

# MEADOWBANK SHEPHERDS BAY STAGE 6-9 LANDSCAPE MAINTENANCE PLAN

PREPARED BY
PLACE DESIGN GROUP

**FOR** 



# MEADOWBANK STAGE 6-9 LANDSCAPE CONTRACT PACKAGE

# LANDSCAPE TECHNICAL SPECIFICATION

# Prepared by:

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for

# **HOLDMARK PROPERTY GROUP**

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# **PART A**

#### 1. GENERAL

#### 1.1 General

#### **Precedence**

Requirements of individual technical sections of the specification override conflicting requirements in this section.

#### 1.2 Referenced Documents

### **Current editions**

General: Use referenced documents which are editions, with amendments, current one month before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

Site copies: One

# **Contractual relationships**

Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in referenced documents.

#### **General Standards**

# 1.3 Interpretation

#### General

Unless the context otherwise requires, the following definitions apply:

- Supply: "Supply", "furnish" and similar expressions mean "supply only".
- Provide: "Provide" and similar expressions mean "supply and install".
- Approved: "Approved", "reviewed", "directed", "rejected", "endorsed" and similar expressions mean "approved (reviewed, directed, rejected, endorsed) in writing by the Contract Administrator".
- Superintendent: Person appointed in writing be the Principal to be the Superintendent and notified as such in writing to the Contractor by the Principal, and, so far as concerns the functions exercisable by a Superintendent's Representative.
- Give notice: "Give notice", "submit", "advise", "inform" and similar expressions mean "give notice (submit, advise, inform) in writing to the contract administrator".
- Obtain: "Obtain", "seek" and similar expressions mean "obtain (seek) in writing from the Contract Administrator".
- Proprietary: "Proprietary" mean identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Samples: Includes samples, prototypes and sample panels.

#### **Technical**

- Pipe: Includes pipe and tube.

# Maintenance period

- Co-extensive with the defects liability period.

#### 1.4 Contract Documents

#### General

Diagrammatic layouts: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable. Before commencing work, obtain measurements and other necessary information.

Levels: Spot levels take precedence over contour lines and ground profile lines.

#### 1.5 Design

#### Space requirements

Check space requirements of equipment and services indicated diagrammatically in the contract documents and submit a report on consequent variations to the design.

#### 2. QUALITY

# 2.1 Inspection

#### **Notice**

Witness points: If notice of inspection is to be given in respect of parts of the works, advise if and when those parts are to be concealed.

Hold points: If notice of inspection is to be given in respect of parts of the works, do not conceal those parts without approval.

Minimum notice for inspections to be made: two working days (48 hours).

Concealed services: Give notice so that inspection may be made of services to be concealed.

#### 2.2 Tests

#### **Notice**

General: Give sufficient notice so that designated tests may be witnessed.

Hold points: Do not carry out designated tests without approval.

Minimum notice for tests to be witnessed:

- 2 working days for site tests; and
- 5 working days for local pre-delivery tests.

#### Reports

General: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and compliance or non-compliance with requirements.

Number of copies of test certificates: Three

#### **Endorsement**

If tests are to be carried out on parts of the works, do not conceal those parts and do not commence further work on those parts until the tests have been satisfactorily completed and compliance verified.

#### 2.3 Samples

# **Timing**

Delays: Coordinate submissions of related samples. Do not cause delays by making late submissions or submitting inadequate samples.

#### Quantity

General: Submit a sample of each designated item and 2 copies of supporting documentation.

#### Identification

Identify the Project, Contractor, Subcontractor or Supplier, Manufacturer, applicable product and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify non-compliances with project requirements, and characteristics, which may be detrimental to successful performance of the completed work.

# **Approval**

General: Do not commence work affected by samples until the samples have been approved. Submit further samples as necessary.

#### Retention

Keep approved samples in good condition on site, until practical completion.

#### Incorporation

Incorporate in the works samples, which have been approved for incorporation. Do not incorporate other samples.

#### Criteria

Match approved samples throughout the works.

#### 2.4 Contractor's Submissions

# **Timing**

General: Submit documents in a timely manner, to suit the construction program. Advise if any of the documents are to be returned.

Delays: Coordinate submissions of related items. Do not cause delays by making late or inadequate submissions.

#### Quantity

Bound documents: 3 copies.

Loose documents up to and including A3: One copy.

Loose documents larger than A3: One transparency on heavyweight plastic film the

same size as the standard contract drawings.

Standard contract drawing size: A1

#### Identification

Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify non-compliances with project requirements, and characteristics, which may be detrimental to successful performance of the completed work.

#### **Endorsement**

Witness points: Give notice before commencing work affected by contractor's submissions, unless the submissions have been endorsed as satisfactory.

Hold points: Do not commence work affected by contractor's submissions until, if appropriate, the submissions have been endorsed as satisfactory,

Errors: If a document contains errors, submit a new or amended document as appropriate, indicating changes since the previous submission.

### Design

General: If part or all of an installation is to be designed by the contractor, submit documents showing the layout and details of the installation.

Variation documents: If it is proposed to change the installation from that shown on the contract documents, or if statutory authorities require changes, submit variation documents showing the proposed changes.

#### Shop drawings

General: Submit dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and submit dimensioned setout drawings.

#### **Authorities**

Correspondence: Submit copies of correspondence and notes of meetings with authorities. Authorities' approvals: Submit documents showing approval of the authorities whose requirements apply to the work.

#### **Samples**

If it is intended to incorporate samples into the works, submit proposals.

#### **Materials and components**

Product data: For proprietary items, submit the manufacturer's product data including:

- technical specifications and drawings;
- type test reports;
- performance and rating tables; and
- recommendations for installation and maintenance.

Proposed products schedules: For major products not specified as proprietary items, within 3 weeks of site possession submit a schedule of those proposed for use.

Product certification: If products must comply with product certification schemes, submit evidence of compliance.

#### **Execution**

Embedded services: Submit proposals for embedding services in concrete walls or floors, or chasing into concrete or masonry walls.

Acceptance of substrate: Submit installers' statements verifying that the substrate is satisfactory for receiving the installation.

# 3 MATERIALS AND COMPONENTS

#### 3.1 General

Sources policy

#### **Proprietary items**

Implication: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

>

Alternatives: If alternatives are proposed, submit proposed alternatives and include samples, available technical information, reasons for proposed substitutions and cost. If necessary, provide English translation. State if use of proposed alternatives will necessitate alteration to other parts of the works and advise consequent costs.

#### Manufacturers' or suppliers' recommendations

General: Select, if no selection is given, and transport, deliver, store, handle, protect, finish, adjust, prepare for use, and use manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier.

Instructions: Submit the recommendations and instructions, and advise of conflicts with other requirements.

Project modifications: Advise of activities that supplement, or are contrary to, manufacturers or suppliers' written recommendations and instructions.

Product certification: If products must comply with product certification schemes, use them in accordance with the certification requirements.

#### **Sealed containers**

If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

#### Consistency

For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

#### 4 EXECUTION

#### 4.1 Installation

#### General

General: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements. Under suspended ground floors, keep services at least 150 mm clear above ground surface, additional to insulation, and ensures access is not impeded.

Lifting: Provide permanent fixtures attached to the equipment, for lifting heavy items of equipment, as recommended by the manufacturer.

# 4.2 Services Connections

### Statutory authorities' requirements

If the authorities elect to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the authorities.

#### Connections

Connect to statutory authorities' services or service points. Excavate to locate and expose connection points. On completion reinstate the surfaces and facilities which have been disturbed.

# 4.3 System Integration

#### General

Interconnect system elements so that the installations perform their designated functions.

# 4.4 Building Penetrations

#### Piping sleeves

General: Provide metal or UPVC sleeves formed from pipe sections, for piping penetrations through building elements.

Finish: Prime paint ferrous surfaces.

### Fire rated building elements

Seal penetrations using a system to AS 4072.1.

#### Non-fire rated building elements

Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustic rated, maintain the rating.

#### Limitations

General: Do not penetrate or fix to the following without approval:

- Structural building elements including external walls, fire walls, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings.

Membranes: If approval is given to penetrate membranes, provide a waterproof seal between the membrane and the penetrating component.

## 4.5 Piping

# Cleaning

Protection: During construction, prevent the entry of foreign matter into the piping system by temporarily sealing the open ends of pipes and valves using purpose-made covers of pressed steel or rigid plastic.

#### Installation

General: Install piping in straight lines at uniform grades with no sags. Arrange to prevent air locks. Provide sufficient unions, flanges and isolating valves to allow removal of piping and fittings for maintenance or replacement of plant.

Arrangement: Arrange and support piping so that it remains free from vibrations whilst permitting necessary movements. Minimise the number of joints.

Spacing: Provide at least 25 mm clear between pipes and between pipes and building elements, additional to insulation.

Dissimilar metals: Join dissimilar metals using fittings of electrolytically compatible material.

#### Cover plates

If piping emerges from exposed building surfaces, provide cover plates of non-ferrous metal, finished to match the pipe, or of stainless steel, close fitting and firmly fixed in place.

#### 4.6 Finishes

# **Piping**

General: Finish exposed piping, including fittings and supports, as follows:

Externally and steel piping and iron fittings internally: Paint.

Valves: Finish valves to match connected piping.

# 4.7 Marking

#### General

General: Mark equipment, electrical wiring, piping, valves, conduits and ducts, to provide a ready means of identification.

Piping, conduits and ducts: To AS 1345, as applicable.

#### Labels

Type: Select from the following:

- Engraved and black filled lettering on stainless steel or brass, minimum thickness
   1 mm.
- Cast metal.

# **Piping**

Identify throughout its length, including in concealed spaces.

#### 5 COMPLETION

#### 5.1 General

#### Samples

Remove unincorporated samples on completion.

#### **Contractor's submissions**

Within 2 weeks after practical completion, submit three (3) copies of designated documents.

#### Warranties

General: Name the Principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

#### 5.2 Record Drawings

#### General

Submit record drawings, in paper and electronic format. Show the "as installed" locations of building elements, plant and equipment. Show off-the-grid dimensions where applicable.

#### **Services**

Show dimensions, types and location of equipment, cables, piping and ductwork in relation to permanent site features and other underground services. Include relationship to building structure and other services, and changes made during commissioning and the maintenance period. Include diagrammatic drawings of each system showing piping and wiring, and principal items of equipment.

#### Format

Use the same borders and title block as the contract drawings.

### 5.3 Operation and Maintenance Manuals

# General

General: Submit operation and maintenance manuals for installations.

#### **Contents - general**

Include the following:

- Drawings and technical data: As necessary for the efficient operation and maintenance of the installation.
- Equipment descriptions:
  - . Name, address, email address, telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.
  - Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed.

- Maintenance procedures:
  - . Safe trouble-shooting, disassembly, repair and reassembly, cleaning,

alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.

- Drawings:
  - . Record drawings, at scale and full size.

#### **Contents - services**

Include the following in addition to Contents - general:

- Installation description: General description of installation.
- Equipment descriptions:
  - . Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
- Operation procedures:
  - . Control sequences and flow diagrams for systems installed.
- Certificates:
  - Copies of test certificates for the mechanical installation and equipment used in the installation.
  - . Test and balancing reports.

#### Timing and quantity

Final copies: Submit 3 sets of final volumes prior to practical completion being granted. Incorporate feedback from review and from training of principal's staff, including preparation and insertion of additional data.

Revisions: Submit 3 sets of loose-leaf amendments for insertion in the manuals, incorporating feedback from the maintenance period, within 2 weeks after completion.

### 5.4 Training

# Operation

Immediately after practical completion, explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

# Maintenance

Immediately after practical completion, explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

# 5.5 Completion Tests

#### General

Carry out acceptance tests and final tests.

# 5.5 Maintenance

#### General

General: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.

Emergencies: Attend emergency calls promptly.

# **Maintenance records**

Referenced documents: If referenced documents or technical sections require that logbooks or records be submitted, include this material in the maintenance records.

Certification: On satisfactory completion of the installation, submit certificates stating that each installation is operating correctly.

#### 1. GENERAL

#### 1.1 Cross References

#### General

Refer to the: - General requirements section,

# **Related sections**

Refer to the following sections:

- Engineer's External Siteworks and Stormwater Specification

Earthworks

### 2. QUALITY

# 2.1 Inspection

#### Witness points

Give sufficient notice so that inspection may be made of the following:

- Enclosures to trees to be retained.
- Erosion control measures installed
- Stripping of topsoil complete, and

#### 2.2 Contractor's Submissions

#### **Materials**

Submit details of materials proposed, including the following:

# 3 SITE MANAGEMENT

# 3.1 Removal of Topsoil

#### General

Extent: Remove the topsoil layer of the natural ground containing substantial organic matter, over the areas to be excavated or regraded, and areas to be occupied by structures, pavements, embankments and the like and other areas designated to have topsoil removed.

Depth to be removed: To base of root zone, refer to Geotechnical Report.

# **Topsoil Stockpiles**

Site topsoil approved for re-use and imported topsoil, are to be stockpiled at Contractor's off-site temporary storage area or in locations as directed, where necessary. Topsoil to be brought to site as needed, there will be no on-site storage

Establish stockpiles to sizes, as directed, to heights not exceeding 1.5 m. Provide adequate drainage and erosion protection. Do not burn off or remove plant growth which may occur during storage. Do not allow traffic on stockpiles. If a stockpile is to remain for more than four weeks, sow with temporary grass. Protect the topsoil stockpiles from contamination by excavated material, weeds, and building debris.

#### 3.2 Tree Protection

# Warning sign

General: Display a sign in a prominent position at each entrance to the site, warning that trees and plantings are to be protected during the contract. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high, in red on a white background, to AS 1744.

#### 3.3 Trees to be Retained

# Protection and repair

Protection: Protect from damage the trees and shrubs to be retained, including those beyond the site area, both above and below ground.

Repair: Repair trees damaged during the work.

#### 3.3.2 Tree enclosures

General: Provide temporary protective enclosures or guards.

#### Chain wire above ground enclosures

Install temporary galvanised chain wire panels, 2600 mm long and 1800 mm high, with above ground concrete footings. (Refer to Appendix A, for further detail information).

Trees to be enclosed: All trees to be retained, refer to the Trees to be

Retained Schedule

Type of enclosure: As above.

#### 3.3.3 Work around trees

The following measures are not accepted:

- Star pickets with fencing wire,
- Safety mesh, or
- Bunting fencing

Do not use below ground concrete footings.

Do not change the existing ground levels, nor store, stockpile, dump or otherwise place any construction materials within the fenced area.

Do not use machinery within the dripline, or trench within the enclosure, unless otherwise nominated by the Landscape Architect. Ensure that adjacent excavations do not affect the tree root zone.

All pruning is to be carried out by a qualified tree surgeon (NAAA Professional Member).

Apply 100 mm deep well composted mulch within the enclosure and install a temporary above ground irrigation system to the Landscape Architects approval.

# 3.3.4 Work on trees

If it is proposed to perform work on trees, give notice, obtain instructions and approvals.

#### 3.3.5 Removal

If a tree is damaged and repair work is considered impractical, or is attempted and fails, give notice and await instruction.

### 3.4 Work Near Trees

# Harmful materials

Keep the area within the dripline free of construction material and debris. Do not place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks. Prevent wind-blown materials such as cement from harming trees and plants.

#### Damage

Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

#### Work under trees

General: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Excavation: If excavation is required near trees to be retained, give notice and obtain instructions. Open up excavations under tree canopies for as short a period as possible.

Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation. If it is necessary to excavate within the drip line, use hand methods such that root systems are preserved intact and undamaged.

#### **Roots**

Do not cut tree roots exceeding 50 mm diameter. Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system.

All root pruning, unless noted on the contract drawings, is to be carried out by hand.

#### Backfilling

Backfill to excavations around tree roots with a mixture consisting of three parts by volume of topsoil and one part of well rotted compost with a neutral pH value, free from weed growth and harmful materials. Place the backfill layers, each of 200 mm maximum depth, compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

#### Compacted ground

Do not compact the ground under and around trees. If compaction occurs, give notice and obtain instructions.

#### 3.5 Trees to be Relocated

# Marking

General: Mark trees to be relocated using suitable non-injurious tree ties, easily visible and removable means of identification.

Tags: 100 x 50 mm zincanneal tags, painted yellow and lettered to conform with the tree number on the drawings. Secure tags to trees using loose galvanised steel wire bands.

Trees to be relocated: Refer to Section 3.3.1 Trees to be Retained Schedule and drawings

# **Protection and repair**

Protection: Protect from damage the trees to be relocated, including those beyond the site area, both above and below ground.

Repair: Repair trees damaged during the work, using recommendations and or instructions of a qualified tree surgeon (NAAA Professional Member).

#### Work on trees

If it is proposed to perform work on trees, give notice and obtain instructions.

#### Removal

If a tree is damaged, and repair work is considered impractical, or is attempted and fails, give notice and obtain instructions.

### 3.6 Existing Services

N/A - By Builder

### 3.7 Environmental Protection

N/A - By Builder

#### 3.8 Site Restoration

N/A - By Builder

### 3.9 Records, Existing Structures

N/A - By Builder

### 3.10 Underpinning, Existing Structures

N/A - By Builder

#### 3.11 Artefacts

N/A - By Builder

### 3.12 Noise, Vibration and Dust Control

N/A - By Builder

#### 3.13 Traffic Control Devices

N/A - By Builder

# 4 SITE CLEARING

### 4.1 Site Clearing

#### Extent

General: Clear only the following site areas:

- Areas to be occupied by works such as buildings, paving, excavation, regrading and landscaping.
- Other areas designated to be cleared.
   Contractor's site areas: If not included within the areas specified above, clear generally only to the extent necessary for the performance of the works.

# **Clearing operations**

Removal: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas.

Old works: Remove old works, including slabs, foundations, pavings, drains and manholes found on the surface.

Existing grass: Remove grass to a depth just sufficient to include the root zone.

# 4.2 Spoil

Dispose off site in an approved manner

# 5 COMPLETION

# 5.1 Completion Temporary works

- Tree enclosures: Remove temporary tree enclosures at completion.
- Tree marking: Remove temporary marks and tags at completion.
- Environmental Protection: Remove structures including those to stormwater pits, ramps etc.

Section 3 EARTHWORKS

# 1. GENERAL

1.1 Cross References

**General** Refer to the:

General requirements section.

**Related sections** 

Refer to Engineer's External Siteworks and Stormwater Specification-



#### 1. GENERAL

### 1.1 Cross References

#### General

Refer to the *General Requirements* section.

# 1.2 Interpretation

#### **Definitions**

Unit segmental paving: Paving surfaces of exposed aggregate concrete, loose river gravel, and paving made with concrete segmented paving units to MA 20.

**Density ratio**: Percentage of the maximum density at optimum moisture content as determined by AS 1289.5.2.1.

**Masonry units:** Paving units of clay, natural stone or concrete masonry, purpose-made for use as paving, or units made for bonded masonry construction but suitable for paving.

**Substrate:** The building element to which the tiles are to be bedded.

Bonding slurry: The interface layer between substrate and paving units.

**Underlay:** An intermediate layer (eg. render, screed or sheeting) applied to the substrate to provide a suitable surface for tile bedding.

**Separation layer:** A membrane laid on the substrate beneath the bedded finish to prevent the two elements from adhering to each other.

Jointing material: A grout, applied to full depth of paving slab.

#### 2. QUALITY

# 2.1 Inspection

### Witness points

Give sufficient notice so that inspection may be made at completion of:

- substrate preparation;
- trial set-out for unit paving and cobbles;
- paving;
- control joints before sealing and grouting; and
- completion of tiling.

#### 2.2 Samples

#### **Finishes**

**General:** Submit samples of the paving finishes, showing the full range of texture and colour of the material.

# Sample panels

**General:** Prepare sample panels of designated paving finishes, including samples of junction details and trim.

Unit paving pattern: Prepare a trial setout for each area.

#### Sample panels schedule

Paving finish (as scheduled drawings)	on	Sample panel size (mm)	Number panels	of	Location
Type 1-5 Travertine paving Phorphyry cobble banding,	stone	1800 x 1800	One		As directed

### 2.3 Submissions

#### **Execution**

**Grouting:** Submit proposals for grouting methods and materials.

**Unit paving pattern:** If it appears that minor variations to joint widths will obviate cutting, submit proposals.

### 3 MATERIALS AND COMPONENTS

#### 3.1 Insitu Concrete base

General: Provide minimum 20 MPa compacted reinforced insitu concrete slab.

# 3.2 Bonding Slurry

**General:** Provide bonding slurry as an interface layer between the insitu concrete base and bedding mortar, and between the bedding mortar and concrete segmental concrete pavers.

Mix proportions 1 part fine, washed sand to 6 parts Portland type GP Cement AS 3972 (1991), by volume with sufficient water to form a slurry of workable consistency.

#### **Mortar Bed**

General: To AS 3700.

Provide sand/cement mortar mix of minimum 25mm and maximum 40mm thickness, with no air voids to support pavers as detailed.

#### Mix proportions to AS CA27:

3 parts blended, washed sand, concrete aggregates AS 2758 {part 1 (1985), to 1 part Portland type GP Cement AS 3972 (1991), to 1 part water / elasticiser mix.

#### 3.3 Elasticiser

**General:** An approved mortar additive to improve workability, elasticity, adhesion and strength.

# 3.4 Water

**General:** Provide clean water, free from contaminants and deleterious material including soluble salts.

# 3.5 Jointing Material: Grouting Mix

**General:** Provide non-shrink cementitious grout to joints of greater than 4mm in width. Grout to finish below surface of pavers.

**Application:** Grouting mix to be dry-bagged, proprietary brand, fine aggregate / cement / admixtures type, with high flow and shrinkage properties, non-staining during application and of a compressive strength in excess of 20 MPa.

Mixing: in accordance with manufacturer's specification.

#### 3.6 Stabilised gravel pavements

**Cement:** Type GP, white cement to AS 3972 **Mix:** 30 : 1 selected natural stone : cement

**Gravel grading:** Maximum particle size 10 mm, 30-40% passing 5 mm sieve.

**Gravel source:** Crushed Sandstone

Supplier: Benedicts Sand and Gravel or approved supplier

(Refer to Appendix B)

### 3.7 Components

### Concrete pavement reinforcement

Welded wire fabric: To AS 1304 Bar: To AS 1302

#### 4.0 EXECUTION

# 4.1 General

# Subgrade

General: Remove topsoil containing grass roots. Fill and compact as necessary. Ensure strength and stiffness is similar throughout, including soft spots and service trenches. If necessary, loosen the subgrade to a depth of 200 mm and adjust the moisture content before compaction.

Level tolerance: + 0, -25 mm.

Clay fill: Moisture condition near long term equilibrium moisture condition.

Cohesive subgrade soils:

- Minimum dry density ratio (standard compaction) to AS 1289.5.4.1: 100% Cohesionless subgrade soils:
  - Minimum dry density index to AS 1289.5.6.1: 80%

#### **Substrate Preparation**

### Cleaning substrates

If the paving is to be bonded to the substrate, remove oils, greases, retarders and loose material and leave the surface clean and dust-free.

#### Subbase

Minimum dry density ratio: 98% to AS 1289.5.2.1

Thickness tolerance: + unspecified, -5 mm.

Level tolerance: ± 25 mm.

## **Basecourse**

Placing: Spread and compact the basecourse. Adjust the moisture content to facilitate compaction.

Minimum dry density ratio: 98% to AS 1289.5.2.1

Thickness tolerance: + unspecified, -5 mm.

Level tolerance: Generally -0, +25 mm, but at existing structures -0, +10 mm. Over 3m length of design profile,  $.\pm 10$ mm.

#### **Drainage**

Finished surface crossfalls: Between 1% and 2.5%.

Ponding: Grade pavements to even falls so as to drain away from buildings to drainage outlets without ponding.

Surface run-off: Provide channels and drains to discharge points.

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Poorly drained sites, use one of the following methods:

- Stabilise subgrade to pavement courses.
- Provide subsurface drains or pervious granular material, slotted or pervious pipes, or both, under or beside the pavement.

At walls: Set finished level of pavements below damp-proof course, weep holes and drainage openings.

#### 4.2 Falls and Levels

#### Grading

**Ponding:** Grade paving to even falls to drain away from buildings to drainage outlets without ponding.

Falls: Minimum fall for drainage 1:150 or as shown on the drawings.

#### Finished level

Maintain the same finished level across junctions between different finishes.

#### **Tolerances**

Pavement thickness: + 3 mm, - 0.

Surface level:  $\pm$  25 mm from the specified level,  $\pm$  10 mm from a 3 m straight edge in areas of uniform grade.

Maximum deviations:

- Across junctions between adjacent paving surfaces: 2 mm.
- Across junctions between adjacent paving unit surfaces: 2 mm.

# **4.3** Concrete Pavements (Refer to section 6.2 for base to paved pavements)

#### **Standard**

General: To AS 3600.

#### Subgrade

Preparation for placing: Moisten the subgrade to ensure a firm, uniformly moist surface at the time of placing. Remove loose material and debris from the surface. Do not operate construction equipment on the prepared surface.

#### **Subbase**

Minimum 75 mm thick.

#### Reinforcement

Slab reinforcement: Required for irregular panels, and rectangular panels with length: width ratio greater than 1.3:1. Lap fabric so that the outermost transverse wires of one sheet overlap the 2 outermost wires of the other.

Trimming reinforcement: Required where slab surrounds another structure, and at re-entrant corners, except where isolation joints are provided.

- Type: At least one Y12 bar, 600 mm min, length

Position: Locate in top half of slab, 30 mm min. cover. Support on bar chains at 1m centres.

Control joints: Stop reinforcement 50 mm clear of control joints.

#### Concrete grade

Foot and bicycle traffic: N20 Light traffic: N20

#### Slab thickness

Light traffic: 100 mm

# Control / contraction joints

Spacing (maximum):

Unreinforced slabs: 2m

Light traffic: F52 reinforcing fabric: 3m

F62 reinforcing fabric: 6m

Depth: Full depth where constructed using formwork. ¼ to 1/3 slab thickness where constructed by scoring the plastic concrete, using proprietary crack-inducing device, or sawing set concrete.

Width: 3mm

Design tool off arises to 6mm radius.

#### **Placing**

General: Provide formwork for sides and stop ends.

Temperature limits: The temperature of the concrete when placed in forms must be in the range 10 - 32°C. Do not place concrete when the shaded air temperature is less than 4°C.

Hot weather placing: If placing concrete in hot weather, avoid premature stiffening of the mix and reduce water absorption and evaporation losses. If the air temperature exceeds 32°C, place and compact the concrete as quickly as possible and then cover it with an impervious membrane or hessian kept wet.

#### Isolation / expansion joints

Location: Where slab wider than 1.5m abuts rigid structures, at path intersections, over structural joints. Maximum 6 m spacing.

Design: Permit free movement of slab, and exclude foreign matter. Do not tool off joint arrises abutting the seal.

- Joint filler: 10 mm thick bitumen impregnated fibreboard.
- Joint depth: Full thickness of slab.

Access holes and pits at pavement edges: Thicken the slab 50 mm for 100 mm from the rigid structure (tapering 300 mm), and reinforce the panel(s) containing the rigid structure with F62 fabric.

### Other joints

Dowelled joints: Formed or sawn joints reinforced with dowels and sealed.

Tied joints: Formed or sawn joints reinforced with tie bars.

Construction joints: Locate to coincide with control or isolation joints.

## **Finishes**

**Exposed aggregate finish:** Steel trowel to a smooth surface. After final set use clean water and brushes to remove the surface film of mortar until the aggregate is uniformly exposed without cutting of the matrix.

**Surface texture:** 20 mm diameter Blue metal exposed aggregate

**Finished pavement surface:** Uniform in appearance and free from depressions in which water can lie, with a texture depth of 2 - 2.5mm.

# **Tolerance**

Level: Over 3m length of design profile, ± 6mm

#### 4.4 Stabilised Gravel Pavements

#### Laying

**General:** Lay the mix damp but not wet, to finish 100 mm thick after compaction, with an even surface, flush with edges where provided.

**Compaction:** Compact to achieve a dry density ratio of 95% when tested to AS 1289.5.4.1 (standard compaction)

# 4.5 Edging

# Stainless Steel edging

**General:** Set edges flush with adjoining surfaces to define planting, grass areas or both. Fix using galvanised pegs two per fixing. Drive pegs into ground at 800mm centres on planting side of the edging and both sides of joints between sections, with peg tops 15mm below the top of the edging.

Curving: Where the steel edge is to be curved, space the pegs to hold it to a uniform curve.

# 4.6 Paving Generally

# **Cutting and laying**

**Cutting:** Cut pavers neatly to fit around fixtures and fittings and at margins where necessary. Drill holes without damaging tile faces. Rub edges smooth without chipping

**Laying:** Return pavers into sills, reveals and openings. Butt up to returns, frames, fittings, and other finishes. Strike and point up beds where exposed.

#### Variations:

If necessary, distribute variations in hue, colour, or pattern uniformly, by mixing pavers or tile batches before laying.

#### Protection:

General: Keep traffic off pavers until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

#### **Maximum Deviations:**

Minimise lipping to maximum 2mm. Deviation from a 2000mm long, straight edge placed on finished paving surface is not to exceed + 4mm.

# 4.7 Setting Out

#### General:

Joint widths: Set out pavers to give uniform joint widths to match existing.

**Joint alignment:** Set out pavers with joints accurately aligned in both directions to a tolerance of + 4mm in 2 m from the design alignment.

**Margins**: Use whole or purpose made pavers at margins where practicable, otherwise set out to give equal margins of cut pavers. If margins less than half paver width are unavoidable, locate the cut pavers where they are least conspicuous.

**Fixtures:** If possible position pavers so that holes for services and fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Before tiling ensure that fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout.

#### 4.8 Falls and Levels

General: Grade all paving to even and correct falls as required. Make level junctions with walls.

#### Fall general: 1:150 minimum.

**Deviation:** Maximum deviation of the finished floor level between points of contact under a 2m straight edge laid in any direction on an area of uniform grade to be 1:300 or 3mm, whichever is the lesser.

#### 4.9 BEDDING

Refer to details on drawing LBE07-CD-900-series

#### 5 JUNCTIONS

#### 5.1 Control Joints

#### **Movement joints**

**General:** Provide movement joints over structural joints in the base (isolation, contraction, and expansion) right through the paving and bed to the substrate. Fill joints with a compressible material to match existing.

### Abutment with building or against other fixtures or service pits

Where paving more than 1.5 m wide abuts the wall of a building provide a strip of 10 mm thick bitumen impregnated fibreboard between the paving and fixtures.

#### 5.2 Execution

#### **5.2.1** Joints

Seal control joints with an approved only grey elastometic sealant equal to Sikaflex 1A, Thioflex 600 or Dow Corning 790 silicone.

#### 5.2.2 Jointing Material

**General:** Joint fillers and sealers shall be as shown on the drawings. In the absence of a specific detail, seal joints using a closed cell polyethylene backing rod and a two-part polysulphide sealant.

#### 5.2.3 Grouting

Prior to commencing grouting and after inspection of the insitu concrete bedding slab (reinforced to vehicular pavements as shown on drawings), seal the face of the clean out holes to prevent loss of grout. The grout pour height shall not exceed 48 times the width of the cores or 3500mm, whichever is least.

#### 5.2.4 Cleaning Down

On completion of paving, clean down with water and stiff brushes and remove all mortar projections, splashes and irregularities. Make good around any services penetrating the paving and make good any faults.

# 5.3 Paving Finish Junctions

#### General

**Location:** Where changes of paving finish occur, locate the junction in a manner compatible with existing work.

# 5.4 Grouted and Caulked Joints Grouted joints

**General**: Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the surface with a clean cloth.

Epoxy grouted joints: Ensure that tiles edge surfaces are free of extraneous matter such as cement films or wax, before grouting.

### 6 PAVING

#### 6.1 Base Course

For pedestrian areas only, as shown on drawings. Refer to Engineers drawings for extent of preparation.

#### **Preparation**

Prepare the subgrade by grading to accommodate the thickness of the base course and paving. If necessary, loosen the ground to a depth of 200 mm and adjust the moisture content before compaction. Compact the ground to the required density.

#### Base course material

**General:** Crushed rock consisting of hard, dense, durable particles free from deleterious material, of nominal size 25 mm, uniformly graded, with not more than 10% passing a 0.075 mm sieve.

Minimum thickness (mm): 150 mm

#### **Placing**

Spread and compact the base course to the required thickness and 95% maximum modified dry density. Adjust the moisture content as needed to facilitate compaction.

#### Required density:

Minimum density ratio:

- Subgrade and base: Refer to Structural Engineers Drawings

#### Cohesive subgrade soils:

- Minimum dry density ratio (standard compaction) to AS 1289.5.4.1: 1:100

#### Cohesionless subgrade soils:

Minimum density index to AS 1289.5.6.1: 80%

#### Base:

Minimum dry density ratio (standard compaction) to AS 1289.5.4.1: 100%

# Subbase:

- 90% of modifies maximum dry density.

Density test requirements: Refer to Structural Engineers Specification

#### 6.2 Concrete Base

**General:** Reinforced concrete slab minimum 100 mm with F72 mesh placed centrally (min 20 MPa).

#### **Preparation:**

**General:** Trim the ground to accommodate the thickness of concrete and compact to a firm, even surface. Provide formwork for sides and stop ends.

#### **Concrete placing**

Preparation for placing: Moisten the subgrade to ensure a firm, uniform moist surface at the time of placing. Remove loose material and debris from the surface. Do not operate construction equipment on the prepared surface.

**Temperature limits:** The temperature of the concrete when placed in the forms must be in the range 10 - 32°C. Do not place concrete when the shaded air temperature is less than 4°C.

**Hot weather placing:** If placing concrete in hot weather, avoid premature stiffening of the mix and reduce water absorption and evaporation losses. If the air temperature exceeds 32°C, place and compact the concrete as quickly as possible and then cover it with an impervious membrane or hessian kept wet.

#### Joints:

**Isolation joints:** are required where pavement meets other construction ie. walls, slabs.

Longitudinal joints: at 5m spacings along the long direction of the paving.

**Transerve joints:** are perpendicular for longitudinal joints at 12m spacings, maximum.

#### Finish.

Exposed aggregate finish -steel trowel to a smooth surface. After final set use clean water and brushes to remove the surface film of mortar until the aggregate is uniformly exposed without undercutting the matrix.

#### **Tolerance:**

6 mm maximum deviation using a 3 m straight edge.

### Finished surface:

Provide a surface uniform in appearance and free from depressions in which water can lie, with a texture depth of 2 - 2.5 mm.

### 6.3 Paving

**6.3.1** Use concrete pavers described by the following terms (or their equivalents) which comply generally with the following standards and testing information:

**Cement:** AS 3972 - (1991) Portland and Blended Cements

**Aggregates:** AS 2758.1 (1985) Concrete Aggregates

Admixtures: AS 1478 (1992) Chemical Admixtures for Concrete

**Pigments:** BS 1014 Pigments for Portland Cement and Portland Cement

Products

**Unit Pavers Testing Information** 

DESCRIPTION	RESULTS	TEST METHOD / STANDARD
Characteristic Compressive Strength	Min 40Mpa	AS/NZS 4456.4 1997
Minimum Breaking Load (Pedestrian traffic)	2.0 kN*	AS NZS 4456.5 1997
Minimum Breaking Load (Vehicular traffic)	5.0 kN*	AS NZS 4456.5 1997
Abrasion Resistance	Max Abrasion Index 3.0 (High volume pedestrian malls)	AS/NZS 4456.9 1997
Slip Resistance – Shotblast Surface & Hone Grit	Min Dynamic Coefficient of Friction 0.45	AS/NZS 3661.1:1993
Moisture Content and Total Absorption	Max 9%	AS4456.16-1997
Resistance to Salt Attack	Initial signs of particle	AS1226.10

	disintegration after 21 cycles. Excessive after 26 cycles.
Freeze Thaw	No signs of damage after 5 AS4046.6-1992 cycles.
Water/Cement Ratio	Max 0.6

<sup>\*</sup>Depending on unit size and thickness - steel reinforcement may be required to achieve this value.

#### 6.3.2 Hardscape Finish Types

#### P1 - Type 1

Standard concrete to shared 2.5m wide cycleway (as per Ryde Public Domain Plan Technical Manual)

Location: Pedestrian + cycleway pavement, as shown Paving: Reinforced concrete to Engineer's detail

Size (mm): 150mm thk Colour: Natural Finish: Light broom

Installation: Control and expansion joints to Engineer's detail.

#### **P2 - Type 2**

Precast high quality concrete/limestone pavers with sandstone porphyry banding and header course

Location: Pedestrian pavement / plazas / foyers
Paver: Kotah blue limestone by Cinajus

Size (mm): 600x300x30mm Colour: Kotah blue Finish: Natural

Installation: Rigid pavement application with sealant to pattern design as detailed and to

manufacturer's recommendation.

#### **P3 - Type 3**

Decomposed Granite (not used in this stage)

Location: Public Domain (Orchard areas)

Size: 600x300x60mm

Colour: tbc Finish: tbc Installation: tbc

# P4 - Type 4

Mixed colour sandstone paving to private courtyards

Location: Private Courtyards Size: 600x300x60mm

Colour: tbc Finish: tbc Installation: tbc

### P5 - Type 5

Limestone (High Quality)

Location: Pool Area
Size: 600x300x60mm

Colour: tbc

Finish: tbc Installation: tbc

### P6 – Type 6 Timber Decking

Location: BBQ Area / Boardwalk / Private Common Area Courtyard / Pool Area

Size: tbc
Colour: tbc
Finish: tbc
Installation: tbc

#### P7 - Type 7

Grey granite / limestone pavers (Ryde PDTM)

Location: Streetscapes

Size: 600x300x60 + 300x300x60mm (Ryde PDTM)

Colour: Grey Finish: tbc Installation: tbc

# **P8 – Type 8**

Australian porphyry stone (Ryde PDTM)

Location: Streetscape Thresholds

Size: 100x100x60mm

Colour: Grey Finish: tbc Installation: tbc

#### P9 - Type 9

Resin bound gravel to base of trees

Location: Streetscapes (to base of trees: tree pits)

Size: tbc
Colour: Grey
Finish: tbc
Installation: tbc

#### 6.4 Paver Infill Service Covers

Location: As shown on consultants drawings.

Type: Havestock infill covers (or similar approved) with raised stainless steel edge

(60 & 40 mm high).

Telstra pits to have approved infill covers to Telstra requirements.

Size (mm): To suit existing service pits

Colour and Finish: Infill paving as indicated - or to match adjacent paving.

Installation: Rigid pavement application with sealant to pattern design as detailed and

specified.

# Falls, Levels and Jointing

Lay all paving to even and correct falls as required and as shown on the drawings with no ponding and away from buildings and towards drainage outlets. Jointing at interface of rigid pavements and fixed objects (kerbs, sumps, and buildings) to be flexible sealant.

#### 6.5 General

All paver shapes shall be true in shape with intersecting faces subtending at 90 degrees.

All pavers intersecting at a radius are to be cut at prescribed radius to alleviate faceting.

#### **Grading:**

Grade pavers to avoid abrupt changes in level and provide a smooth surface to prevent water ponding.

**Units:** Deviation between the surface of each paver and its surrounding surface shall not be greater than 4mm. Refer to construction details.

#### **Cutting Units:**

Maintain sharp arises and accurate joints and margins. Use a diamond tipped saw.

#### Laying pavers on curves

Cut pavers as necessary to maintain maximum joint of 10 mm when laying pavers on curves. All pavers intersecting at a radius are to be cut at prescribed radius to alleviate faceting.

### 6.6 Laying Unit Paving - Rigid Pavement Application

#### 6.6.1 Bonding Slurry Mixing

Mixing to be performed either by hand, using equipment, which is clean and free of deleterious material. Alternatively, mix using a cement mixer to achieve a smooth, homogenous consistency, free of lumps.

The volume of slurry mix made, at any one time, must not exceed the amount required to lay the pavers within 45-60 minutes, from initial mixing time.

#### 6.6.2 Mortar Bed Mixing

Mortar bed mix, as specified, to be performed using a cement mixer free of deleterious material. Mix by continuously adding aggregates to water/elasticiser mix to ensure a homogenous consistency, free of lumps. The consistency should be such that it may be loosely shaped into a cricket ball and remain whole when released, leaving the hand moist but not wet.

All components to be measured by means of calibrated containers.

The volume of the mortar bed mix made, at any one time, must not exceed the amount required to lay the pavers within 45-60 minutes, from initial mixing time.

### 6.6.3 Grout Preparation

Mixing shall be in accordance with the manufacturers specifications.

#### 6.6.4 Installation

Ensure concrete base is free of deleterious material.

Prepare mortar mix, slurry mix and dampen concrete base with clean water.

Apply 1 mm thick layer of slurry mix, using a hand broom. Apply prepared mortar mix and loosely screed so that the thickness of combined bed and paver is 5 mm higher than desired finish levels.

Bed down dry paver, gently tap into position using a rubber mallet to within a level of approximately 2 mm higher than desired finish levels.

Remove paver, fill voids with additional mortar then loosen bed with criss-cross hand trowel through bed. Apply an even, light covering of dry cement at rate of 4 cups per square metre, dampen by misting with water. Apply a 1 mm layer coating of slurry mix to underside of paver, using a stiff brush. Bed down paver using a rubber mallet.

Trowel fill voids with mortar at the front edge and front corners of paver, discarding excess mortar.

On completion of the paved area, cover with hessian sheets and spray with water mist. Allow to remain moist for a minimum of 12 hours.

To Superintendent or Engineer's satisfaction, place wooden board or similar paver over areas subject to pedestrian traffic during first 12 hours of curing.

#### **Grouting:**

After 12 hours curing, joints are to be grouted. Remove residual material, prior to commencing joint filling operation. Prepare grout mix. Dampen joints, apply grout mix ensuring full penetration for thickness of paving slab. Light tamp down trowel edge into grouting mix. Use a rubber squeegee to spread out until filled flush with the top of pavers. Remove excess grout with trowel.

Completion: Wipe pavers clean using damp sponge. Remove all excess grout and cement.

### 6.6.5 Expansion Joints and Sealants

Joints in concrete pavement slabs shall be carried through stonework and shall confirm to architectural details.

Expansion joints shall be installed where stonework abuts restraining surfaces such as kerbs and corners using a 10mm thick impregnated fibroboard joint filler cut to required depth, placed against restraining surface prior to placement of stonework. The joint filler shall have a bond breaker placed on the top edge, allowing grouting to be placed over it during the grouting process with a tooled joint formed for application of the sealant.

Where control joints occur under stonework the stone shall be sawn full depth exactly 24 hours after laying to allow the control joint to be projected through the stone ready for sealant.

Sealant to all joints shall be Sikaflex-11FC. Selected colour by the Superintendent placed in accordance with the manufacturers recommendations.

# 6.7 In situ Concrete refuge kerb & service path

#### Concrete

Standard: To AS 1379

**Thickness** 

Foot traffic: min 200 mm

#### Reinforcement

F62 mesh with min 30 mm cover

# Preparation

General: Trim the ground to accommodate the thickness of concrete and compact to a firm, even surface. Provide formwork for sides and stop ends.

# Concrete placing

Preparation for placing: Moisten the subgrade to ensure a firm, uniform moist surface at the time of placing. Remove loose material and debris from the surface.

Temperature limits: The temperature of the concrete when placed in the forms must be in the range 10 - 32°C. Do not place concrete when the shaded air temperature is less than 4°C.

Hot weather placing: If placing concrete in hot weather, avoid premature stiffening of the mix and reduce water absorption and evaporation losses. Of the air temperature exceeds 32°C, place and compact the concrete as quickly as possible and then cover it with an impervious membrane or hessian kept wet.

#### Joints

Control joints: Form tooled joints at 750mm spacing, to replicate the existing tooled pattern. Refer to drawings 811007-LA-C-72.01-72.05.

Expansion joints: Cast in joint filler at maximum 6 m spacing. Locate at junctions with fixed structures such as buildings and manholes, at path intersections, and at intervals not exceeding 15 m elsewhere. Do not tool off joint arrises abutting the seal.

Joint filler: 10 mm thick bitumen impregnated fibreboard.

Contraction joints: Weakened plane joints 3 mm wide extending at least one quarter the depth of the section, at spacing approximately equal to the paving width but not exceeding 2 m. Tool off arises to 6 mm radius.

Dowelled joints: Formed or sawn joints reinforced with dowels and sealed.

Tied joints: Formed or sawn joints reinforces with tie bars.

Construction joints: Locate to coincide with contraction and expansion joints.

#### **Finishing**

Light broom finish: Steel trowel to a smooth surface. After final set use clean water and lightly brush the surface film of mortar perpendicular to path of travel without under cutting of the matrix.

Tolerance: 6 mm deviation using a 3 m straight edge.

Finished pavement surface: Provide a surface uniform in appearance and free from depressions in which water can lie, with a texture depth of 2 - 2.5 mm.

### 7. ASPHALTIC CONCRETE PATHWAY/DRIVEWAY

### 7.1 Description

This specification provides for the works of the construction of pathway/ driveway pavements, including subgrade preparation and the supply, spreading, trimming and compaction of base course and asphaltic concrete surfacing. For pavement areas and depth(s) refer to the drawings.

### 7.2 Setting out

The Contractor shall be responsible for the setting out and the checking of the works for discrepancies and ambiguities and shall refer any discrepancies or ambiguities found to the site engineer/ Superintendent for resolution prior to starting the works.

# 7.3 Preparation of subgrade

The pathway area shall be boxed out to the depth(s) as detailed and in the locations shown on the drawings. The work shall present as smooth continuous lines and curves that sit well in the surrounding landscape and free of pondages.

Excavation shall be in all classes of material to the lines grades and levels shown on the drawings.

If in the opinion of the site engineer/ superintendents, soft or unsuitable material is encountered at the specified subgrade finished level, such material shall be excavated and replaced as directed with compacted approved material as specified herein. Minor pockets of unsound material such as those caused by tree roots, stumps etc. shall be excavated and all costs associated with the removal and replacement shall be deemed to be an extra to the Contract Sum.

Trim the sub grade to provide smooth grades, curves and falls and compact as specified to achieve a uniform bearing surface for pavement base course materials to be placed thereon.

### .4 Disposal of Spoil & Rubbish

Dispose of spoil and rubbish off site at an Authorised Waste Disposal Centre.

Spoil means all unsuitable material and surplus material from excavations, brooming, sweeping, filling and other works under the Contract which is not required to complete the works as specified.

Unsuitable material means material from excavations under the Contract whose quality due to composition or excessive moisture renders it unacceptable for incorporation into the Works.

All, Loading, haulage to the disposal site, unloading of spoil and tipping fees will be at the Contractor's expense and shall be deemed to be included in the Tendered prices and rates for such items.

# 7.5 Trimming and Compaction

All sub grade and pavement materials shall be compacted by rolling, and/or by other approval means, at  $\pm$  3% optimum moisture content to achieve a compaction of 100% standard maximum dry density.

#### 7.6 Base Course

Base course shall consist of Principal supplied granular material which is stockpiled on site within 1 km of the Works. Material shall be compacted to achieve a grading and density to allow subsequent placement of AC surfacing thereon. Grading shall match RTA requirements for base course materials refer to MR Form No 744 and 743. Base course stockpiles consist of crushed brick and baked clay products.

# 7.7 Testing

Test all material placed and compacted and subgrade preparation to verify required compaction has been achieved. Testing shall be performed to current Australian Standards by an approved NATA Testing Facility. Tests shall be undertaken and 50m centres generally, with a minimum of 2 tests for every work component.

No work shall be covered over until test results confirm the compliance of the compaction undertaken.

### 7.8 Asphaltic Concrete

Provide 25mm minimum compacted thickness asphaltic concrete pavement surfacing placed and compacted over trimmed and compacted base course. Provide parallel and true edge line of continuous straights and curves for the compacted asphaltic concrete surfacing. No ponding shall occur on the finished surface.

The base course shall be tack coated prior to laying AC10 in accordance with best industry practice

Asphaltic concrete shall comply with

- MR Form No 612: supply and laying of Asphalic Concrete

- Mix designation : AC10

Bitumen Emulsion: To AS1160

Designation: AMS/170-60

Placing and compaction: To AS 2734

Tack coat: cut back bitumen or bitumen emulsion

# 7.9 Finishing

Grade evenly to match existing pavement levels and to finished levels that allow drainage away from pavement surface without ponding.

# 8 COMPLETION

# 8.1 Cleaning

Leave paving clean on completion. Clean paved surfaces using an appropriate cleaning agent.

# 8.2 Spare tiles/ pavers

General: Supply spare matching pavers and accessories of each type for future replacement purposes. Store the spare materials on site.

Quantity: At least 1% of the quantity installed.

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#### **GENERAL** 1.

#### 1.1 **Cross References**

#### General

Refer to the General requirements section.

#### **QUALITY** 2.

#### 2.1 Inspection

## Witness points

Give sufficient notice sot that inspection may be made at the following stages:

- Furniture items delivered to site before installation.
- Building locations or substrates prepared to receive furniture before the furniture is installed

#### 2.2 **Contractor's Submissions**

#### Subcontractors

Submit names and contact details of proposed suppliers and installers.

#### Installation

Submit the manufacturer's standard drawings and details showing methods of constructions, assembly and fixing, with dimensions and tolerances.

#### NOMINATED FURNITURE ITEMS 3.

#### 3.1 The work specified in this section includes the supply and installation of new items.

## Criteria for Rejection:

In general all furniture items supplied shall be consistent and regular in size and form, free of warps, chips, cracks, metal crazing or discolouration, and shall be completely free of defects or surface/structural damage.

The furniture items shall be supplied in accordance with this specification and be subject to conforming to the relevant details including specified component types and dimensional details.

All furniture items supplied which do not satisfy any of the requirements set out herein shall be deemed subject to rejection upon delivery to site by the Superintendent.

#### Materials Handling and Packaging:

The responsibility for adequate packaging and protection throughout the transport period to site including off loading shall be the responsibility of the supplier.

It is recommended that in order to avoid damage during transport the furniture items be packaged using sufficient polystyrene foam and timber planks so as to avoid contact between items during transit. All finished timber and metalwork should be protected using heat-bonded plastic, air bubble plastic or approved equivalent.

Supplier may wish to nominate alternative systems for materials handling which may vary from those supplied.

The supplier shall furnish the contractor with his preferred system for materials handling and in cases be held accountable for its performance.

#### 3.2 Installation

## Footings/Foundation:

In accordance with the construction details to seat bases are for each furniture type.

All concrete footings are to have troweled finished top set "on flat" using spirit levels irrespective of adjacent surface pavement grades and crossfalls. Similarly all cast in fixings are to be set vertical and plumb perpendicular on top of footing. Allowances are to be made for varying footing set-down depths for bench and seat footings where local surface pavement crossfalls induce a variance in leg heights.

### Fixings:

In accordance with AS 1720.1 the contractor is to provide all footings and ancillary items sufficient to carry out the fixing of site furniture as called for on the drawings.

Ensure all furniture items and signs are set plumb and legs, posts vertical using spirit levels and the like irrespective of adjacent surface pavement grades and crossfalls.

Where surface pavement grades result in uneven leg heights on seats and benches the specified height of furniture items above finished grades will be with respect to the "high" side of seat/bench.

Therefore the specified height above pavements for seats/benches is to be regarded as the maximum at any one point, as noted on the drawings.

#### Handling and Repair:

The contractor shall be responsible for ensuring safe handling of all furniture items from the time of acceptance upon delivery through the installation period and subsequent protection of furniture items through to handover.

The contractor shall be required to make good any damage to site furniture timber, metal and paint finished components which occurs post delivery and during or after the installation process.

#### **Approvals:**

The contractor shall check all setout dimensions on site and seek the Superintendent's approval for all furniture positions to commencement of the footing excavation.

## Cleaning, Protection and Refurbishment:

Keep the works clean as they proceed. Protect finished furniture installations from damage and restrict user access to fittings until such times as directed by the Superintendent.

**Adjacent Works:** The contractor shall be responsible for making good any damage to adjacent works, with emphasis on paving, steel structures, walling and precast units which occur as a result of the furniture installation process.

#### 3.3 Furniture

## Seat Type 1 - Typical Park Bench Seat

Location: Refer to drawings

Number: 17

Manufacturer & model: 'Urban Seat 11 (Aluminium)' with armrest and backrest by Botton

and Gardiner

Colour and Finish: Painted cast steel aluminium,

#### Seat Type 2 - Bespoke Seating Elements

Location: Refer to drawings

Number: tbc
Manufacturer & model: tbc
Colour and Finish: tbc

#### Timber & Steel portal structure.

Location: Refer to drawings

Number: as shown

Manufacturer & Model: By D & C sub contractor with approved shop drawings

Size, Colour and Finish: Powder coated galv steel frame, fine sawn F17 Class 2 red iron

bark timber. Footing to Engineer's detail.

Water features.

Location: Refer to drawings

Number: 2

Manufacturer & Model: By D & C pool consultant with approved shop drawings

Size, Colour and Finish: Pool tiles - Mosaic pool tiles (tbc)

Pool capping - 100 mm thick Travertine capping.

Additional if required: Stainless steel blades - 316 grade and max

of 0.5 micron polish.

'Heelsafe' grate by ACO Polycrete Pty Ltd

Bins: Councils standard double bins.

Bollards: 1300 high x 150mm dia 1.6mm thick 316 S/S core drolled

to depth of 400 mm Colorfen Constructions 02 9545 4284

Cycle Racks

Location: Refer to drawings

Manufacturer & Model: Urban Art Projects - Environ Bike Racks ENV09

**Tactile Indicators TA1** 

Manufacturer & Model: Warning Tactile Colourmax Yellow Stainless Steel (316)

DTAC COLOURMAX TGSIs

#### 3.4 Timber & steel structures

Construct deck and shade structures

Design & construct items based on details in this package.

All timber shall be seasoned hardwood, Durability Class 1 or 2 for decking and facia. All timber shall be stress Grade F17 to AS 1720.1 & AS 2858.

#### **Acceptable Species:**

Red Ironbark Durability Class 1
Red Forest Gum Durability Class 1
Red River Gum Durability Class 2

Should any member exhibit excessive bowing warping, cupping or splitting within the defects liability or 6 months whichever is longer after installation those members must be replaced. Excessive bowing warping etc. is defined as equal to Span/300.

135

Timberwork to comply with: AS1684 Timber framing Code

AS 1720 Timber Engineering Code

Bearers shall be Galvanised 250 PFC & 100mm UC / Joists shall be 100 x 100mm Seasoned H/W DAR as per the detail. Decking shall be Seasoned H/W DAR 150 X 35mm F17

The top profile of the decking boards to have 3-5mm pencil round to avoid incidence of splintering.

## Fixings:

Provide all necessary fittings fixings fastenings, nails, screws and the like of approved types sufficient to transmit loads and stresses imposed and to ensure the rigidity of the assembly. Pre-Drill and screw timbers for fastenings where appropriate and where necessary to prevent splitting.

PFC & UC bearers to be galvanised to AS 1650 and nails shall conform to AS 2334. Wood screws to AS1476. Bolts to AS1111 with suitable anti-corrosion treatment.

All fixings and fastenings shall be either stainless steel, hot dip galvanised or mechanically plated to comply with AS1650. Provide all necessary fastenings, nails, screws and the like to transmit loads and stresses imposed and ensure the rigidity of the assembly. Pre-Drill and screw timber for fastenings where appropriate and necessary to prevent splitting.

#### Sealing:

All cut ends or end grains of each timber should be sealed with Mobilcer-M Wax Emulsion or similar sealant as soon as possible after the timber components are cut. All ends should be cut square.

## 1 GENERAL

#### 1.1 Cross references

#### General

Refer to the General requirements section.

#### **Related sections**

Refer to the related sections:

## Refer to the consultants' sections:

Refer to Engineer's drawings and masonry notes for retaining walls and wall specification.

## 2 QUALITY

## 2.1 Inspection

## Witness points

Give sufficient notice so that inspection may be made of:

- set out before placing posts.
- Set-out of formwork for concrete wall footings

Hold points >Completion of Set-out

## 3 EXECUTION

## 3.1 Construction generally

#### Set out

Set out the fence and wall lines and mark the positions of posts.

#### **Excavation**

Excavate post holes and footings so that they have vertical sides and a firm base.

#### Line and level

Erect posts vertically. Set heights to follow the contours of ground plane.

## **Concrete footings**

In ground: Place mass concrete around posts and finish with a weathered top falling 25 mm from the post to ground level.

## 4 FENCE TYPES – NOT IN THIS CONTRACT

#### 5 WALL TYPES

#### 5.6 WALL TYPE 1: Sandstone Cladded Block Work Walls

**Dimensions:** Approx 200-300mm width x height and length varies (as shown on drawings.

**Type:** Single core filled concrete blockwall or substrate as determined by builder to Engineer's detail.

**Cladding:** 40mm thick and various widths x 150mm height Sandstone cladding

**Capping:** Sandstone Capping, maximum dimension of straight stone runs.

Construction: The Sandstone shall be fixed to the concrete walling with epoxy mortar

with butt joints, mortar colour to match dominant colour within wall.

Refer to Engineer's drawings for structural details and specifications of wall.

## 5.7 WALL TYPE 2

**Type:** Sandstone filled Gabion Walls (sandstone to be resued from site where possible)

#### Anti - Graffiti

All exposed faces of concrete walls will be treated with an approved anti-graffiti sealant

Refer to Engineer's drawings for structural details and specifications of walls.

#### 5.8 NATURAL STONE - STONEWORK

GENERALLY: Natural stone shall be of uniform quality, texture and strength, sound and free from defects (including vents, cracks, fissures, foreign material and the like) liable to affect its strength, appearance, durability, or proper functioning under the intended conditions of use, and subject to approval in accordance with the requirements of the Contract.

## 5.9 STONE - STONEWORK

REFERENCE: Colour of stone - Stonework. The design principle is that the sandstone should be even coloured buff sandstone. Striated sandstone will not be permitted. The sandstone for the cladding should be Gosford Quarries 'Acrogem'

REQUIREMENT: Sandstone shall be new and of a hard and durable quality free from sand balls, excessive tea leaf, quartz pebbles, fissures, sealed joints, hard ball, shale inclusions or any other defect and without clearly defined, easily split bedding planes.

It shall be sawn from the lower lifts of an approved source with accurately sawn beds with joints to be diamond sawn squarely and accurately to permit fixing without voids at the joints.

All sandstone shall be new and completely free from sand balls, clay balls, hard ball, quartz pebble, fissures, healed joints, dry beds, mica beds, manganese, black line, shale inclusion or any other defects.

QUALITY: The Supplier must nominate the location in the quarry from which the stone to be used would be taken. Stone to be used in the works is to be quarried from a single approved source of stone.

The stone shall be from the approved source. It shall be extracted from the quarry by either channelling, drilling and wedging, or wire cutting.

Stone is to be quarried from a source that has been recently tested by a recognised testing laboratory such as the CSIRO National Building Technology Centre, Ryde, NSW or Amdel Pty Ltd, South Australia or Scientific Services Laboratory, Melbourne, Victoria.

Stone tested must have received an hypothetical durability rating of "A" or "B" as defined by the Amdel testing criteria.

Copies of recent test reports identifying the quarry source and location with complete details of these tests are to accompany each tender.

Generally all stone selected should have a proven durability for its intended use. Where the slightest doubt exists as to the performance of any block of stone in its nominated position, it will be rejected.

All stone shall be free of any defects liable to affect durability or structural soundness for its intended use. Reasonable variations natural to the source in colour and texture shall be acceptable within a range of samples requested, for approval by the Superintendent.

The use of any staining, bleaching or chemical oxidising agent is unacceptable to the Superintendent.

Selection standards are as follows:

- (i) The degree of concentration of tea leaf will be subject to the approval of samples to be submitted by the Contractor. The amount of tea leaf acceptable will depend on the intended location of a block of stone (e.g. only light depositions will be acceptable in public areas at ground level etc.)
- (ii) Shale inclusions in finished moulded stone shall be restricted to a single occurrence in the occasional stone. Acceptance will be subject to the final location of the stone and the size of the inclusion.
- (iii) Stone with sharp lines or with thick (5 mm or more) distinctly marked lines shall not be accepted. Stone with faint indistinct markings, which are indefinable as lines may be acceptable.

The Superintendent will only inspect stone in its worked condition in order to check the compliance of that stone with standards as specified. The Contractor shall accept liability for all stone up to its worked condition with regard to defects, etc. as herein specified.

All worked stone shall be inspected in the mason's yard on site immediately prior to installation on the building works. Stone found unacceptable for its specific purpose shall be rejected.

Prior to delivery, each worked stone is to be inspected by the Superintendent and if any stone has not oxidised evenly and naturally to the required standard the stone will be rejected.

#### 5.10 SUPPLY OF STONE - STONEWORK

Prior to commencement and throughout progress of the contract the Contractor shall stockpile on premises within the Sydney/Gosford region, sufficient processed material to prevent any delays to the programmed work which could occur because of rejection of stone or delays in the transportation of stone.

The Contractor shall nominate this proposed location and will be required to provide access to this location for inspection of stone by the Superintendent or his representative at any time within working hours during the progress of the Contract.

All stone is to be carefully packed and a stropped with arrises protected against damage during handling and transport. Stone received in a damaged condition will be rejected.

## 5.11 SURFACE FINISHES TO SANDSTONE - STONEWORK

All sandstone paving and guttering shall be gang sawn with a fine steel grit. Samples are to show this finish. .

#### 5.12 REJECTED STONE - STONEWORK

Any stone rejected on site is to be removed by the Supplier or his agent within forty eight hours of rejection.

#### 5.13 PROLONGATION - STONEWORK

Delays to the Contract caused by the rejection of stone, delay in delivery of stone or by failure to remove rejected stone from the site shall be the responsibility of the Contractor and any resultant prolongation costs incurred to the Contract shall be born by the Contractor.

#### 5.14 MORTAR - STONEWORK

STANDARD: To AS 3700

RETEMPERING: Discard mortar which has become too stiff for use. Do not retemper with water.

PRE-MIXED MORTAR: Do not use unless prior approval has been obtained.

MORTAR MIX:

Generally: Use a mix which has a strength less than that of the stone bedded in it, and a porosity equal to or greater than that of the stone.

Replacement work: Use a mix complying with the above, and in addition matching as closely as possible the colour, texture, strength and porosity of the original.

Face or pointing mortar: Colour and texture to match approved sample.

Proposed Mixes: Pointing mortar shall be as follows:

(a) 1:2:9 off-white cement:hydrated lime:sand will be used for all sandstone walls.

Section 7 SUBSOIL DRAINAGE

#### 1 GENERAL

## 1.1 Cross references

#### General

Refer to the General requirements section.

#### 1.2 Standard

#### Stormwater drainage

General: To AS 3500.3.

## 1.3 Interpretation

#### **Definition**

Pipe surround: Includes pipe overlay, pipe side support, side zone and haunch zone.

## 2 QUALITY

#### 2.1 Inspection

#### Witness points

Give sufficient notice so that inspection may be made at the following stages:

- Excavated surfaces.
- Concealed or underground services.

## **Hold points**

As above

## 2.2 Samples

#### General

Submit samples of the following:

- Each type of imported pipe bedding material.
- Each type of filter material.

#### 3 EXECUTION

#### 3.1 Subsoil drains

#### General

Provide PVC subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable. Hydraulic drawings will need to be co-ordinate with landscape.

#### Pipe depth

Provide the following minimum clear depths, measured to the crown of the pipe, where the pipe passes below the following elements:

- 100 mm below formation level of the pavement, kerb or channel.
- 100 mm below the average gradient of the bottom of footings.
- 450 mm below the finished surface of unpaved ground.

#### **Jointing**

At junctions of subsoil pipes provide tees, couplings or adaptors to AS 2439.1.

#### Trench width

Minimum 300 mm, unless shown otherwise on the drawings.

Section 7 SUBSOIL DRAINAGE

#### Pipe underlay

**General:** Grade the trench floor evenly to the gradient of the pipeline. If the trench floor is rock, correct any irregularities with compacted bedding material. Bed piping on a continuous underlay of bedding material, at least 100 mm thick after compaction. Lay the pipe with one line of perforations at the bottom.

**Chases:** If necessary, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

#### Pipe surrounds

General: Place the material in the pipe surround in layers  $\leq$  200 mm loose thickness, and compact without damaging or displacing the piping.

### Depth of overlay:

- To the underside of the bases of overlying structures such as pavements, slabs and channels.
- To within 150 mm of the finished surface of unpaved or landscaped areas.
- As shown on the drawings.

#### Filter fabric

**General:** Provide polymeric fabric formed from plastic yarn composed of at least 85% by weight propylene, ethylene, amide or vinyledenechloride, and containing stabilisers or inhibitors which provide resistance to deterioration due to ultraviolet light.

Marking: To AS 3705.

**Protection:** Provide heavy-duty protective covering. Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

#### Filter socks

Provide polyester permeable socks capable of retaining particles of 0.25 mm size. Securely fit or join the sock at each joint.

**Subsoil pipeline schedule -** as shown on the Engineers drawings. For locations, refer to landscape grading drawings and details

**Backfilling:** Backfill material above pipe overlay to be in accordance with the requirements of the Civil Engineers Service Trenching section.

Flushing Points: Refer to Engineer's External Siteworks and Stormwater Specification.

**Tolerances:** Pipelines shall be within 50mm of design line and level and shall fall towards the outlet at all points. Subsoil drains to be installed at minimum grade of 1% unless otherwise specified.

#### 1 GENERAL

# Staging – This project is to be staged in 4 parts. For staging of works refer to Architects Site Plan drawing A1.005

#### 1.1 Cross References

#### General

Refer to the General requirements section.

**Planting:** Including plant and other materials, planting works and planning establishment.

## Building works associated with landscaping:

Refer to the related sections: OPEN SPACE AND COURTYARD FURNITURE

**EXTERNAL WALLS** 

**IRRIGATION** 

Refer to the consultants' sections: LIGHTING

## 1.2 Scope of Works

External works as outlined on the drawings will include the supply and installation by the Landscape Contractor of the following, including, but not limited to:

- all external non structural masonry block work walls and raised planters
- placement of cast in situ concrete pavements
- removal of existing vehicle driveways and make good with asphalt pavement
- laying of paving and stairs
- cladding of external walls and architectural substrates
- construction of external masonry walls
- gates, furniture, art works and water features
- excavating and removal of unwanted materials
- topsoiling and raised planter soil mix installation
- fertilising
- mulching
- drainage cell installation including waterproofing to block work retaining walls and filter fabric
- planting
- grassing
- gravel, crushed brick/tile and decomposed granite mulches
- maintenance

## 1.3 Standards

Soils

General: To AS 4419 (Int).

## 1.4 Approved Suppliers and Subcontractors

**Requirement:** Refer to *PARTICULAR CONDITIONS OF CONTRACT* or use approved subcontractors and suppliers for the landscaping works, and for the supply of materials, including soil, plants, seeds and mulch.

## 1.5 Ordering

**Requirement**: Within 14 days of the date of acceptance of tender, furnish proof of ordering the required materials, and advise immediately if any supply difficulties are encountered. For purposes of clarity, this refers to the acceptance of the tender for the head contract, NOT the landscape sub-contract. No extension of time will be granted if any material or product is not available because of late ordering.

#### 1.6 Interpretation Definitions

**Site rock:** Rocks approved for salvage.

Site topsoil: Soil excavated from the site, which has the following characteristics:

- Contains organic matter.
- Supports plant life.
- Free from unwanted matter.

#### **Unwanted matter (in topsoil):**

- Stones over 25 mm diameter.
- Clay lumps.
- Weeds and tree roots.
- Sticks and rubbish.
- Material toxic to plants.

## Imported topsoil:

- Fine: Clay loam, fine sandy loam, sandy clay loam, silty loam, loam.
- Medium: Sandy loam, fine sandy loam.
- Coarse: Sand, loamy sand.

Topsoil mixture: Topsoil and compost or other additives, thoroughly mixed before placing.

## 2 QUALITY

## 2.1 Inspection

## Witness points

Give sufficient notice so that inspection may be made at the following stages:

- Setting out completed.
- Subgrades cultivated or prepared for placing topsoil.
- Topsoil spread before planting

- Grassing bed prepared before turfing, seeding, or temporary grassing.
- Plant holes excavated and prepared before planting for stock in excess of 100L size.
- Drainage Cell installed.
- Plant material set out before planting.
- Planting, staking, and tying completed.
- Grassing or turfing completed.
- Completion of planting establishment work.

## 2.2 Samples

#### General

General: Submit test results for each material, to indicate source and content.

#### Plant materials

Quantity: Submit one plant sample for each 100 of each species or variety, in the condition in which it is proposed to supply that plant to the site.

Samples schedule

Item	Quantity
One species of each type scheduled less than 25L in size	Min. One, or one for each 100 specified.
Organic mulch	5Kg of each type scheduled
Inorganic mulch	5Kg of each type scheduled

Note: Plants to be available for destructive inspection

## 2.3 Tests

Soil Tests/ Sampling: As recommended in AS 4419 (Int) Appendix A.

Provide proof, in the form of certificates from NATA registered laboratories, that the following materials comply with the specification:

- Topsoil mix Type 'A'
- Topsoil mix Type 'B'
- Topsoil mix Type 'C'

## 2.4 Contractor's Submissions

## **Suppliers**

Submit statements from suppliers of plants and other materials, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of the material to the site.

#### **Materials**

**MEADOWBANK STAGE 6-9** 

Supplier's data: Submit supplier's data including:

- certificate identifying seed species, purity, age and germination viability,
- submit a 5kg sample of mulch, which demonstrates the quality, organic content,

value

- material source of supply

Compost: Submit a certificate of proof of compost pH value.

**Execution** 

**Program:** Submit a work program in the form of a bar chart for the landscape works.

**Planting machine:** If a planting machine is to be used as an alternative to hand planting, submit a proposal.

**Maintenance program:** Submit a proposed planting period maintenance program.

Spraying: Submit proposal.

## 3 SITE AND SOIL

#### 3.1 Preparation

#### Weed eradication

**Herbicide:** Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any of its registered formulae, at the recommended maximum rate.

**Manual:** Regularly remove, by hand, rubbish and weed growth throughout grassed, planted and mulched areas. Remove weed growth from an area 750 mm diameter around the base of the trees in grassed areas. Continue eradication throughout the course of the works and during the planting establishment period.

#### Vegetative spoil

Remove vegetative spoil from site. Do not burn.

#### Earth mounds

Place clean filling in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil as determined by AS 1289.5.4.1. Minimise slumping and further internal packing down. Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles.

#### **Embankments**

Place erosion control mesh to all embankments as shown on plan and to all areas which exceed 1:3. Erosion control mesh shall be equal to 'Jute Mesh' as supplied by Total Erosion & Pollution Control ph: 02 9524 0155

**Site rock**: Stockpile for future placement and accessibility for lifting. Dispose of other rock off site.

## Sub soil drainage layer

Place 18mm pea gravel or approved equivalent to max. 150 mm depth at base of tree pits.

#### 3.2 Reinstatement

**Requirement:** Refer to clause 3.8 in *Site Preparation section* and to Engineer's *External Siteworks and Stormwater Specification Section 3.7* 

**Backfilling:** Backfill to excavations around tree roots with a mixture consisting of three parts by volume of topsoil and one part of well rooted compost with a neutral pH value, free from weed growth and harmful materials. Place backfill layers, each of 300 mm maximum depth, compacted to a dry density similar to that of the original and surrounding soil. Do not backfill around tree trunks to a height greater than 300 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

# 3.3 Subsoil Ripping

General: Rip parallel to the final contours wherever possible. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees to be retained.

Ripping depths: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.

Heavily compacted clay subsoil: 450 mm.

Ripline planting areas: 150mm

#### Planting beds

**Excavated:** Excavate to bring the subsoil to the design levels allowing for the thickness of topsoil. Shape the subsoil to fall to subsoil drains where applicable. Break up the subsoil to a further depth of 150mm.

**Unexcavated:** Remove weeds, roots, builder's rubbish and other debris. Bring the planting bed to 75mm below finished design levels.

#### Cultivation

Minimum depth: 100mm.

Cultivation depths (mm):

Grassed areas: 100mm

Planting areas: 150mm

**Services and roots:** Do not disturb services or tree roots, if necessary cultivate these areas by hand.

**Cultivation:** Thoroughly mix in materials required to be incorporated into the subsoil. Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25mm, clods of earth exceeding 50mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

## Filter fabric and drainage aggregate

Allow for Sarlon Polyweave "f" filter fabric or similar and max. 150mm deep 18mm aggregate to areas shown on the drawings which are to have gravel drainage layer in lawn or mass planted areas or tree pits in streetscape.

#### **Additives**

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil.

Gypsum: Incorporate at the rate of 0.25 kg/m<sup>2</sup>.

### PODIUM SLAB DRAINAGE CELL

**Requirement:** Supply and install drainage cell on podium slab areas to extent nominated, strictly in accordance with the manufacturers specification. A cementous topping graded to fall to drainage outlets, will be applied over waterproof membrane to the structural slab by the builder

Drainage cell nominated in details for planters on slab areas is equal to *Atlantis cell or similar* installed in accordance with the manufacturers specification. Place over drainage cell filter fabric to base and sides of planter, lap 300mm over all joints

## 3.4 Topsoil Definitions

**Site topsoil: Soil** excavated from the site which:

- contains organic matter
- supports plant life
- is free from unwanted matter such as stones over 25mm diameter, clay lumps, sticks and rubbish and clumps, and material toxic to plants
- is approved for reuse on site as topsoil.

**Topsoil mixture:** Topsoil and compost or other additives, thoroughly mixed before placing.

**Top dressing:** Coarse or medium soil to AS 4419 (Int.), suitable for application to turf or grass areas.

**Soil textures:** Use topsoils described by the following terms (or their equivalents) which comply generally with the texture classifications and typical uses of AS 4419 (Int.):

Medium (sandy loam)

Topsoil particle size table (% passing by mass)

AS sieve aperture	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	95 – 100	95 - 100
0.60	75 – 100	75 – 100	70 - 90
0.30	57 – 90	55 – 85	30 - 46
0.15	45 – 70	38 – 55	10 - 22
0.075	35 – 55	25 – 35	5 - 10
0.002		2 – 15	2 - 8

Tops	oil pro	perties	schedul	е
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Property	Туре	Amount
Nutrient levels	Phosphorus (P) (mg/L)	0.7 - 4
	Potassium (K) (mg/L)	32 - 250
	Sulfur (S ) (mg/L)	> 40
	Calcium (Ca) (mg/L)	50 - 350
	Nitrogen (N) (mg/L)	≤ 100
	Maganese (Mn) (mg/L)	1 - 15
Additives	Gypsum (% by volume)	Medium
	Compost	
Other properties	Organic matter (% by mass)	20 max.
	Wettability	
	Soil reaction (pH)	6 - 7
	Electrical conductivity (dS/m)	
	Soluble salts (by % mass)	0.1
	Moisture content (% by maximum mass)	um 10% max.
	Toxicity index to AS 3743	

## Permeability

## **Topsoil schedule**

Location	Туре
Trees in planting on grade	Topsoil mix Type 'A' (300 mm depth) and
	Topsoil mix Type 'B' to achieve finished levels
Turf on grade	Topsoil mix Type 'A' (50 mm depth)
Mass planting on grade	Topsoil mix Type 'A' (300 mm depth)
Turf on podium	Topsoil mix Type 'C' (300 mm depth) Topsoil
Mass planting on podium	Topsoil mix Type 'D" (from 'Fytogreen'). Depths
	as recommended by manufacturer / supplier.
Planting in pots	Topsoil mix type 'C' 300mm depths
	Topsoil mix type 'B' to achieve finish levels

Topsoil mix 'A' properties schedule

Property	Amount
Air filled porosity	10 to 15%
Wettability	210.35 mm/minute
Total water holding capacity	46.9%
Organic matter	3.17%
Permeability	17.4cm/hr
Bulk Density	1.0 tonnes/m³ (loose)
	1.1 tonnes/m³ (compact)
Toxicity	87%
Moisture Content	< 10% by mass (AS 1289)
Formulation:	
Screened Sandy loam	40%
Washed Coarse Sand	20%
Washed Graded Horticultural Ash	10%
Blended Select Compost	30%

**Source:** Import Topsoil Type A "Organic Planting Mix, MS133" from Benedict Sand and Gravel or an approved equivalent.

**Additives:** Topsoil raised to the standard of the appropriate type be the use of additives may be used subject to compliance with the relevant test criteria.

**Topsoil tests:** If testing is required, take soil samples as recommended in AS4419 (Int.) Appendix A, ands test to the methods in AS4419 (Int.), or AS 3743, as applicable. Test all imported topsails and upgraded site topsoil proposed for reuse.

**Topsoil mix Type 'A'** – topsoil mix for any depths ≤ 300mm depth below surface as scheduled. Mix A is a loamy sand in a matrix of decomposed organic matter and is required to fulfill the chemical criteria for premium grade non-specialist mixes according to AS 4419. The following additions provide a guideline. Testing is required to confirm additions and adjustments should be made as recommended. (For further technical information refer to Appendix F).

Magrilime or a 50/50 lime dolomite mix	to bring pH to 5.3-6.5
Trace element mix	200 g/cubic metre
Potassium nitrate	500 g/cubic metre
Nitram (ammonium nitrate)	500 g/cubic metre
Superphosphate	1 kg/cubic metre
Controlled release fertiliser	2 kg/cubic metre
Gypsum	1 kg/cubic metre
Magnesium sulphate (epsom salts)	400 g/cubic metre

**Topsoil mix Type 'B'** – subgrade mix for any depths >300mm below surface eg backfilling pits for advanced trees and planters on podium, below Type 'A' mix.

Backfill Mix B is a washed fine sand, with uniform particle size, 0.25mm to 0.50 mm. Particle shape is to be round to sub-round.

# The chemistry and physical properties of mix Type 'B' are as follows:

Property	Amount
Hydraulic conductivity (permeability)	1200 mm/hr
Moisture Retention capacity	15%
Cation exchange	Very low
% clay and silt fines	Low

**Mix testing:** All mixes are to be submitted for testing and approval prior to installation. Approximately 5 litres of each mix type is required to be tested for chemical and physical compliance with the specification. Soil suppliers must also supply a list of the components used in each mix and their proportions as well as rates of any chemical additives.

**Topsoil mix Type 'C'** - topsoil mix for any depths  $\leq$  300mm depth below surface in planter boxes on podium and planter tubs, as scheduled. Mix C is a light weight free draining blend, and is required to fulfill the chemical criteria for premium grade, lightweight mix according to AS 3743. (For further technical information refer to Appendix F).

**Source:** Import Topsoil Type C *"Planter Box Mix, MB133 (Menangle)"* from Benedict Sand and Gravel or an approved equivalent.

## A possible formulation with additives would be a combination of the following:

Formulation:	% by volume
Screened Menangle Sandy Loam	30%
Washed Coarse Sand	20%
Washed Horticultural Grade Ash	20%
Nutrihumus (12mm)	10%
Composted Hardwood Sawdust	10%
Composted Cow Manure	10%
Natural gypsum	2 kg/cubic metre
8/9 month controlled release fertiliser	1.5 kg/cubic metre

Testing is required to confirm additions and adjustments should be made as recommended.

# The chemistry and physical properties of mix Type 'C' are as follows: Amount

	7
Bulk Density	0.95 tonnes/m³ (loose)
·	1.09 tonnes/m³ (compact)
Permeability (AS 4419)	19.8 cm/hr
Moisture Content	< 10% by mass

## Sand Particle Size Distribution (USDA sleve size, mm)

The sand is to conform to the following particle size distribution:

Particle Size (mm)	Percentage Content by Mass
> 2.0	0%
2.00 – 1.00	< 5%
1.0 – 0.50	< 20%
0.50 - 0.25	55 – 90%
0.25 – 0.10	< 25%
0.10 - 0.05	< 5%
< 0.05	< 5%
< 0.002	< 3%

The particle size distribution is a guide to the sand required. The selection of the sand is based on the growing medium sand specification and rootzone sand/ mixture, technical performance requirements.

Once the sand is selected a specific grading range shall be written by Rootzone Laboratories International that is correlated between wet sleve and dry sleve analysis to provide a grading range for quality control purposed during stock piling of the sand.

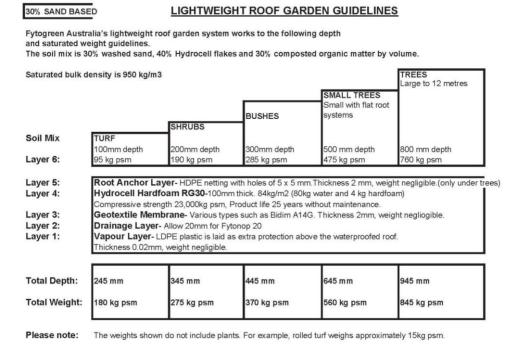
## **Peat Moss**

Use medium grade sphagnum peat moss, with the pH not less than 3.0 and the total dissolved salts less than 250ppm. The peatmoss shall be free of sand, soil and other contaminants. The total organic matter content after loss on ignition at 600°C for 4 hours shall be greater than 95%.

The rate of peatmoss inclusion is expected to be approximately 10% by volume.

**Mix testing:** All mixes are to be submitted for testing and approval prior to installation. Approximately 5 litres of each mix type is required to be tested for chemical and physical compliance with the specification. Soil suppliers must also supply a list of the components used in each mix and their proportions as well as rates of any chemical additives.

**Topsoil mix for all podium planters (Type D):** Soil mix from Fytogreen (30% sand based) to be used in all the podium planter for mass planting.



Disclaimer: This information is supplied in good faith and trials are recommended by the user to test the suitability of the procedure in their climatic region. The system now covers 2 million square metres of roof garden in Europe since 1985 and 8,000m2 in Australia since 2002. No liability will be accepted by Fytogreen Australia or it's representatives as to the final performance based on this information. Date 5/6/2006

**Source:** Lightweight soil from Fytogreen <a href="www.fytogreen.com.au">www.fytogreen.com.au</a>. Please contact supplier for more detailed specification for this soil type.

## **Placing topsoil**

General: Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.
- In planted areas, topsoil is required to finish 75mm below the adjacent hard surfaces such as kerbs, raised planter boxes and paths.
- In planter tubs, topsoil is required to finish 50 mm below the top of the planter tub to allow for 50 mm inorganic mulch.

**Contamination:** Where diesel oil, cement or other phytotoxic material has been spilt on the subsoil or topsoil, excavate the contaminated soil, dispose of it off the site, and replace it with site soil or imported topsoil to restore design levels.

**Spreading:** On steep batters, if using a chain drag, ensure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

#### Consolidation

Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface, which has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

#### **Topsoil depths**

Spread topsoil to the following typical depths:

- Excavated and raised planting areas: If using organic mulch or gravel mulch 300 mm (Refer to details on drawings)
- Excavated tree pits: Refer to details on drawings.
- Irrigated grassed areas generally: 50 mm. (Refer to details on drawings)

#### Surplus topsoil

General: Surplus topsoil to be disposed of off site.

#### 3.5 Fertiliser

**Requirement:** Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

#### Fertiliser schedule

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Location	N:P:K ratio	Application rate	Proprietary item
Garden beds		50 g/m <sup>3</sup>	Dynamic Lifter planting mix
Irrigated lawns		60 g/m <sup>3</sup>	Osmocote Slow Release or approved equivalent

## 4 GRASS

## 4.1 Turfing

#### Turf

Obtain turf from a specialist grower of cultivated turf. Provide turf of even thickness, free from weeds and other foreign matter.

#### Supply

Deliver the turf within 24 hours of cutting, and lay it within 36 hours of cutting. Prevent it from drying out between cutting and laying.

#### **Fertilising**

Mix the fertiliser thoroughly into the topsoil before placing the turf. Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover.

#### Laying

General: Lay the turf in the following manner:

MEADOWBANK STAGE 6-9

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- 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 edging, or grass seeded areas.

Strip turf laying: Close butt the end joints and space the strips 300 mm apart. Apply a layer of top dressing between the strips of turf. Finish with an even surface.

## **Tamping**

Lightly tamp to an even surface immediately after laying. Do not use a roller.

#### **Pegging**

On steep slopes peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

#### Watering

Water immediately after laying until the topsoil is moistened to its full depth. Continue watering to maintain moisture to this depth. Keep the grass in a healthy condition.

#### Mowing

Mow to maintain the grass height within the required range. Carry out the last mowing within 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

**Turfing schedule** 

Botanical Species	Variety	Turf roll size (mm)	Location	Mowing height (mm)	Supplier)
Stenotaphrum secundatum ST85		As provided	Refer dwgs	30	Lowlands Lawn Turf or approved equivalent

(For further technical information refer to Appendix F)

#### Maintenance

Refer to Section 6.2 – Establishment of Grassed Areas.

## 5 PLANTS

## 5.1 Planting

## **Plants**

**General:** Provide plants with the following characteristics:

- Large healthy root systems, with no evidence of root curl, restriction or damage.
- Vigorous well established, free from disease and pests, of good form consistent with the species or variety.
- Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site.

Trees: Provide trees, which, unless required to be multi-stemmed, have a single leading shoot.

Replacement: Replace damaged or failed plants with plants of the same type and size.

## **Plant containers**

**General:** Supply plants in weed-free containers of the required size.

**Open root stock:** If trees are to be supplied as open rooted stock, ensure this is appropriate to the species, variety, size and time of year for planting.

**Potting-on:** Do not carry out potting-on.

#### Plant schedule

Refer to Planting plans.

### Labelling

Label at least one plant of each species or variety in a batch with a durable, readable tag. Do not use nursery tags for this purpose. Remove all such nursery tags from site.

#### Storage

Deliver plant material to the site on a day to day basis, and plant immediately after delivery.

#### Individual plantings in grassed areas

Excavate a hole to twice the diameter of the root ball and at least 100 mm deeper than the root ball. Break up the base of the hole to a further depth of 100 mm, and loosen compacted sides of the hole to prevent confinement of root growth.

#### Locations

If it appears necessary to vary plant locations and spacing to avoid service lines, or to cover the area uniformly, or for other reasons, give notice to the superintendent.

### **Planting conditions**

Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

#### Watering

Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

#### **Placing**

Remove the plant from the container with minimum disturbance to the root ball, ensure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant root ball level with the finished surface of the surrounding soil.

### **Fertilising**

Pellets: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Refer to Fertiliser Schedule.

#### Backfilling

Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball, so that the plant stem remains the same height above ground as it was in the container.

## Watering basins for plants in grass

Except in irrigated grassed areas and normally moist areas, construct a watering basin around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L. Refer to detail.

**Planting in planter tubs:** Place tree and mass planting in the formed hole in planter tub with 100 mm drainage layer to base, 500 mm topsoil type B backfill and 300 mm topsoil type C to the top as detailed. The topsoil shall be below the final surface level with allowance for mulch.

#### 5.2 Planting Advanced Plant Stock

**Objective:** At the date of practical completion, all trees and palms shall be healthy, in correct position, of at least the size specified, structurally stable and free of visible stakes, ties, guys, wires and the like. The contractor shall be responsible for achieving this objective.

**Notice:** Give sufficient notice before delivery of advanced plant stock.

**Advanced stock:** The Contractor is to liase and coordinate with the supplier of advanced trees, including possible long term storage, acclimatisation of tree to local conditions, preparation for and timing of delivery to site.

**Conditions:** Select a time for planting having regard to the appropriate season, time of actual operation, root ball diameter and depth, lifting methods, weather conditions and the like.

**Lifting:** Two days before planting of each specimen, thoroughly irrigate it to the full depth of the root ball. Minimise the cutting of roots. Cut roots with sharp tools. Do not fracture the ball of soil around the root system, but maintain it in firm condition during planting by wrapping in appropriate open weave material (eg hessian), securely tied.

**Placing:** Excavate a hole 1.5 times the pot size. Remove the plant from its container with minimum disturbance to the root ball, ensure that the root ball is moist and place it in the centre of the hole and vertical with the top of the rootball level with the finished surface of the surrounding soil.

**Planting:** Avoid disturbance to the root ball and plant. Remove the root ball wrapping and ties by cutting.

Root Control Barriers for Bamboo: For extent of location refer to drawings.

Supplier; C.R.C. Australia Pty. Ltd. (or approved equivalent)

(p)02-9918-2591

Product: T-RIB BARRIER SYSTEM (600mm depth) or approved equivalent

For installation refer to manufacturers instruction.

**Maintenance:** Refer to 6.3 – Establishment of Planting Works.

## 5.3 Planting Area Edging

Location: As shown on drawings.

Material: Stainless steel edge with pegs

Size (mm): Edge: 150 x 5mm and peg 400 x 10mm

Installation: Driven into ground. Refer to Drawings.

## 5.3 Mulching

## Mulch

**General:** Provide mulch, which is free of deleterious and extraneous matter such as soil, weeds and sticks.

Standard: To AS 4454.

**Organic mulches:** Horticultural Grade Fines, free from stones.

**Mulch material:** Organic mulches shall be free of pests, diseases, toxins and weeds and equal to Horticulture Grade Pine Bark Fines.

## Inorganic mulch types:

**Terrabond:** To be placed to the surface of tree pit areas as indicated on details shown on drawings. Uniform size or graded material in the size range 6 – 10 mm.

## Placing mulch

**General:** Place mulch to the required depth, clear of plant stems, and rake to an even surface flush with the surrounding finished levels. Spread and roll mulch so that after settling, or after rolling, it is smooth and evenly graded between design surface levels sloped towards the base of plant stems in plantation beds, and not closer to the stem than 50 mm in the case of gravel mulches.

**In mass planted areas:** Place after the preparation of the planting bed but before planting and other work.

**In smaller areas (e.g. planter boxes):** Place after the preparation of the planting bed, planting and other work.

**Application:** Place mulch clear of plant stems, and rake to an even surface flush with the surrounding finished levels.

**Extent:** To surrounds of plants planted in riplines and grass areas, provide mulch to 750 mm diameter.

**Depths:** Spread organic to a depth of 75 mm, and gravel mulch to a depth of 75 mm, with the exception of gravel mulch to planter tubs to a depth of 50 mm.

**Mulching schedule** 

Mulch key	Location	Mulch type	Depth	Stabilisation method
Horticultural Grade Fines Mulch	Planting areas		75 mm	

# 5.4 Spraying

#### **Notice**

Immediately give notice of evidence of insect attack or disease amongst plant material.

**Spraying:** Where required, spray with insecticide, fungicide or both.

**5.5 Stakes and Ties** (for all planting as itemised below)

## Stakes

**General:** Use hardwood, straight, free from knots or twists pointed at one end.

**Installation:** Drive stakes into the ground for at least a third of their length, avoiding damage to the root system.

#### Stake sizes:

- For plants  $\geq$  2.5 m high: One 50 x 50 x 2400 mm three stakes per plant.
- For plants 1 2.5 m high: One 50 x 50 x 1800 mm two stakes per plant.
- For plants < 1 m high: One 38 x 38 x 1200 mm one stake per plant.

#### **Ties**

**General:** Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant.

## Tie types:

- For plants ≥ 2.5 m high: 50 mm jute tie installed twice, doubled around the stake and stem in a secure manner.
- For plants < 2.5 m high: 50 mm jute ties stapled to the stake.</li>

## 5.5 Tree Surgery

#### **Notice**

Give sufficient notice to the superintendent before commencing tree surgery.

#### Qualifications

Employ suitably qualified persons to carry out tree surgery work in a safe and progressive manner.

## **Pruning**

General: Comply with the recommendations of AS 4373.

#### **Operations**

Remove dead and decayed wood or limbs that have been broken. Make cuts into live wood. If the trees show signs of deterioration after the work has been done, carry out a program of feeding or soil amelioration such as soil aeration, irrigation or incorporation of organic material. Continue this program until the end of the planting establishment period.

#### **Precautions**

Avoid damage to trees being treated or to nearby trees and surroundings. Do not use trees as anchors for winching operations or bracing. Provide bracing as necessary before cutting to prevent uncontrolled breakages and damage to surroundings.

#### **Dressing**

Prevent incursion of rot or disease after cutting.

#### Root pruning

Do not unduly disturb the remaining root system.

#### 6 COMPLETION

## 6.1 Planting Establishment

## **Period**

**Commencement:** The planting establishment period commences at the date of **builder** being issued with occupation certificate.

Required period: 52 weeks

#### **Existing planting and grass**

Where existing grass or planting is within the landscape contract area, maintain it as for the corresponding classifications of new grass or planting.

## **Recurrent works**

Throughout the planting establishment period, carry out maintenance work including, watering, mowing, weeding, rubbish removal, fertilising, pest and disease control, reseeding, returfing, staking and tying, replanting, cultivating, pruning, hedge clipping, aerating, reinstatement of mulch, renovating, top dressing, and keeping the site neat and tidy.

#### Log book

Keep a log book recording when and what maintenance work has been done and what materials, including toxic materials, have been used. Make the log book available for inspection on request.

#### 6.2 Establishment of Grassed Areas

**Generally:** Establishment turfed areas as outlined below commencing at completion of turfing.

**Protection:** Ensure protection of grassed areas to all vulnerable points and prevent traffic and damage until practical completion and to the end of defects liability. Any damage to be made good by the Contractor at his/her expense.

**Replacement of grass:** Replace all damaged, dying or dead grass. Damage under this heading shall mean such damage that, in the opinion of the Managing Contractor will lead to the death of the grass.

**Fertilising:** Apply an approved 'complete' lawn fertiliser at completion of the first and last mowings, and at other times as necessary to maintain healthy grass cover. Apply fertiliser at the rate and by the method recommended by the manufacturer and to the approval f the Managing Contractor.

Water grass areas as required to maintain them in a continuing health condition and in a state of active growth.

**Mow** grass to 40 mm height when grass has grown to 50 mm height, subsequently as necessary to encourage good grass growth, and to 25 mm height during the last week of the establishment period, or to the satisfaction of the Managing Contractor. Remove grass clippings from site.

**Maintenance:** maintain the turfed areas until the attainment of a dense continuous sward of healthy and evenly green grass over the whole area. Lift failed turf and relay with new turf. Where levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

**Top dressing:** When the turf is established, mow, remove cuttings and lightly top dress to a depth of 10 mm. Rub the dressing well into the joints and correct any unevenness in the turf surface.

**Weeding:** Keep the grass area free from noxious weeds. A selective weedicide spray may be approved by the Managing Contractor for use against broad-leafed weeds. Supply details of chemical analysis and manufacturer's literature when applying for approval. Weedicide to be applied strictly in accordance with the manufacturer's recommendations.

**Trim** grass against mowing edges and kerbs.

#### 6.3 Establishment of Planting Works

**Water** each plant as necessary from the date of planting until the Managing Contractor is satisfied that it has become established, and thereafter until the end of the plant establishment period and as often as necessary to maintain continuing healthy growth. This item also includes maintenance and 'tuning' of the watering system.

**Protection:** Ensure protection of planted areas to all vulnerable points and prevent traffic and damage until Practical Completion and to the end of Defects Liability. Any damage to be made good by the Contractor at his/her expense.

**Replacement of plants:** Replace, at no extra cost, any plant which dies from natural causes whatsoever up until Practical Completion and the end of the Plant Establishment period. Plant replacements shall be of the same size and species as nominated in the planting schedules (See Drawings).

**Weed** beds and remove rubbish at bi-weekly intervals and as necessary to leave in a clean tidy state up until Practical Completion and through to the end of the plant Establishment Period.

**Specified level:** Make good any specified levels by lifting mulch, removing or adding topsoil mix, and replacing mulch to the required level.

Prune only those trees planted as part of the work under the contract to remove broken, bruised

or dead branches, to maintain shape, for health reasons, or as directed. Obtain approval before pruning and comply with the recommendations of AS 4373. Apply an approved fungicidal wound dressing to cut surfaces in accordance with the manufacturer's recommendations.

## 6.4 Completion

## Product warranty

Submit the supplier's written statement certifying that plants are true to the required species and type, and are free from diseases, pests and weeds.

## **Maintenance manual**

Submit recommendations for maintenance of plants.

## Cleaning

**Stakes and ties:** Remove those no longer required at the end of the planting establishment period.

**Temporary fences:** Remove temporary protective fences at the end of the planting establishment period.

Section 8 TREE SUPPLY

#### 1 GENERAL

#### 1.1 Cross References

#### General

Refer to the General requirements section.

## 1.2 Interpretation

#### **Definitions**

Calliper: Measured at 300 mm above ground.

Size index: Product of height (m) x calliper (mm).

**Small trees:** Trees grown in containers < 20 L (other than tubestock), and balled and burlapped or RCB grown trees of size index < 35.

**Other than tubestock or small trees:** Trees grown in containers 20 L, and balled and burlapped or RCB grown trees of size index 35.

## 2 QUALITY

## 2.1 Inspection

## Witness points and hold points

Give sufficient notice so that trees may be inspected before shipment.

#### Partial sampling

**Method:** Expose a small section of the rootball, by washing, sufficient to permit inspection of root development from the stem to the outer extremity. After inspection, carefully replace soil.

Rates: Inspect root systems using partial sampling at the following rates:

- 20 trees (or less): 1 tree sampled.
- 21 50 trees: 2 trees sampled.
- 51 (or more) trees: 4%.

#### 2.2 Tests

## Rootball occupancy test

**Procedure:** Shake or handle unsupported rootball.

**Acceptance criterion:** > 90% of soil volume remains intact.

#### Small trees rootball: shoot ratio test

**Procedure:** Hold stem at 80% of height above ground, deflect 30° from vertical, side to side.

Acceptance criterion: Container or rootball remains flat on the ground.

#### 2.3 Contractor's Submissions

#### Reports

**Forward order contracts:** Submit regular reports in writing to the contract administrator. Include checks against specification requirements, and current photographs.

- Inspection frequency: 3 months.
- Report frequency: 3 months.

Section 8 TREE SUPPLY

#### Materials

**Substitution:** If non-complying trees are proposed, submit proposal. Submit a copy of the approval of substitution with the non-complying trees.

#### **Execution**

**Holding methods:** Submit proposed methods for holding trees beyond specified dates so that trees will continue to comply.

## 3 TREES

#### 3.1 Above Ground

#### True to type

Type: Supply trees which are true to type.

## Health and vigour

**Health:** Supply trees with foliage size, texture and colour consistent with that shown in healthy specimens of the species.

**Vigour:** Supply trees with extension growth consistent with that shown in vigorous specimens of the species.

#### Freedom from pests and disease

**Foliage:** Restrict attack by pests and disease to < 10% of the foliage, such that potential for long term success of the trees is not affected.

#### Balance of crown

Maximum variation in crown bulk on opposite sides of stem axis: - 20%.

#### Uniformity of growth

**Longest internode:** Maximum 1.2 x shortest internode.

# Stem taper Support:

Small trees less than 20 L:

- Supply trees which are self-supporting unstaked.

Trees > 20 L, supply trees:

Supply trees whose tree calliper at 300 mm above ground exceed callipers at 1000 mm above ground by 20%.

#### **Pruning history**

General: Comply with the recommendations of AS 4373.

**Pruning wounds:** Confine fresh pruning wounds to < 25% of the clean stem height.

**Wound diameter:** < 50% of stem diameter immediately above point of pruning.

Pruning location: Clean cut at branch collar.

## Included bark

**Stem / branch / bark ridge:** Convex (outwardly pointing) at junctions between codominant stems, and stems and branches.

### **Apical dominance**

**Apical bud:** If appropriate for the species, supply trees which have a defined central leader and intact apical bud.

Section 8 TREE SUPPLY

#### Indication of north

Trees grown in 100L containers or above indicate northerly aspect in the nursery using a permanent peg embedded in the rootball 150 mm north of the centre of the stem.

#### 3.2 Below Ground

#### **Root division**

**Root systems:** Fibrous with repeated and sequential division, complying with the **Root division table**.

#### Root direction

**Roots growing out or down:** > 90% of roots within rootball at every stage of development.

## Sampling

**Partial sampling:** To take place prior to delivery. Wash away a section of rootball sufficient to inspect root development from the stem to outer extremities of the rootball in one section.

- 0 – 20 trees 1 tree sampled

- 21 – 50 trees 2 trees sampled

51+ trees 4 % of order

#### Root division table

Tree sizes		Root division
Container volume (L)	Size index (balled and burlapped or RCB grown trees)	
< 20	< 35	Major divisions at maximum 50 mm intervals
≥ 20, < 100	≥ 35, < 130	Major division by 15 L container, or 250 mm diameter x 300 mm deep rootball, and at maximum 100 mm intervals beyond this size
≥ 100, < 200	≥ 130, < 230	Major division by 75 L container, or 450 mm diameter x 450 mm deep rootball, and at maximum 100 mm intervals beyond this size
≥ 200	≥ 230	Major division by 150L container, or 650 mm diameter x 450 mm deep rootball, and at maximum 100 mm intervals beyond this size.

#### 3.3 Balance

Rootball: shoot ratio (tubestock and small trees)

Tubestock height above soil level:  $2 \times 10^{-2} \text{ km}$  x height of tube  $\pm 25\%$ .

Rootball: shoot ratio (other than tubestock or small trees)

Rootball: shoot ratio equations:

- Container grown trees: Size index = CF x Container volume (L)( ± 10%).
- Balled and burlapped or RCB grown trees:

Rootball volume (L) ( $\pm 10\%$ ) = Size index/CF.

TREE SUPPLY Section 8

CF values table Container grown trees		Balled and burlapped or RCB grown trees		
Container volume (L)	CF	Size index	CF	
≥ 20, < 60	1.5	≥ 35, < 90	1.8	
≥ 60, < 100	1.3	≥ 90, < 130	1.56	
≥ 100, < 150	1.21	≥ 130, < 180	1.45	
≥ 150, < 200	1.14	≥ 180, < 230	1.37	
≥ 120, < 300	1.07	≥ 230, < 320	1.28	
≥ 300, < 600	0.97	≥ 320, < 580	1.16	
≥ 600, < 1000	0.93	≥ 580, < 930	1.12	
≥ 1000	0.9	≥ 930	1.08	

#### 3.4 Schedules

Plant schedule

Refer to Planting Plans.

# **Delivery schedule** To be advised.

## **SCOPE OF WORKS**

The scope of the electrical and lighting component of the project shall include:

- Supply and install light fittings as per landscape drawings
- ii. Testing and Commissioning
- iii. Works as executed drawings
- iv. Warranty and Defects Liability

#### Work by other trades

- i. Supply and install service mains
- ii. Supply and install a temporary main switchboard
- iii. Supply and install pits conduits and underground cable

#### GENERAL REQUIREMENTS

#### 1 GENERAL

Refer to Electrical Engineers Drawings and Specifications for electrical layouts and technical input. All Cabling, connection and servicing for landscape lighting works to be carried out by others.

Landscape lighting includes additional pole mounted lighting to the northern section of the Western Linear Park as seen on drawings, as well as in ground up-lighting for public art elements found at entry to site and at the riparian node as per landscape drawings.

#### 1.1 CONTRACT DOCUMENTS

#### General

Setting out and placement of lighting fixtures. For layouts of service lines and supplies refer to Electrical Engineers documentation. Before commencing work, obtain measurements and other necessary information.

## 1.2 DRAWINGS

The landscape lighting works are detailed in the following drawings:

LCM02-CD-101 General Notes

LCM02-CD-904 Wall Details

LCM02-CD-914 Furniture Details - Sheet 2

#### 2 QUALITY

#### 2.1 INSPECTION

#### Notice

Minimum notice for inspections to be made: 5 working days.

Concealed services: Give notice so that inspection may be made of services to be concealed.

#### 2.2 SAMPLES

#### Timina

Delays: Coordinate submissions of related samples. Do not cause delays by making late submissions or submitting inadequate samples.

#### Quantity

General: Submit a sample of each designated item and 2 copies of supporting documentation. Include ancillary items such as fasteners, flashings and seals.

#### Identification

Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification. Identify non-compliances with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

#### **Approval**

General: Do not commence work affected by samples until the samples have been approved. Submit further samples as necessary.

## Retention

Keep approved samples in good condition on site, until practical completion.

#### Incorporation

Incorporate in the works samples which have been approved for incorporation. Do not incorporate other samples.

#### Criteria

Match approved samples throughout the works.

#### 3 MATERIALS AND COMPONENTS

#### 3.1 GENERAL

#### **Proprietary items**

Implication: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

Alternatives: If alternatives are proposed, submit proposed alternatives and include samples, available technical information, reasons for proposed substitutions and cost. If necessary, provide an English translation. State if provision of proposed alternatives will necessitate alteration to other parts of the works and advise consequent costs.

#### Sealed containers

If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

## Consistency

For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

#### 4 EXECUTION

## 4.1 INSTALLATION

#### General

General: Install equipment and services plumb, fix securely and organise reticulated services neatly according to manufacturer's specifications.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

## 4.2 SERVICES CONNECTIONS

## Statutory authorities' requirements

If the authorities elect to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the authorities.

#### Connections

Connect to statutory authorities' services or service points. Excavate to locate and expose connection points. On completion reinstate the surfaces and facilities which have been disturbed.

## 4.3 SERVICES COORDINATION

#### General

- Ensure co-coordination with other building and service elements.
- Show adjusted positions on the shop and record drawings.

#### 5 COMPLETION

#### 5.1 GENERAL

#### **Samples**

Remove unincorporated samples on completion.

#### **Contractor's submissions**

Within 2 weeks after practical completion, submit 3 copies of designated documents.

#### **Warranties**

General: Name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

#### 5.2 RECORD DRAWINGS

#### General

Submit record drawings. Show the "as installed" locations of building elements, plant and equipment. Show off-the-grid dimensions where applicable.

#### **Services**

Show dimensions, types and location of equipment, conduit and cables in relation to permanent site features and other underground services. Include relationship to building structure and other services, and changes made during commissioning and the maintenance period. Include diagrammatic drawings of each system showing wiring, and principal items of equipment.

#### Quantity

Provide record drawings in the following quantities and formats:

Paper prints:

Number of sets:

## Accuracy

Documents: Incorporate all modifications made during the progress of the work and testing period. Show any provisions for the future.

Endorsement: Sign and date all record drawings. Keep one set of shop drawings on site at all times expressly for the purpose of marking changes made during the progress of the works.

3

#### 5.3 COMPLETION TESTS

#### General

Carry out acceptance tests and final tests.

## **Functional checks**

Carry out functional and operational checks on energised equipment and circuits and make adjustments for the correct operation of safety devices.

## **Functional checks**

Residual current devices: Verify earth leakage tripping times and currents.

#### 5.4 CLEANING

#### General

At practical completion, clean the following:

- Luminaires. Relamp luminaires used during construction.
- Insides of switchgear and control gear assemblies.
- Switchgear and contactors, and other electrical contacts. Adjust as necessary.

# SCHEDULE OF EQUIPMENT

## 1 LUMINAIRES AND OTHER EQUIPMENT

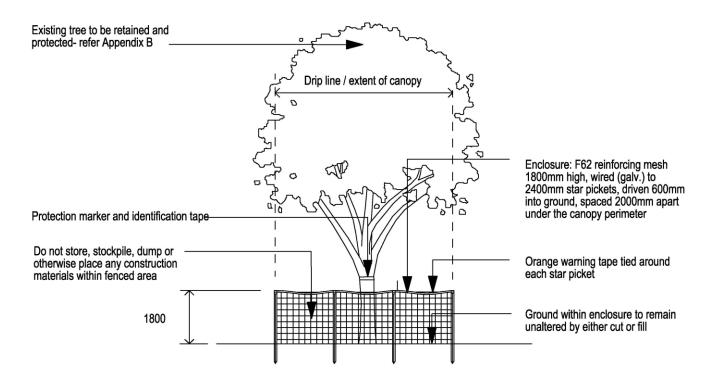
DESCRIPTION	MANUFACTURER AND CATALOGUE NUMBER	LAMP
Pole lighting L1 A	Mounted on 4.8 m smartpoles or approved equivalent. BEGA - 8081	BEGA – 8081 liminaires and metal halide lamps
Pole lighting L1 B	'Largent' LED by  Architectural area lighting. 16555 East Gale Ave. City of Industry   CA 91745 T 626.968.5666   F 626.369.2695 www.aal.net   Rev. 10/2010	SLVT-T2-60LED-WW IES Type 2. 60 light emitting diode array (73 watts). Class 1, 120 thru 277 volt. Warm white (3500K).
Garden tree up lighting L2	'Scarab' Accent lighting C700S3 7L3K – BL AGS73 JBR-2 by Kim lighting 16555 East Gale Avenue • City of Industry, CA 91745 • Phone: 626.968.5666 • Fax: 626.369.2695 • www.kimlighting.com	9L 9 LEDs, 11W
Water feature lighting L3	LS285 LED STAR II LED  By Lumascape	Luxeon Star 3 x 1W LED Warm White
LED strip light – L4 SL7655-21 SL8900-00	LUMINAIRE: Weatherproof Flex LED Strip IP67 W/White LED Mounting Track by Superlight HOUSING: Steel channel as detailed with Opal Acrylic lens for SL8900	Warm White LED
In Wall step light – L5	Step Light: LLF 20 Low level floodlight by  Kim lighting 16555 East Gale Avenue • City of Industry, CA 91745 • Phone: 626.968.5666 • Fax: 626.369.2695 • www.kimlighting.com	LED 3000K

# **PART B**

Appendix A WORK AROUND TREES

## **APPENDIX A**

#### Work around existing trees





### **EXISTING TREE ENCLOSURE**

PREPARATION & GROUNDWORKS

NTS

MEADOWBANK STAGE 6-9 i

### **APPENDIX B**

## Paving, Walling & Vitreous Tile Supplier Schedule

Sydney Stone Company 109 Kanangra Road Terrey Hills NSW 2084 Phone: 2 9986 1302

Fax: 2 9986 1304

Gosford Quarries 300 Johnston St, Annandale NSW 2038 Phone: 2 9810 7555

Fax: 2 9810 1669

Cinajus stones Phone: +61 2 9773 5677 Fax: +61 2 9773 5644 Email: info@cinajus.com Address: 32 Bryant Street

Padstow NSW 2211

MEADOWBANK STAGE 6-9

## **APPENDIX C**

# Topsoil and Planter Box Soil Supplier Schedule

#### **Approved Suppliers:**

#### **Topsoil**

Benedict Sand and Gravel P. O Box 875, St Ives. NSW 2075 Tel: 02 9986 3500

ANL

317 Mona Vale Road Terrey Hills NSW 2084 Phone: 02 9450 1444 Fax: 02 9450 2428

#### **Light Weight Planter box mix**

The Hills Bark Blower P. O Box 422, Round Corner. NSW 2158 Tel: 02 9654 2288

## **CONTENTS**

Maintenance Program (Hardscape Works)	p 3
Maintenance Program (Softscape Works)	p 4

## PLACE Design Group Pty Ltd DEVELOPER MAINTENANCE & DEFECTS LIABILITY PROGRAM

Client: Holdmark

Site Foreman

Project Name: Meadowbank Shepherds Bay Stage 6-9

Precinct Name: All streetscape zones, open space and private gardens

Works Description: Maintenance for all Hard Landscape areas

Maintenance Period: 12 Months from Practical Completion

Maintenance Period: 12 Months from Practical	Completion			
		On Maintenance	On Maintenance	Off Maintenance
TASK DESCRIPTION:		FREQUENCY: 0-9 Months	FREQUENCY: 9-12 Months	FREQUENCY: Handover
Steel tree grate		E		S: 4 #
Visual inspection of all tree grates for damage or lifting beginning larger any damaged or warped tree grate	ond flush surfaces	Fortnightly Fortnightly	Monthly Monthly	Bi-Annually As Required
Clean in accordance with manufacturers recommendation	s	As Required	As Required	Yearly
Leaf and debris clearance with blower	•	Monthly	Quarterly	As Required
Constructed block work walls		,		
with sandstone cladding				
Visual inspection of all walls for damage, cracks or other in Visual inspection of walls for graffiti. Remove graffiti as red		Fortnightly Fortnightly	Monthly Monthly	Bi-Annually Quarterly
graffiti coatings manufacturer.	commended by the anti-	As Required	As Required	As Required
Visual inspection of all cladding & capping material for stail	ns & defects	Fortnightly	Monthly	Bi-Annually
Clean in accordance with manufacturers recommendation	s	As Required	As Required	As Required
Replace failed or damaged cladding and capping material		As Required	As Required	As Required
Constructed block work walls with cement render & paint finish				
Visual inspection of all walls for damage, cracks or other in	mperfections			
such as efflorescence		Fortnightly	Monthly	Bi-Annually
Repair failed or damaged cement render and paint finish	***	As Required	As Required	As Required
Visual inspection of walls for general stains & graffiti. Rem recommended by the anti graffiti coatings manufacturer.	ove graffiti as	Fortnightly As Required	Monthly As Required	Quarterly As Required
Clean stains in accordance with paint manufacturers recor	nmendations	As Required	As Required	As Required
Podium Planter - Walls				
Visual inspection of all walls for damage, cracks or other in		Fortnightly	Monthly/As Required	Bi-Annually/As Required
Visual inspection of walls for graffiti. Remove graffiti as red graffiti coatings manufacturer.	commended by the anti	Fortnightly	Monthly/An Bogging	Ougstock/A- D
Paved Surfaces		Fortnightly	Monthly/As Required	Quarterly/As Required
Visual inspection of all paving for damage, cracks or stains	š	Fortnightly	Monthly	Bi-Annually
Visual inspection of all paving for lifting of sub base		Fortnightly	Monthly	Bi-Annually
Visual inspection of all paving for mortar damage / re-poin	ting	Fortnightly	Monthly	Bi-Annually
Clean in accordance with manufacturers recommendation	S	As required	As required	As required
Replace failed or damaged pavers or tiles		As required	As required	As required
Clear away all Leaf and debris with blower		Monthly	Quarterly	As required
Tactile Indicators  Visual inspection of all varieties of TGSI's for damage or life	fting	Fortnightly/As required	Monthly	Quarterly
Re glue or Replace all loose tactile dimples	iung	Fortnightly/As required	Monthly	As required
Relay or Replace all loose tactile pavers		Fortnightly/As required	Monthly	As required
Pedestrian Balustrades and Handrails		3 7, 3 7, 3	,	
Inspect, maintain & repair all glass balustrades		Monthly/As required	Quarterly	Bi-Annually
Inspect, maintain & repair all Stainless steel hand rails		Monthly/As required	Quarterly	Bi- Annually
Clean stains and glass in accordance with manufacturers i	recommendations	As Required	As Required	As Required
Timber Decking Inspect, maintain & repair all defects to timber		Monthly/As required	Quaterly	Bi-Annually
Clean stains and glass in accordance with manufacturers in	recommendations	As required	As Required	As Required
Allow for re-application of timber exterior paint or oil based		·	2 years	2 years
years where timber is used				
Pergola				
Inspect, maintain & repair all defects to timber, steel and of		Monthly/As required	Quarterly	Bi-Annually
Clean stains and glass in accordance with manufacturers in Allow for re-application of timber exterior paint or oil based		As Required	As Required	As Required
where timber is used	stain every two years		2 years	2 years
Entry Gate				
Inspect, maintain & repair all defects to gate		Monthly	Monthly/As required	Bi Annually/As required
Clean stains in accordance with manufacturers recommen	dations	As Required	As Required	As Required
Water Features  Plant maintenance spec to be provided by the water Features	ıre Designer	As Required	As Required	As Required
Inspect, maintain & clean all hard surfaces, tiles & MEP Ed	•	Monthly/As require	Quarterly	Quarterly
Plant maintenance spec to be provided by the water Featu		As Required	As Required	As Required
Furniture				
Inspect, maintain & repair all furniture elements		Monthly/As required	Monthly/As required	Quarterly/As required
Inspect, maintain & repair all pumps, filters, water storage	and pipes	Monthly As Required	Monthly/As required	Quarterly/As required
Bollards				0
Inspect, maintain & repair all defects to Stainless Steel bol Clean stains in accordance with manufacturers recommen		Monthly As Required	Monthly/As required As Required	Quarterly/As required As Required
Lighting	luations	As Required	As Required	As Required
Refer to manufacturer specification		As Required	As Required	As Required
As per Clients requirements				
Drainage				
Replace failed or damaged surface drains or grates Replace failed or damaged sub surface drains or outlets		As required As required	As required As required	As required As required
Remove all leaf and debris from field gullies & surface dra	ins	Monthly	As required Quarterly	As required As required
Clear away all Leaf and debris with blower		Monthly	Quarterly	As required
Irrigation		•		•
Inspect, maintain & repair all defects to lines & emitters		Monthly/As required	Quarterly	Bi-Annually
Inspection of water storage tank Inspection & service of irrigation pump and UV filter		Bi-Annually Monthly	Annually/As Required	AnnuallyAs Required
Inspection & service of irrigation pump and UV filter Inspection & service of irrigation control panel		Monthly Monthly	Quarterly Quarterly	Bi-Annually Bi-Annually
Urgent works		-	•	·
Report any theft, damage or vandalism		Weekly	As required	As required
ADDITIONAL WORKS / COMMENTS:				

## PLACE Design Group Pty Ltd DEVELOPER MAINTENANCE & DEFECTS LIABILITY PROGRAM

Client: Holdmark

Project Name: Meadowbank Shepherds Bay NSW Stage 6-9

Precinct Name: All streetscape zones, open space and private gardens

Works Description: Maintenance of all Soft Landscape areas

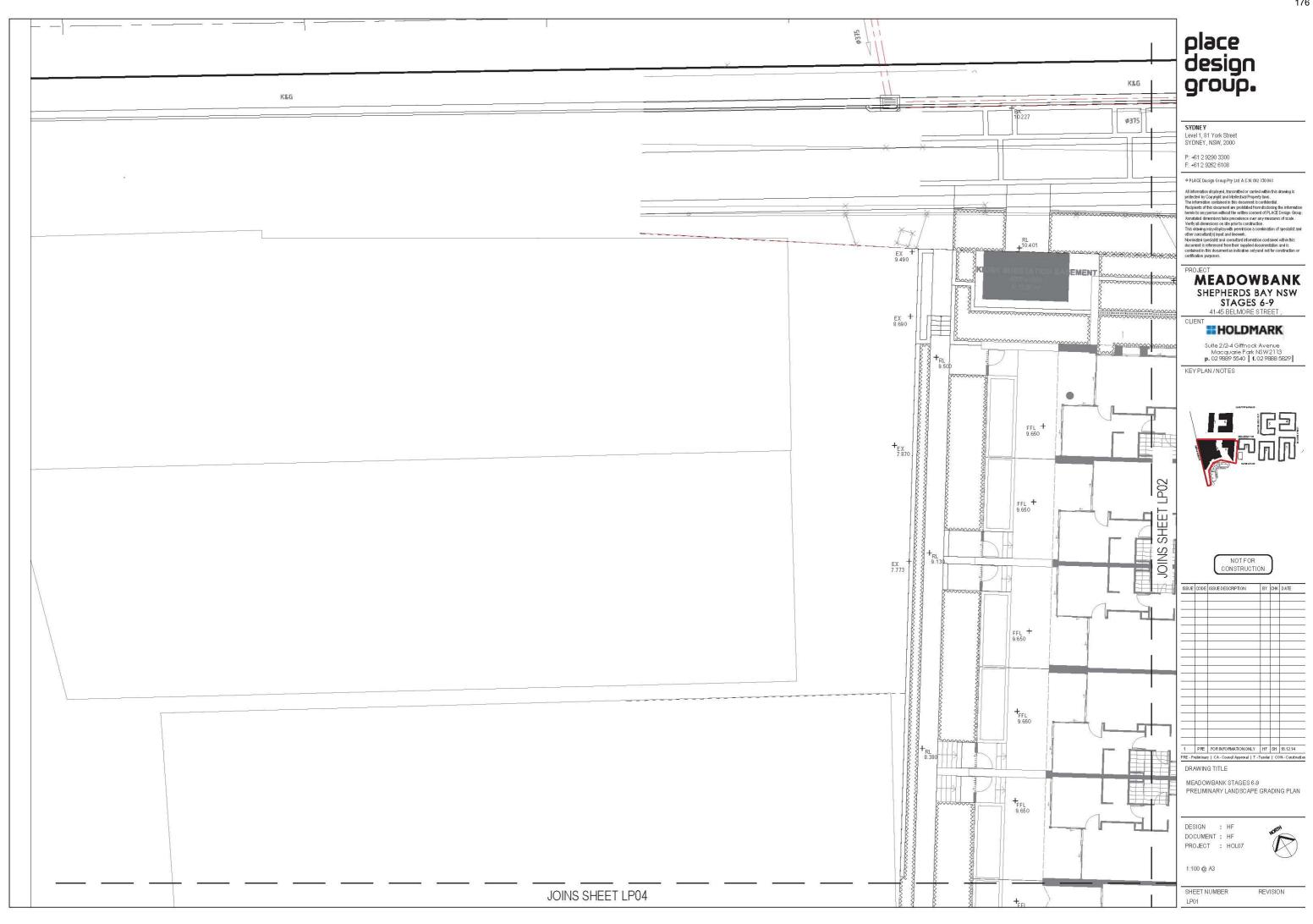
Maintenance Period: 12 Months from Practical Completion

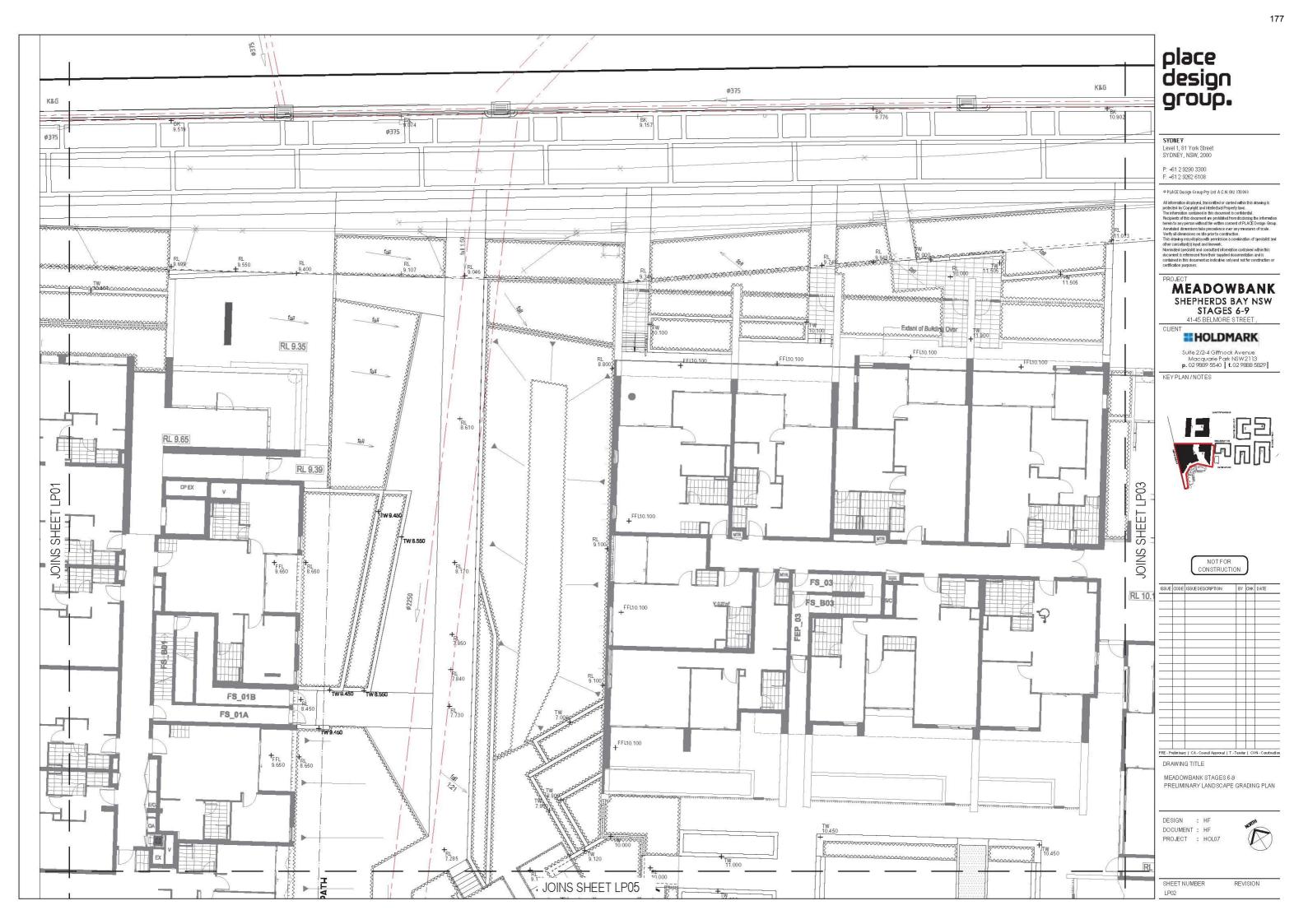
SOFTSCAPE AREAS:

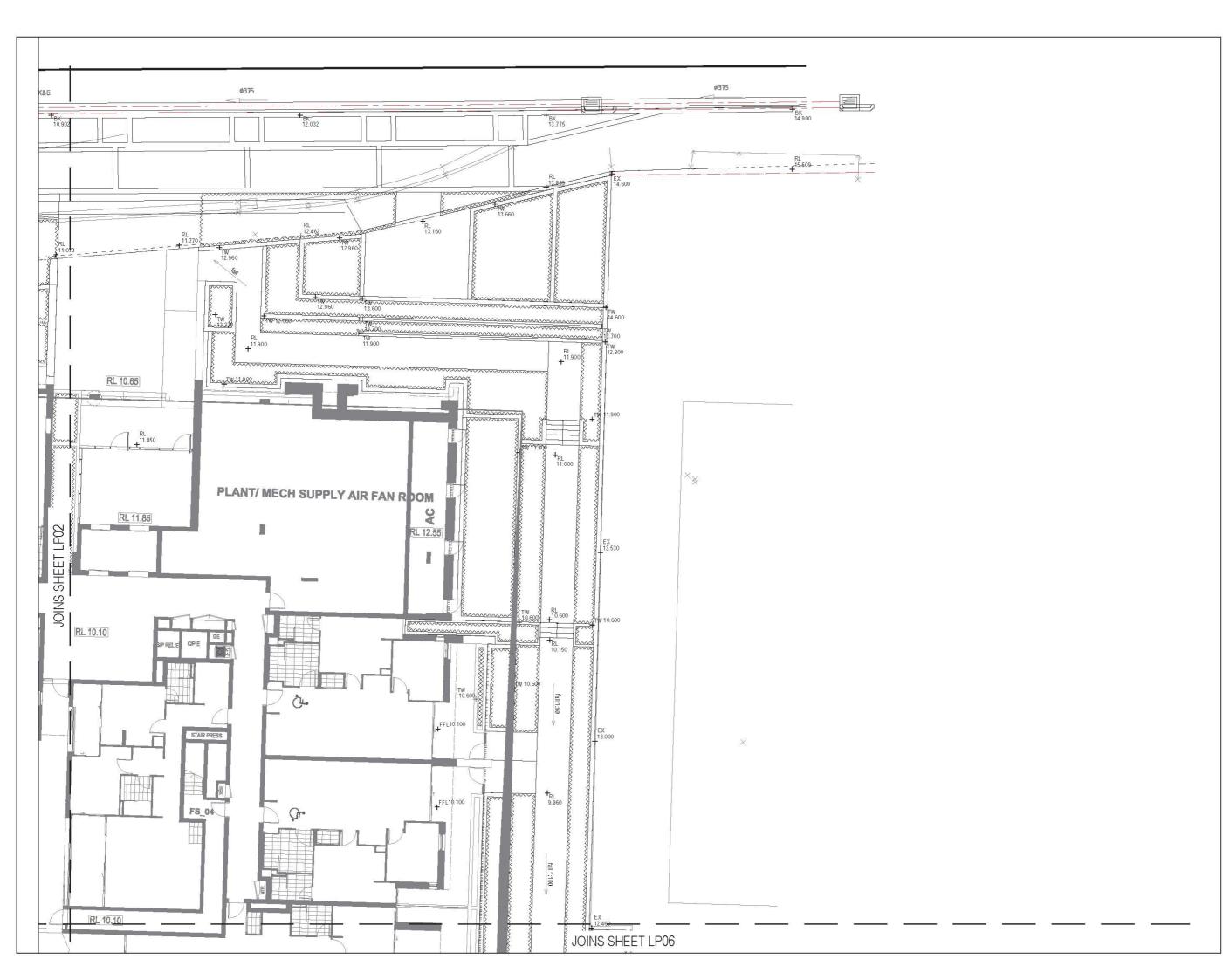
	On Maintenance	On Maintenance	Handover
TASK DESCRIPTION:	FREQUENCY: 0-9 Months	FREQUENCY: 9 - 12 Months	FREQUENCY: 12 Months
Trees			
Visual inspection of all trees	Fortnightly in summer/Monthly in Winter	Monthly in summer/Once in Winter	Quarterly in summer/winter
Manually inspect water levels to trees	Fortnightly in summer/Monthly in Winter	Monthly in summer/Once in Winter	Quarterly in summer/winter
Inspect damage to trees	Fortnightly in summer/Monthly in Winter	Monthly in summer/Once in Winter	Quarterly in summer/winter
Replace any taping to trees	Fortnightly in summer/Monthly in Winter	Monthly in summer/Once in Winter	Quarterly in summer/winter
Prune dead or damaged branches	Fortnightly in summer/Monthly in Winter	Monthly in summer/Once in Winter	Quarterly in summer/winter
Check for and report pests & diseases	Fortnightly	Monthly	Quarterly
Replace failed or damaged trees	Fortnightly/As required	Monthly/As required	As required
Spray in accordance with manufacturers recommendations	As required	As required	As required
Adjust &/or replace stakes & ties where necessary	As required	As required	As required
Turf			
Mow all turf areas to maintain height between 25-35mm	Weekly in Summer/Monthly in Winter	Fortnightly in Summer/Every 2 Months in Winter	Fortnightly in Summer/Every 2 Months in Winter
Trim edges of all turf areas	Weekly in Summer/Monthly in Winter	Fortnightly in Summer/Every 2 Months in Winter	Fortnightly in Summer/Every 2 Months in Winter
Remove clippings from site	Weekly in Summer/Monthly in Winter	Fortnightly in Summer/Every 2 Months in Winter	Fortnightly in Summer/Every 2 Months in Winter
Remove litter & debris from turf areas	Weekly in Summer/Monthly in Winter	Fortnightly in Summer/Every 2 Months in Winter	Fortnightly in Summer/Every 2 Months in Winter
Check for and report pests & diseases	Fortnightly	Monthly	Quarterly
Spray in accordance with manufacturers recommendations	As required	As required	As required
Monitor and apply fertiliser to turf areas	6 month intervals - Autumn/Spring	Yearly - Spring	Yearly - Spring
monitor and apply refuliser to turi areas	o monun intervais - Autumin/Spring	reany - Spring	reany - Spring
Mulch			
Remove litter & debris from mulch areas	Fortnightly	Monthly	Quarterly
Remove weed growth in mulch areas	Fortnightly	Monthly	Quarterly
Top up mulch levels	Annually	Annually	Annually
Plants			
Check for and report pests & diseases	Fortnightly	Monthly	Quarterly
Spray in accordance with manufacturers recommendations	Fortnightly	Monthly	Quarterly
Prune damaged or dead branches	Fortnightly	Monthly	Quarterly
Remove weed growth in plant areas	Fortnightly	Monthly	Quarterly
Replace failed or damaged plants	Fortnightly/As required	Monthly/As required	Quarterly/As required
Adjust &/or replace stakes & ties where necessary	Fortnightly/As required	Monthly/As required	Quarterly/As required
Planter Podium - Planting			
Check for and report pests & diseases	Fortnightly	Monthly	Quarterly
Spray in accordance with manufacturers recommendations	Fortnightly	Monthly	Quarterly
Prune damaged or dead branches	Fortnightly	Monthly	Quarterly
Remove weed growth in plant areas	Fortnightly	Monthly	Quarterly
Replace failed or damaged plants	Fortnightly/As required	Monthly/As required	Quarterly/As required
Adjust &/or replace stakes & ties where necessary	Fortnightly/As required	Monthly/As required	Quarterly/As required
rajust a.o. ropiuse statics a ties where necessary	, orangnayina roquirou	monany/rio required	againeriy.710 required
General Watering to all street trees Irrigation by water cart or hosecock as required to maintain	Weekly first 6 months/Fortnightly there often	Monthly dependent on rainfall conditions	Monthly dependent on rainfall conditions
plant vigor & health	Weekly first 6 months/Fortnightly there after dependent on rainfall conditions	Monthly dependent on rainian conditions	working dependent or railinal conditions
Urgent works	MM.		
Report any theft, damage or vandalism	Weekly	As required	As required

ADDITIONAL WORKS / COMMENTS:

Site Foreman







# place design group.

SYDNEY Level 1, 81 York Street SYDNEY, NSW, 2000

P: +61 2 9290 3300 F: +61 2 9262 6108

PLACE Design Group Pty Ltd A.C.N. 082 370 083

#### MEADOWBANK SHEPHERDS BAY NSW STAGES 6-9 41-45 BELMORE STREET

**#HOLDMARK** 

Sulte 2/2-4 Giffnock Avenue Macquarie Park NSW 2113 p. 02 9889 5540 | f. 02 9888 5829 |

KEY PLAN / NOTES



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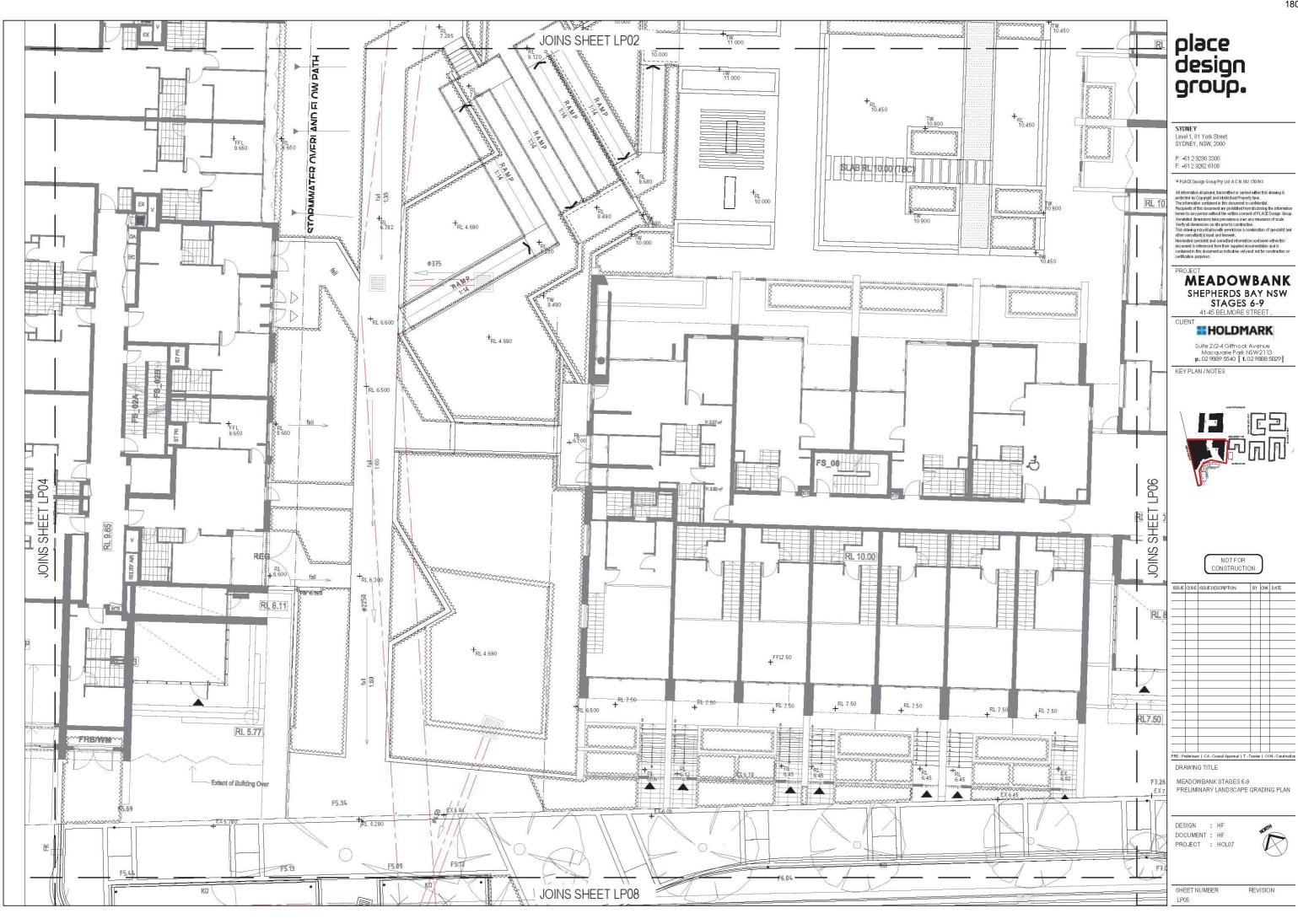
MEADOWBANK STAGES 6-9 PRELIMINARY LANDSCAPE GRADING PLAN

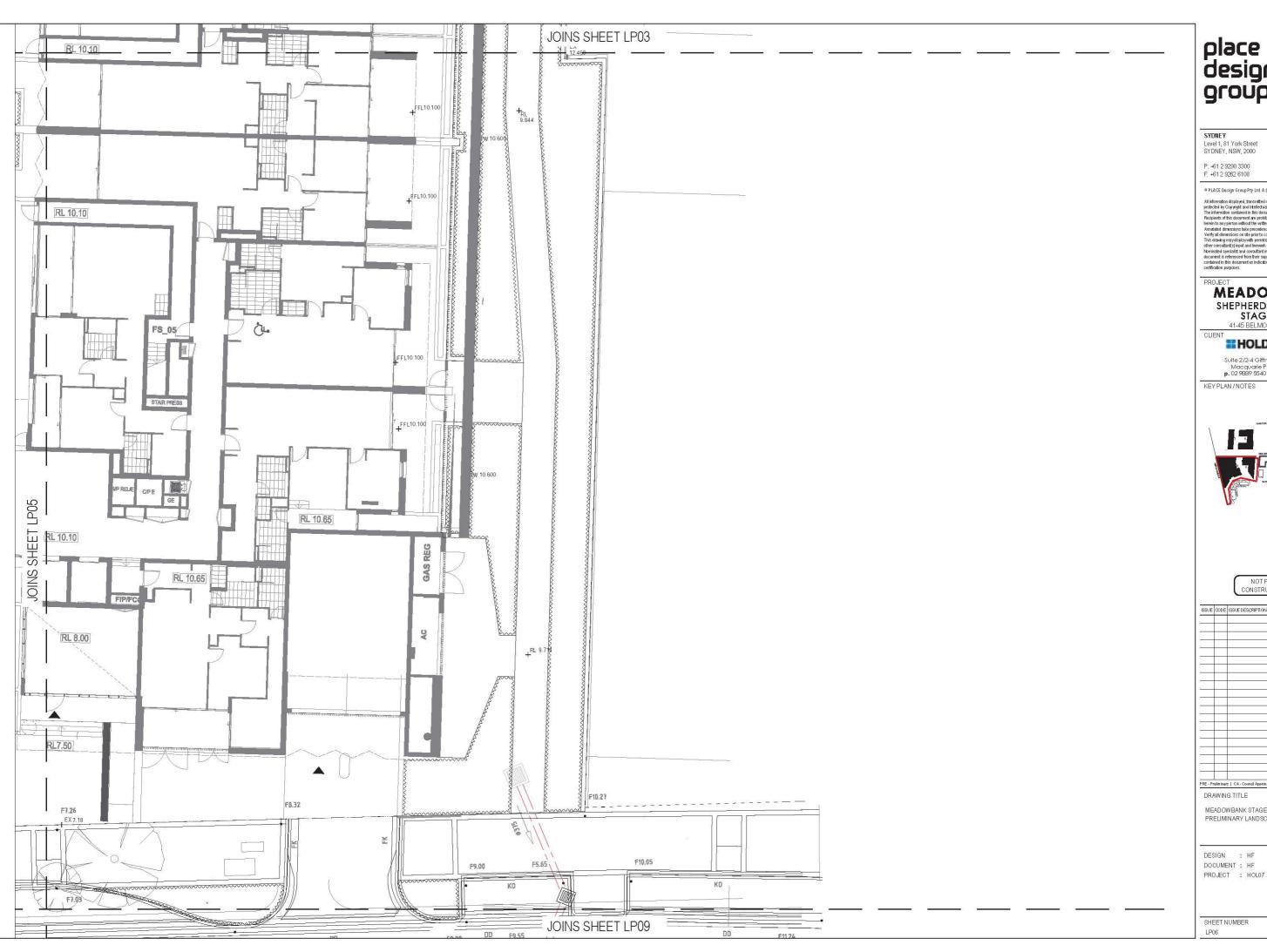
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#### MEADOWBANK SHEPHERDS BAY NSW

STAGES 6-9 41-45 BELMORE STREET

**#HOLDMARK** 

Sulte 2/2-4 Giffnock Avenue Macquarie Park NSW 2113 p. 02 9889 5540 | f. 02 9888 5829 |

KEYPLAN/NOTES



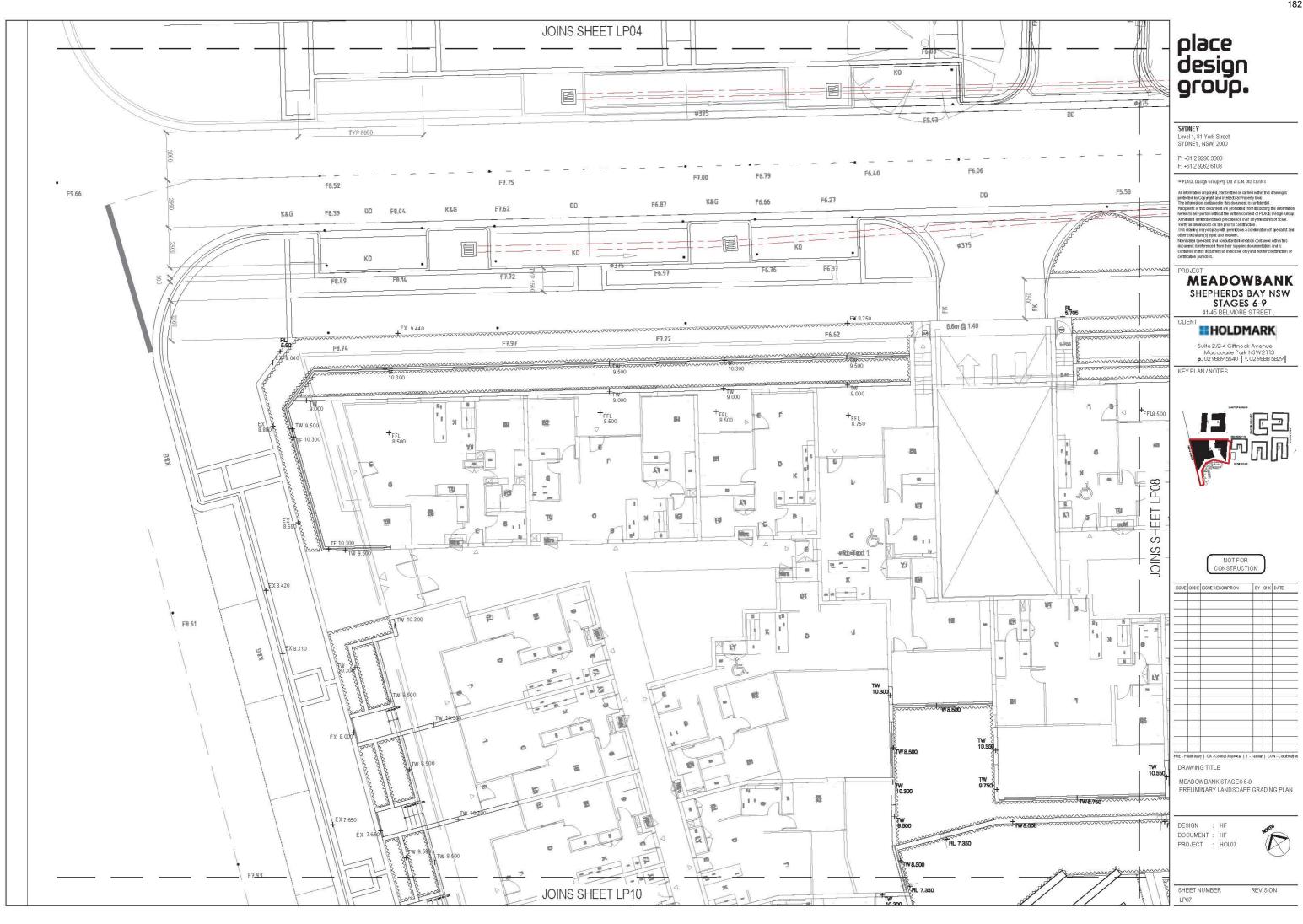
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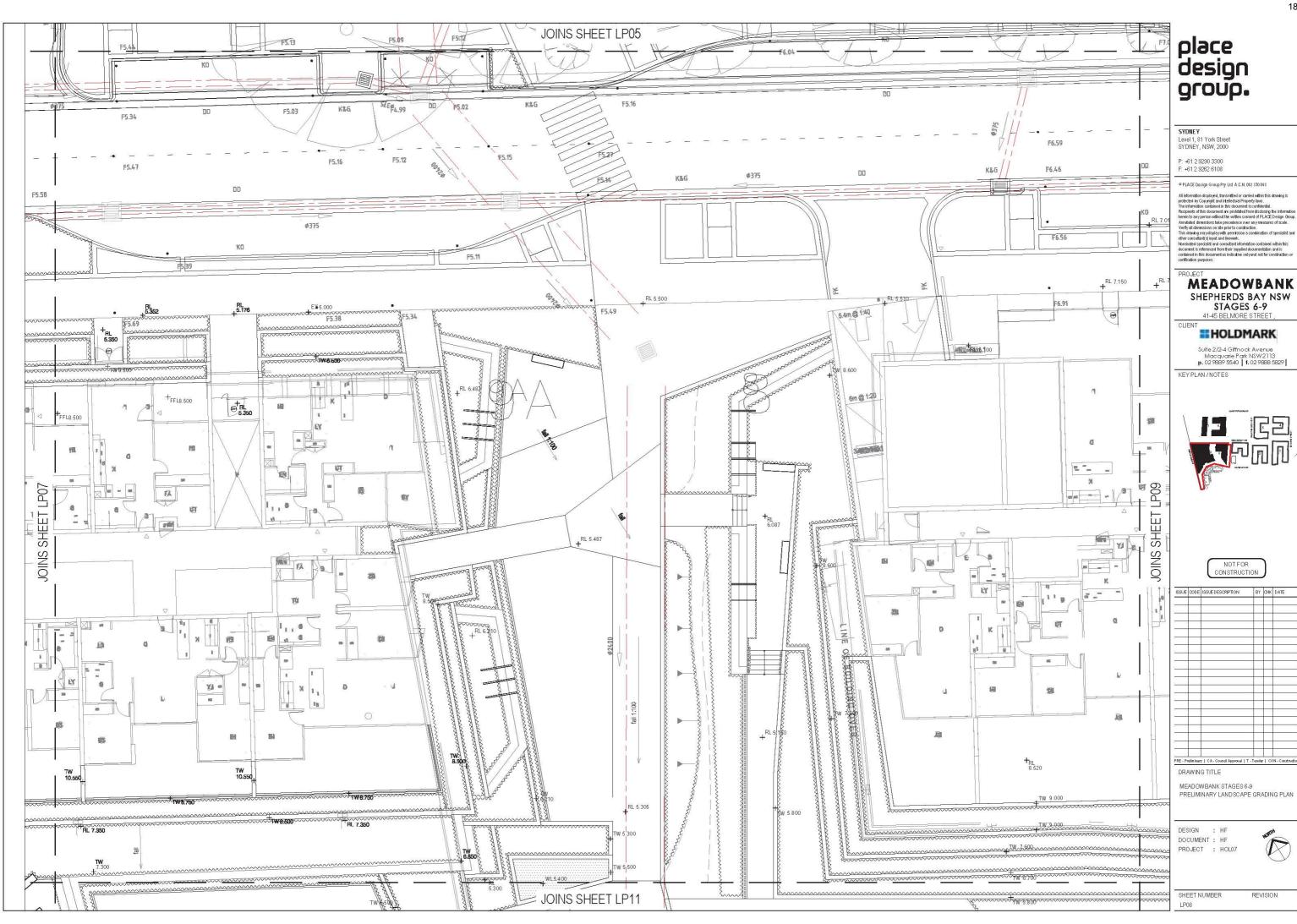
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MEADOWBANK STAGES 6-9 PRELIMINARY LANDSCAPE GRADING PLAN

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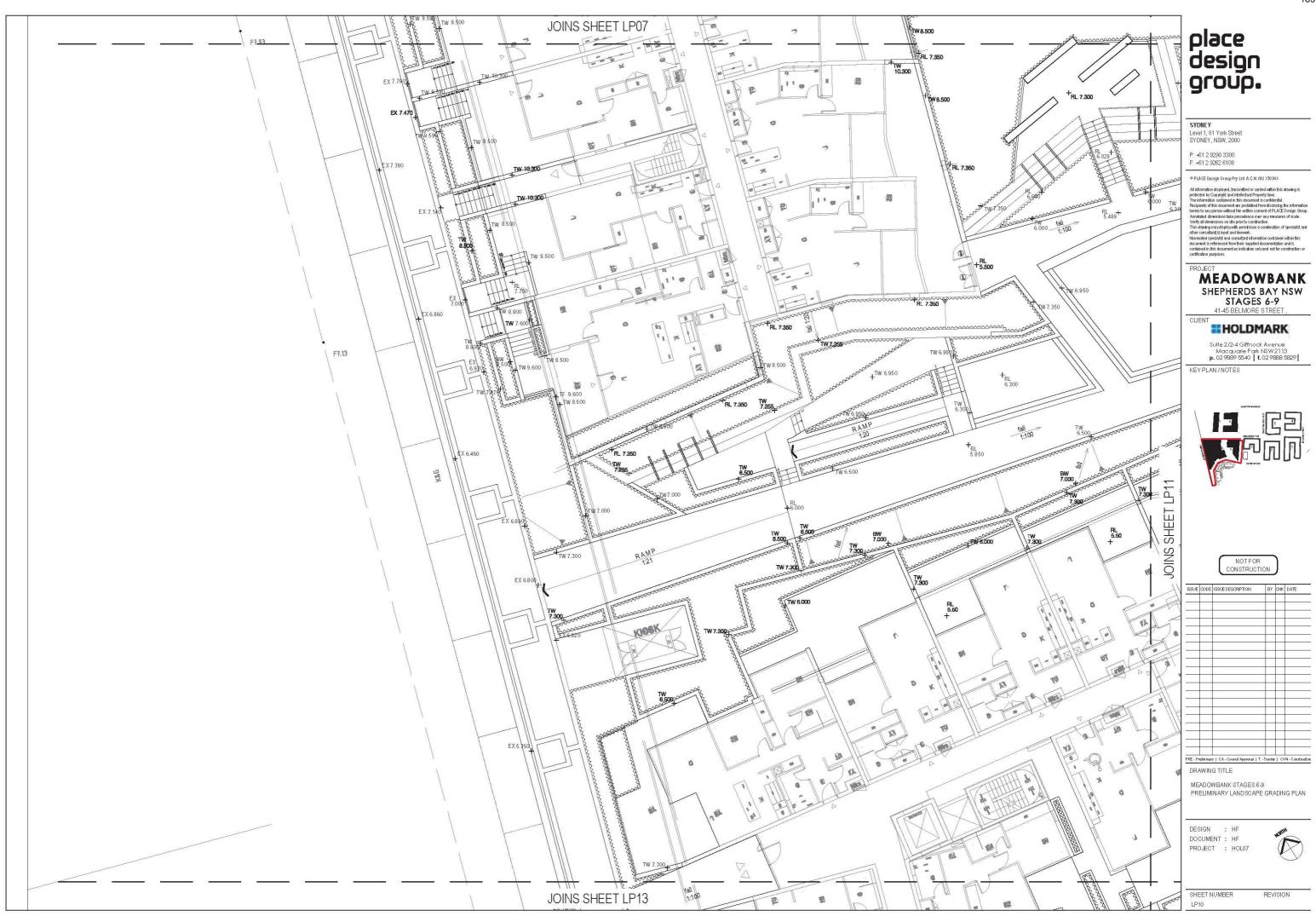


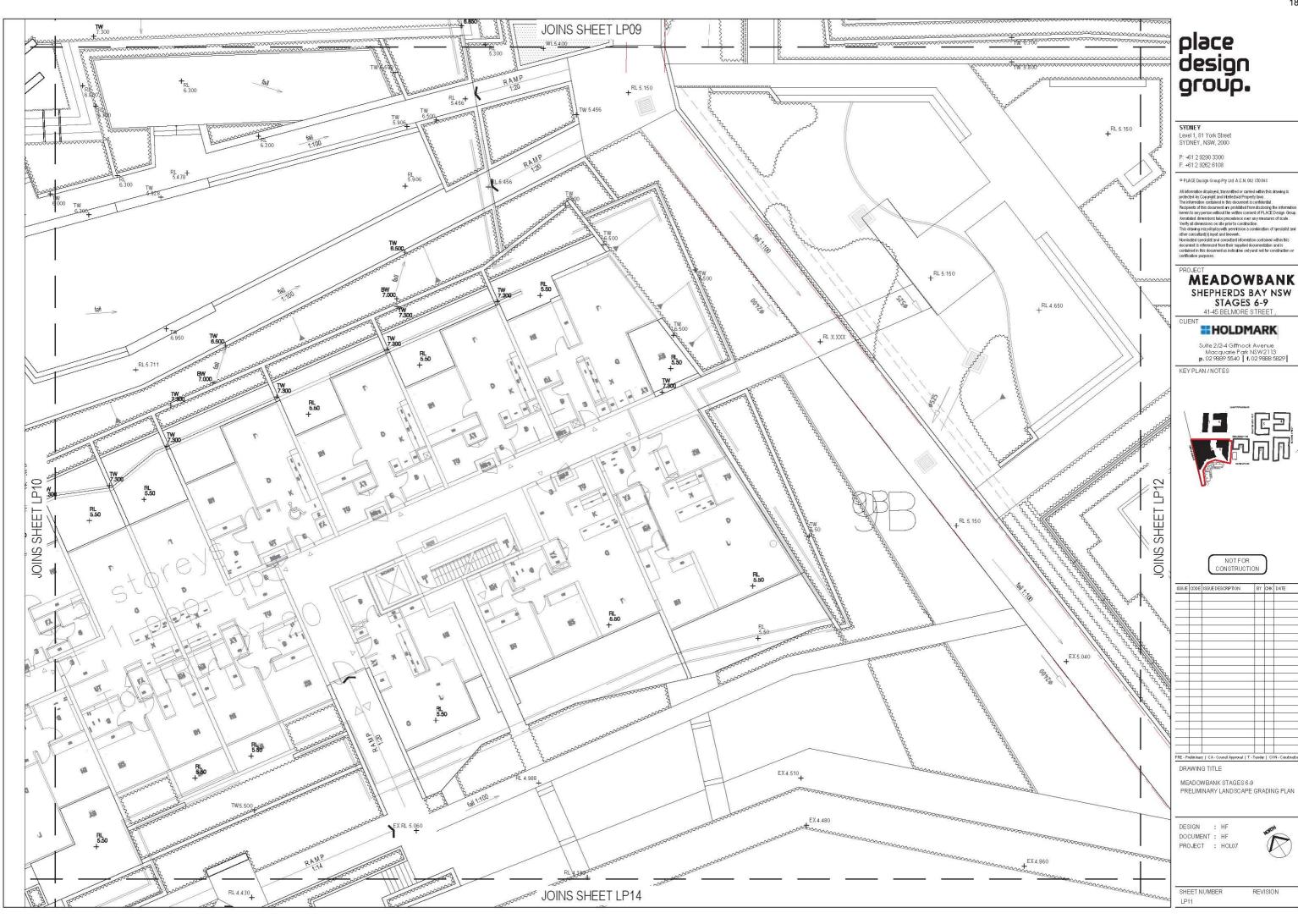
## SHEPHERDS BAY NSW

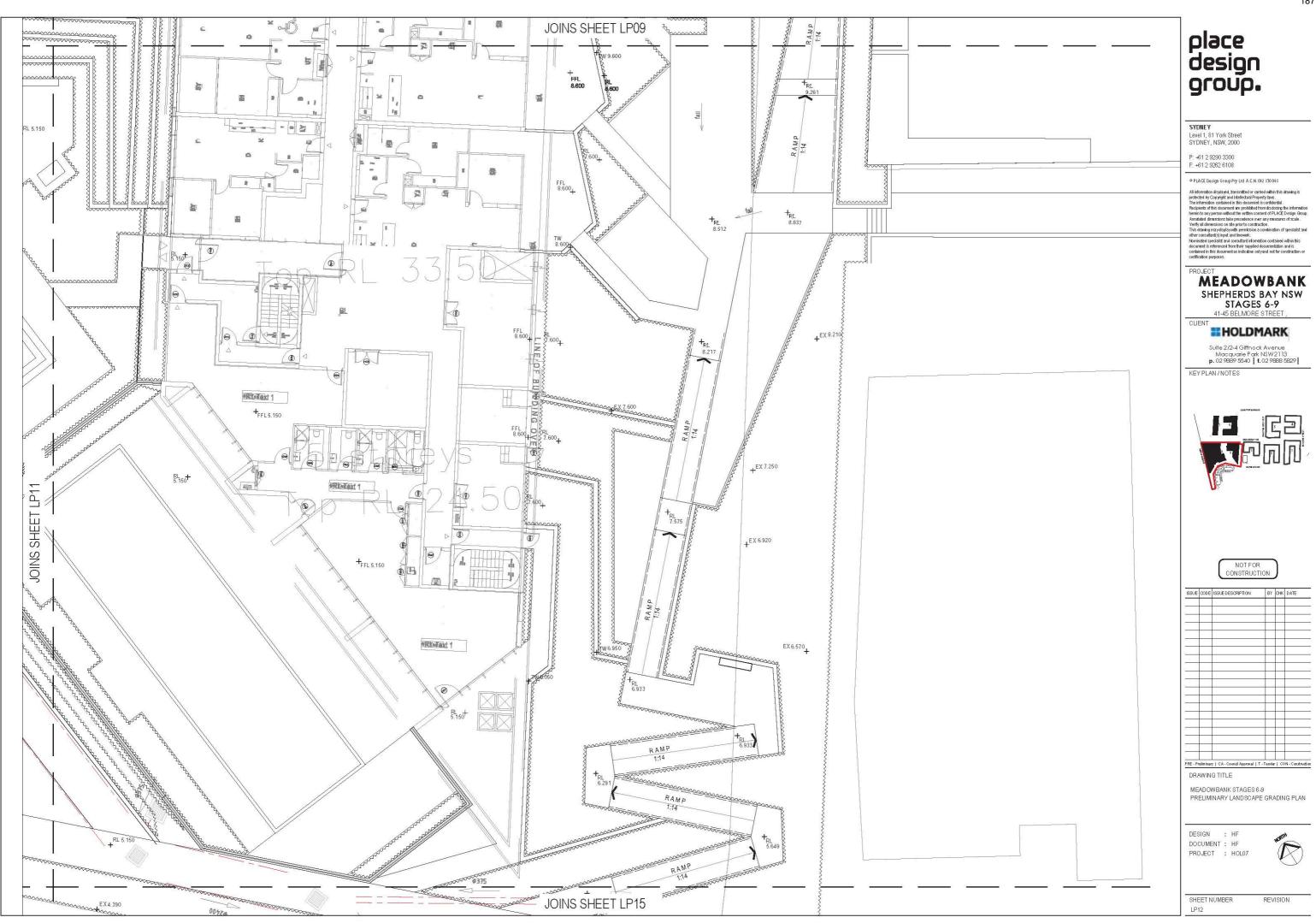


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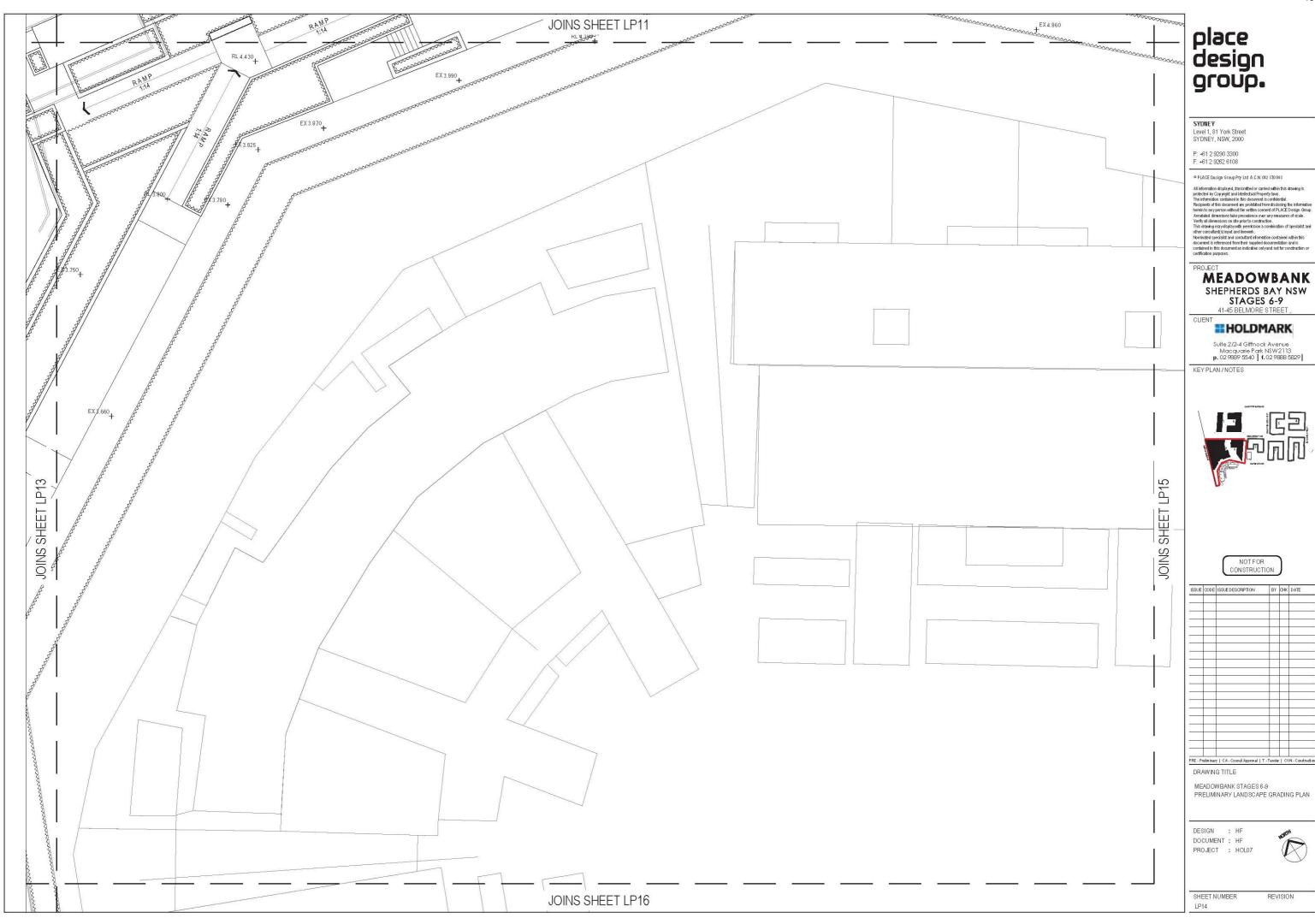
PRELIMINARY LANDSCAPE GRADING PLAN













# place design group.

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## MEADOWBANK SHEPHERDS BAY NSW STAGES 6-9 41-45 BELMORE STREET,

#### **#HOLDMARK**

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KEY PLAN / NOTES



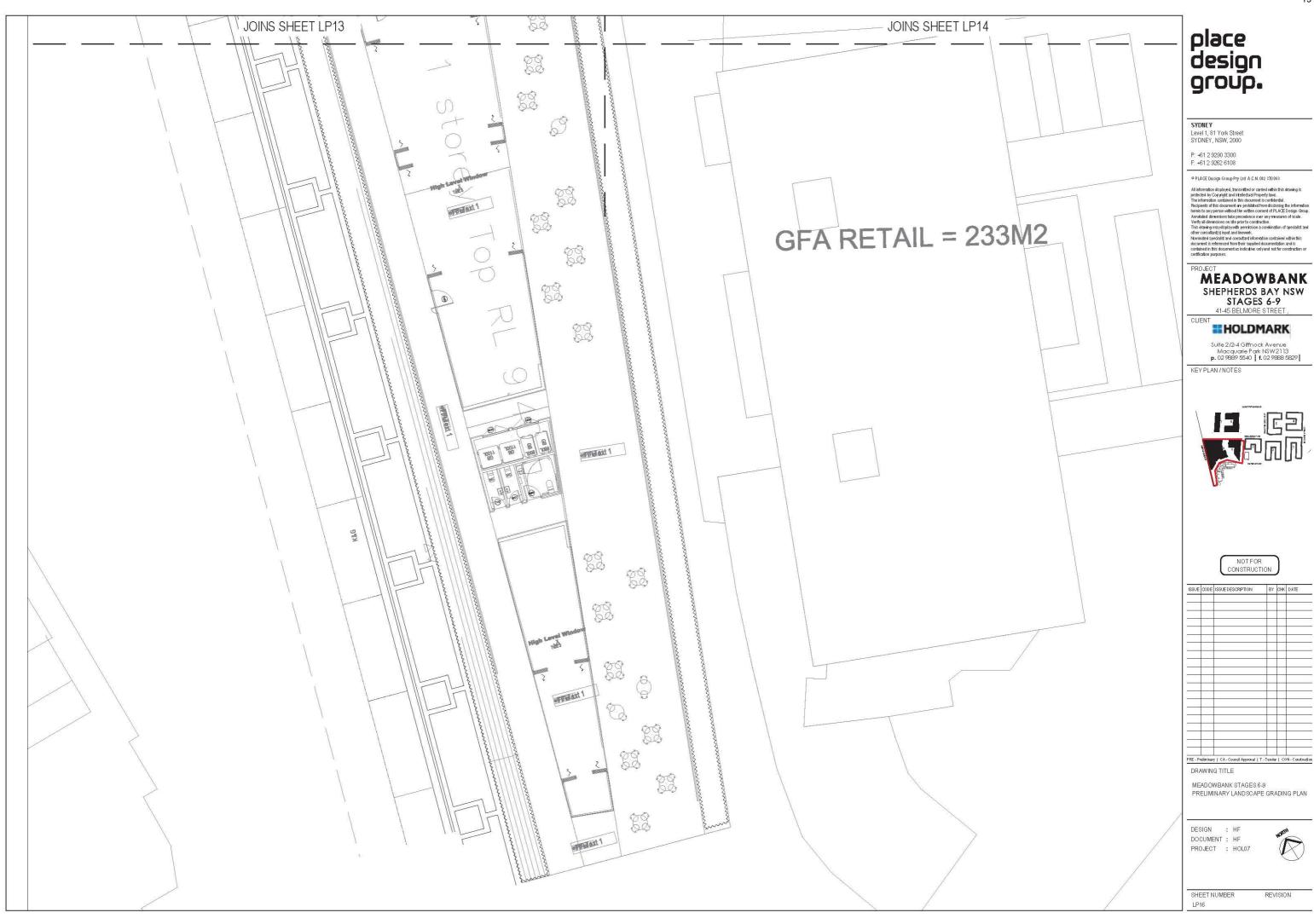
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MEADOWBANK STAGES 6-9 PRELIMINARY LANDSCAPE GRADING PLAN

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PRELIMINARY LANDSCAPE GRADING PLAN



# HARRIS PAGE & ASSOCIATES SHEPHERDS BAY **STAGES 6 & 7** STORMWATER CONCEPT DESIGN

STORMWATER SERVICES LEGEND

#### **GENERAL NOTES**

- DRAWINGS A REDIAGRAMMATIC ONLY AND HAVE BEEN PREPARED FOR THE PURPOSE OF INDICATING THE DESIGN INTENT AND SCOPE OF MICHIGS OF THE HORAULIC SERVICES.

  IT IS THE RESPONSIBILITY OF THE BUILDER AND/OR PLUMBING SUBCONTRACTOR TO INVESTIGATE AND COORDINATE BEFORE AND DURAN THE CONSTRUCTION PHASE ALL EXISTING SERVICES WHICH WILL EFFECT THE INSTRULATION OF THESE SERVICES.

  HORAULIC PRIMINGS ARE TO BE FERD IN CONJUNCTION WITH THE HYD RAULIC SERVICES SPECIFICATION AND WITH RELEVANT ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL
- ALL WORK TO BE CARRIED OUT IN A COORD ANCE WITH THE RELEVANT CODES AND AUSTRALIAN
- ALL WORK TO BE CARRED OUT IN ACCOUNTAGE WITH THE RELEVANT COLDS AND AGO FACIANT STRIND AREA. STANDAR RES. POSITION AND LEVELS OF AUTHORITIES MAINS AND/OR EXISTING SERVICES A REINDICATIVE ONLY. AND ARE TO BE CHECKED PROPORTO COMMENCIONS ANY WINDER.

  DO NOT SCALE FROM THIS DRAWNINS, REFER TO A RICHITECTURAL DRAWNINSS FOR DIMENSION.

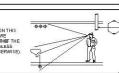
#### **ABBREVIATIONS**

A/B	ABOVE	MM	MILLIMETERS
0	AT	N.T.S	NOT TO SCALE
BDO	BALCONY DIRAINAGE OUTLET	O#F	OVER FLOW
CIS	CASTINSLAB	%	PERCENTAGE
CO	CLEAROUT	PDO	PLANTER D RAIN OUTLET
CONT	CONTINUATION	RL	REDUCED LEVEL
D	DEPTH	RINR	RAINWATER RE-USE
DIA	DIAMETER	RWO	RAINWATEROUTLET
DP	DOWNPIPE	RV	REFLUX VALVE
е	EXISTING	S FM	SEWER RISING MAIN
HAL	HIGH LEVEL	SS	SUB SOIL DRAINAGE
IL.	INVERT LEVEL	SASTEEL	STAINLESS STEEL
KIP	KERB INLET PIT	SSRM SUB	SOILRISING MAIN
L	LITRE	STW	STORMWATER
LAL	LOWLEVEL	sv	STOP VALVE
L/s	LITRES PER SECOND	SWP	STORMWATERPIT
m	METRES	SWPM	STORMWATER RISING MAJ
MAX	MAXIMUM	U/S	UNDERSIDE
MIN	MINIMUM	UV	ULTRA-VIOLET

#### DRAWING SCHEDULE

DWG No.	Scale	Drawing Title
SW-00	NTS	STO PANNATER SERVICES COVER SHEET AND LEGEND
SW-01	1:250	STO PMINATER SERVICES SEDIMENT & EROSION CONTROL PLAN
SW-02	1:250	STO RMINATER SERVICES BASEMENT LEVEL 1
SW-03	1:250	STO RMINATER SERVICES BASEMENT LEVEL 2
SW-04	1:250	STO PMINATER SERVICES BASEMENT LEVEL 3
SW-05	1:250	STO PMINATER SERVICES LOWER GROUND FLOOR
SW-06	1:250	S TO RMINATER SERVICES PODIUM DRAINAGE









turner

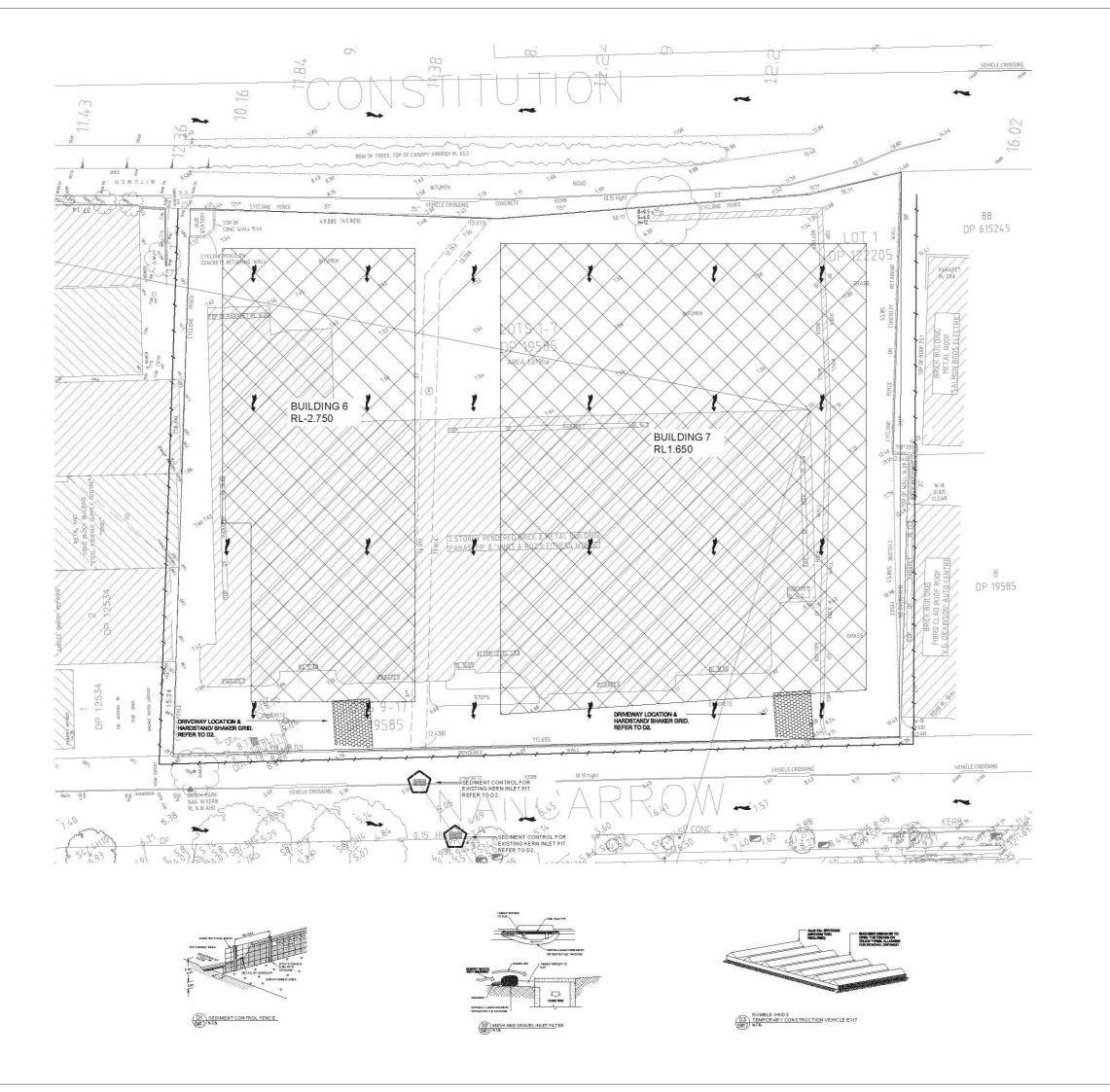




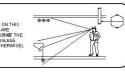
SHEPHERDS BAY STAGE 6 & 7

STORMWATER SERVICES COVER SHEET, LEGEND & NOTES

DATE	DRAMN	CHECKED	No IN SET	SCALE	
OCT. 2014	АТ	TN		NTS@B	
PROJECT No.		DRAWING No.	8	REVISION	
5727	SW-00			P1	







EROSION & SEDIMENT CONTROL

- THIS PLAN TO BE READ IN CONJUNCTION WITH THE ARCHITECTURAL AND ENGINEERING PLAND AND ANY OTHER PLAND OR WRITTEN INSTRUCTIONS TRATTARY BE ISSUED.
- 2. THE CONTRACTOR SHALL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS SHOWN ON THIS DRAWMED.
- PRO TECT ALL NEW PITS FROM SEISM ENTINFILTRATION PRO OR RESIVELY, AS THEY ARE CONSTRUCTED.
- ALL DOWN STREAM STORMWINTER PITS ARE TO BE PROTECTED FROM SEDIMI INFILTRATION DURING CONSTRUCTION.

- 6. 1) INSTALLANY NECESSARY SEC DRITTYND UNDARY FENCES FOR THE SITE 23 CONSTRUCT TOLLT FENCING ADDIETALLED ALONG DOWNSLOPE BOUNDAR.
- DURING WHINDY WEATHER, LARGE UNPROTECTED AREAS SHALL SE KEPT MO EST (NOT WHIT) BY SPRIN ALING WHITH WATER TO KEEP DUST UND SE CONTROL.
- FINAL SITE LANDSCAPING SHALL BE UND ENTAKEN AS SOON AS POSSIBLE, AND UNITH INTO THE TYPE MICHAEL DIAGREE COMPLETION OF CONSTRUCTION ACTIVITIES.
- SAND USED IN THE CONCRETEGURING PROCESSIONALL BE REMOVED ADAP, AND WITH IN TER WORKING DAYS FROM PLACEMENT.
- 11. TEMPORARYSO IL AND MATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LAN DS THEY ARE PROTECTING ARE REMABILITATED.
- THE CONTRACTOR SHALL PROVIDE ACCEPTABLE RECEPTORS FOR CONCRETE AMORYAR SUBRIES, PAINTS, ACID WASHINGS, LICHT-WEIGHT WASTE MATERIALD AND LITTER AD REQUIRED.
- RECEPTORS FOR CONCRETE AND MORTAR SLUARIES, PAINTS, ACID WINSH INCOLD HT-WIEDONT WASTERNALD AND LITTER, ARE TO BE EMPTIED AS MEDISSEARY, DISPOSAL OF WASTESHALL BE IN AMAIN HER APPROVED BY THE SITE SUPERMITTEN DET.
- . MAINTAIN ERO BION AND SEDEMENT CONTROL MEASURED IN A FUNCTION INGOON OF MONEY AND THE SATE COMPLETED AND THE SETTE REMAILITATED







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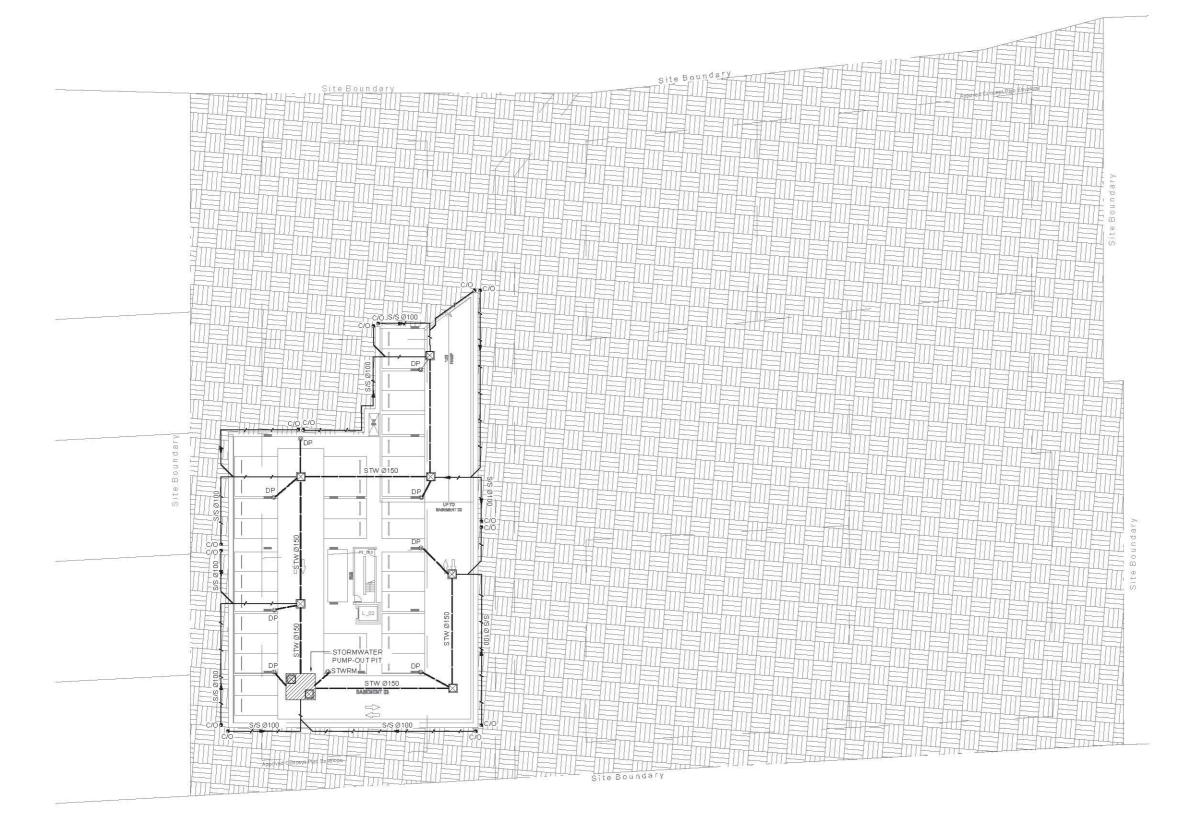
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SHEPHERDS BAY STAGE 6 & 7

STORMWATER SERVICES SEDIMENT & EROSION CONTROL PLAN

DATE	DRAMN	CHECKED	No IN SET	SCALE	
OCT. 2014	АТ	TN		1:250 @B	
PROJECT No.		DRAMING No.		REVISION	
5727	SW-01			P1	



- THE STORMWATER DRAINAGE IS DESIGNED IN CONJUNCTION WITH CARDNO WOUD MASTER PLAN DOCUMENT 600283\_WISUDMASTERPLANREPORTV02 DATED 2404/2013 & RYDE CITY COUNCILS DEVELOPMENT CONTROL PLAN 2010 SECTION 8.
- ALL D RAININGS TO BE READ IN CONJUNCTION WITH BG&E STO PMINIATER ROAD INFRASTRUCTURE ARL D'ANNINS I D'OR CONNECTIONS TO BIO-RETENTION AREAS AND, INFERSTRUCTURE TRANS MAIN DESIGN.

  ALL ARIQUE RAGE RECURRENCE INTERVALS) & RAINFALL INTENSITY D'ATA ARE BASED FROM INFORMATION COLLECTED FROM THE BUREAU OF METEOROLOGY!

A VERAGE RECURRENCE INTERVALS (MEADOWBANK)

20 YR - 186MMMHR 60 YR - 216MMMHR 100 YR - 238MMMHR

4. THE 'RATIONAL METHOD' HAS BEEN ADOPTED FOR ALL SITE CATCHMENTS CALCULATIONS.

- 100% OF EACH BUILDING ROOF AREA ASSUMED TO BENON TRAFFICABLE AND DISCHARGE TO
- ASSOCIATED RAINWATER TANKS.
  ALL LANDSCAPE AREA TO DISCHARGE TO NOTED BIG-RETENTION FILTRATION BASIN, BIG RETENTION
- TILTRATION BASIN TO BIGGE DESIGNETALLS.

  SEDIMENT AND EROSION CONTROL PLAN CONTAINS THE EMISTING SURVEY PLAN. THE CONCEPT STORMHATER PRANINGS CONTAINS NEW ROAD SURVEYPLAN TO BETTER INDICATE NEW STORMHATER PLAN STORMHATER TO BETTER INDICATE NEW STORMHATER INFRASTRUCTURE AND EXTENSION TO HAMILTON CRESCENT.



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LEGEND

---- CATCHMENT ZONE SUBSOIL DRAINAGE LINE STORMWATER DRAINAGE LINE

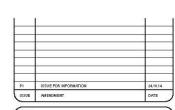
> $\boxtimes$ STORMWATER PIT 300mm² GRATED OUTLET

STORMWATER HEADWALL

0 DOWNPIPE

0 CLEAR OUT





**HOLDMARK** 

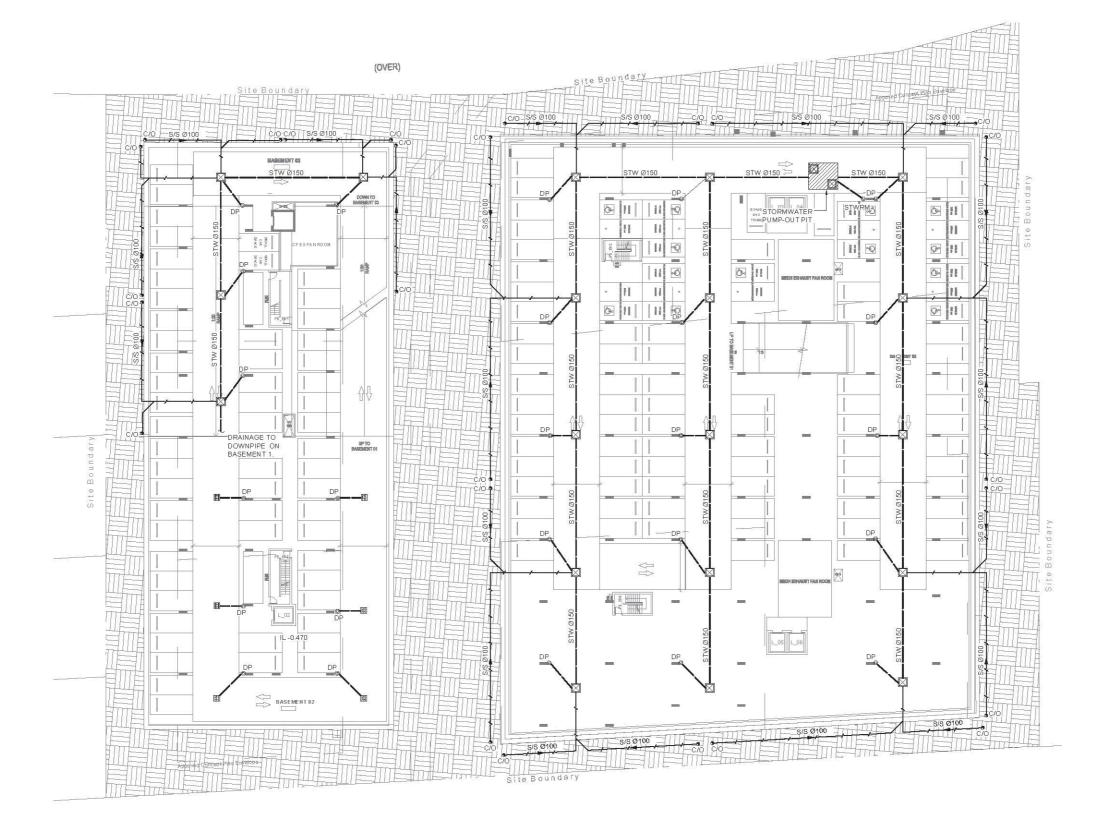
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SHEPHERDS BAY STAGE 6 & 7

DA SUBMISSION STORMWATER CONCEPT BASEMENT LEVEL 3

DATE	DRAMN	CHECKED	No IN SET	SCALE	
OCT. 2014	AT	TN		1:200@	
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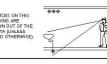
- THE STORMWATER DRAINAGE IS DESIGNED IN CONJUNCTION WITH CARDNO WOUD MASTER PLAN DOCUMENT 600283\_WSUDMASTERPLANREPORTV02 DATED 24/04 /2013 & RYDE CITY COUNCILS
- DEVELOPMENT CONTROL PLAN 2010 SECTION 8.
  ALL DRAWINGS: TO BE READ IN CONJUNCTION WITH BG&E STORMWATER ROAD INFRASTRUCTURE DRAWINGS FOR CONNECTIONS TO BIO-RETENTION AREAS AND INFRASTRUCTURE TRUNK MAIN
- ALL ARIGNERAGE REGURRENCE INTERVALS) & RAINFALL INTENSITY DATA ARE BASED FROM INFORMATION COLLECTED FROM THE BUREAU OF METEOROLOGY\*.

AVERAGE RECURRENCE INTERVALS (MEADOWBANK) 20YR - 186MM/HR 60YR - 216MM/HR 100YR - 238MM/HR

- 4. THE 'RATIONAL METHOD' HAS BEEN ADOPTED FOR ALL SITE CATCHMENTS CALCULATIONS.
- 100% OF EACH BUILDING ROOF AREA ASSUMED TO BE NON TRAFFICABLE AND DISCHARGE TO ASSOCIATED RAINWATER TANKS.
- ALL LANDSCAPE AREA TO DISCHARGE TO NOTED BIO-RETENTION FILTRATION BASIN. BIO RETENTION FILTRATION BASIN TO BE DESIGN DETAILS.



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LEGEND

---- CATCHMENT ZONE SUBSOIL DRAINAGE LINE STORMWATER DRAINAGE LINE

> STORMWATER PIT 300mm² GRATED OUTLET

STORMWATER HEADWALL

0 DOWNPIPE 0

CLEAR OUT



BIO-RETENTION AREA



**HOLDMARK** 

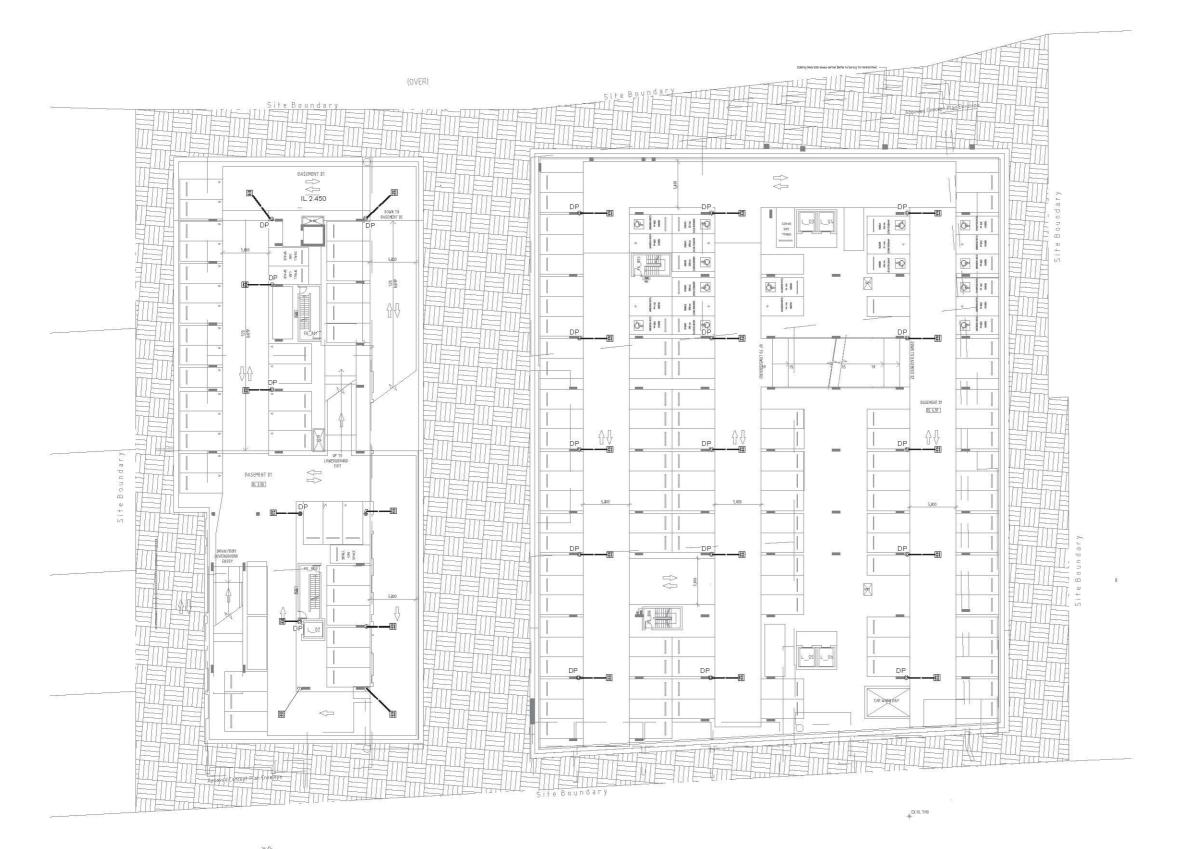
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SHEPHERDS BAY STAGE 6 & 7

DA SUBMISSION STORMWATER CONCEPT BASEMENT LEVEL 2

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DRAWING No.			REVISION
	АТ	AT TN DRAMING No.	AT TN



#### GENERAL NOTES

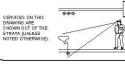
- THE STORMWATER DRAINAGE IS DESIGNED IN CONJUNCTION WITH CARDNO WISUD MASTER PLAN DOCUMENT 60038 JUNGUOMASTERPLAN REPORTING DATED 2404 /2013 & RYDE CITY COUNCILS DEVELOPMENT CONTROL PLAN 2010 SECTION 8.
  ALL DRAININGS TO BE READ IN CONJUNCTION WITH BGAE STORMWATER ROAD INFRASTRUCTURE
- D RAWINGS FOR CONNECTIONS TO BIO-RETENTION AREAS AND INFRASTRUCTURE TRUNK MAIN
- ALLA RIJA VERAGE RECURRENCE INTERVALS) & RAINFALL INTENSITY DATA ARE BASED FROM INFO RMATION COLLECTED FROM THE BUREAU OF METEOROLOGY.

AVERA GE RECURRENCE INTERVALS (MEADOWBANK) 20YR - 186MM/HR 50YR - 215MM/HR

- 4. THE 'RATIONAL METHOD' HAS BEEN ADOPTED FOR ALL SITE CATCHMENTS CALCULATIONS.
- 100% OF EACH BUILDING ROOF AREA ASSUMED TO BE NON TRAFFICABLE AND DISCHARGE TO ASSOCIATED RAINNIATE TANNS.
  ARL LANDSCAPE AREA TO DISCHARGE TO NOTED BIO-RETENTION FILTRATION BASIN TO BOSE DESIGNOETAILS.



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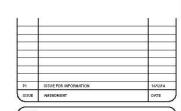
---- CATCHMENT ZONE SUBSOIL DRAINAGE LINE

> $\boxtimes$ STORMWATER PIT 300mm² GRATED OUTLET

STORMWATER HEADWALL

0 DOWNPIPE CLEAR OUT

BIO-RETENTION AREA



**HOLDMARK** 

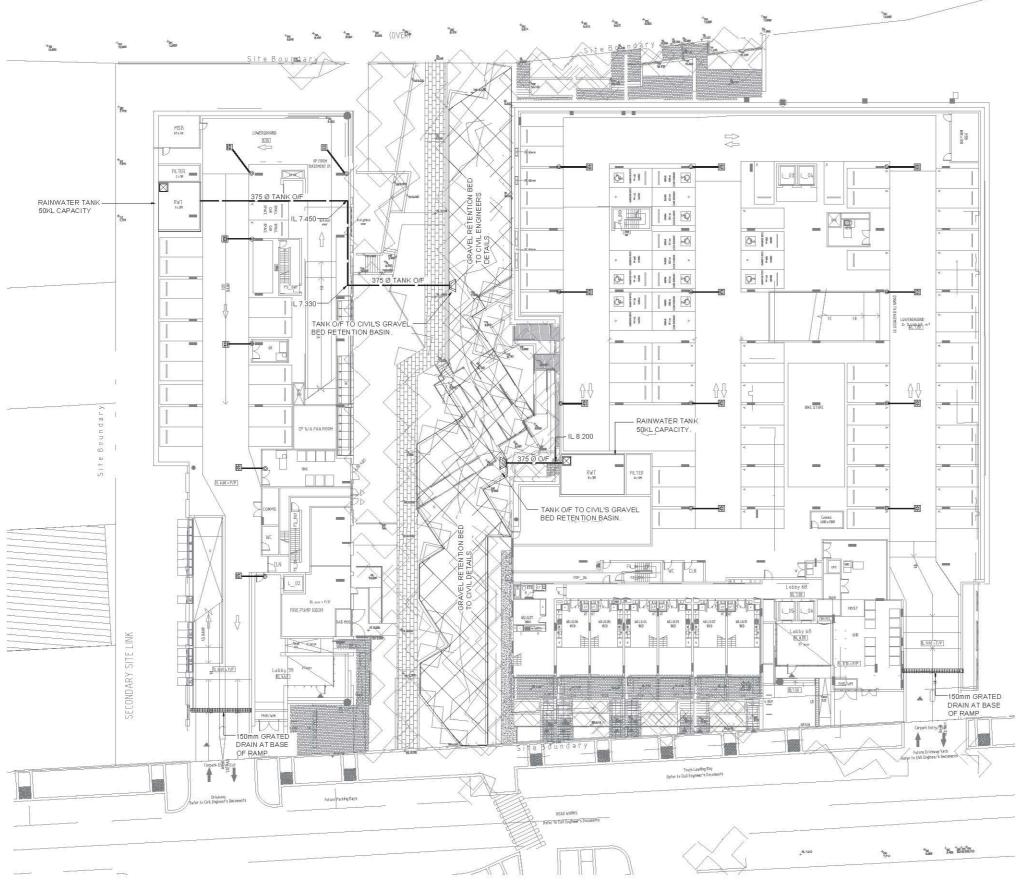
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SHEPHERDS BAY STAGE 6 & 7

DA SUBMISSION STORMWATER CONCEPT BASEMENT LEVEL 3

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- THE STORMINATER DIRAININGE IS DESIGNED IN CONJUNCTION WITH CARDNO WISUD MASTER PLAN DO CLIMENT 600283, WISUDMASTER PLANREPORTIVOZ DA TED 2404 2013 & RYDE CITY COUNCILS DE VECOMENT CONTROL PLAN 2010 SECTION 8.
  ALLD PRAININGS TO BE READ IN CONJUNCTION WITH BIGAE STORMINATER ROAD INFRASTRUCTURE DRAININGS FOR CONNECTIONS TO BIO-PETENTION AREAS AND INFRASTRUCTURE TRUNK MAIN
- DESIGN.

  3. ALL ARIJANERAGE RECURRENCE INTERVALS) & PAINFALL INTERSITY DATA ARE BASED FROM INFORMATION COLLECTED FROM THE BUREAU OF METEO ROLOGY.

AVERAGE RECURRENCE INTERVALS (MEADOWBANK) 20YR - 186MM/HR 50YR - 215MM/HR 100YR - 238MM/HR

- 4. THE 'RATIONAL METHOD' HAS BEEN ADOPTED FOR ALL SITE. CATCHMENTS CALCULATIONS.
- 100% OF EACH BUILDING ROOF AREA ASSUMED TO BE NON TRAFFICABLE AND DISCHARGE TO ASSOCIATED RAINWATER TANKS.
- ALL LANDSCAPE AREA TO DISCHARGE TO NOTED BIO-RETENTION FILTRATION BASIN. BIO RETENTION FILTRATION BASIN TO BG&E DESIGN DETAILS.



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LEGEND

———— CATCHMENT ZONE SUBSOIL DRAINAGE LINE STORMWATER DRAINAGE LINE

> STORMWATER PIT 300mm² GRATED OUTLET

STORMWATER HEADWALL

0 DOWNPIPE

0 CLEAR OUT



GRAVEL BASIN RETENTION AREA





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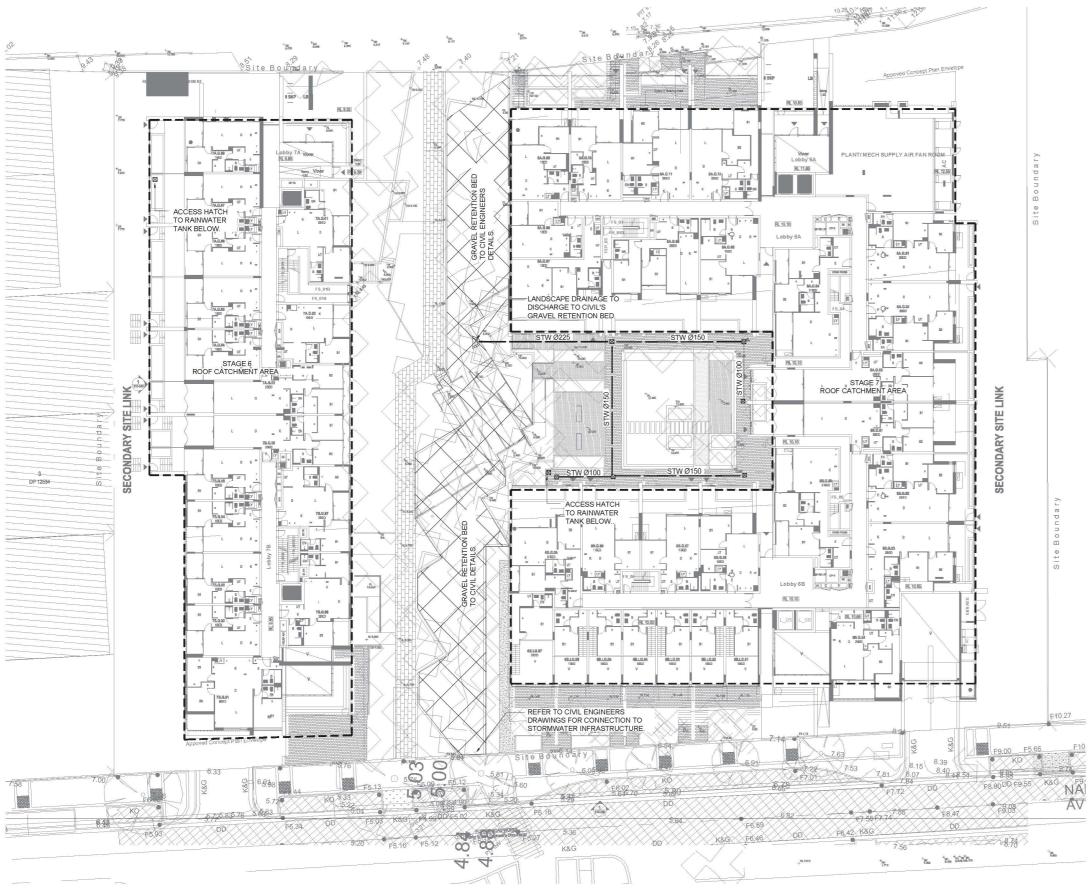
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SHEPHERDS BAY STAGE 6 & 7

DA SUBMISSION STORMWATER CONCEPT LOWER GROUND FLOOR

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#### GENERAL NOTES

- THE STORMWATER DRAINAGE IS DESIGNED IN CONJUNCTION WITH DRAFFLOW YOU WAS THE HEAR DOCUMENT BOOKS, WISDUMASTERPHAREPORT WAS 24 THE 2404 VOIS A PTÉ 2417 VOINCIUS DEVELOPMENT CONTROL PLAN 2010 SECTION 8.
  ALL DRAWINGS TO BE READ IN CONJUNCTION WITH BISSE STORMWATER ROAD INFRASTRUCTURE DRAWINGS FOR CONNECTIONS TO BICRETEINION AREAS AND INFRASTRUCTURE TRIMM MAIN
- ALL ARI(AVERAGE RECURRENCE INTERVALS) & RAINFALL INTENSITY DATA ARE BASED FROM INFORMATION COLLECTED FROM THE 'BUREAU OF METEOROLOGY'.

AVERAGE RECURRENCE INTERVALS (MEADOWBANK) 2017: 188MMHR 501R: 215MMHR 1001R: 238MMHR

- 4. THE 'RATIONAL METHOD' HAS BEEN ADOPTED FOR ALL SITE CATCHMENTS CALCULATIONS.
- 100% OF EACH BUILDING ROOF AREA ASSUMED TO BE NON TRAFFICABLE AND DISCHARGE TO
- TOUR OF EACH BUCUMPATCH TANKS.

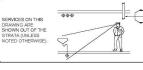
  ASSOCIATED PAIRWAYETE TANKS.

  ALL LANDSCAPE AREA TO DISCHARGE TO NOTED BIO-RETENTION FILTRATION BASIN. BIO RETENTION FILTRATION BASIN TO BOSE DESIGN DETAILS.

## Catchment to Rainwater Tanks Catchment Zone Area (ha) CROOF6 0.186 CROOF7 0.364







LEGEND

— — — CATCHMENT ZONE SUBSOIL DRAINAGE LINE STORMWATER DRAINAGE LINE

STORMWATER PIT

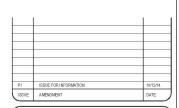
300mm<sup>2</sup> GRATED OUTLET

STORMWATER HEADWALL

0 DOWNPIPE

CLEAR OUT

GRAVEL BASIN RETENTION AREA



**HOLDMARK** 

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SHEPHERDS BAY STAGE 6 & 7

DA SUBMISSION STORMWATER CONCEPT PODIUM FLOOR

5727		SW-C	16	REVISION P1
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## Shepherds Bay > Stage 6 & 7 Development Application



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	Numer to 102	ADA/10/070	1.200
	Name of 21	AGA 110-000	1.000
	Linear ground	A-0/4-110-000	1.000
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	Cassid Oil	ADA 00 140	1.200
	Laurel CO	ACA NO 100	1:000
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	South East Elevation	A-DA-210-000	1,200
	South Ward Statement / Harrison American	A-CIA-210-030	1.200
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29 Shadow Diagram	1		
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	Approximat Assembly 01	A-CA-730-010	1:000
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AR PLANTAGE POSSIBLE	Siege 7 Pop. Lb. Zorm	A64365395	1,500
	Stage 6 Fig. 12: Zalve	A-DA-740-050	+500
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118 Perspectives	Parameters III	ADAMOUN ADAMOUN	975 975



ROTHESAY AVENUE DEVELOPMENTS PR.

SHEPHERDS BAY - STAGE 8 6.7 Nancarrow Ave. Meadowbark NSW 2114 Australia

A-DA-100-010 C





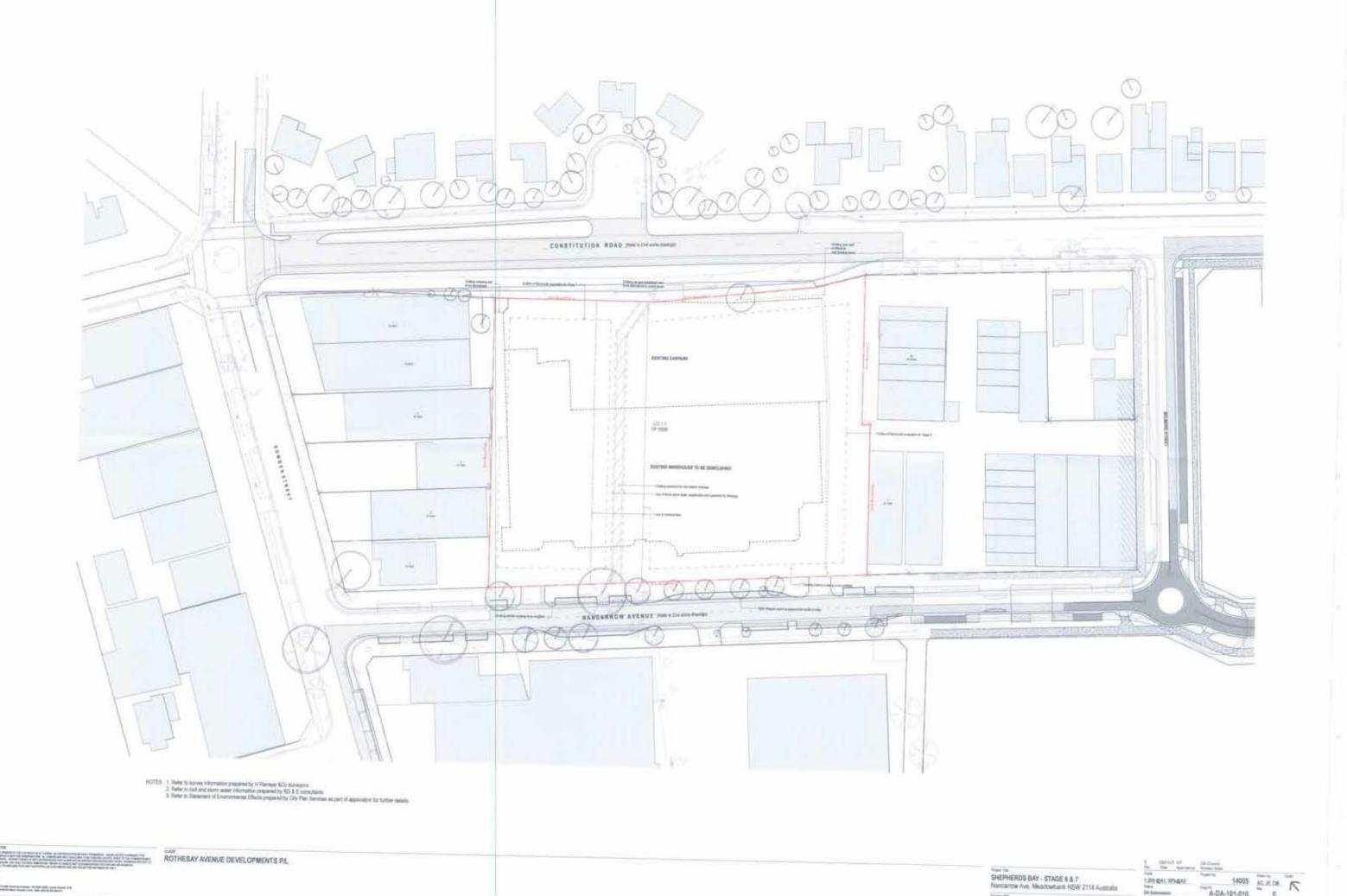
ROTHESAY AVENUE DEVELOPMENTS PIL.

SHEPHEROS BAY - STAGE 5 & 7 Rendertow Ave. Misodowbern NSW 2114 Australia Context Sita Analysis Plan

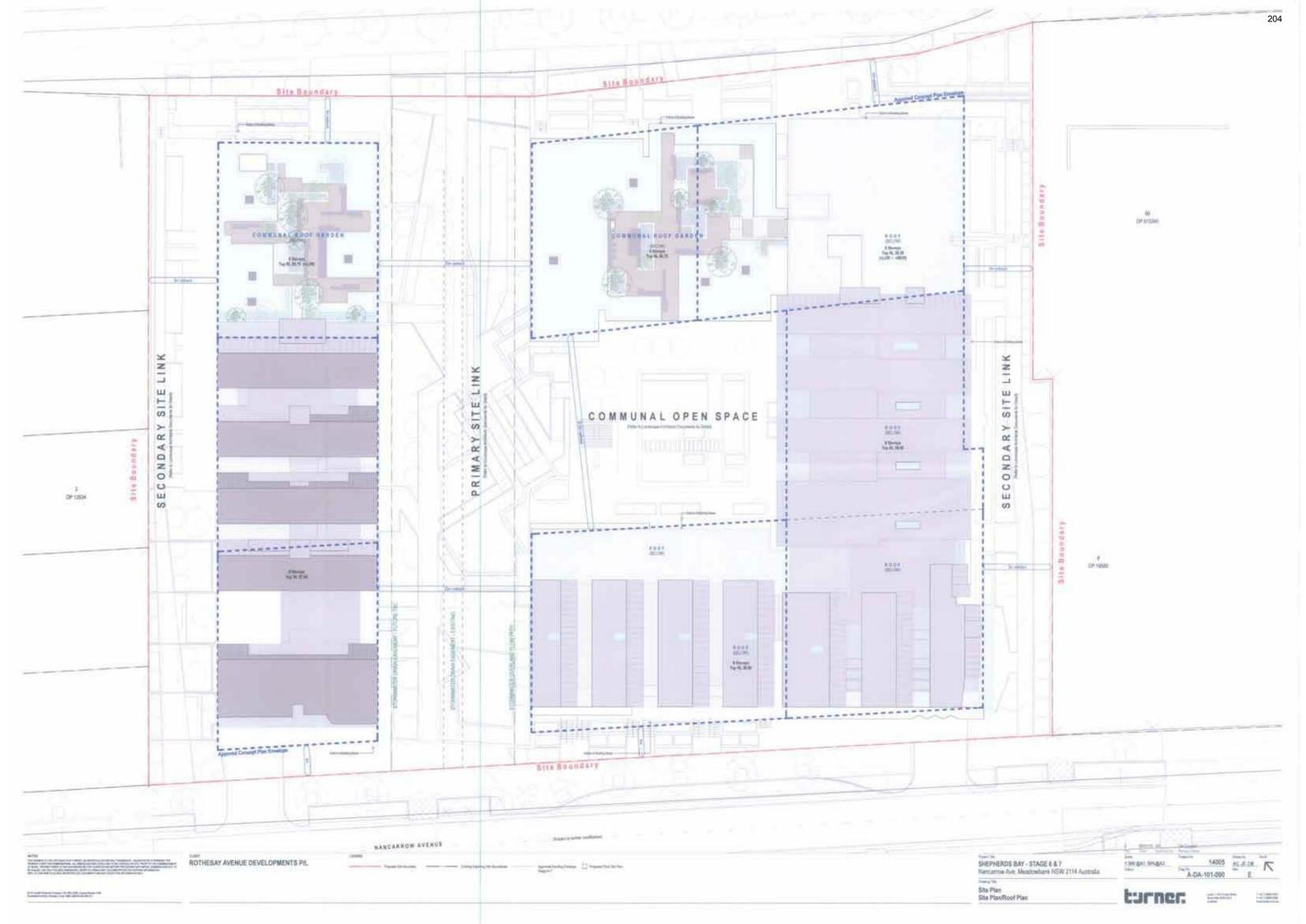
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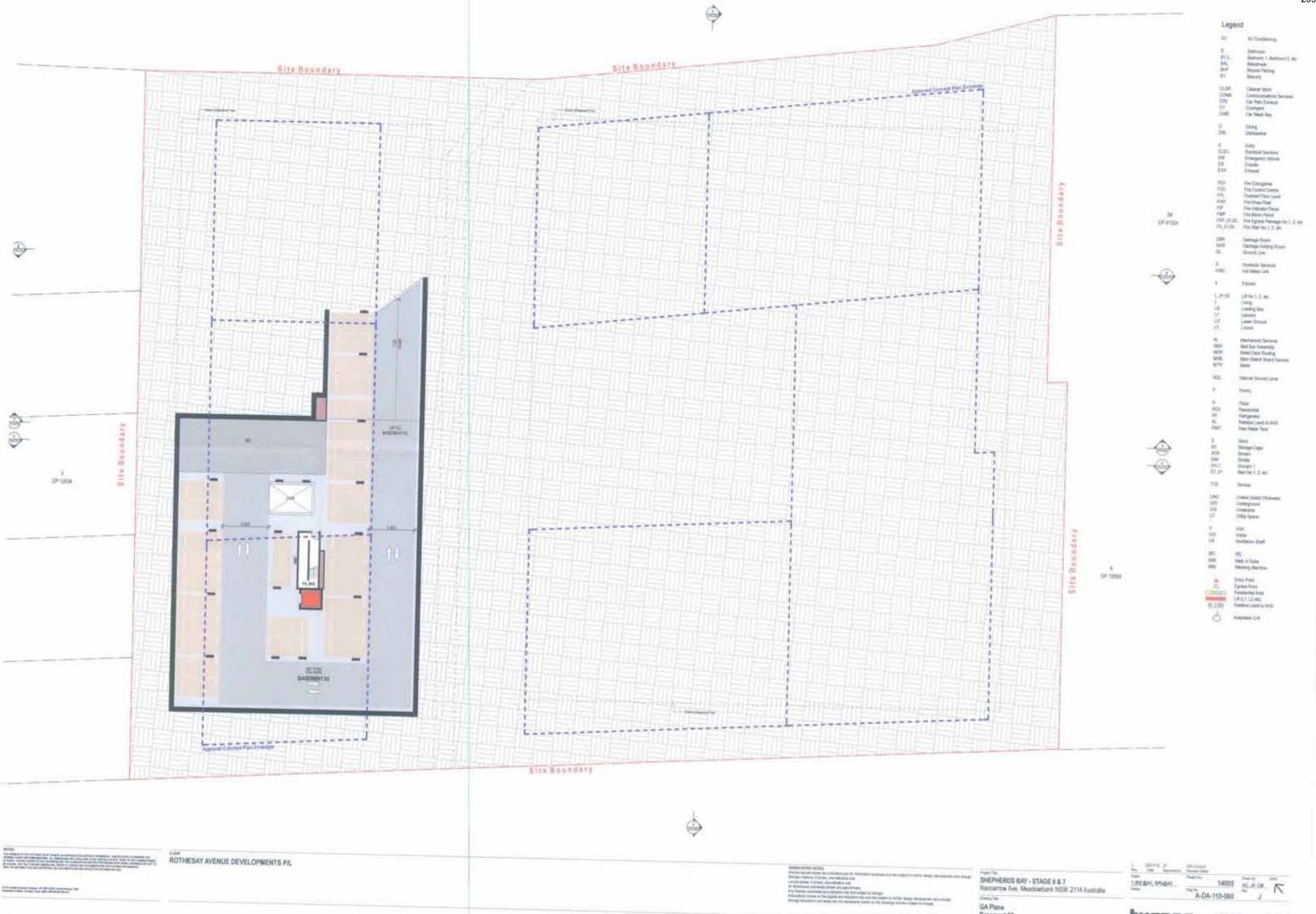
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Estimate Village





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GA Plana Sesement 02

