page 11

10 220	0.75
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CONCRETE STRENGTH	
ELEMENT	MINIMUM COMPRESSIVE STRENGTH (F'c)
Driveway	32 MPa
Footpath	25 MPa
Kerb and Gutter	25 MPa
Median	25 MPa
Stormwater Manholes (including covers)	25 MPa
Stormwater anchor blocks, encasement etc.	20 MPa

3.03 KERBS GUTTERS FOOTPATHS AND MEDIANS

The foundation under all Kerbs, Gutters, Footpaths and Medians shall be compacted to 95% Standard Maximum Dry Density.

3.04 ROADWORKS AND HARDSTANDINGS

Roadworks and hard standings shall comply with the following properties.

COMPACTION REQUIREMENTS	
LAYER	MINIMUM COMPACTION (STANDARD MAXIMUM DRY DENSITY)
Subgrade	100%
Sub base	100%
Base course	100%

3.05 STORMWATER DRAINAGE

Bases for Precast Concrete Box Drains shall be 25 MPa concrete reinforced with F72 reinforcing wire mesh.

4 PRELIMINARIES

4.01 COORDINATION WITH CERTIFYING OFFICER AND WOOLLAHRA MUNICIPAL COUNCIL

The party carrying out the work shall co-ordinate activities and co-operate with the Certifying Officer to ensure that the work proceeds to their mutual satisfaction.

If the work requires some prior work to be completed by WOOLLAHRA MUNICIPAL COUNCIL, the Certifying Officer shall be notified of any requirements not less that seven days before such completion is needed but in sufficient time for the Certifying Officer to notify Council and for Council to have the work completed.

The Certifying Officer shall notify Council of any such requirements within four (4) working days of receiving notification from the party carrying out the work.

4.02 **PROVISION FOR TRAFFIC**

Prior to commencing any work on the site a formal Risk Assessment of the impacts of the proposed work on traffic and pedestrian flow shall be carried out and documented in accordance with OHS & R and other relevant requirements.

Based on this risk assessment a Traffic Management Plan shall be developed. The Traffic Management Plan shall include drawings showing the positions of all warning signs and traffic control devices and the directions of traffic flow through and/or around the site for each stage of the work. The Traffic Management Plan shall be certified by a person who has passed a RTA approved Traffic Control course. Proof of the certifiers qualifications and authority shall be forwarded to the Certifying Officer.

The risk assessment and Traffic Management Plan shall be forwarded to the Certifying Officer at least fourteen (14) days prior to any work commencing on the site.

Approval of the proposed Traffic Management Plan shall be obtained from the RTA, Police and the relevant road Authority prior to implementing the plan. If the Certifying Officer or any of the approving authorities considers that the extent or arrangement of signs and control devices shown or other aspects of the Traffic Management Plan is inadequate, a new Traffic Management Plan shall be submitted, amended to satisfy the relevant requirements.

The approved Traffic Management Plan shall be implemented in accordance with the current edition of the relevant Australian Standard. Control signs, temporary safety fencing and all safety facilities shall be installed as shown and shall be maintained during each stage of the work.

In addition to the current edition of the relevant Australian Standard a minimum of one sand bag (or similar) shall be placed on every barricade. Also as a minimum, the appropriate operational safety lighting shall be placed on every second barricade or parawebbing post.

The implementation of the Traffic Management Plan shall be monitored daily and if it is found to be inadequate immediate steps shall be undertaken to correct any faults or failures of the implementation. If the Certifying Officer deems it necessary a revised Traffic Management Plan shall be submitted. Any revisions to the Traffic Management Plan are subject to the same approvals as the original Traffic Management Plan.

If the Certifying Officer advises that he is of the opinion that a danger exists due to the inadequacy of warning signs, barricades or other safety devices or due to procedures for control of traffic, supplementary signs, barricades or safety devices and/or procedures as necessary shall be put in place immediately to overcome the danger.

Access for property owners in the vicinity of the site shall be maintained at all times and all owners whose access is interrupted by work shall be consulted prior to work commencing. Any interruptions shall be minimised and essential interruptions shall be allowed only at times acceptable to the owners.

4.03 INSPECTION DURING MANUFACTURE

Materials and equipment covered by this Specification may be subject to inspection by the Certifying Officer at any time during construction at the manufacturer's works or those of his sub-contractors.

Should the Certifying Officer so direct, no materials or equipment shall be dispatched by manufacturers or suppliers until notification, by the Certifying Officer, in writing that the inspection requirements have been satisfied.

4.04 INSPECTION, TESTING & REPORTING GENERALLY

All inspection and testing necessary to ensure that the work is carried out in accordance with this Specification shall be carried out as the work proceeds, including all tests referred to in the Specifications or Drawings.

The Certifying Officer may waive requirements for testing of specific items of work or materials in cases where, in the opinion of the Certifying Officer, the work is seen as complying with the requirements of the Specification and further testing is not justified. However, no waiver shall apply unless provided in writing by the Certifying Officer and any waiver shall only apply to the specific item of work set out in the written advice from the Certifying Officer.

The results of all inspections and tests shall be provided to the Certifying Officer as soon as practicable.

4.05 QUALITY ASSURANCE TESTING & REPORTING

Prior to commencing work on site or ordering any materials, a documented plan for Quality Assurance inspection, testing and reporting shall be submitted to the Certifying Officer.

The plan submitted to the Certifying Officer shall include the names and positions of staff responsible for managing Quality Assurance for work covered by this Specification and shall include sample forms for inspection, testing and reporting the results of tests for both materials and workmanship.

Acceptance or rejection by the WOOLLAHRA MUNICIPAL COUNCIL, it's agents, or the Certifying Officer, of inspection or test certificates provided under the Quality Assurance procedures shall in no way relieve the responsible party from fulfilling all or any of their obligations under the Specification.

Tests and test certificates carried out or provided pursuant to the Specification generally and which have been included in support of Quality Assurance programme shall have the same effect (if any) on obligations as if they were carried out independently of the Quality Assurance programme.

4.06 MATERIALS/WORK DESIGNATED FOR Q.A. REPORTING

The responsible party is encouraged to make use of the Quality Assurance programme which is implemented for the Works, by designating a broad range of materials and workmanship and providing corresponding inspection and test reports regularly to the Certifying Officer, as evidence of compliance of the work with the requirements of the Specification.

The minimum requirements of materials and work to be inspected, tested and reported upon, under the Q.A. reporting programme for this Specification, are as follows:

Materials:	Backfilling materials	
	Pipes, rubber rings & jointing compounds	
	Concrete	
	Road sub-base and base materials.	
Workmanship:	Formwork ready for inspection	
	Pipes laid ready for inspection	
	Compaction of backfill	

Compaction of sub-grade, sub-base, base and base courses for roads, hardstandings and other pavements.

4.07 ENVIRONMENTAL MANAGEMENT

Prior to commencing any work on the site a formal Risk Assessment of the impacts of the proposed work on the environment shall be carried out and documented in accordance with EPA and other relevant requirements.

Based on this risk assessment an Environmental Management Plan shall be developed. The Environmental Management Plan shall be developed in accordance WOOLLAHRA MUNICIPAL COUNCIL guidelines and the requirements of the EPA and other relevant authorities. The Environmental Management Plan shall include drawings showing the positions of all environmental control devices for each stage of the work.

The risk assessment and Environmental Management Plan shall be forwarded to the Certifying Officer at least fourteen (14) days prior to any work commencing on the site. If the Certifying Officer or any of the approving authorities considers that the extent or arrangement of environmental control devices shown or other aspects of the Environmental Management Plan is inadequate, a new Environmental Management Plan shall be submitted, amended to satisfy the relevant requirements.

The Environmental Management Plan shall be implemented in accordance with the requirements of the EPA and other relevant authorities. Environmental control devices shall be installed as shown and shall be maintained during each stage of the work.

The implementation of the Environmental Management Plan shall be monitored daily and if it is found to be inadequate immediate steps shall be undertaken to correct any faults or failures of the implementation. If the Certifying Officer deems it necessary a revised Environmental Management Plan shall be submitted.

If the Certifying Officer advises that he is of the opinion that a danger exists due to the inadequacy of environmental control devices or due to procedures for control of environmental risks, supplementary environmental control devices and/or procedures as necessary shall be put in place immediately to overcome the danger.

All requirements as set out by the appropriate regulations including the Clean Waters Act, the Environmental Protection Authority and Local Government shall be met.

4.08 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

Prior to commencing any work on the site a formal Risk Assessment covering all potential impacts to the health and safety of workmen and the public shall be carried out and documented in accordance with WorkCover guidelines.

Based on this risk assessment an OHS & R Management Plan shall be developed. The OHS & R Management Plan shall be developed in accordance with WorkCover guidelines and the requirements of the Construction Safety Act and other relevant requirements.

The risk assessment and OHS & R Management Plan shall be forwarded to the Certifying Officer at least fourteen (14) days prior to any work commencing on the site. If the Certifying Officer considers that the OHS & R Management Plan is inadequate, a new OHS & R Management Plan shall be submitted, amended to satisfy the relevant requirements.

The Management Plan submitted shall include the names of managers, supervisors and field staff responsible for maintaining compliance with the Plan and all relevant legislative requirements. Details of training, certificates and/or qualifications for all such personnel shall be included.

The plan submitted shall include for at least one ganger or supervisor who is employed on the site full time to be responsible for ensuring that all requirements of the Plan and all relevant legislative requirements are implemented. The plan shall allow for periodic reports to be submitted to and countersigned by the relevant Manager. These reports shall be submitted regularly to the Certifying Officer.

Neither the submission of an OHS & R plan nor its acceptance by either the Certifying Officer or WOOLLAHRA MUNICIPAL COUNCIL shall in any way relieve any other party of their OHS & R obligations.

5 SITE PREPARATION

5.01 GENERAL

All existing foundations, concrete slabs on ground and other structures or obstructions on the site shall be demolished except for specific structures which are designated herein or on the drawings as to remain.

In the case of structures designated to remain on site, damage thereto during construction of the works shall be made good to the satisfaction of the Certifying Officer.

All existing services are to be located and if necessary disconnected prior to commencing site preparation and there shall be no damage to water, drainage, electricity, telephone, gas, parking meter or other services which are in use or are required by the owners of the services.

All waste/debris etc. from the site shall be disposed of to a legal dump site. The Certifying Officer may seek written confirmation that all waste/debris etc has been disposed of accordingly. All waste/debris etc that is recyclable shall be recycled or sent to a suitable site for recycling.

5.02 REMOVAL OF TOPSOIL AND VEGETATION

Topsoil and vegetation shall be removed, stumps grubbed out and the holes backfilled and compacted as specified under backfill, except in cases where the area is to be generally excavated to a level below the stumps.

Areas designated in the documents as not to be cleared, trees which have to be preserved, and natural surfaces which are to remain as natural surfaces at completion of the Works, shall be protected from damage during demolition and throughout the course of the work.

Topsoil suitable for use in landscaping may be stockpiled on site for later use if there is sufficient room on site and landscaping is included in the Works or if landscaping by others is proposed. Stockpiles shall be maintained tidy. Silt and soil shall be prevented from washing down on the site, onto surrounding areas, or into drains, etc.

Topsoil or other material remaining in stockpiles at the conclusion of the Works shall be compacted, trimmed and grassed in accordance with the Landscape Works section of this Specification. Surplus topsoil shall be removed from site and disposed of as for disposal of waste/debris etc described in the GENERAL section above.

5.03 SILTATION

Siltation and sediment control devices shall be installed to all areas which may be subject to erosion.

All requirements as set out by the appropriate regulations including the Clean Waters Act, the Environmental Protection Authority and Local Government shall be met in regard to the control of sediment and siltation that would otherwise run off the site.

5.04 **PROTECTION OF EXISTING TREES**

Existing trees specified or shown on the drawings as not to be removed shall be protected from all damage during the currency of the work. Clarification shall be sought from the Certifying Officer as to the status of those trees not specified or shown as not to be removed on the drawings prior to the commencement of work.

Bulk materials and harmful materials including oil, waste concrete, clearings, boulders and the like shall not be stored, stockpiled, dumped or otherwise placed under or near trees. Spoil from excavations shall not be placed against tree trunks, even for short periods and wind blown materials such as cement shall be prevented from harming trees and plants.

Stays, guys and the like shall not be attached to trees and tree bark shall not be damaged in any way.

When working near trees topsoil shall not be removed from within the drip line of trees unless otherwise specified. If it is necessary to excavate within the drip line, hand methods shall be utilised such that root systems are preserved intact where possible. The duration of open excavations under tree canopies shall be negotiated with the Certifying Officer at the time of the excavation.

Tree roots exceeding 50mm nominal diameter shall not be cut. Where it is necessary to cut tree roots, a saw or similar means shall be used such that the cutting does not unduly disturb or rock the remaining root system. Immediately after cutting, an appropriate bituminous fungicidal sealant shall be applied to the cut to prevent the incursion of rot and disease.

Backfilling to excavations around tree roots shall be with the topsoil mixture as specified in the LANDSCAPE WORKS section of this Specification. The backfill is to be placed in layers, each of 150mm maximum depth, compacted to a dry density similar to that of the surrounding soil. Backfill around tree trunks or over the root zone shall not be above the original ground surface unless agreed to by the Certifying Officer . Immediately after backfilling, the root zone surrounding the tree shall be thoroughly watered.

6 EXCAVATION

6.01 GENERAL

Excavation shall be to the lines and levels shown in the Drawings unless directed otherwise by the Certifying Officer. Excavating plant and equipment shall be capable of performing the work to the satisfaction of the Certifying Officer.

If, in the opinion of the Certifying Officer, an appropriate area exists on the site suitable material may be stockpiled and used for backfilling, provided that excess stockpiled material is disposed of when all backfilling is completed.

Surplus excavated material or material classified as unsuitable for use as fill elsewhere on the site shall be disposed of to a legal dump site.

Excavations shall be trimmed to line and level by machine and/or by hand as necessary to produce profiles to the accuracy required by the Drawings and/or Specification.

Over excavations in rock shall be backfilled with mass concrete of a strength similar to the rock.

In the case of excavations for roadworks and/or hardstandings, the area shall be compacted to the standard specified in the relevant section of the Specification unless shown otherwise in the Drawings.

Surface drains shall be constructed and maintained around and within the site to control surface water and keep excavations dry. Sumps shall be provided in low areas to collect water which cannot be controlled by drains.

Silt traps shall be provided to prevent the discharge of silt or debris to other property, into the environment or into creeks, rivers, public drains or sewers.

Silt traps and sumps shall be pumped out continuously while ever water is present. Material in excavations softened or damaged by flowing or ponded water shall be removed and reinstated as for over excavations.

6.02 SAWCUTTING

Should excavation be required in an area of concrete or asphalt, nominal sawcuts of 50mm depth shall be made in the surface prior to excavation.

In the case of excavations for drainage Works, sawcuts shall be provided on both sides of the trench. For kerb and/or gutter Works, sawcuts shall be provided around the perimeter of the area of pavement to be reinstated. Medians shall be sawcut on the face of new median kerb alignment.

6.03 EXCAVATION FOR FOUNDATIONS

The exposed surface at the bottom of each excavation shall be adequately protected from disturbance by other operations or by ground water or stormwater. Care shall be taken to avoid disturbance to adjacent material during removal of any foundation material which has been disturbed, allowed to deteriorate or otherwise made unsuitable. Material removed shall be replaced by selected material compacted as directed by the Certifying Officer.

Where footings are to be founded on rock, the rock surface shall be fully exposed to the depth and slope shown in the Drawings, shaped to conform with the shape of the footings and left in a roughened condition. Any pockets of unsuitable material in the bearing surface shall be removed and the pockets filled with mass concrete of a strength similar to the rock.

Excavations shall be kept free from water until concrete is placed and formwork is removed, and until all concrete below water level is sufficiently set or protected.

6.04 SHORING

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Where necessary, excavations shall be supported and temporary supports provided to protect adjacent property, services and other permanent construction, and to provide safe working conditions in and about the excavations.

Temporary supports shall be designed and constructed in accordance with the structural and safe working requirements of the relevant local and statutory authorities. Working Drawings for temporary supports, conforming with all relevant requirements shall be submitted to the Certifying Officer at least two weeks before it is intended to erect the supports.

Temporary supports shall be removed from the excavations and excavations backfilled as construction progresses. Removal shall be effected in such a way as not to damage any foundation or finished concrete.

6.05 UNDERGROUND SERVICES AND BUILDINGS

Existing buildings and underground services including telephone, parking meter cables, electricity, water supply, stormwater, sewage, drainage, gas lines and traffic detectors shall be protected as required by the owner of the respective services.

It shall be deemed that inquiries have been made with all authorities likely to have services in the area and buildings in the area have been inspected and allowance has been made for all necessary protective works. Prior to the commencement of any Excavation work documentary evidence shall be submitted to the Certifying Officer in order to verify that such inquiries have been made and all necessary precautions have been taken and the temporary works are in place.

Information provided by WOOLLAHRA MUNICIPAL COUNCIL regarding services on the site or regarding adjacent buildings is provided as a guide only and does not relieve the responsible parties of their responsibility to inform themselves as to conditions on, under or around the site .

In cases where services including drainage pipes are encountered during excavation, the Certifying Officer shall be immediately notified and he may issue instructions as to what protection and/or concrete encasement is to be provided.

Exploratory hand excavations shall be carried out in all areas where services may be encountered and excavation around services shall be by hand as necessary to avoid damage to the services.

6.06 CONDITIONS BELOW GROUND

If rock or artificial obstructions are encountered the Certifying Officer may permit modifications to details to mitigate some of the additional cost of excavating in rock or removing obstructions. Requests to amend details will only be considered if such amendments do not adversely affect the structural strength, stability or the usefulness of the Works.

If water is encountered, such sections of the site shall be dewatered as necessary to permit work to proceed as required or such other measures as may be authorised by the Certifying Officer shall be undertaken.

7 FILLING

7.01 BACKFILLING

All timbering, bracing and rubbish of all descriptions shall be removed before or as backfill is placed.

Backfilling shall not commence until the Certifying Officer has been notified and, if he deems necessary, has inspected the work.

Suitable granular materials only shall be used for backfill, except that non-granular materials such as silt and clay may, at the Certifying Officer's discretion, be used for the upper 300 mm of backfill around exterior walls and foundations.

All spaces excavated for foundations and not occupied by permanent work shall be backfilled to the surface of the surrounding ground and compacted as specified or as directed by the Certifying Officer.

Backfill on all sides of piers and walls shall be carried up at the same level until ground surface is reached. No backfill shall be placed against any abutment or wall until 14 days after placing the concrete unless authorised by the Certifying Officer.

Selected material surplus from excavations may be used for backfilling trenches if permitted by the Certifying Officer.

7.02 COMPACTED FILL

Areas to be filled shall be prepared, trimmed and finished as provided under the EXCAVATION section of this Specification. Fill shall not be brought into fill areas until the Certifying Officer has been notified and, if he deems necessary, has inspected the prepared areas.

Preparation shall include the removal of all topsoil, vegetation, debris, construction rubbish or materials or existing obstructions which would create soft or hard spots under the fill such as to prevent even compaction of the fill.

7.03 FILLING AND BACKFILLING MATERIAL

Fill material shall be as specified in the Drawings or in Project Specific Specifications.

Backfill material shall be a selected predominately granular material which is capable of being compacted to the necessary densities using equipment which is available on site and can work the material in close proximity to trench walls, adjacent structures and the like.

If crushed and re-cycled concrete is used for fill and/or backfill, it shall comply with the description of the appropriate Class of material in the Section RE-CYCLED MATERIALS FOR FILLING AND BASES in this Specification.

7.04 COMPACTION OF FILL AND BACKFILL

Material shall be spread in layers extending the full width of the excavation and each layer shall be compacted at optimum moisture content to achieve the specified density. The finished thickness of each layer (after compaction) shall be not greater than 150 mm.

Compaction shall be controlled by conducting field density and laboratory compaction tests on the filling material as the compaction progresses. All testing is to be carried out by a NATA registered laboratory. The results of the density testing must be submitted to the Certifying Officer.

Settlements of excavations, fill and backfill which occur during construction shall be filled, compacted and trimmed as they occur. Soft spots or unsound areas shall be dug out as soon as they occur and the space filled with sound material properly compacted to a condition equivalent to the surrounding sound material.

In the case of embankments, fill shall be placed and compacted not less than 0.75m beyond the line of the face of the batter and shall be cut back to the correct line and level when the embankment is completed.

8 CONCRETE WORKS

8.01 CONCRETE QUALITY

8.01.01 Ready Mixed Concrete

Ready mixed concrete shall be produced in accordance with the requirements of the current edition of the relevant Australian Standard and shall be obtained from a supplier capable of complying with the said standard.

8.01.02 Site Mixed Concrete

Site mixed concrete shall comply with the current edition of the relevant Australian Standard. The methods of batching, mixing and transportation shall be to the satisfaction of the Certifying Officer.

8.01.03 Mix Design

The mix proportions of the various types of concrete shall be submitted to the Certifying Officer at least seven days before the concrete is placed. The concrete shall conform to the following requirements:

- 1. Portland cement shall be type GP unless otherwise shown on the drawings;
- 2. Aggregates shall comply with the current edition of the relevant Australian Standard as applicable and their maximum size shall be as shown on the Drawings or;
- 3. Mixing water shall be free from substances deleterious to concrete or steel;
- 4. Characteristic compressive strength F'c and slump shall be as shown on the Drawings. If not shown on the Drawings, the slump shall be the minimum necessary for the proper placing and compaction of the concrete;
- 5. Chemical admixtures shall not be used, unless specified. If it is proposed to use admixtures they must be in accordance with the current edition of the relevant Australian Standards and the Certifying Officer must be notified of the intention to use such admixtures. The Certifying Officer may refuse permission for the use of admixtures if, in the opinion of the Certifying Officer, they may be detrimental to the quality, finish or durability of the Works;
- 6. In the case of "Paddington Mix" concrete, aggregate used are of variety of contrasting colours of River Gravels of 10mm size. Mix is also referred to as "River Sand" mix at nominated batching plants.

8.02 MATERIAL STORAGE

Cement shall be stored in weather-tight buildings, bins or silos, and protected from dampness and contamination. Bags of cement shall be so stacked as to allow earlier deliveries to be used first. Any cement which is lumpy or has otherwise deteriorated during storage shall not be used.

Aggregate stockpiles shall be arranged in a manner which will prevent intermixture with other types of aggregate and contamination by other materials. Moisture content shall be uniform when the aggregates are used.

8.03 SAMPLING AND TESTING

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Samples of concrete shall be taken for project control testing and tests carried out as described in the current edition of the relevant Australian Standard.

The sampling and the making, curing, capping and testing of test specimens shall be in accordance with the current edition of the relevant Australian Standard and shall be carried out by a NATA registered laboratory. If these services are not available, the Certifying Officer must be satisfied that the personnel carrying out the tests are competent to do this work.

The laboratory test certificates shall be forwarded to the Certifying Officer .

Acceptance criteria shall be as defined in the current edition of the relevant Australian Standard.

8.04 FORMWORK

8.04.01 General

At least 24 hours notice shall be given to the Certifying Officer when the formwork is ready for inspection. If the Certifying Officer considers that any formwork or falsework may be inadequate for it's intended purpose, concrete shall not be placed in the formwork until the Certifying Officer is satisfied as to the adequacy of the formwork or falsework.

Should any formwork be displaced during concreting or within the period specified for the retention of formwork, the concrete shall be removed between such limits as the Certifying Officer may determine, construction joints shall be formed and the section of work shall be reconstructed.

Forms shall be chamfered for re-entrant angles and filleted for corners, the face of the bevel in each case, unless otherwise shown or specified having a width of 25mm.

Concrete work which does not comply with the Specification or which has other defects due to inadequacy of formwork, shall be removed and replaced, or the defects shall be rectified as directed by the Certifying Officer .

8.04.02 Joints in Forms

Where form joints have been shown on the Drawings these shall be included in the formwork design and shall be shown on the formwork shop drawings. If other joints, such as construction joints, are required details shall be submitted to the Certifying Officer at least 7 days prior to their construction.

Surfaces which will be exposed to view shall be formed with an approved grade of plywood sheeting. Sheeting may be thick sheets without support between studs or thinner sheets may be used as a surfacing layer over the formwork. In either case, joints between sheets, surface defects and holes shall be filled and smoothed before treatment with form release agent.

Joints in formwork, blockout pieces and formwork supports shall be constructed so as to permit easy removal and stripping despite any swelling which might occur when the formwork is in place.

All form joints shall be sufficiently tight to prevent the leakage of fines from the concrete. Joints between form panels, stop ends, bottoms of walls and column forms shall be sealed with strips of formed polyurethane or by other appropriate means. Any indications of leakage in the finished concrete will render that concrete liable to rejection.

8.04.03 Form Bolts and Ties

Bolts and ties, if shown on the Drawings, shall be located as shown. Coil ties and she-bolts shall not be used without cones .For all exposed surfaces form bolts and ties will be set in a regular pattern so as to give an

even appearance upon stripping. This pattern shall be submitted to the Certifying Officer at least 7 days prior to the formwork being erected. Snap ties shall not be used except for minor work not subject to substantial loading. Holes left by ties, she-bolts or other form fixings shall be plugged with cement mortar and finished flush with the concrete surface.

8.04.04 Treatment of Formed Surfaces

All form faces shall be treated prior to placing concrete with a suitable release agent. The release agent shall be applied uniformly without runs or puddles and shall be kept off reinforcement and construction joint surfaces. Removable portions of formwork ties and bolts shall be greased.

8.04.05 Cleaning of Forms

All dust, debris, rust or other stains shall be removed from the interior of the forms before concrete is placed. Readily removable panels which permit cleaning and inspection immediately before placing of concrete shall be provided at bottoms of all wall and column forms.

8.04.06 Removal of Forms

Removal of formwork shall be effected in such a manner as will not damage the concrete or affect the safety of the structure.

For concrete made with Type GP cement the stripping times shall generally not be less than seven days. All cantilevers and suspended slabs shall remain propped for at least 28 days.

Reduced stripping times may be allowed if undisturbed shores are incorporated in the formwork or if evidence is furnished that the concrete has sufficient strength to support safely its own weight and superimposed loads.

Walls shall not be erected nor any permanent loads placed on suspended slabs or beams until at least one week after the removal of supporting formwork and props.

8.04.07 Forming Below Ground Level

Side forms may be omitted below grades where soil conditions are such as will allow the correct shapes and sizes to be cast. The sizes of members shall, however, be increased as required to provide the additional cover of 50mm. Unless otherwise specified or shown on the Drawings, filling used as formwork below slabs or other structural concrete, shall be thoroughly compacted. Unless otherwise specified or shown on the Drawings, filled or excavated surfaces on which concrete will be cast shall be blinded with quarry dust, sand or weak concrete and covered with approved waterproof sheeting.

8.04.08 Off-Form Finishes

Formwork shall comply to standards specified on the Drawings or in other Documents. The Certifying Officer shall be notified as to how any repairs to defective concrete are to be carried out. After agreement by the Certifying Officer as to how repairs are to be effected the repairs shall be carried out without delay.

8.05 **REINFORCEMENT**

8.05.01 General

The reinforcement shall comply with the current edition of the relevant Australian Standards.

The grade and origin of all reinforcement shall be readily identifiable and test certificates shall be furnished to the Certifying Officer, if so directed by the Certifying Officer.

Reinforcement shall not be spliced, welded or bent on site unless specifically shown on the Drawings.

The Certifying Officer shall be notified at least 24 hours before the reinforcement is completely fixed and ready for inspection. Reinforcement shall be maintained in the specified positions until the pouring of concrete is completed.

8.05.02 Storage and Cleaning

Reinforcement shall be stored clear of the ground and working areas and shall be protected from deterioration due to exposure. When concrete is placed, the reinforcement shall be clean and free from mill scale, loose rust, mud, oil, grease and/or other harmful matter.

8.05.03 Placing and Fixing

Reinforcement shall be accurately fixed in the positions shown on the Drawings and shall be securely held off the forms by suitable supporting chairs and by wiring together at all intersections with at least 1.6 mm dia. annealed wire.

Reinforcement shall not be held in position by bare steel supports or wires which extend to the concrete surface, nor by pieces of wood, brick, stone or other improvisations.

Reinforcement shall be supported at such intervals as will prevent excessive bending or displacement under construction foot traffic. Special stools extending above the reinforcement shall be provided to support planks for barrow runs and pipes for pumped concrete.

The cover shall be the minimum distance between the outside of any reinforcement including fitments and tie wires and the nearest concrete surface.

8.06 CORE HOLES AND EMBEDMENTS

Prior to pouring concrete all core and embedment requirements for all trades shall be installed.

In the case of core holes or embedments not shown on the Drawings, or where temporary openings are required for construction purposes, appropriate details shall be submitted to the Certifying Officer at least 7 days prior to their construction.

Reinforcing bars may generally be slightly moved to clear core holes and embedments, but they shall not be cut, nor shall any cores be cut in hardened concrete, without the Certifying Officer's permission.

Where reinforcing mesh must be cut, additional reinforcing bars of at least equal strength to the cut reinforcement shall be placed at each side of the core hole or embedment.

8.07 CONCRETE WORKMANSHIP

8.07.01 General

The Certifying Officer shall be notified of the intention to pour concrete at least 24 hours before commencing the work. Concrete shall not be placed in any section until the Certifying Officer has been notified and, if he deems necessary, has inspected the formwork and reinforcement.

All concreting shall be carried out in good light and weather conditions, under the supervision of a capable foreman.

Concrete placement shall not be commenced if excess water has not been removed from forms or excavations or if, the weather conditions could adversely affect the concrete.

Concrete shall not be placed under such conditions as will not allow the specified standard of concrete to be attained or if it is necessary to increase the specified maximum slump in order to produce a dense concrete mass free from air bubbles or other defects.

8.07.02 Transporting and Placing

Concrete shall be transported to its final position in a manner which will prevent segregation, contamination, or loss of materials.

Concrete shall be deposited as near as practical to its final position. Working it along the forms with vibrators will not be permitted.

Concrete shall not be freely dropped from a height greater than 1.5m.

In the construction of walls or other deep sections the concrete shall be placed and compacted in successive layers not exceeding 1.0m in depth.

The concrete placing shall be carried out continuously between construction joints and the rate of placing shall not be less than required to maintain a plastic concrete edge and to prevent the formation of cold joints.

8.07.03 Compaction

The concrete shall be thoroughly compacted by means of suitable mechanical vibrators to form a solid concrete mass free from honeycombing and air bubbles and with uniform solid surfaces.

Internal vibrators shall be used systematically at uniformly spaced points not further apart than twice the radius of visible vibration effect. Vibrators shall not be allowed to draw fines from the surrounding concrete or to damage partially hardened concrete. Vibrators shall not be allowed to be stationery in one position for more than 30 seconds.

8.08 EMERGENCY MEASURES

Where delays occur in concrete placing, a concrete batch may be held in the mixer or agitator for a period of up to 1 hour in suitable weather conditions.

Concrete to which the initial mixing water was added more than 1 hour or which has been discharged from the mixer or agitator more than 30 minutes prior to placing, shall not be used in the work.

The addition of water to partially hardened concrete or re-tempering will not be permitted.

Where concrete placing is delayed until the concrete is in danger of taking its initial set, the line of stoppage shall be formed into a construction joint. If the stoppage occurs in a position considered unsuitable for a construction joint the concrete shall be removed from the forms back to a suitable location.

8.09 JOINTS

Construction joints shall be formed in locations and to details shown on the Drawings.

Where construction joints are not shown on the drawings, but are requested, the proposal shall be submitted to the Certifying Officer at least 7 days prior to the joint being constructed.

Before fresh concrete is placed against hardened concrete, the joint surfaces on the hardened concrete shall be thoroughly roughened and cleaned so that all loose or soft material, all foreign matter and all laitance are removed. Immediately before concrete placement, the forms near the joint shall be re-tightened and the joint surfaces shall be saturated with water. The free water shall be removed and the joint surfaces shall be coated with neat cement slurry. The slurry shall not be allowed to dry out before placing the fresh concrete.

Dowels and tiebars shall be prepared and placed across joints where indicated on the Drawings. They shall be correctly aligned and securely held parallel to the surface of the finished slab, during placing and finishing operations. The spacing and vertical location of dowels and tiebars shall be as specified in the Drawings. The following tolerances shall not be exceeded:

- P Horizontal location half the diameter of the dowel or tiebar.
- P Vertical location dowels: half the diameter of the dowel; tiebars: 10mm.

Tiebars in longitudinal joints shall be omitted when the centre of the tiebar would be within 200mm (horizontally) of a transverse joint.

The method used to hold dowels in position shall be sufficiently rigid to ensure that individual dowels do not deviate by more than 3 mm in 300 mm from their specified alignment.

All dowels and tiebars shall be clean and free of oil, grease, loose rust and other foreign material when the concrete is placed to permit maximum bonding with the concrete for the unpainted portion of dowels. At construction joints the unpainted ends of dowels shall be installed in the first-placed slab. The portion of each dowel intended to move in the concrete shall be painted or coated with a suitable bond breaking compound prior to placing concrete.

8.10 CONCRETE CURING AND PROTECTION

Freshly cast concrete shall be protected from premature drying, excessively hot or cold temperatures, rain, wind and damage from other causes. In extreme temperatures special protection shall be provided as necessary..

All exposed concrete surfaces shall be cured either by ponding, covering with an impermeable membrane in close contact with moistened concrete, or by applying a suitable curing compound in accordance with the Manufacturer's recommendations. The Certifying Officer shall be notified of the intention to use a curing compound. Curing compounds will not be permitted on the surface of construction joints, where subsequent finishes are to be applied, or where they could detract from the appearance of the finished concrete.

Curing shall commence immediately after initial set of the concrete and shall continue for a period of at least seven days. If formwork is removed during the curing period, the exposed surfaces shall be cured for the remainder of the period.

In hot weather, rapid drying out after the curing period shall be prevented by wetting as necessary.

All finished concrete surfaces shall be protected from damage due to construction traffic, excessive loading or other causes.

8.11 DEFECTIVE CONCRETE

All concrete shall be subject to inspection by the Certifying Officer after the stripping of formwork and before any patching or finishing work has commenced.

Should any concrete be rejected, the whole of the concrete shall be removed between such limits as the Certifying Officer may decide and replaced with acceptable concrete.

Remedial work shall be carried out as soon as practical after removal of forms and inspection.

The Contractor shall submit to the Superintendent detailed work method statements for any rectification work required, prior to the work being carried out.

8.12 SURFACE FINISHES

Surface finishes shall be as shown on the drawings or as follows:

8.12.01 Floated Finish to All Visible Surfaces

After the concrete has been placed, struck off, consolidated and levelled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared and/or when the mix has stiffened sufficiently to permit the proper operation of a power-driven float. The surface shall then be consolidated with power-driven floats. Hand floating with wood or corked-face floats shall be used in locations inaccessible to the power-driven machine. Trueness of surface shall be re-checked at this stage with a three metre straight edge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to the required tolerance. The slab shall then be re-floated immediately to a uniform smooth, granular texture.

8.12.02 Broomed Finish

Slabs shown on the drawings as broomed finish shall be given a coarse transverse scored texture by drawing a broom or hessian belt across the surface. This operation shall follow immediately after floating. Edges of slabs and joints shall be ironed and bevelled with a suitable hand held tool.

8.12.03 Floors and Wearing Surfaces

Floors and surfaces which are specified as non-slip concrete finish shall be machine floated as for the "Floated Finish to All Visible Surfaces" section of this Specification, except that final floating shall commence when initial set is well advanced but the concrete is sufficiently plastic for traces of cement paste to be worked up to the surface. Floating shall continue until the surface is hard and able to be walked on without showing any footmarks, and some coarse aggregate is just visible at the surface.

A sample area shall be prepared for inspection by the Certifying Officer and to train their workmen, if necessary, in when to start and finish floating. The sample area shall be a slab surface which, in the opinion of the Certifying Officer, is away from general traffic.

The surface of the concrete shall be finished to true planes within 6mm in 3m, as determined by a 3m straightedge placed anywhere on the slab in any direction.

Unless shown otherwise on the Drawings, surface finishes for concrete works shall be as follows:

WORK	REQUIRED FINISH
DRIVEWAY	BROOMED
FOOTPATH except in Paddington DCP area	BROOMED
FOOTPATH in Paddington DCP area (Paddington Mix Concrete)	BRUSH FINISH EXPOSING AGGREGATES
KERB AND GUTTER	STEEL TROWEL
KERB RAMP	BROOMED
MEDIAN	FLOAT

9 KERBS, GUTTERS, FOOTPATHS, AND MEDIANS

9.01 GENERAL

All works executed under this part of the Specification shall be constructed in straight lines or curves, without local irregularities, true to the alignment and grade shown on the Drawings and in accordance with the standard Drawings.

Gutters shall be cast in place either by slip forming or by conventional methods of setting up forms and placing concrete. They shall be formed as separate integral kerb and gutter for flexible pavements, but for concrete pavements they may be formed separately or formed integrally with the base or shoulder slab.

Where the gutters are constructed separately from a concrete shoulder slab, they shall be tied to the shoulder slab by steel tie bars, as detailed on the Drawings.

Where the gutters are formed before a concrete shoulder slab, the tie bars shall be inserted into holes formed or drilled into the face of the concrete after seven (7) days and bonded with epoxy concrete binder or other suitable methods.

Where the gutters are constructed integrally with a concrete base slab and of the same material as the base slab, a joint is not required. The profile of the gutter shall be as shown on the Drawings.

Where the gutters are formed adjacent to concrete base slabs already in place tie bars shall be inserted into the edge face of the existing slab to positions and dimensions shown on the Drawings and bonded with epoxy concrete binder or other suitable methods.

Where kerbs are constructed separately from the concrete base slab, they shall be dowelled to the base slab by steel tie bars, to dimensions shown on the Drawings or inserted into holes drilled into the base slab and bonded with epoxy binder or other suitable methods.

Where kerbs and/or gutters are to be constructed against an existing flexible pavement a sawcut shall be made into the existing pavement 600mm off the gutter lip. The pavement shall be reinstated to a depth of 50mm adjacent the new gutter. For the construction of median kerbs a sawcut shall be made on the edge of kerb line.

Medians shall be keyed into the existing pavement as per the standard Drawing. The median may, at the Certifying Officer's discretion, be bonded to the pavement using a suitable epoxy product in accordance with the manufactures recommendations.

Full details of the methods to be used shall be submitted to the Certifying Officer at least 7 days prior to commencement of construction of the base.

Footpaths shall be constructed to the details shown on the Drawings and in accordance with the CONCRETE WORKS section of this Specification.

9.02 FOUNDATION

The foundation shall have a smooth uniform surface compacted so that the relative compaction is as specified on the Drawings or in other Documents.

9.03 FORMWORK

Forms shall be designed and constructed as per the FORMWORK section of the CONCRETE WORKS section of this specification.

9.04 CONCRETE FINISH

Concrete finish shall be as per the SURFACE FINISHES section of the CONCRETE WORKS section of this specification.

Slip formed kerb and/or gutters shall have the same standard of finish as specified for gutters constructed using conventional forms.

9.05 JOINTS

Expansion joints 10mm in width for the full depth of the kerb and/or gutter, shall be constructed at 6m intervals and where the gutter abuts gully pits, vehicle crossings or retaining walls. In the case of concrete pavements, the joints shall coincide with transverse joints in the concrete base. Expansion joints shall consist of a suitable preformed joint filler.

Contraction joints 55mm to 65mm deep shall be constructed in footpaths at intervals matching the width of the footpath slab or a maximum of 2m. They shall not be greater than 3mm wide. Expansion joints 10mm in width shall be placed at every third contraction joint or at a maximum of 6m spacing.

All joints shall be perpendicular to the top face of the kerb and/or gutter line in both the vertical and horizontal planes.

9.06 DRAINAGE OUTLETS

Wherever holes for drainage are to be made through the kerb, UPVC kerb entry adaptors of the required size shall be provided, and they shall be fitted into the kerb forms in a workmanlike manner so as to ensure a neat appearance at the face of the kerb. Prior to placing kerbing and guttering, investigations shall be made to find out if additional holes for drainage are required, and where such holes are found to be necessary, they shall be provided.

9.07 CURING AND PROTECTION

The curing and protection of freshly placed concrete shall be as per the CONCRETE CURING AND PROTECTION section of the CONCRETE WORKS section of this specification.

9.08 TOLERANCES

Unless otherwise specified, the finished levels of concrete structures not adjacent to road pavements shall not vary more than 25mm from the specified levels. In the case of kerbs, gutters, drainage pits and other structures adjacent to road pavements, the finished concrete shall not vary more than 10mm from the specified levels and alignment. Kerbs and gutters shall not deviate from level or alignment by more than 5mm from a straight edge 3 metres long, subject to any necessary allowances on vertical and horizontal curves.

10 ROADWORKS AND HARDSTANDINGS

10.01 GENERAL

The extent and description of work is provided in the Drawings, including the depth of courses of base and wearing surfaces.

Preparation of sub-grade, materials and placing of the various courses, and general provisions for inspection and/or testing or other aspects of the work shall comply with this section of the specification as applicable.

10.02 PREPARATION OF SUB-GRADE

For the purposes of this clause, the sub-grade is the surface and material below the surface upon which the first subbase course or base course will be laid.

The site shall be trimmed to levels ready to receive the sub-base courses or base course over the entire area to be surfaced. Backfill to trenches and structures shall be consolidated and trimmed to grade and filter layers, if any, in place.

Low areas shall be filled with selected material and compacted to a density at least equal to the surrounding area.

The whole area shall be compacted to a depth of not less than 150mm to an in-situ density as specified on the Drawings or in other Documents. All compaction and testing shall be carried out in accordance with the current edition of the relevant Australian Standard. All test results shall be submitted to the Certifying Officer prior to commencing work on subsequent layers.

Areas shall be re-trimmed if necessary after compaction.

If it is not possible to attain the specified compaction, the area shall be scarified to a depth of 200 mm and recompacted to the required density.

Immediately after the area has been trimmed and compacted the area shall be proof rolled. Proof rolling shall be undertaken using a minimum 12 tonne static roller a loaded bogie axle tipping truck. The proof rolling shall be carried out in the presence of the Certifying Officer or his delegate.

If, in the opinion of the Certifying Officer, the proof rolling reveals soft spots or other unsatisfactory areas these areas shall be removed and replaced in accordance with the requirements of this Specification. The removal of the subject areas may be waived if it can be demonstrated that the area in question complies with the requirements of the Specification.

10.03 CRUSHED ROCK SUB-BASE AND BASE COURSES

Only one class of sub-base or base course material from the one source shall be placed per layer and/or section of the work. Mixing of different classes of sub-base or base course materials or the mixing of the same class of base material from different sources will not be permitted.

The classification and nature of base materials are designated as follows:

Classification	Nature
DGB20	20 mm nominal size densely graded crushed rock base
DGS40	40 mm nominal size densely graded crushed rock sub-base
GMB20	20 mm nominal size graded macadam crushed rock
Lime Treated Crushed Rock	20 mm nominal size densely graded crushed rock lime treated

The details of the base materials which are proposed to be supplied along with the plant and methods which are intended to be used for obtaining and mixing of different materials, if applicable, shall be submitted to the Certifying Officer.

No materials shall be delivered until the Certifying Officer has received the information relating to the source of supply and the plant and methods to be used in obtaining the material.

Added fine material, if required, shall be mixed by blending it uniformly with the crushed rock prior to delivery. The Certifying Officer shall advised of the nature, source of supply and the quantity of any added fine material prior to carrying out the work. The properties of any class of crushed rock when compacted in the pavement shall be within the limits for that class set out in following table if it is tested in accordance with the procedures specified in the relevant RTA Test Method.

Table 3 Crushed Rock Property Limits						
Test	Property	Clas	ss Cl	ass (Class	
Method		DGB20 Bas	DGS20 e Su	GMB20 Ib-base I	Base	
T106	Percent Passing 26.5 mm sieve	100	100	100		
	Percent Passing 19.0 mm sieve	95-100 95-	100 95-100			
	Percent Passing 13.2 mm sieve	75-90	70-90	70-90		
	Percent Passing 6.7 mm sieve	55-7	75 50)-75 5	60-75	
	Percent Passing 2.36 mm sieve	35-55	30-55	35-55		
T107	A. Ratio	40-60	38-62	35-60		
	B. Ratio	40-60	38-62	35-60		
	C. Ratio	40-60	38-62	30-60		
T108	Liquid Limit if non-plastic	20 r	nax. 23 max. 20) max.		
T109	Plastic Limit (if plastic)	20 I	nax. 20 max. 20) max.		
T109	Plasticity Index	6 max.	12 max. 6	max.		
T114	Maximum Dry Compressive Strength	1.7 MPa 1.0 min.	MPa min.			
T215	Aggregate Wet Strength	100 min.	kN 100 kN 10 min.	00 kN min.		
T213	Particle Shape by Proportional Caliper % Mis-shapen (2:1)	35 max. 40 i	nax. 30 max.			

T215 Percent Variation 35 max. 35 max. 35 max. in Strength (Dry/Wet)/Dry

The requirements stated in Table 3 are after any pre-treatment deemed necessary. Samples taken prior to compaction in the pavement may require pre-treatment by procedures such as those described in the current relevant RTA Test Methods prior to the commencement of the specified tests. The tests are based on the assumption that the density of all fractions of the pavement material is approximately 2.65 g/ml. Materials containing fractions having a density outside the range 2.50 to 2.85 g/ml will be individually investigated and assessed by the Certifying Officer.

The maximum value of the Liquid Limit may be increased to 23 for non-plastic crushed rock, provided that the value determined is not influenced by the presence of adverse constituents.

After being subject to pre-treatment comprising two cycles of compaction, or to artificial weathering, the Plasticity Index shall not exceed 6 for Class DGB material or 12 for Class DGS material, and it shall not increase by more than 3 from that of the sample prior to pre-treatment.

After soaking in water at 65 degrees Celsius for up to ten days the Plasticity Index shall not exceed 6 for Classes DGB and GMB material or 12 for Classes DGS and GMS material, and it shall not have increased by more than 3 from that of an equivalent portion of the sample tested without the soaking.

The minimum Aggregate Wet Strength for crushed slag shall be 80 kN.

When tested in accordance with the current relevant RTA Test Method in a saturated but surface dry condition after soaking in water for 24 hours, the 10 percent Fines Value of that portion of the sample passing the 19.0 millimetre sieve and retained on the 9.5 millimetre sieve shall not vary by more than 35 percent from that of an equivalent portion of the sample tested dry without soaking.

10.04 CRUSHED OR RIPPED SANDSTONE SUB-BASE COURSES

Crushed sandstone shall be obtained only from quarries or other sources which have been nominates to the Certifying Officer and the Certifying Officer has granted permission in writing for the Quarry or other source to be used.

If required by the Certifying Officer, samples of material obtainable from a nominated Quarry or other source shall be provided to the Certifying officer, together with certificates issued by a NATA registered laboratory, establishing that the material complies with this Specification.

Sandstone shall be crushed or ripped from sound clean sandstone free of overburden, clay seams, shale or other deleterious materials and shall conform to the following minimum requirements:

When tested to AS1289.C4.1-1997, linear shrinkage shall not exceed 5%;; The CBR shall be not less than 30%; Particle size grading shall be as shown in the following table:

NOMINAL SIZE (mm)	PERCENTAGE PASSING (%)
75.00	85-100
53.00	75-100
37.50	65-100
26.50	57-94
19.00	50-88
9.50	37-76

NOMINAL SIZE (mm)	PERCENTAGE PASSING (%)
4.75	27-65
2.36	20-52
1.18	15-42
425 Fm	10-28
75 Fm	5-17
2 Fm	0-5

10.05 SAMPLES FOR TESTING

The Certifying Officer shall be supplied with samples of base and Subbase materials proposed for use at least 28 days prior to delivery of materials or commencement of construction of the pavement base.

Samples of 50 kg mass will be required, but the Certifying Officer may require additional samples.

Materials used shall conform to the samples.

10.06 SPREADING, COMPACTION AND TRIMMING

Materials shall be supplied on site with a moisture content, uniformly distributed, within the range 60 percent to 90 percent of the optimum moisture content for compaction as determined by the current relevant RTA Test Method. Material shall be spread in uniform layers with final compacted thicknesses as shown in the Drawings. Final compacted thicknesses of individual layers shall not exceed 150mm.

Spreading shall be undertaken by a method which will ensure segregation does not occur and movement of material is kept to a minimum.

Each layer shall be uniformly compacted over its entire area and depth.

Compaction to the specified density over each section of the work shall be achieved within 24 hours of the material being placed.

During spreading and compaction the moisture content of the material, shall be maintained at between 60 percent and 90 percent of the optimum moisture content as determined by the current relevant RTA Test method. Material containing excessive moisture shall not be compacted until it has dried out to the specified moisture content.

During compaction, the surface shall be trimmed and material added where necessary to produce a tight dense surface parallel with the finished wearing surface.

Any base material placed that has attained the specified compaction but subsequently becomes wet or damaged shall be dried out and uniformly recompacted and re-trimmed to the required density and tolerances in accordance with this clause.

The top of the upper base layer shall be trimmed and compacted to produce levels which do not vary from the levels shown on the Drawings by more than the following:

Base layer which is to have a sprayed seal wearing surface: plus or minus 15 mm

Base layer which is to have an asphaltic concrete wearing surface: plus 10 mm and minus 20 mm

The top surface of the upper base layer shall also not deviate from the bottom of a 3 metre straight edge, laid in any direction, by more than 7 millimetres in the case of a base layer which is to have a sprayed seal wearing surface and by not more than 10 millimetres in the case of a base layer which is to have an asphaltic concrete wearing surface. Any irregularities in excess of the tolerances stated above shall be corrected by loosening the surface, removing or adding base material as required and re-trimming and re-compacting the area. In no case shall quarry dust or other fine materials be used to build up depressions.

Immediately after the area has been trimmed and compacted the area shall be proof rolled. Proof rolling shall be undertaken using a minimum 12 tonne static roller a loaded bogie axle tipping truck. The proof rolling shall be carried out in the presence of the Certifying Officer or his delegate.

If, in the opinion of the Certifying Officer, the proof rolling reveals soft spots or other unsatisfactory areas these areas shall be removed and replaced in accordance with the requirements of this Specification. The removal of the subject areas may be waived if it can be demonstrated that the area in question complies with the requirements of the Specification.

A primer seal may be applied over the base layer as protection provided that the primer seal is applied in accordance with procedures outlined by the relevant RTA Form.

10.07 TRAFFIC LIMITATIONS ON BASES

Only vehicles and equipment essential for the construction of the base layer shall be permitted to travel over the section of base under construction.

Only vehicles and equipment complying with the Load Limits of the current Local Government Act will be permitted to travel over completed sections of the pavement base.

10.08 ASPHALTIC CONCRETE MIXES

After application of the tack coat asphaltic concrete shall be laid in two courses to make up the total compacted thickness shown in the drawings. The base course and the surface course shall be as described in the Drawings.

Should it become necessary to apply a thin corrective surface course to achieve the specified tolerances on surface finish, then such a course shall comprise dense grade asphaltic concrete with 5 millimetre nominal size aggregate of the type appropriate for the section of pavement requiring correction.

10.09 PLACING ASPHALTIC CONCRETE

Tack coats and asphaltic concrete shall be delivered spread and compacted as described in the current relevant RTA specification.

Bitumen shall be removed from and damage to kerbs or other work damaged or defaced during construction or paving to road areas and hardstandings shall be made good.
11 PAVING BRICKS, COBBLESTONES, AND INTERLOCKERS

11.01 GENERAL

All surfaces and pavement structures executed under this part of the Specification shall be constructed true to the line, levels, and grades, without local irregularities, as shown on the Drawings and in accordance with the relevant standard drawings.

All pavement shall be finished to lines and levels that ensure positive drainage at all drainage outlets and channels.

11.02 EXCAVATION

Any existing concrete or asphalt footpath areas shall be excavated as per the EXCAVATION Section of this Specification.

Any soft or damp patches shall be removed and replaced with suitable fill material and the whole area compacted in accordance with the FOUNDATION section of the KERBS, GUTTERS, FOOTPATHS AND MEDIANS section of this Specification.

11.03 BASE COURSE

The strength, constituents, quality, placement and acceptance of the base course material shall be in accordance with the ROADWORKS AND HARDSTANDING sections of this Specification.

The top surface of the base course after compaction, shall not deviate from the bottom of a 2 metre straight edge, by more than 10mm .

Where shown on the Drawings interlocking pavers shall have a reinforced concrete base. The base shall be constructed in accordance with the CONCRETE WORKS section of this Specification and the relevant standard Drawing.

Should the Certifying Officer deem it necessary the Base course shall be constructed of 5 MPa concrete in areas where dust etc. from the base course may create a problem for adjacent public areas, such as shop entrances.

11.04 BEDDING SAND

Bedding sand shall be a well-graded sand passing a 4.75mm sieve and be suitable for concrete manufacture. The sand shall be of uniform moisture content between 4-8% when spread, and shall be protected against rain when stockpiled on site prior to spreading. Saturated sand shall not be used.

The bedding sand shall comply with the following grading limits:

Sieve Size(mm)	% Passing
9.52	100
4.75	95 - 100
2.36	80 - 100
1.18	50 - 85
0.600	25 - 60
0.300	10 - 30
0.150	5 - 15
0.075	0 - 10

The bedding sand shall be free of soluble salts or other contaminants likely to cause efflorescence or lead to reduced skid resistance.

The sand bedding shall be spread loose in a uniform layer, to a depth of approximately 35mm. The sand bedding shall be screeded in a loose condition to a level such that, after compaction, the pavers shall be at the correct levels and profiles.

The spread sand shall be carefully maintained in a loose condition and protected against pre-compaction both prior to and following screeding. Any pre-compacted sand or screeded sand left overnight shall be loosened before further paving units are placed. The sand bed shall not be screeded in advance of the laying face to an extent to which paving will not be completed on that day.

Screeded sand must be fully protected against accidental pre-compaction, including compaction by rain or dew. Any screeded sand which is pre-compacted prior to laying of units shall be removed and brought back to profile in a loose condition.

11.05 CRUSHED AND RE-CYCLED CONCRETE

If crushed and re-cycled concrete is used as a base for pavers in lieu of the bedding sand described herein, it shall comply with the description of Class B - Paver Base in the Section RE-CYCLED MATERIALS FOR FILLING AND BASES in this Specification.

The material shall be placed and the bed for the pavers prepared as for Bedding Sand described above. Methods of laying, compacting and filling the joints between the pavers shall be as applies to pavers laid on a natural sand base.

11.06 PAVING UNITS

Paving units shall comply with the current edition of the relevant Australian Standard or the CMAA Specification for Concrete Segmental Paving Units (MA20).

The paving units shall be as specified on the Drawings or in other Documents.

A 1 sq.m. footpath paving sample shall be provided to the Certifying Officer prior to undertaking works. This sample shall be used to determine the colour and texture variation of the paving block units that will be used . The sample shall either be incorporated in the works or laid as a separate sample delivered to a site as directed by the Certifying Officer. A separate sample shall be supplied for each different type of paving stone to be incorporated into the Works. The Certifying Officer shall have 5 working days to make any comments he may have regarding the sample.

The Certifying Officer shall be notified of the completion of all the paving works. The Certifying Officer will then use the 1 sq.m. sample provided to assess if the paving blocks used are within the colour and texture variation supplied in the sample.

If the Certifying Officer determines the laid pavers are outside the colour and texture range provided in the sample, the Certifying Officer will nominate which or all paving blocks are to be replaced.

The Certifying Officer shall be notified of any changes to the 1 sq.m. sample previously provided.

Interlocking paving blocks shall be as specified on the Drawings or in other Documents.

11.07 LAYING PATTERN

Footpath paving blocks are to be laid in a stretcher bond pattern, unless shown otherwise on the Drawings or in other documents. The continuous joint shall run parallel to the kerb and gutter.

At the intersection of roadways, the paving pattern of the major roadway shall be continued from the alignment of the adjacent building to the kerb and gutter of the intersecting road. This shall be completed in a manner shown on the relevant standard Drawing.

Interlocking pavers shall be layed in a "Herringbone" laying pattern.

11.08 METHOD OF LAYING

Paving units shall be placed on the uncompacted screeded sand bed to the nominated laying pattern, with care being taken to maintain the specified bond throughout the works. Paving units shall be placed such that all joints are correctly aligned.

The first row shall abut an edge restraint and shall be laid at a suitable angle to the edge restraint to achieve the required visual orientation of paving units in the completed pavement.

The size of the gaps between individual paving units and edge restraints, kerbs, etc, shall be 2mm " 1mm.

In each row all full units shall be aligned first. Closure units shall be cut and fitted subsequently. Closure units shall be cut by power saw, or other appropriate method. The cut shall be clean and the paver must butt up against the respective edge.

To fill spaces between 25 and 50mm wide, a coloured concrete (to match the paving block) shall be used, having a 1:2:4 cement, sand, course aggregate mix. The normal aggregate size shall not exceed one third the smallest dimension of the infill space. For smaller spaces, dry packed mortar shall be used.

Except where it is necessary to correct any minor variations occurring in the laying bond, the paving units shall not be hammered into position. Where adjustment of position is necessary, care shall be taken to avoid premature compaction of the sand bedding.

Workmen shall use planks to avoid disturbing pavers prior to compaction if it is necessary to work over uncompacted pavers. No other traffic shall be allowed on pavers prior to compaction.

11.09 SERVICE BOXES, AREA LIGHTS, POLES, ETC.

Traffic facilities such as parking and traffic signs, parking meters, and public facilities such as garbage bins, seats and area lights shall have the block paving cut in around so that the block paving is of a tight fit where no sand or blocks can be easily removed and it is safe for pedestrian usage.

All existing public utility services shall have a 50mm wide red-oxide concrete border around the utility. The red-oxide concrete shall be at least 75mm thick.

All existing public utility service boxes shall be reset to suit any new levels. The respective utility authority shall be liaised with for any adjustments to any public utility service boxes.

A 200 x 200mm wide strip shall be filled with coldmix adjacent to any Electricity pole.

11.10 TREE SITES

The paving units are to be continued in the stretcher bond pattern - leaving approximately 1 square metre free for each tree site as per the relevant Standard Drawing.

A concrete edge restraint shall be formed on each side of the tree site.

On the kerbside, depending on placement of existing trees, an area the length of 1-2 pavers shall be paved.

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Details of proposed "Tree Sites" shall be set out and confirmed with the Certifying Officer at least 7 days prior to the pavers being laid in the respective areas.

11.11 JOINTS

Expansion joints 10mm in width shall be constructed at the interface of the paving blocks and concrete or asphalt footpath pavements and/or any paving that may exist on private properties.

Expansion joints shall consist of a preformed joint filler in accordance with the current relevant RTA standards.

11.12 COMPACTION

The paving units shall be compacted to achieve consolidation of the sand bedding (approximately 10mm settlement), and brought to design levels and profiles by not less than two passes of a high frequency, low amplitude mechanical flat plate vibrator having a plate area sufficient to cover a minimum of 12 paving units.

Compaction shall proceed as closely as possible following laying and prior to the application of any traffic.

Compaction should not be attempted within one metre of the laying face. Compaction shall continue until lipping has been eliminated between adjoining units.

All work to within one metre of the laying face must be left fully compacted at the completion of each days laying.

Any units which are structurally damaged during compaction shall be immediately removed and replaced.

11.13 FILLING JOINTS

After compaction of the paving blocks and prior to the termination of work on that day and prior to the application of any construction traffic, sand for joint filling shall be spread over the pavement.

The joint filling sand shall be a well graded sand passing a 2.36mm sieve and be suitable for concrete manufacture. The joint filling sand shall be as dry as practicable when spread.

The joint filling sand shall comply with the following grading limits:

Sieve Size (mm)	% Passing		
2.36	100		
1.18	90 - 100		
0.600	60 - 90		
0.300	30 - 60		
0.150	15 - 30		
0.075	5 - 10		

The joint filling sand shall be free of soluble salts or other contaminants likely to cause efflorescence or lead to reduced skid resistance.

The filling sand shall be broomed to fill the joints and the pavement recompacted to achieve compaction of the joint filling sand. As the work proceeds joints shall be checked for adequacy of filling and any shortfall shall be made

good prior to further compaction taking place. Any excess surface sand shall be removed promptly from the surface of the paving blocks.

11.14 EDGE RESTRAINT

Adjacent to free edges where paving blocks do not adjoin a hard paved surface, a mass concrete edge restraint shall be provided. The concrete shall be finished at a level 35mm above the base of the block and shall be a minimum thickness of 100mm and depth of 200mm.

The adjacent ground shall be graded to meet the top of the paving.

12 STEELWORK

12.01 MATERIALS - GENERAL

If requested by the Certifying Officer, copies of mill test certificates shall be provided for all materials showing chemical and mechanical properties. If mill test certificates are not available tests shall be carried out as directed by the Certifying Officer in order to establish that the material is suitable for use in the Works.

Unless otherwise shown on the Drawings, materials shall be of the following grades:

Plates, Universal Beams & Columns, Sections	Grade 250
Welded Beams & Columns	Grade 300
Rectangular hollow sections	Grade C350
Circular hollow sections	Grade C350

12.02 SHOP DRAWINGS

Shop drawings shall be prepared from the Working Drawings in such detail as necessary for the complete fabrication, assembly and erection of the structural steelwork to ensure correct fit-up and matching of steelwork to all other work.

Each shop drawing shall be clearly cross-referenced to the corresponding Working Drawing.

Shop drawings shall show all marking of members, material sizes, dimensions, holing and the location, type and size of welds and bolts. Procedures for shop and site assembly, including the torque requirements and tightening method for high-strength bolts, and requirements for surface preparation and protective coating shall be noted on the shop drawings.

Minor modifications of details may be suggested to suit the particular shop and site procedures. Such modifications shall be subject to the general agreement of the Certifying Officer before inclusion in the shop drawings.

The practicability of all design details shall be checked in regard to fabrication and erection and any amendments considered necessary for the proper execution of the work shall be proposed. These proposed amendments shall be subject to the agreement of the Certifying Officer.

12.03 DIMENSIONS

All work shall be fabricated to the actual dimensions required on site and all dimensions shall be verified on the site prior to proceeding with the work.

12.04 FABRICATION

Fabrication shall be carried out to recognised standards of good practice and shall comply with the requirements of the current edition of the relevant Australian Standard, except as otherwise specified.

On completion of fabrication, tolerances shall in accordance with the current edition of the relevant Australian Standard unless otherwise specified or shown on the Drawings.

Cut edges shall be free of gouges, burrs and other defects that would adversely effect the serviceability of the steelwork or detract from the finished appearance. All burrs, fins and raggedness left by sawing, punching, shearing, cropping or flame cutting shall be removed before assembly.

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Mechanically guided flame cutters may be used for stripping wide plates to required widths and for cutting a number of similarly shaped pieces simultaneously.

Re-entrant corners shall be shaped notch-free to a radius of at least 11 mm.

12.05 BOLT HOLES

Holes for bolts shall generally not be more than 2 mm larger in diameter than the bolt. Holes for anchor bolts shall not be more than 6 mm larger in diameter than the anchor bolt, unless otherwise shown on the Drawings.

The bolt pitch, and edge distances, shall conform with the requirements of the current edition of the relevant Australian Standard.

The surface around holes shall be smooth and free of burrs, fins and other defects that may prevent solid seating of contact surfaces.

Holes shall be drilled to size or punched 3 mm under size and reamed to size. Holes shall not be punched full size without the prior agreement of the Certifying Officer. The region around holes punched full size shall be flat before assembly. Dressing around such holes by appropriate means shall be permitted.

12.06 SPLICES AND JOINTS

Where available stock lengths of steel are shorter than the required length of member, splicing by complete penetration full section butt welds may be permitted as directed by the Certifying Officer.

Welded splices in compound members shall be staggered, and the component plates and sections spliced before compounding.

Critical field splices and joints shall be mated in the shop on completion of fabrication to ensure satisfactory fit when erected.

Should field splices and joints, whether bolted or welded, in addition to those shown on the Working Drawings be proposed or required, or in different locations, such connections shall be by agreement with the Certifying Officer in respect to design, procedure and workmanship.

12.07 WELDING

12.07.01General

All welding shall be carried out by electric metal-arc processes in accordance with the current edition of the relevant Australian Standard.

Welding plant and equipment shall be of a standard acceptable to the Superintendent and shall be operated in accordance with the manufacturer's instructions.

Electrodes and other welding consumables shall be stored and used as recommended by the manufacturer. Covered electrodes for manual arc welding and fluxes for automatic and semi-automatic welding that have been wet or dampened shall not be used whether they have been re-dried or not.

When welding heavy sections and in other special applications and conditions, low hydrogen electrodes may be used subject to the conditions of the current edition of the relevant Australian Standard. Low hydrogen electrodes shall be employed if so directed by the Certifying Officer.

12.07.02Welding Details

All welding shall comply with details shown on working drawings or, if no details are shown, as directed by the Certifying Officer.

12.07.03Welding Personnel

All welding shall be carried out under the supervision of a person who holds a welding supervisors certificate in structural welding in accordance with the current edition of the relevant Australian Standard, or other qualifications acceptable to the Certifying Officer.

The qualifications of welders shall comply with the current edition of the relevant Australian Standard . Evidence acceptable to the Certifying Officer that welders are qualified for the procedures they will be carrying out shall be provided. The Certifying Officer may elect to observe qualification and procedure tests.

12.07.04Welding Procedures

Details of welding procedures shall be provided to the Certifying Officer as part of the shop drawings and such procedure tests as the Certifying Officer may require in accordance with the current edition of the relevant Australian Standard shall be carried out prior to their employment in the work.

Preparation of edges to be welded shall be carried out by mechanical means or machine flame cutting. Manual flame cutting shall only be used if permitted by the Certifying Officer and provided that the cut surfaces are ground to the satisfaction of the Certifying Officer.

The procedure and sequence of welding shall be such that distortion and restraint are minimised. When, in the opinion of the Certifying Officer, welding is likely to result in excessive shrinkage stresses or distortion, a complete programme for the welding sequences to be used shall be prepared. When excessive distortion is evident, it shall be corrected to the satisfaction of the Certifying Officer.

When site welding is to be employed, the assembly of steelwork shall be planned in sections to permit a maximum amount of welding to be completed on the ground. The work shall be planned in a manner to limit overhead welding as much as possible.

Areas to be site welded shall be left uncoated for a distance of at least 50 mm from the weld line unless the coating is a "weld through" type primer.

No welding or flame cutting shall be carried out while a member is in a state of stress without the prior permission of the Certifying Officer.

12.08 BOLTED JOINTS

12.08.01Washers

At least one washer shall be placed under the bolt head or nut, whichever is to be rotated when tightening. Taper washers shall be used where the surface under the bolt head or nut is not perpendicular to the axis of the bolt.

12.08.02Mild Steel Bolts

Unless otherwise noted on the Drawings, commercial grade mild steel bolts shall be used only for anchor bolts and purlin and girt connections.

Mild steel bolts, washers and nuts shall comply with the current edition of the relevant Australian Standard.

12.08.03High Strength Bolts

High strength bolts, nuts and washers and bolting procedures shall comply with the current edition of the relevant Australian Standard. Where hot-dip galvanised bolts are required, the nuts shall be provided with supplementary lubrication as specified in the current edition of the relevant Australian Standard.

12.08.04Protective Treatment

The protective treatment to be applied to bolts shall be as shown on the Drawings.

Contact surfaces of friction-type bolted joints may be primed with inorganic zinc silicate coating prior to installation of the bolts but shall be free of any other type of paint.

12.09 DELIVERY AND STORAGE

12.09.01Identification

Before dispatch to site each separate member shall be distinctly marked in accordance with the marking diagram of the shop drawings. The mark numbers may be painted but shall also be stamped on the member in characters at least 13 mm high. The members shall also carry orientation marks required for assembly and erection.

All bolts, nuts, washers and other small items shall be properly labelled for easy identification and each shipment of steel shall contain the bolts, nuts and washers required for the erection of that shipment.

Where practicable, loose pieces for connections shall be securely attached to the members at or adjacent to the point of connection.

12.09.02Handling and Storage

Steelwork shall be handled, transported and stored in a manner that will not cause permanent deformation nor result in excessive damage to the protective coating. Members damaged during handling and storing shall be liable to rejection.

Repairs to damaged steel and coating shall be carried out to the satisfaction of the Certifying Officer.

Steelwork delivered to the site shall be stored clear of the ground and separated from other steelwork items until erected.

Bolts, nuts, washers and other small pieces shall be kept in grit free containers and stored in weather-proof premises.

12.10 ERECTION

12.10.01General

An erection procedure shall be adopted such that all members can be placed and fixed in position without distortion.

During erection steel members shall not be cut, welded or drilled without the prior agreement of the Certifying Officer. Drifting shall only be used for bringing parts into position but not to match unfair holes nor to enlarge holes or otherwise distort metal.

Bracing, guying and other temporary members to facilitate erection shall be provided and shall be affixed in a manner that does not deform or deface permanent steelwork.

Upon completion of erection all temporary bracing, erection bolts and the like shall be removed and the permanent steelwork made good to the satisfaction of the Certifying Officer.

Tolerances for setting out and erection of steelwork shall be in accordance with the current edition of the relevant Australian Standard.

No final tightening of bolts or permanent welding shall be carried out until sufficient members have been erected to enable the work to be aligned, levelled and plumbed as specified.

12.10.02High Strength Bolted Joints

High strength bolts shall be installed in accordance with the current edition of the relevant Australian Standard. Bolts shall be tightened by the part-turn method. Bolts and nuts shall be location marked to check that the correct rotation from the snug tight position has been obtained.

Facilities shall be provided so that all joints can be inspected by the Certifying Officer both before and after tightening of the bolts.

As bolts are finally tightened they shall be marked with paint or other indelible marker to ensure that the work is systematically carried out and to facilitate inspection by the Certifying Officer.

12.11 ATTACHMENT TO CONCRETE FOUNDATIONS

Steelwork supported by concrete or masonry shall be bedded on cement grout. Unless otherwise specified, the grout shall consist of a Portland cement/sand mortar having a minimum compressive strength of 25 MPa at 28 days.

The steelwork shall be set up on steel packing or on levelling nuts on the anchor bolts. Grouting shall not be commenced until sufficient steelwork has been aligned, levelled and plumbed, adequately braced and secured by permanent fastenings. Grouting shall not commence until permitted by the Certifying Officer.

Immediately before grouting, the space under the steel shall be thoroughly cleaned and wetted and left free of excess moisture.

Grout shall be placed by either of the following two alternatives:

- A The grout shall be mixed as dry as possible and shall be worked under the steel by thoroughly ramming with a blunt tool; or
- B Suitable fluid grout shall be pumped under pressure. Holes shall be provided in the steelwork as required for grout injection and air bleed-off.

Side forms shall be provided to retain grout. The space to be grouted shall be completely filled with mortar. Exposed grout edges shall be splayed and neatly finished. The edges shall be cured for at least three days by covering with sand, kept continually moist or by use of an approved curing compound.

When non-shrink grout is specified, the work shall be performed using an appropriate pre-mixed grout. Details of the proposed grout shall be submitted to the Certifying Officer prior to carrying out the work. Preparation of surfaces, mix proportions, application procedures and curing shall be in strict accordance with the manufacturer's instructions.

13 PROTECTIVE COATING FOR STEELWORK

13.01 GENERAL

Protective coating shall be carried out in accordance with the principles of the current edition of the relevant Australian standard. Coating materials, surface preparation and methods of application shall, except where specifically varied by this Specification, be in accordance with the current edition of the relevant Australian standards and in accordance with the coating manufacturer's recommendations.

To ensure compatibility of the layers of a coating system, the coating material used in all layers shall be provided by the same manufacturer.

Before commencing preparation for coating, the name of the protective coating applicator and full details of the coating systems proposed to be used on the several parts of the works, shall be submitted to the Certifying Officer, including manufacturer's descriptions and recommendations for surface preparation and for application.

13.02 PREPARATION AND APPLICATION CONDITIONS

All preparation for, and application of coatings (except hot dip galvanising) shall be carried out in dry conditions with a steel temperature not less than 3EC above the dew point.

Surfaces prepared for coating shall be cleaned of dust and coated as soon as practicable.

The application of paint to blast cleaned surfaces shall be commenced within four hours of completion of blast cleaning and shall be completed on that day and before dew point is reached.

Under no circumstances shall paint or primer be applied over moisture on the surface of the metal. Should rain fall during or after cleaning, but before the application of paint or primer, the whole of the surface in question shall be recleaned. The Certifying Officer may prohibit the continuation of painting if, in his opinion, rain is likely to fall within two hours of painting. Paint shall not be applied during damp or foggy conditions.

Effective controls shall be established to preclude operations in unsuitable weather conditions. Work shall not be performed on surfaces wetted or likely to become wetted after blasting and before coating, when the relative humidity exceeds 90%, or when the metal surface temperature exceeds 50EC or is lower than 10EC.

All coating operations shall be performed in a neat and workmanlike manner by personnel with proven experience in the field. Each coating shall be uniform, free from runs and sags, and shall be allowed to dry and/or cure in accordance with the manufacturer's instructions.

Such measures as are necessary shall be taken to obviate health hazards arising from the use of paints and coating materials and to satisfy all requirements within the trade. Such equipment and measures as are necessary for the adequate protection of adjacent structures, permanent plant and equipment against damage or disfigurement during both cleaning and coating operations shall be taken. At the completion of the work, all paint spots, stains, etc. shall be removed so as to leave the site and all adjacent structures in a clean condition acceptable to the Certifying Officer.

Where the installation of plant, flooring and/or similar items will prevent surfaces from being satisfactorily coated after erection, the surfaces that will be inaccessible shall be finish coated prior to erection, or while still accessible for purposes of coating.

13.03 PROTECTION AND REPAIRS

Coated steelwork shall be protected during transport, storage and erection to prevent damage to the coating. Protection should include, but not be limited to, use of cloth slings, padding and blocking during transport and storage, and storage clear of the ground and of adjacent stored members.

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

All damaged areas of coating shall be made good to the satisfaction of the Certifying Officer. All areas to be repaired shall be thoroughly degreased. Generally, repairs shall include surface preparation, priming and top coating as required for the original coating. Damaged areas of zinc primed coating systems, shall be cleaned back to bright metal and spot-primed immediately with organic zinc rich primer, dry film thickness 100 Microns. Damaged areas of hot dip galvanised steel shall be reinstated by lightly spot-blasting (or sanding with abrasive discs) the damaged areas, and spot-primed with organic zinc rich primer to achieve a dry film thickness of 0.1 mm. Where the coating system includes top coats, these shall then be applied or reinstated over the patch primed area.

13.04 SURFACE PREPARATION

Preparation for hot dip galvanising shall consist of removal of paint, oil, grease, welding slag and spatter, followed by pickling to remove mill scale and rust. Pickling shall be carried out in the galvanising workshop. Preparation for other coatings shall consist of power tool cleaning or abrasive blast cleaning, depending on the type of coating to be used or as shown on the Drawings.

All areas of the surfaces which are to be blast cleaned and which show any trace of oil or grease shall be degreased using an appropriate cleaning agent prior to blasting to avoid recycling of these contaminants during the blast cleaning operations.

Abrasive blast cleaning shall be carried out by sand or grit blasting using compressed air nozzles. Metallic abrasive, if used, shall be sharp and hard and free from dust. Acceptable materials will be cast iron grit, or cut wire. Sand abrasive, if used, shall be substantially free from dust and clay and completely free of salt.

The specified blast cleaning standard shall be deemed to be the absolute minimum requirement for a particular item and coating specification. All surfaces to be coated shall be dry abrasive blast cleaned and wet blasting will not be permitted. Surface profile height after blasting shall be within the range 0.025 to 0.040 mm.

All abrasive blast cleaned surfaces shall be kept free from contamination and to this end, operators should be equipped with gloves. Areas inadvertently contaminated with bare hands shall be re-cleaned as specified or carefully wiped with an appropriate solvent.

Where a surface shows discolouration within a short time after blast cleaning, the surface shall be thoroughly washed with fresh water, dried and re-blasted. If necessary, the procedure shall be repeated.

13.05 APPLICATION OF COATINGS

Unless otherwise specified, all primers and subsequent coats used throughout the Works shall be applied according to the manufacturer's recommendations, and to the satisfaction of the Certifying Officer.

Mixing, thinning and application instructions as nominated by the coating manufacturer shall be absolutely adhered to and no other addition to the mixed coating shall be used.

Immediately after blasting operations and before the commencement of coating, all surfaces shall be air blown with clean dry air or efficiently brushed down with fibre bristles giving particular attention to corners, intersections and horizontal areas where settlement of dust would be most likely to occur.

Unless specified, all prime coats shall be applied in the applicator's own workshop.

Where spraying of zinc based and similar high solids type paints is to be carried out, the pressure pot shall be fitted with an efficient agitator which shall be in constant use during the application of the coating.

An efficient air line filter shall be fitted as close as possible to the pressure pot to eliminate line condensation and oil in air supply to the spray gun. All equipment, including receptacles, shall be to the Certifying Officer's satisfaction.

All unpainted machined steel surfaces of sliding bearing plates, rockers or rollers shall be given two coats of an appropriate inhibitive grease to prevent corrosion.

13.06 HOT DIP GALVANISING

Detailing of all hardware to be galvanised shall conform to the procedures set out in the current edition of the relevant Australian Standard. All units to be galvanised shall be fabricated in sections suitable for the galvanising baths and galvanised after fabrication. Where modifications, drain holes, etc. are required for galvanising, they shall be detailed on the shop drawings.

All steelwork and metalwork specified to be galvanised shall be hot dip galvanised to comply with the current edition of the relevant Australian Standard to provide a minimum of 600 g/m2 zinc coating.

Care must be taken to ensure that the threads of nuts and/or bolts are protected to eliminate the necessity for recutting.

Where galvanised surfaces are affected by welding, the surfaces shall be thoroughly cleaned and zinc-sprayed to a minimum thickness of 0.1 mm.

Where practicable, all galvanising is to be carried out after fabrication.

Galvanised surfaces shall be free from uncoated spots. The zinc coating shall be free from blisters, flux, black spots, dross and projections which will interfere with the proper use of the article and from other defects not consistent with good galvanising practice.

13.07 CHROME PLATING

Where chromium (chrome) plating is specified it shall be in accordance with the current edition of the relevant Australian Standard.

Steelwork is to be heavily coppered, nickel-plated to a depth of at least 0.050 mm and overlaid with chromium plating to a depth of 0.012 mm then buff-polished to a lustrous finish.

Copper and brass are to be nickel-plated and then chromium plated as specified for Steelwork.

13.08 PRIMING

Unless other finishes are specified, or the member is to be encased in concrete, all steelwork shall be shop-primed before delivery to site.

All surfaces to be shop-primed shall be thoroughly cleaned. Rust mill scale and welding slag shall be removed and the surface thoroughly dried.

Immediately after cleaning and drying, the surfaces shall be completely covered by a coat of anticorrosive red oxide zinc phosphate primer suitable for application on metal surfaces. The primer may be applied by brushing and/or dipping.

13.09 SURFACES NOT TO BE COATED

The following surfaces and materials shall not be blasted or coated unless specified, indicated on the drawings or otherwise directed by the Certifying Officer:

! areas to be field welded shall be masked after blasting to leave a 50 mm unprimed margin. A further 50 mm of primer shall be masked before top coating to facilitate final touch-up of field welds

- ! mating surfaces of friction grip connections shall not be coated except where galvanising or an inorganic zinc silicate prime coat is required
- ! metalwork to be embedded in concrete shall be cleaned of grease, paint and loose rust before embedment, and shall not be coated unless required to be galvanised, except that surface preparation and priming shall extend to a line not less than 50 mm below the surface of the concrete.

13.10 CONNECTIONS

Generally, completed welded or bolted connections shall be degreased, prepared, primed and top coated, where applicable, with the coating system required for the steelwork. Where galvanising or inorganic zinc silicate primer is used, only hot dip galvanised bolts, nuts and washers shall be used in bolted joints. Welded joints in galvanised or inorganic zinc silicate primed steelwork shall be blast cleaned Class 2 1/2 and reprimed with organic zinc rich primer. If top coating is required, the galvanised surfaces of joints shall be degreased as necessary and etch primed before top coating.

Bolted connections in galvanised or inorganic zinc silicate primed steelwork shall be prepared and coated as specified for repairs.

13.11 INSPECTION

Work may be inspected by the Certifying Officer or his nominated inspector at each stage of the coating operation, ie after blasting, prior to each coat and after final topcoat application. Where so specified, by the Certifying Officer, application of coatings shall not proceed until each previous operation has been inspected by the Certifying Officer or his nominated inspector.

A list of work and procedures shall be submitted to the Certifying Officer prior to any coatings being applied. All coats are to be applied in strict accordance with the manufacturer's recommendations and as set out in the coating specification.

The coating manufacturer's technical representative shall be available for consultation and to inspect work, both onsite and in the applicator's workshop, in conjunction with the Certifying Officer or his nominated inspector. The procedure associated with surface preparation and the application of each coating shall in the first instance be carried out in the presence of the Applicator, the Technical Representative of the coating manufacturer and the Certifying Officer or his nominated inspector.

Inspection will be carried out in accordance with the recommendations of the current edition of the relevant Australian Standard.

For the purpose of inspection, the Certifying Officer shall be given five (5) days written notice of the intention to apply the paint coats to the steelwork. The Certifying Officer shall be given all assistance required during the inspection to permit examination.

Wet paint and dry film thickness gauges shall be provided and operated to ensure the correct thickness of each coat and of the full paint system.

The dry paint film thickness gauge shall be suitably calibrated and regularly checked against a known standard to ensure its accuracy.

Surface profile, coating thicknesses and coating adhesion will be checked by the Certifying Officer or his nominated inspector using the following methods:

! surface profile will be measured by visual examination and comparison with profile standards or by use of a Surface Profile Gauge

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

! wet film coating thicknesses, dry film coating thicknesses and adhesion shall be measured in accordance with the current edition of the relevant Australian Standard.

If these film thicknesses, adhesion, profile and the like are not in accordance with the Specification or the coating manufacturer's published data, the surfaces concerned shall be cleaned back to bright metal and recoated.

13.12 COATING MATERIALS

Materials used in protective coatings shall be in accordance with the following:

- ! inorganic zinc silicate coating shall consist of zinc powder in a self-curing inorganic medium. Materials shall comply with the requirements of the current edition of the relevant Australian Standard.
- ! organic zinc rich primer shall consists of powdered zinc in an epoxy base and curing agent, and shall comply with the requirements of the current edition of the relevant Australian Standard.
- etch primers for galvanised items shall consist of zinc tetroxy-chromate pigment in a polyvinyl butyl resin binder and a catalyst component containing phosphoric acid, with a volatile solvent vehicle
- ! high-build vinyl coating shall consist of vinyl resin binder and volatile solvent with pigment to suit
- ! micaceous iron oxide coating shall consist of micaceous iron oxide pigment with or without aluminium or red iron oxide pigment to distinguish between coats, carried in an alkyd resin binder complying with the current edition of the relevant Australian Standard.

Unless otherwise specified hot dipped galvanised surfaces shall not receive further protective coating except in cases where the galvanising has been damaged, in which case they shall be repaired as directed by the Certifying Officer.

14 BRICKWORK AND BLOCKWORK

14.01 BRICKS

Bricks shall conform to the current edition of the relevant Australian Standard. They shall be sound, hard and well burnt, of uniform shape and size with unbroken arrises, nominal size 230 x 110 x 76 m. Clinkers or callows shall not be used.

Sample bricks representing those intended for use in the work shall be submitted to the Certifying Officer prior to ordering the bricks. Samples which meet the requirements of the Specification and Drawings shall be retained on site in good condition. Only bricks equal to the retained samples shall be used in the works.

Dumping of bricks is prohibited.

14.02 CONCRETE MASONRY BLOCKS

Concrete blocks shall be 400 mm long x 200 mm high x 100mm thick, hollow concrete masonry conforming to the requirements of the current edition of the relevant Australian Standard. Half blocks and smaller blocks shall be used as required for particular dimensions. Where it is unavoidable that blocks be cut, they shall be cut with an abrasive saw to give a neat finish.

14.03 STRUCTURAL BLOCK WORK

Structural walls and other work shown in the Drawings as manufactured from concrete filled and reinforced "hollow concrete blocks" or other form of masonry shall be constructed to details shown in the Drawings.

Concrete used to grout the cavities in the blocks shall have 10mm maximum sized aggregate and cement and water content designed to provide F'c 35 MPa unless shown otherwise in the Drawings. An appropriate plasticising agent may be used to delay initial set and facilitate the consolidation of the concrete in horizontal and vertical cavities. If a plasticising agent is proposed details shall be submitted to the Certifying Officer at least 5 (five) working days before it's intended use.

Joints between blocks shall be sufficiently mortared or sealed to prevent loss of grout. In the case of curved walls laid dry, blocks shall be profiled so that the perpends meet neatly on both faces to prevent grout loss.

If necessary to prevent stains or disfiguring from minor grout or water loss at faces which are exposed when the wall is completed, joints shall be sealed from inside the cavities.

Grouting shall be carried out as the blocks are laid and grout shall be well consolidated into all cavities. Pencil vibrators and/or hand rodding shall be used if necessary to achieve a dense grout matrix in difficult areas and/or cavities which are reinforced.

Generally, not more than two courses shall be laid without grouting. In cases where it is demonstrated that more than two courses can be grouted satisfactorily, the Certifying Officer may permit more than two courses to be laid prior to grouting.

15 STORMWATER DRAINAGE

15.01 MATERIALS

15.01.01Pipes

Reinforced concrete, Vitrified clay and/or Polyethylene pipes shall comply with the requirements of the current edition of the relevant Australian Standard. Pipes shall be of the class shown on the drawings.

Rubber joint rings for use with reinforced concrete or vitrified clay pipes shall comply with the requirements of the current edition of the relevant Australian Standard.

15.01.02Precast Reinforced Concrete Box Culverts

Precast reinforced concrete box culverts shall comply with the requirements of the current edition of the relevant Australian Standard.

15.01.03Selected Backfill

Selected backfill shall comply with the requirements of the FILLING section of this Specification.

15.01.04Concrete

Concrete, reinforcement and formwork for drainage structures shall comply with the requirements of the CONCRETE section of this Specification. Concrete strength shall be as specified on the Drawings.

15.01.05Cement Mortar

Cement mortar shall comply with the requirements of the current edition of the relevant Australian Standard.

15.02 PRECAST CONCRETE BOX DRAINS

Precast concrete box drains shall be in accordance with the current edition of the relevant Australian Standard and/or RTA Standard Form.

The base of Precast Concrete Box Drains shall be cast in-situ Reinforced concrete to the line, level and grade as shown on the Drawings.

The box section shall be positioned true to line, the invert level of the section true to level and grade as shown on the Drawings and the sections closely butted together. A thin layer of mortar, one (1) part cement to three (3) parts sand, shall be used on the sections prior to placing the sections together.

The maximum permissible tolerance shall not exceed 10mm above or below true grade nor 20mm to either side of the true alignment, for any two points 8m apart. Moreover, no portion of the work shall depart more than 10mm from true level, as determined from the nearest convenient bench mark which shall be indicated by the Certifying Officer.

Any culvert or culverts not laid within these tolerances shall be lifted and relaid so that the gradient and alignment are within the specified tolerances.

In all cases care shall be taken with laying so that the interior of the box sections have a neat, smooth and uniform surface at the joints and the interior surfaces of the sections shall be cleaned of any excess mortar after jointing. The joints shall be protected from rapid drying by covering with wet bags for at least three (3) days after placing or alternatively by the application of an approved curing compound.

Trenches at the sides of box drains shall be carefully packed and solidly compacted at the sides with sand or metal dust in uniform layers which shall be carried up to the top of the precast section all to the satisfaction of the Certifying Officer.

15.03 REINFORCED CONCRETE PIPE DRAINS

15.03.01Description of Pipe

The class and size of pipes shall be as shown in the Drawings. Unless shown otherwise, all pipes shall be manufactured for rubber ring jointing and shall be supplied complete with rings suited to the pipe manufacturer's details.

The size, class, manufacturer's name and date of manufacture shall be indelibly marked on the obvert of every pipe. The markings shall be large, durable and distinctive enough to be read easily during CCTV scanning some years after the pipe has been put into service.

15.03.02Pipe Bedding

The material used for bedding of pipes shall be approved granular material having a high permeability and a high stability when saturated; and be free of organic matter and coarse material retained on a 2.36mm sieve.

Samples of the types of materials intended to be used shall be submitted to the Certifying Officer prior to their use.

No bedding material shall be placed until the excavation has been inspected by the Certifying Officer. After inspection by the Certifying Officer bedding material shall be placed and compacted so that the bottom of the trench is at the correct level for pipe laying.

15.03.03Method of Laying

Before pipes are laid all dirt and foreign material that may have entered the pipe shall be removed and the outside of spigots and inside of sockets thoroughly cleaned of foreign matter.

The pipes shall be laid and jointed accurately to lines, gradients and levels shown on the plans. All pipes shall be laid in such a manner that pipe barrels have solid bearing throughout their length.

The maximum permissible tolerance in any single length of pipe shall not exceed 10mm above or below true grade, nor 10mm to either side of the true alignment and the maximum departure from the grade shall not exceed 20mm between any two points 8 metres apart. No portion of the work shall depart more than 10mm from true level.

Any pipe or pipes not laid within these tolerances shall be lifted and relaid so that the gradient and alignment are within the tolerance specified.

Laying shall commence at the low points of the pipeline and proceed uphill.

The space between abutting ends of pipes shall not exceed one-half (1/2) per cent of the diameter of the pipe. Where bandage joints or spigot and socket pipes are used, small recesses 150mm long shall be left under pipe joints to permit jointing, or in the case of spigot and socket pipes to allow the barrels to bear evenly on the foundation for their full length.

Where two or more lines of pipe are to be laid side by side, the space between the lines of pipe shall be not less than 300mm unless otherwise specified or shown on the Drawings.

All open ends of pipeline stubs shall be baulked and closed off before backfilling commences.

If required by the Certifying Officer everything necessary shall be provided to demonstrate that no obstructions or defects exist in the pipeline after backfilling. Any obstruction or other defect shall be removed to the satisfaction of the Certifying Officer.

15.03.04Method of Jointing

Rubber ring joints for concrete pipes shall be formed by placing the rubber ring evenly over the spigot end of the pipe and rolling it into the socket, care being taken to ensure that the joint is free from dirt or other obstructions and that the rubber ring is placed evenly in the joint. Rubber ring joints shall be fitted in the manner described by the manufacturer.

Where precast collars or spigot and socket pipes are used, joints may be made with cement mortar or an appropriate bituminous filler. Where possible, the joint immediately adjacent to a pit and/or a headwall shall not be made until after the pit or headwall is constructed.

In all cases care shall be taken that the interior of pipes are cleaned of any excess jointing material after jointing. Mortar joints shall be protected from the sun, and if necessary covered with earth or wet bags to prevent rapid drying of the mortar for at least three (3) days after placing or alternatively by the application of an appropriate curing compound.

All holes provided in concrete pipes for lifting or handling purposes shall be plugged with concrete bungs supplied by the manufacturer and are to be rammed home. The Certifying Officer may require the installation of bungs using a bitumen paint. All holes shall be plugged to the satisfaction of the Certifying Officer prior to the backfilling of trenches.

15.03.05Methods of Testing

Copies of the following shall be submitted to the Certifying Officer.

(i) Video tapes of Close circuit television video inspection carried out on all pipeline works after the lines have been backfilled and the backfill completely compacted and after any overlying earthworks and/or roadworks have been completed

In the event of joints or pipes bring damaged during backfilling or other subsequent work, the damaged pipes shall be removed and replaced.

(ii) Works as executed levels on the invert of the constructed pits and on the inverts of any inlet or outlet pipes.

15.04 DRAINAGE STRUCTURES

Drainage Structures such as gully pits, junction chambers etc. shall be constructed in the locations and of the type as shown on the Drawings.

Lintels shall be laid with the top of the lintel flush with the top of the adjacent Kerb. A transition of at least 2 metres long between the Kerb and Gutter and either end of the lintel shall be installed after the Lintel has been installed.

For junction chambers set in roadways, footpaths, medians or grass verges the covers shall finish flush with the surrounding surface. For junction chambers set in embankments the cover shall be laid horizontally and the surrounding ground shaped to suit the position of the cover.

16 SUBSOIL DRAINS

16.01 **PIPES**

Pipes for subsoil drains shall be 100mm diameter "socked" corrugated black high-density polyethylene unless noted otherwise in the Documents. Unless otherwise specified, pipes shall be 100mm diameter.

16.02 FILTER MATERIAL

Filter material shall be coarse sand or crushed stone complying with one of the gradings in the following Table.

Where subsoil drains are laid in or adjacent to areas to be planted the pH of the filter material shall be in the range 6-7.

AS Sieve	<u>Pe</u>	ercentage Passing by Mass		
Size (mm)	Fine Filter	Fine Filter Coarse Filter		
26.5		100	100	
19.0		90-100	95-100	
9.5	100	65-85	80-95	
4.25	90-100	-	65-80	
2.36	70-90	-	45-65	
1.18	-	15-30	25-45	
0.60	-	0-2	12-20	
0.30	7-16		3-8	
0.15	0-4		0-2	
0.075	0-2			

TABL	E 4
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16.03 TRENCHES

The standard width of trench shall be 300mm. Where invert levels are not specified the minimum depth to pipe invert shall be 1m.

Unless otherwise detailed or directed, trenches for longitudinal drains shall be located so that the pipe centre line will be 150mm from edge of pavement or behind back of kerb as the case may be.

16.04 BEDDING, LAYING AND JOINTING

Unless otherwise detailed or permitted, the minimum grade of pipes shall be 1%. Corrugated polyethylene pipes shall be laid with one line of slots at the bottom.

The trench shall be lined with a suitable geotextile material prior to the placement of the pipe and filter material. Sufficient geotextile material shall be placed in order that the geotextile material can be laid over the top of the filter material at the completion of the backfilling.

Filter materials shall be placed so as to avoid segregation. Filter material shall be compacted in maximum layers of 300mm using a suitable mechanical plate vibrator.

Pipes shall be jointed in accordance with manufacturer's instructions.

The top 75mm of the filter medium below pavement, topsoil or other specified finish shall be fine filter material. In planting beds extend fine filter to finished surface of topsoil.

17 RE-CYCLED MATERIALS FOR FILLING AND BASES

17.01 MATERIALS GENERALLY

Crushed re-cycled materials for filling, backfilling, base courses etc, shall be crushed from clean hard and durable concrete. It may be blended with crushed brick, roof tiles ceramic tiles or selected sound rock but the proportion of materials other than concrete shall not exceed the limits set out in the table below

Prior to any crushed re-cycled materials being ordered from the suppliers, a certificate from a NATA registered testing laboratory shall be submitted to the Certifying Officer setting out the percentages of materials other than crushed concrete included in the proposed blended material, the Class of the material as set out herein, the particle size grading and the strength and plasticity index properties.

Each material Class shall comply with the following table:

		MATERIAL CLASS					
PROPERTY	TEST METHO D	A 1	A 2	В	С	D	E
		Road Base		Paver Base	General Filling	Bulk Filling	Drainage Medium
GRADING - Sieve sizes (mm)	AS 1141.11	Percenta	ige Passin	g each size			
150.0						100	
53.0						80-100	100
37.5			100			70-90	70-95
26.5		100	100			60-80	55-80
19.0		95- 100	85- 100				
13.2	70-90 70-90			100	40-70	20-45	
6.6		50-70 50-70		100	70-100	30-60	10-25
4.75				80-100			
2.36		35-55	35-55	50-80	40-65	20-50	0-2
0.425		10-30	10-30	10-30	10-30	10-35	0
0.075		5-15	5-15	5-20	40-65	5-20	
INDEX PROPERTIES (Max)						
Liquid limit %	AS1289	27	25	30	30	35	Not
Plasticity Index %	.3.1.1 & .3.2.1	8	8	12	15	15	Applic- able
% passing 0.425 mm x PI		180	180	240	300	400	
STRENGTH PROPERTIES							
Wet Strength (kN) (Min)	AS	70	50	50	50	50	50

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Standard Specification Page 58

		MATER	RIAL CLA	.SS			
PROPERTY	TEST METHO D	A 1	A 2	В	С	D	Е
		Road	Road Base		General Filling	Bulk Filling	Drainage Medium
Wet/Dry Strength variation (Max)	1141.22	35	40	60	70	70	50
Maximum Dry Compressive Strength (MPa) (Min)	T114	1.7	1.0	1.0	0.7	0.7	1.0
Unconfined Compressive Strength (MPa) (Max)	AS 1141.51	1.5	1.5	1.5	Not Applicable		
PARTICLE SHAPE							
Misshapen (% Max)	AS 1141.14	35	35	35	50	50	35
OTHER MATERIAL (% M	ax by mass)						
Asbestos	T276	0	0	0	0	0	0
Wood, organics, plastic, plaster		0.2	0.2	0.2	0.2	0.2	0.2
Metal, glass, ceramics, asphalt		3	4	5	10	10	5
Clay brick, tile, crushed rock, masonry brick			5	10	10	10	5
Total other than concrete, brick and asphalt		3	4	5	10	10	5

17.02 ALTERNATIVE SPECIFICATIONS

Crushed re-cycled concrete materials may be supplied to alternative specifications if shown on the drawings and/or described in Project Specific Specifications included in the Contract for special applications. Re-cycled concrete may be shown or specified as stabilised with varying quantities of lime or Portland Cement or other materials designed to give it special properties.

In these instances a certificate from a NATA registered testing laboratory shall be submitted to the Certifying Officer setting out the percentages of materials other than crushed concrete included in the proposed blended material, the particle size and grading and any other particulars deemed necessary by the Certifying Officer to establish that the material complies with the alternative Specification.

17.03 BACKFILL FOR TRENCHES

When selecting a class of material for backfilling trenches, due regard shall be had for the width of the trench and the method of compacting the backfill.

Narrow trenches which will be compacted by a packer with a small footprint will generally require a smaller maximum particle size, whereas when backfilling a wide trench which can be compacted with a vibrating roller, particle size corresponding to Class C - General Filling could be more appropriate.

The Citifying Officer will advise as to whether, in his view, the proposed material is not suitable for use in the work or does not comply with the requirements of the Contract.

18 TIMBER FENCES

18.01 GENERAL

All timber is to be hardwood with a minimum Stress Grade of F7. The spacing of the posts will be not greater than three metres (3m).

Timber shall be primed prior to fixing and treated against white ants, termites, rot, and other pests.

Posts shall be plumb and embedded in sufficient concrete to ensure the structural adequacy of the post. Where the posts are into a sandstone retaining wall, they are to be plumb and embedded into the existing penetration of the sandstone block. The post shall be grouted into position.

All structural fixings to the posts are to be galvanised. For Heavy Duty Ordinance fences the galvanised cover straps shall be 50mm wide and 450mm in length. The gauge of the strap will be 1.5mm thick. The strap shall be securely nailed to the posts and rails using enough suitably sized galvanised nails to ensure structural adequacy.

Light Duty Fences shall have the top rail secured to the post using galvanised 75mm nails fixed into the post. There shall be a galvanised metal strap 40mm wide by 1.5mm thick and 450mm long. The strap shall be securely nailed to the posts and rails using enough suitably sized galvanised nails to ensure structural adequacy.

Fences shall be painted using premium quality semi gloss enamel delivered on site in sealed containers. All fences are to be painted the colour specified on the Drawings.

19 LANDSCAPING

19.01 SOILS - GENERAL

All soils required as part of the contract shall be to the depths and levels shown in Drawings. The soil composition shall be as detailed under soil composition, unless otherwise directed by the Certifying Officer.

Organic Garden Mix:	shall be used for all massed planted areas, garden beds and specimen tree planting.
Planter Box Mix:	shall be used for all contained planter beds.
Topsoil Mixture:	shall be used for all new and re-instated turfed areas.

19.02 SOIL COMPOSITION

19.02.01Organic Garden Mix:

50%	Black Soil
20%	Coarse Sand
30%	Organics containing:
	Composted Sawdust
	Composted Pine Bark
	Spent mushroom Compost
	Spent Coffee Grounds
	Composted Organics

19.02.02Planter Box Mix:

30%	Black Soil
10%	Graded Ash
10%	D/W Coarse Sand
10%	Nepean Sand
20%	Composted Hardwood Sawdust
10%	Humus
10%	Composted Topsoil

19.02.03Topsoil Mixture:

Definitions

Topsoil: General purpose soil to the current edition of the relevant Australian Standard.

Topsoil shall mean soil which contains organic matter, supports plant life, is free from unwanted matter such as stones over 25mm diameter, clay lumps, weeds, tree roots, sticks, rubbish, materials toxic, to plant growth and the like.

Topsoil Mixture:	Four (4) parts by volume of topsoil and one (1) part of compost, as specified in COMPOST, thoroughly mixed before placing.
Topsoil type in topsoil mixture:	Sandy Loam.
Sandy Loam:	Sandy loam shall be sand 75%, silt 10%, clay 10%, organic matter 5%, and PH value within a range of 5.5 to 7.0 with salt content (measured oven dry) 0.1%

maximum.

Topsoil Texture:	Coarse (light) to medium, as defined in the current edition of the relevant Australian Standard.
Topsoil Types:	Comply with the following table.

Composition % by Mass	Test Method	(By Texture) Medium Sandy Loam
Sand Silt Clay Organic Matter Salt Content Reaction PH Range	AS1289.D1.1 AS1871.5 AS1289.D3.1	80% 10% 10% 5% under 0.6% Table B1 5.5 - 7%

19.03 MULCHES - GENERAL

Mulches shall be free of deleterious and extraneous matter, including soil, weeds, rocks, twigs and the like. All mulches required shall be to the depths and levels shown in the Drawings and their composition shall be in accordance with that referred to in the Drawings and detailed in Mulches Composition unless otherwise directed by the Certifying Officer.

19.03.01Leaf litter: shall be used for all mass planted areas, garden beds, and specimen tree planting.

19.03.02Pine Bark: shall be used for all contained planting areas.

19.03.03Decomposed Gravel: shall be used for all areas adjacent to paved footpaths

19.04 MULCHES - COMPOSITION

19.04.01Leaf Litter

Suitable vegetative material (which may include leaf matter and tree loppings from Eucalyptus, Tristania, Pinus or other suitable species, but not privet, camphor laurel, coral tree, poplar, willow, or noxious weeds), processed through a chipper to pieces not larger than 75 x 50 x 15mm.

19.04.02Pine Bark

Horticultural grade equivalent to Australian Native Landscapes Specifications, graded to 25mm.

19.04.03Decomposed Gravel

Equivalent to Australian Native Landscapes Decomposed Granite Pink Specification, graded less than 5mm.

19.05 COMPOSTS - GENERAL

Any composts required shall be in accordance with Compost Description and where a specific type of compost is indicated in the Drawings it shall be in accordance with the relevant types listed below, unless otherwise directed by the Certifying Officer.

19.06 COMPOSTS - COMPOSITION

Well rotted vegetative material or animal manure, or other approved material, free from harmful chemicals, grass and weed growth, and with a neutral pH value. If required, a certificate of compost pH value shall be provided to the Certifying Officer.

19.06.01Mushroom Compost

Shall be spent mushroom compost typical of the compost used throughout the mushroom growing industry with a neutral pH value free from grass and weed growth.

19.06.02Composted Sawdust

Shall be typical of that used in the Nursery Industry as an admix for potting mix. It shall have been treated in accordance with NSW Department of Agriculture guidelines leached for a minimum of 12 weeks with a pH restricted to a range of 6 - 6.5.

19.06.03Pine Bark Fines

Shall be recovered from the screening process of pine bark. They shall not be recent screenings but aged to the point of partial breakdown so that if wet they do not float.

19.06.04Composted Manure

Shall be aged and composted with no toxic components, free from seeds and reproductive parts of weeds.

19.07 PLANTS

Plants shall be vigorous, well established, hardened off, of good form consistent with species or variety, not soft or forced, free from disease and insect pests, with large healthy root systems and no evidence of having been restricted or damaged. Trees shall have a single leading shoot.

19.07.01Substitutions:

No substitutions to either plant size or species shall be made, unless otherwise directed by the Certifying Officer.

19.07.02Replacements:

Sufficient quantities of plants shall be ordered to allow for plant failures. Any plants which fail or are damaged during the work shall be replaced with plants of the same specific type, quality and size, unless otherwise directed by the Certifying Officer.

19.07.03Warranty:

A warranty from the supplier shall be provided to the Certifying Officer attesting that the plants are true to the specified species and type, and free from diseases, pests, weeds, and the like.

19.07.04Storage:

ROADWORKS, DRAINAGE AND MISCELLANEOUS WORKS

Wherever possible plants shall be planted immediately after delivery to the site. If this is not possible, they are to be kept in good condition by appropriate storage methods in order to prevent theft, drying out or damage from any cause including, but not limited to, frost, wind, sun, vermin, animals and the like.

19.08 PLANT CONTAINERS

Sizes: Plant material shall comply with the sizes specified in the Drawings and conform with the following characteristics:

19.08.01Super Advanced Trees

200 Litre - Shall be in container sizes minimum 200 litres and shall have a well developed straight stem, minimum calliper 60mm. Trees shall be well shaped with a densely foliaged crown minimum height 4.5 metres.

100 Litre - Shall be in container sizes minimum 100 litres and shall have a well developed straight stem, minimum calliper 38mm. Trees shall be well shaped with a densely foliaged crown minimum height 3 metres.

35 Litre - Shall be in container sizes minimum 35 litres (350 x 380mm pot or equivalent plastic bag) and shall have a well developed straight stem, minimum calliper 18mm. Minimum height 1200mm.

25 Litre - Shall be in container sizes minimum 25 litres (300 x 340 pot or equivalent plastic bag) and shall be a minimum of 1 metre in height.

19.08.02Super Advanced Shrubs

25 Litre - Shall be in container sizes minimum 25 litres (300 x 340 pot or equivalent plastic bag) and shall be a minimum of 750mm in height.

15 Litre - Shall be in container sizes minimum 15 litres (250 x 230mm pot or equivalent plastic bag) and shall be a minimum of 600mm in height.

5 Litre - Shall be well established container grown plants with a single leading shoot well furnished with buds and leaves of a height not less than 400mm. Container size shall be 240 x 240mm pots, 200 x 230mm plastic bags or equivalent 5 litre containers.

19.08.03Advanced Shrubs/Ground Covers

2.5 Litre - Shall be in container sizes minimum 2.5 litre (150mm x 152 x 152mm pot). Shall have a strong primary shoot well furnished with leaves, with developing secondary shoots and shall be a minimum of 200mm in height.

19.08.04Tubestock

Tubestock: shall be in a minimum 100mm x 75mm growtubes with a strong leading shoot. Plants shall not be overgrown and leggy.

19.09 PLANTING - GENERAL

Planting shall only be carried out after subgrade preparation as shown in the Drawings has been completed and any required soil spreading has been carried out. Planting shall be done in accordance with the relevant Drawings.

19.10 SOIL SPREADING

19.10.01 Mass Planted Areas

Planting soil shall be spread and progressively tamped in order to avoid later subsidence. The spread soil shall be thoroughly watered to prevent voids. The surface shall be raked over lightly to attain finished profiles. The surface of the planting soil shall be finished at a level which allows the surface of the 75mm thickness of mulching material to be at the same level as adjacent finished levels.

19.10.02Turf Areas

The specified planting soil shall be spread on the prepared subgrade, consolidated to avoid later subsidence and raked over lightly to obtain the finished profile. Planting soil shall finish at the same level as adjacent finished surfaces.

19.11 MULCH SPREADING

Mulch shall be spread and rolled so that after settling, or after rolling, it is:

Smooth and evenly graded between design surface levels; Flush with adjacent finished levels; Of the required depths, and Sloped towards the base of plant stems in plantation beds, but not in contact with the stem.

19.12 STAKES AND TIES - GENERAL

Stakes and ties shall be used when planting any super advanced tree of 35 litres or more unless otherwise directed by the Certifying Officer. Materials and workmanship shall be in accordance with the relevant Drawing and the information specified below.

19.12.01Stakes:

Stakes shall be durable hardwood (30 x 38 x 1800mm), straight, free from knots or twists and pointed at one end. There shall be a minimum of two per plant.

19.12.02Ties

Ties shall be 50mm hessian webbing. Ties shall be fixed securely to stakes in a figure of eight pattern, with the lowest tie 300mm above ground. Other ties shall be where necessary to stabilise the plant or as directed by the Certifying Officer.

19.13 TURFING - GENERAL

Turf shall be obtained from a specialist grower of cultivated turf. Only turf of even thickness and free from weeds and other foreign matter shall be used. A warranty from the grower certifying that the turf is free of weeds or other foreign matter shall be provided to the Certifying Officer.

19.13.01Preparation

Subgrade preparation and soil requirements shall be as specified in the Drawings.

19.13.02Species

Species shall be as specified in the Drawings.

19.13.03Laying

The turf shall be layed as follows:

In "stretcher pattern" with the joints staggered and close butted Parallel with the long sides of level areas, and with contours on slopes. To finish flush, after tamping, with adjacent finished surfaces of ground, paving surfaces, edging or garden beds.

19.13.04Rolling

After turf has been laid, it shall be rolled along the stretcher pattern using a minimum roller weight 100kg to a maximum 500kg weight, ensuring levels shall finish at the existing adjacent finished surface levels. 19.13.05Watering

Turf shall be watered immediately after laying. Watering shall be sufficient to moisten the topsoil to its full depth.

19.14 IRRIGATION

Irrigation for roadside planter boxes shall be a low volume system using 200mm diameter polythene pipe with drippers connected by "Multiflex Riser Tube" or equivalent. Drippers are to rate at 4 litres per hour and a minimum of two drippers per square metre of planting shall be installed.

19.15 LANDSCAPE MAINTENANCE PERIOD

The landscape maintenance period shall vary according to the scope of works carried out. The table below indicates the minimum required time for landscape maintenance and establishment. Landscaped areas shall be maintained until, in the opinion of the Certifying Officer, all plants, turf etc are well established.

Value of Landscaping Works	Minimum Maintenance Period (Weeks)
Below \$4,999	3
\$5,000 - \$14,999	6
\$15,000 - \$29,999	10
\$30,000 and over	12

20 PAVEMENT MARKINGS

20.01 GENERAL

The work to be executed under this part of the Specification consists of the setting out, supply, and application of solvent based pavement paint and thermoplastic - cold applied marking material, raised pavement markers, pavement spotting and removal of pavement marks. The work shall be carried out in accordance with the current edition of the relevant RTA Specification . This RTA Specification shall define the pavement marks.

21 STREET NAME SIGNS

This specification is to be read in conjunction with Council's Standard Drawing No SF2.

21.01 BLADE

Extruded 6mm Aluminium section blade manufactured from an approved supplier.

Blade to be 200mm deep for Type A signs and 150mm deep for Type B, C & D signs.

Blade shall have two mounting holes as specified in the Standard Drawing. Holes are to be press punched to ensure uniformity for future replacement.

Blade lengths shall not exceed 1200mm in length, and be a minimum of 500mm in length.

Blade ends shall be cut square.

21.02 REFLECTIVE BACKGROUND MATERIAL

Class 1 (honeycomb pattern) white reflective background material (other than Type C) shall be applied to both sides of the blade, flush with the top and bottom of the blade.

Class 1 Yellow reflective background material shall be used for Type C signs only.

The reflective material shall start 40mm from the bracket end of the blade and be cut flush with the end of the blade.

21.03 LETTERING & LOGO

Street sign wording shall be specified at the time of individual order.

Street name abbreviations shall be in accordance with AS1742.5 – 1997, excluding Avenue and Lane, which shall be indicated as AVE and LN respectively.

Lettering shall be Univers Bold Font in Upper and Lower case applied to both sides of the blade as per the Standard Drawing.

Lettering shall be Black for Type A, B & C signs, and Burgundy PMS 208 for Type D signs.

Lettering shall be cleanly cut and applied in such a manner that prevents the entrapment of air under the applied finishes.

All lettering shall be certified against breakdown or discolouration for seven years.

Woollahra Municipal Council's corporate logo is to be applied to both sides of the blade on Type A & B signs only, and positioned at the bracket end of the blade as per the Standard Drawing.

21.04 POLE & MOUNTING BRACKETS

Poles shall be 50mm nominal bore galvanised steel pipe, with galvanised pole caps included.

Poles unless otherwise specified shall be 3200mm in length.

Signs are to be mounted on the poles (or power pole where appropriate) at a minimum of 2.5m above the ground level or a maximum of 3.0m above ground level.

Existing galvanised poles that are in good condition and not damaged, shall be re-used to mount new signs. However, if the existing pole does not have sufficient length to achieve the mounting height as

stated above, then the pole shall be removed and a new pole installed. Existing poles that are damaged shall be replaced.

Pre-drilled Two piece Aluminium bracket assemblies shall be supplied, complete with bolts, nuts and washers. All materials shall be compatible with the specified blade.

21.05 INSTALLATION

Blades shall be securely fixed to the poles using the supplied bracket assemblies.

Poles shall be concreted into a footing as specified in the Standard Drawing. All poles shall be fixed plumb.

21.06 GENERAL

This specification is to be read in conjunction with Councils official order and Councils' Standard Drawing No SF2.

All signs are to be double sided unless otherwise specified.

All signs shall be constructed from new, first quality materials. Blades and Reflective background material shall carry a 12-year warranty from the manufacturer.

Protection and packaging of all blades, poles, brackets and associated materials for delivery to Council shall be the responsibility of the supplier. Materials are to be packaged in such a manner as to prevent any damage during transportation or delivery.

Manufacturing tolerances of signs shall be specified in Clause 4.2 of AS 1743.

Contract sign manufacturers are to obtain Council's corporate logo from Council's works depot.

21.07 SIGN LOCATIONS

The location of street name & supplementary signs to be used throughout the municipality are as follows (unless specified otherwise):

Type A Street name sign

- New South Head Rd
- Old South Head Rd
- Oxford St (Boundary St to Ocean St)
- Boundary St
- Glenmore Rd
- Gurner St & Hargrave St (Glenmore Rd to Jersey Rd)
- Jersey Rd
- Queen St
- Ocean St & Ocean Ave
- William St
- Edgecliff Rd
- Bellevue Rd
- Victoria Rd
- O'Sullivan Rd
- Newcastle St
- Hopetoun Ave

Type B Street name sign

All other roads throughout the municipality excluding the above.

Type C & D Supplementary signs

Where required. Replace at existing locations.

22 STANDARD DETAIL DRAWINGS

The following Standard Detail Drawings shall apply to work carried out in accordance with this STANDARD SPECIFICATION.

RF SERIES – ROAD & FOOTPATH WORKS

- RF1.1 Standard Kerb & Gutter profiles
- RF1.2 Sandstone Kerb and Concrete Gutter Reconstruction
- RF1.3 Mountable Median Island and Kerb Extension
- RF1.4 Construction of Round-a-bout
- RF2_C Standard Residential Vehicle Crossing & Layback
- RF3 Kerb Ramps, Footpath, Kerb & Gutter reconstruction

DR SERIES – DRAINAGE WORKS

- DR1 Grated Gully Pit
- DR2 Temporary Sediment & Erosion control
- DR3 Standard Junction Pit

SF SERIES – STREET FURNITURE

- SF1 Seat detail
- SF2 Street name & supplementary signs
- SF3 Temporary construction information sign
- SF4 Bin Enclosure

MS SERIES - MISCELLANEOUS / OR FENCING

- MS1 Tubular Handrail system
- MS2 Timber Picket Fence
- MS3 Standard Tree Planting Details
- MS4 Standard Landscaped Kerb Island (under review)
- MS5 Pathway Steps
- MS6 Standard Edging Details around Tree Pits in Asphalt Footpath
- MS7 Standard Treatment Details of Street Name Plates in Construction Sites








NOTES AND LEGEND

- 1. ALL CONCRETE ISLANDS ARE TO BE CONSTRUCTED WITH 40MPa CONCRETE(MIN.) REINFORCED WITH F82 FABRIC 50 COVER ON 150mm COMPACTED THICKNESS OF FINE CRUSHED ROCK (DGB20) OR EQIVALENT.
- 2. THE REINFORCING RING BAR WILL BE BENT TO THE REQUIRED RADIUS AND SPLICED TO CONVINIENT LENGTHS FOR TRANSPORTATION AND HANDLING. ALLOWANCE MUST BE PROVIDED FOR THE LAPPING OF RING BARS FOR PLACEMENT.
- 3. ALL DIMENSIONS IN MILLIMETRES
- 4. PATTERN INFILL IS TO BE OF 90X90X50 GRANITE SETS :-

BLACK COLOUR FOR THE RIM AND BORDER

REMAINDER TO BE VERDANT COLOUR INCLUDING ALL SPLITTER ISLANDS	Scale	NTS	Drawing No.	RF1.4	WOOLLAHRA MUNICIPAL COUNCIL	
	Drawn	SATHIYA	Datum	I	CONSTRUCTION OF ROUNDABOUT	
	Checked	YDS	Date	FEB.'12		







	REPLACEMENT OF DAMAGED SECTIONS. INSPECTIONS ARE TO BE MADE PERIODICALLY AND AFTER STORM EVENTS FOR DAMAGE.	2. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED	NOTES . SEDIMENT CONTROL MEASURES SHOWN ARE GENERAL ACCEPTABLE STANDARD TREATMENTS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ADOPT THE MOST SUITABLE TREATMENT TO SUIT TO MUNICE ALL SEDIMENT & SUIT TOR TO ADOPTATION UNTO EXISTING WATEWAYS	SEDIMENT FENCE	DIRECTION OF FLOW	DISTURBED AREA	WIRE OR STEEL MESH	DRAINAGE AREA 0.4Ha MAX. SLOPE GRADIENT 1:2 MAX. SLOPE LENGTH 60m MAX.	STRAW BALE SEDIMENT FILTER		
Checked	Drawn	Scale			CAP BETW ACT AS SI				0		BURIED
	G.SMITH	AS SHOWN		SANDBA	JNOFF		SANDBAGS		EOTEXTI		
Date	Datum	Drawing No.		G KERB			KERB.		LE FILTE SEDIM	geotextile Filter fabri	
NOV '01	1	DR2		INLET S	THREE LAYE	2m Mil			R FABRI ENT TRA	C	Ð
ERUSION CONTROL DETAILS	TEMPORARY SEDIMENT &	WOOLLAHRA MUNICIPAL COUNCIL		EDIMENT TRAP.	S OF SANDBAGS OVERLAPPED.				C DROP INLET		

DISTURBED AREA

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9

STAKES

DROP INLET

geotextile Filter Fabric.

✓ STAKES

B)

STAKES DRIVEN 0.6m INTO THE GROUND DRAINAGE AREA 0.4Ha MAX. SLOPE GRADIENT 1:2 MAX. SLOPE LENGTH 40m MAX.

ANGLE FIRST STAKE TOWARDS



ORIGINAL = A4 SHEET







<u>6</u> 5 4

PROVIDE 120mm Ø CORPORATE LOGO AS SHOWN

SIZE OF SIGN TO BE 700mm x 400mm AS SHOWN.

WORDING FOR THE PROJECT NAME SHALL BE SUPPLIED.

32

TYPE B TEXT (BODY) SHALL BE NORMAL WEIGHT UNIVERS FONT. TYPE B WORDING IS FIXED (EXCLUDING CONTACT PH No)

PMS 540 (NAVY BLUE) TO BE USED FOR ALL TEXT AND LOGO. SIGN TO BE PRINTED ON A WHITE BACKGROUND.

TYPE A TEXT (HEADING) TO BE BOLD UNIVERS FONT. TYPE A WORDING SHOWN IS AN EXAMPLE ONLY. SPECIFIC

Checked	Drawn	Scale			
Ι	G.SMITH	AS SHOWN			
Date	Datum	DWG No.			
NOV '01	Ι	SF3			
INFORMATION SIGN	TEMPORARY CONSTRUCTION	WOOLLAHRA MUNICIPAL COUNCIL			











6) LOOP HESSIAN TIES OR "OUTDOOR WEB" AROUND THE PLANT FORMING A FIGURE 8, THEN LOOPING AROUND THE STAKE AS SHOWN. STAPLE TIES TO STAKE.

7) WATER PLANT WELL.

Scale	N.T.S	Drawing No.	MS3	WOOLLAHRA MUNICIPAL COUNCIL		
Drawn	G.Smith	Datum	-	STANDARD TREE PLANTING DETAIL		
Checked	B.Rann D.Shiels	Date	MAY '04	– 75 LITRE TREE		
ORIGINAL = A4	SHEET	•			•	









1. NAME PLATES TO BE LEFT INSITU WHERE POSSIBLE.

2. IF THE NAME PLATE IS SEPARATED FROM THE MAIN PATH STRUCTURE BY CONSTRUCTION/EXPANSION JOINTS, ISOLATE IT ALONG THE EXISTING JOINTS DURING THE DEMOLITION AND CONSTRUCTION WORKS.

3. IF STREET NAME PLATE IS EMBEDDED IN MAIN PATH STRUCTURE AS A SINGLE OBJECT, IT SHALL BE SAW CUT AND ISOLATED FROM THE ADJOINING STRUCTURES AND STORED AND PROTECTED FOR REUSE.

4. IF NAME PLATES REQUIRE REPOSITIONING DUE TO CHANGES IN LEVELS THEN THE FOLLOWING PROCEDURE SHALL BE FOLLOWED:

a) NAME PLATES ON THE FACE OF KERB/FOOTPATH SHALL BE SAW CUT AND REMOVED PRIOR TO THE DEMOLITION.

b). SAW CUT AROUND THE NAME PLATE MINIMUM 300mm FROM THE END OF NAME PLATE.

c) USE HAND EXCAVATION TO PROTECT NAME PLATES.

d) NAME PLATES SHALL BE STORED IN A SAFE PLACE DURING THE DEMOLITION WORKS.

e) NAME PLATES SHALL BE REINSTALLED IN THEIR ORIGINAL LOCATION IN THE NEW FOOTPATH/KERB & GUTTER ASSET IN ASSOCIATION WITH OTHER FOOTPATH/KERB AND GUTTER WORKS.

5. HANDLE WITH CARE TO AVOID DAMAGE.

Scale	AS SHOWN	Drawing No.	MS7	7 WOOLLAHRA MUNICIPAL COUNCIL		
Drawn	B.Sudarson	Datum	_	STANDARD TREATMENT DETAILS		
Checked	G.Stewart	Date	AUG '05	OF STREET NAME PLATES IN CONSTRUCTION SITES	PAL CO	