# SCHEDULE 8

## CITY CODES AND STANDARDS

<table>
<thead>
<tr>
<th>NAME</th>
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<td>1.0</td>
<td>City of Sydney Public Domain Codes and Specifications</td>
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<tr>
<td>1.3</td>
<td>Sydney Parks Code Code currently under review (Incorporating the document previously known as the Parks Technical Manual)</td>
</tr>
<tr>
<td>1.4</td>
<td>Sydney Lights Code Currently under review</td>
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<td>1.5</td>
<td>Sydney Signage Code Currently under preparation</td>
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<tr>
<td>1.5.2</td>
<td>City of Sydney Parks Signage Code Internal document. Contact City Design ph: 9246 7579. Will be incorporated into 1.5 by end 2014</td>
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<tr>
<td>1.5.3</td>
<td>City of Sydney Parks Signage Technical Manual – Drawings Internal document. Contact City Design ph: 9246 7579. Will be incorporated into 1.5 by end 2014</td>
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</tr>
<tr>
<td>------</td>
<td>---------------------</td>
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<tr>
<td>2.0</td>
<td>City of Sydney Tree Management</td>
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</table>
Notice of Activation
(clause 3.1 and clause 4.1 of the Development Agreement)

Sydney Light Rail Project ("Project")

To: The City's Representative

From: Transport for NSW
ABN 18 804 239 602

In accordance with the terms of clause [3.1/4.1] of the Development Agreement between the City of Sydney (ABN 22 636 550 790) and Transport for NSW (ABN 18 804 239 602) dated [insert date] with respect to the Project (Development Agreement), Transport for NSW hereby notifies the City of Sydney that:

- [it wishes to undertake the Early and Preparatory Works /
- funding approval has been given by the NSW Government in respect of the Project and the Planning Approval has been issued on terms and conditions acceptable to Transport for NSW and it wishes to undertake the Works].

Dated: [insert date]

Signed for and on behalf of

Transport for NSW
ST ANDREW'S CATHEDRAL

TOWN HALL

QUEEN VICTORIA BUILDING

GALLERIES VICTORIA

Queen Victoria Building Stop (45M)

PS CB09

PS CB10

PS CB11

NOTE

For legend, refer to NSW TCE08-WTP-EN-1-17

Transport for NSW

Worksite Figure 5
ANNEXURE B

BASELINE PAVING LAYOUT
Baseline Paving Layout

George Street Pedestrian Zone
Track Paving Options

Work in Progress Draft
For Discussion Only

Not For Construction

Option 1
800mm Wide
Hazard Warning Band
PAVER SPECIFICATION:

- AUSTRAL BLACK GRANITE, FLAMED EXFOLIATED FINISH 1
- AUSTRAL BLACK GRANITE SETT, FLAMED EXFOLIATED FINISH 2
- HARDWAIR GRANITE SETT, FLAMED EXFOLIATED FINISH 2

INSET 10MM THICK STAINLESS STEEL PLATE MIRROR FINISH.

WIDTH VARIES

EXFOLIATED FINISH 1

EXFOLIATED FINISH 2

PAVE TO EDGE OF RAIL FLANGE, STRUCTURAL SLAB AND HAUNCH RECESS BELOW.

RAIL FLANGE

NOTE: THE CITY'S INTENT IS THAT EXFOLIATED FINISH 2 IS A ROUGHER TEXTURE THAN EXFOLIATED FINISH 1, WHICH IS THE CITY'S CURRENT STANDARD. SAMPLES TO BE SUPPLIED FOR APPROVAL.

DRAINAGE VALLEY, MINIMISE VISUAL APPEARANCE OF DRAINAGE INFRASTRUCTURE AT SURFACE.

MIRROR ABOUT CENTRE OF CARRIAGeway

FOOTPATH

LIGHT RAIL CORRIDOR

DRAWING: PRELIMINARY

CITY OF SYDNEY
PREFERRED PAVING LAYOUT

George Street Transformation

Scale: 1:25@A1
1:50@A3

Page 127
ANNEXURE D

CONCEPT DESIGNS - CATENARY SMARTPOLES®
# TABLE OF CONTENTS

1.0 Executive Summary

2.0 S3B Pedestrian Smartpole 260 Dia - Family

2.1 S3B Pedestrian Smartpole 260 Dia - Details

2.2 S3B Pedestrian Smartpole 260 Dia - Exploded View

3.0 Pedestrian Smartpole 260 Dia - Alternative with external lights - Family

4.0 George Street Corner Block Smartpole

5.0 S3A George Street Catenary Smartpole

6.0 S3C General Use Catenary Smartpole

7.0 George Street Smartpole Family

Appendix 1 - Pedestrian Smartpole - Lighting Option Table
Prepared by Lighting Consultant Steensen Varming

Appendix 2 - Structural Engineering Data
- Indicative Load Estimates of Light Rail Catenary
  Prepared by ARUP
- Review of Light Rail Catenary Load on Existing Smartpole
  Prepared by Taylor Thomson Whitting
EXECUTIVE SUMMARY
LIGHT RAIL SMARTPOLE SUITE

The proposed Light Rail system running the length of George Street and Sydney’s CBD, connecting two major transport hubs, Central Station to the south and Circular Quay to the north, is a significant change to the streetscape of Sydney. The design of urban elements including Pedestrian light poles and Multifunction poles to support the light rail infrastructure is required for this major inner city upgrade.

HUB Street Equipment’s scope of work is to develop and detail design a suite of multifunction poles that will provide the light rail system with the necessary infrastructure while providing George Street & particularly the Pedestrian Precinct with superior pedestrian and street lighting to a world class design standard.

The following concept presentation focuses on a primary concept direction with an alternate option for the bespoke Pedestrian pole proposed for the Pedestrian Precinct of George Street and also the unique Smartpole variant proposed for the street. With all options incorporating common details which are referenced from the new suite of public domain street furniture presented by Tzannes Associates.

Pedestrian Smartpole
A flush mounted approach for all luminaires and semi recessed mounting of other accessories where possible otherwise mounted in a stream lined fashion. The design intent is one of seamless integration as opposed to an assembled kit of parts. Proposed pole diameter is 260 mm.

Pedestrian Smartpole Alternate
The street, pedestrian and tree upright luminaires to be direct fixed to the pole in a minimalist way. Other pole accessories to be mounted in a clean uncluttered manner. Proposed pole diameter is 260 mm.

Each concept includes an accessory mounting track on each pole quadrant hidden by a removable extruded cover strip. Where the mounting of an accessory is required the track is exposed allowing the mechanical fixing of the custom accessory bracket.

The Pedestrian Pole accessories include the following –
- Beacon: on top of every pole, with the ability to change colour for special events
- Road area lighting on every pole
- Street name signage (where required)
- Tree uplighting on every pole next to a tree (to be confirmed by city arborist)
- Pedestrian lighting on every pole
- Pedestrian crossing signals and buttons (where required)
- Traffic signal lights (where required)
- Light rail crossing lights (where required)
- Braille signage (where required)
- Banner (to be confirmed)
- Facility to mount Christmas decoration on every pole top

George Street Smartpole
Concepts are also included for the unique Smartpole proposed for George Street, both typical corner block and category supporting Smartpoles. Both poles incorporate common detailing referenced from the bespoke Pedestrian Pole and new suite of public domain street furniture presented by Tzannes Associates.

An additional “General Use Catenary” Smartpole has been included for use beyond George St where the proposed light rail may exist.
S3B PEDESTRIAN SMARTPOLE 260 DIA - DETAILS

Execution Version City of Sydney Development Agreement - Sydney Light Rail Project
PEDESTRIAN SMARTPOLE 260 DIA ALTERNATIVE

EXTERNAL LIGHT FITTINGS

Execution Version City of Sydney Development Agreement - Sydney Light Rail Project
GEORGE ST CORNER BLOCK SMARTPOLE

Execution Version City of Sydney Development Agreement - Sydney Light Rail Project
S3A GEORGE ST Catenary SmartPole

Excavation Ongoing

New Fence Picking

New Street Light

Existing Street Light

LCA - Catenary Wire

Cost - Aluminium Beam Cladding with Clip

Aesthetic reference to Tarnished Iron, Cast iron cladding as protection zone.
1. Top Cap
2. Existing Streetlight Outrigger
3. New Flush Fitting Outrigger/Bracing
4. New Upper Tole
5. 900mm O/C Between
6. 1.5m Catenary Wire
7. Steel Grease
8. 2252 D10 Extended to height above substation connection
9. 30mm Lightpipe
10. Catenary Arm Mounting on Catenary Smartrpole

3SC GENERAL USE CATENARY SMARTPOLE

Execution Version City of Sydney Development Agreement - Sydney Light Rail Project
LIGHT RAIL SMARTPOLE FAMILY
### STEENSEN VARMING

#### XIDATO XLH 2000 LED MODULE

<table>
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<tr>
<td>Min Current</td>
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<td>Input Voltage</td>
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<tr>
<td>Output Voltage</td>
<td>50 V</td>
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#### XIDATO XLH 4000 LED MODULE

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<td>Output Voltage</td>
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### Minimum Requirements of Technical Parameters per AS/NZS 1655.1, AS/NZS 1655.2 & AS/NZS 1655.3

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<tr>
<td>Tolerance</td>
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Execution Version City of Sydney Development Agreement - Sydney Light Rail Project
### ARUP

#### Execution Version City of Sydney Development Agreement - Sydney Light Rail Project

**22078/A1**

**Sydney Light Rail Strategic Plan**

16 September 2012

**Inductive OGW (Overhead Wire) Load Estimates**

(For Preliminary Mast Assessment Only)

<table>
<thead>
<tr>
<th>Track Geometry</th>
<th>Support Loading (kN)</th>
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<th>Vertical</th>
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<tr>
<td></td>
<td>ULS</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>CASE 1</td>
<td>Span: 35 m, Curve: 350 m</td>
<td>0.620</td>
<td>0.720</td>
</tr>
<tr>
<td>CASE 2</td>
<td>Span: 400 m, Medium Radius</td>
<td>0.580</td>
<td>0.700</td>
</tr>
<tr>
<td>CASE 3</td>
<td>Span: 250 m, Small Radius</td>
<td>0.620</td>
<td>0.760</td>
</tr>
</tbody>
</table>

**Notes:**
- Loading given for dual contact wire. Therefore, from single wire loads:
  - Wind Load on single wire multiplied by 1.6
  - Vertical Load (Contact Wire Selfweight) multiplied by 2
  - Live Load multiplied by 2
  - Live Load not multiplied will only one person supported
- Horizontal Loads provided act perpendicular to track.
- For anchorage masses (at termination of contact wire), additional anchorage load acting parallel to track (equal to tension of terminating wire) also to be considered simultaneously.

**Supported Span = 0.1 × L**

\[ L_1 = \text{previous span} \]

\[ L_2 = \text{next span} \]

**Assumed all spans = 35m (max span)**

**Radial Load (single wire) = \( \text{Radial Load} \times \text{Curve Radius} \)**

**Radial Load (single wire) = \( \text{Radial Load} \times \text{Curve Radius} \)**

\[ \text{Wind Load (single wire)} = 0.613 \times \text{Drag} \times \text{Wind Speed} \times \frac{\text{Wire Dia}}{\text{Supported Span}} \]

**Contact Wire Drag Coefficient**

\[ \text{Contact Wire Diameter (mm)} \]

\[ \text{ULS Wind Speed (m/s)} \]

**Wire Self Weight (single wire) = \( \text{Wire Weight per m} \times \text{Supported Span} \)**

**Contact Wire Weight (per m) (kN/kg)**
Appendix

9.1 Existing Smartpole - Structural Report

To: [Recipient Name]

Dear [Recipient Name],

We have conducted a review of the status of the existing Smartpoles on George Street to support the Sydney Metro Light Rail development.

For this project, it was decided that the existing Smartpoles were not compatible with the structural requirements for the proposed Light Rail development.

The existing Smartpoles were designed to support a maximum load of 2.5kPa. The proposed Light Rail would require a minimum load of 7kPa. Therefore, the existing Smartpoles would need to be retrofitted to meet the structural requirements for the Light Rail development.

The Smartpoles would be retrofitted with additional support structures to increase the load-bearing capacity to at least 7kPa. This would ensure that the Smartpoles can support the future Light Rail infrastructure.

Please let us know if you require any further information or if you have any other questions.

Sincerely,

[Your Name]
ANNEXURE E

INTERSECTIONS DRAWING
ANNEXURE F
SUSTAINABILITY STRATEGY OBJECTIVES

1. Reinforce the inherent sustainability benefits to be realised through diversion of trips to light rail from less sustainable or efficient modes (including buses and cars), and facilitating increased cycling, walking and other public transport use within the project corridor.

2. Strive to comply with all applicable sustainability stretch targets (including Transport Projects Division sustainability stretch targets), with a minimum of achieving baseline targets proposed by Transport for NSW, the Transport Projects Division and City's Sustainable Sydney 2030 targets where feasible.


4. Strive for a 'Leading' rating, with minimum of 'Excellent' rating, under the Infrastructure Sustainability Council of Australia Infrastructure Sustainability Rating Scheme.

5. Strive to offset 100% of the operational electricity requirements for the project, through both integration of renewable energy generation within the project and purchase of renewable energy offsets (such as Green Power).

6. Collaborate with the City and the Federal Government to align the project works program with Sustainable Sydney 2030 related works and NBN infrastructure related requirements (utilities generally), and making appropriate provisions to facilitate the City's Green Infrastructure requirements.
ANNEXURE G
GEORGE STREET TRANSFORMATION AND LIGHT RAIL TREE MANAGEMENT SPECIFICATION

George Street Transformation and Light Rail

Tree Management Specification

Part 1: Tree Protection

Part 2: Tree Pit Design

Part 3: Tree Supply

Part 4: Tree Planting

Part 5: Tree Establishment and Maintenance
1 TREE PROTECTION

1.1 Tree removal and retention

The retention and removal of existing trees shall be determined in consultation with the City of Sydney. Decisions about tree removal and retention shall be based on a combination of proper arboricultural assessment and appropriate high quality design outcomes. Relevant demolition and construction plans shall clearly indicate existing trees to be removed and existing trees to be retained and protected.

All trees marked to be retained shall be protected in accordance with the Australian Standard 4970 Protection of Trees on Development Sites.

1.2 Tree protection plan

A Tree Protection Plan shall be produced in order to specify the measures that will be taken to ensure the ongoing health and stability of the trees. It will also specify the ongoing monitoring and certification of these tree protection measures. The Plan shall be submitted to the City of Sydney Tree Management Unit for review and comment prior to being approved for use.

1.3 Project Arborist

A Project arborist shall be engaged by TfNSW to prepare the Tree Protection Plan. The Project arborist shall be qualified in arboriculture to Australian Qualifications Framework (AQF) level 5 or above, and have at least 5 years demonstrated experience in managing trees within complex development sites.

The responsibilities and duties of the Project Arborist shall include (but not be limited to) the following:

(a) Prepare a plan (or set of plans) showing the location of existing trees to be retained and the position all recommended tree protection devices or other tree protection works;
(b) Include an assessment and discussion of the likely impacts the proposed works will have on the trees. This should include above and below ground constraints on trees that should be retained;
(c) Recommend any design modifications, construction techniques and/or other protection methods required to minimise adverse impact on trees that should be retained during the demolition and construction works, and into the long term;
(d) Prepare a specification for tree protection measures suitable for use in the consent conditions and tender documentation. The specification should include detailed drawings where required. Marked up digital photos should be used to specify tree pruning works where needed. All tree pruning must be in accordance with the Australian Standard 4373 for the Pruning of Amenity Trees;
(e) Detail site specific tree protection measures for each tree in accordance with AS4970;
(f) Undertake an inspection of the site prior to the commencement of works in any given area, and review the tree impact assessment and specified tree protection measures;
(g) Meet with TfNSW nominated personnel to discuss tree protection measures prior to works commencing on any given site;
(h) Inspect and confirm the correct installation of the specified Tree Protection Measures, prior to the commencement of any excavation or demolition;
(i) In the event that tree protection measures have not been previously specified, detail site specific tree protection measures for each tree in accordance with AS4970, and oversee their installation and/or implementation on site as required;
(j) Undertake monitoring of the works during the construction phase to ensure trees are adequately protected in accordance with the Tree Protection Plan;
(k) Liaise with TfNSW nominated personnel as required throughout the project and provide specialised arboricultural advice, such as the extent of root pruning or alternative construction methods, to minimise or avoid the adverse impact on trees;

(l) Inspect and supervise any works (including canopy pruning) within the "Tree Protection Zones" of the trees nominated to be protected. Provide advice where required to minimize root disturbance or damage;

(m) Undertake inspection of trees to be supplied for planting (on site or at nursery) and provide advice regarding their conformance to NATSPEC and/or the contract documentation; and

(n) Undertake final inspection at completion of the works, including landscape works, to provide written certification (including photographic evidence) that the work has been completed in accordance with the Tree Protection Plan.

2 TREE PIT DESIGN

2.1 General requirements

The aim of the following performance based specification is to set the parameters to guide the design and construction of new street tree planter pits within the project area.

Trees are a major component of the landscape and the long term success of a streetscape is often judged on the success of the trees planted within it. The locations of new trees within the streetscape must be selected after thorough review and consideration of the size of the tree at maturity and possible conflicts with, and restrictions imposed, by above and below ground infrastructure.

2.2 Soil Volume

Adequate volumes of soil of a suitable quality are required to ensure successful tree establishment and growth to maturity.

The minimum volume of soil available to support the growth of each tree shall be not less than 30 cubic meters. The following points shall be considered in the calculation of available soil volumes:

(a) The space occupied by rock or other structural pavement supports shall be excluded from the soil volume calculation;

(b) Existing site soil shall be included in soil volume calculations only if it can be demonstrated that the soil has acceptable physical and chemical qualities to sustain long term tree growth and tree roots have unrestricted access to it; and

(c) The alignment of service trenches, the space they occupy, and their possible restriction of natural root spread and development shall be considered in the calculation of available soil volumes.

2.3 Pavement support

There are various methods or systems in use throughout the world for providing uncompacted soil suitable for tree growth beneath loadbearing pavements. Examples include vaulted systems, structural soil (either premixed or mixed in situ), continuous soil trenches, and proprietary loadbearing cells and matrices. Each has their advantages and disadvantages.
A suitable system or model tree pit design shall be developed based on existing site constraints and the need to provide adequate soil volumes. The tree pit design shall be made available for review by the City of Sydney.

Consideration shall be given to the need for gaseous exchange and aeration of the tree pit soil, as well as future access for the provision of soil treatments or amendments if necessary.

2.4 **Soil type**

Advice shall be sought from a suitably qualified and experienced consultant who specialises in the specification and management of urban soils. The consultant shall provide the following services to the project:

(a) Provide analysis and assessment existing site soils when required;
(b) Review and critique the preferred tree pit design and offer any recommendations considered necessary to rectify foreseeable problems or to enhance its function;
(c) Specify the soils to be used within the tree pit design in terms of their performance and physical and chemical qualities; and
(d) Make recommendations as to the necessary testing of supplied soils to ensure the specified soils are of an acceptable quality.

2.5 **Root development**

The tree pit design shall allow for the natural growth and development of the trees' structural root system to ensure their long term structural stability.

Root barriers shall only be used when absolutely necessary to protect below ground services at risk of damage. In this regard, root barriers shall only be used to surround and protect individual services within the root zone, rather than inhibiting root spread in any given direction.

2.6 **Drainage**

Tree pits shall be designed to allow free and natural drainage wherever existing site soil conditions allow. Additional subsoil drainage and connections to existing storm water infrastructure shall be provided when necessary, and at the advice of the urban soil consultant.

2.7 **Irrigation and water sensitive urban design**

The trees will require irrigation to ensure proper establishment. The irrigation may be automatically or manually delivered. The tree pit design shall accommodate the preferred method of irrigation.

The potential for harvesting surface stormwater and diverting it into the tree pits shall be assessed and incorporated into the design whenever feasible.

2.8 **Tree grates and guards**

The tree grates and guards shall be in accordance with the City of Sydney's Codes and Standards, as part of a designed suite of furniture. The tree grate and guard shall be integrated into the tree pit design.
3 TREE SUPPLY

3.1 Species

The tree species supplied for street trees in George Street shall be *Zelkova serrata* 'Green Vase'.

The tree species supplied for street trees in Devonshire Street shall be *Liriodendron tulipifera*.

3.2 Size

The size of trees at the time of planting into the finished landscape shall be 400 Litre and 200 Litre root ball sizes in the proportions set out in section 3.3 below. Adequate lead time for forward ordering the trees must be allowed to guarantee a supply of trees of an acceptable quality.

3.3 General conditions and quality

All trees supplied to the project shall conform to the NATSPEC guide and "Guide for assessing the quality of and purchasing of landscape trees" by Ross Clark 2003. The following specification details the requirements for the supply and transportation of trees.

Nursery stock shall meet design criteria for minimum dimensions, container size and shape, plant shape or special pruning requirements outlined in this document and the table below.

<table>
<thead>
<tr>
<th>Container Volume</th>
<th>Height above container (metres)</th>
<th>Caliper (at 300mm)</th>
<th>Clear Trunk Height (metres)</th>
<th>Percentage of Total Tree Stock Supplied</th>
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</thead>
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<tr>
<td>400 Litre</td>
<td>5.5</td>
<td>&gt; 70 mm</td>
<td>1.5</td>
<td>60%</td>
</tr>
<tr>
<td>200 Litre</td>
<td>4.8</td>
<td>&gt; 50 mm</td>
<td>1.3</td>
<td>40%</td>
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Each species of tree shall be supplied from two different nurseries or locations. Each nursery or location shall supply at least 60% of the total required number of trees, giving a minimum supply redundancy of 20%.

Definitions for the terms used within this specification shall be in accordance with the NATSPEC guide.

3.4 Labelling of stock

Clearly label individual trees and batches with the species name and cultivar / variety. The label is to withstand transit without erasure or misplacement.

3.5 True to type

The trees supplied and planted shall be the species, and variety or cultivar that the City has specified.

3.6 Health and vigour

The trees supplied shall be healthy and vigorous at the time of delivery and planting. Supply trees with foliage size, texture and colour at the time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species. Supply trees with extension growth consistent with that exhibited by vigorous specimens of the nominated species.
3.7 Pest and disease

Trees shall not be diseased or show evidence of pest attack that could affect the long term health of the tree or adjoining plantings. Supply trees with foliage and soil free from attack by pests and diseases.

3.8 Injury

Supply only trees free from injury and wounds.

3.9 Self supporting

Supply only trees that are self-supporting.

3.10 Stem taper

Supply trees where the calliper at any given point on the stem is greater than the calliper at any point higher on the stem.

3.11 Pruning

Trees are not to be pruned into a saleable shape just prior to shipment. All pruning shall be a clean-cut at the branch collar, no lopping or topping of trees is to be carried out and the diameter of any wound must not exceed 50% of the calliper immediately above the point of pruning.

**Clean stem height:** trees shall be supplied with a clean stem height of 35-40% of total tree height. For example a 5m tree is to be pruned to 2m maximum (clean stem height must not exceed 40% of total tree height).

**Pruning wounds:** Restrict fresh cuts (ie recent, non-calloused) to <20% of total tree height.

**Type:** Ensure a clean-cut at the branch collar that complies with AS4373:Pruning of Amenity Trees.

3.12 Crown symmetry

The symmetry of the crown is an important aspect of the presentation and appearance of the tree in the landscape. Difference in crown distribution on opposite sides of the stem axis must not exceed 20%.

3.13 Stem structure

**Species with an excurrent form:** Supply trees with a defined central leader and the apical bud intact. Trees that have had their leaders cut or damaged will not be accepted. Supply trees with a single stem roughly in the centre of the tree with any deviation from vertical <15°.

**Species with decurrent form:** Supply trees where the central stem is not divided at any point lower than the clean stem height nominated, and that the stem junction at the point of division is sound.

**All species:** Ensure that branch diameter is less than or equal to one-half of the calliper immediately above the branch junction.

3.14 Included bark

Supply trees where the branch/stem bark ridges at junctions between stems and branches and between co-dominant stems are convex.

3.15 Trunk position

Supply trees with the distance from the centre of the trunk to any extremity of the rootball is
not varying by >10%.

3.16 Compatibility of graft unions
When purchasing named cultivars propagated by grafting, it is critical that the graft union is sound and that the scion and root stock are compatible. The union between the scion and the root stock must be sound for the entire perimeter of the graft. The diameter of the scion immediately above the graft must be equal to the diameter of the rootstock immediately below the graft (+/-20%).

3.17 Indication of north
Indicate the northerly aspect during growth in the nursery and ensure it is marked on the container so to withstand transit without erasure or misplacement.

3.18 Root division
Trees in containers >45 litre: Primary division of roots is to have occurred within the outer 50% of the rootball at <100mm intervals.

3.19 Root direction
Ensure that roots, from the point of initiation, generally grow in outwards (radial) or downwards direction, and that any deviation from the established direction <45°.

3.20 Root ball occupancy
Soil Retention: On shaking or handling of the unsupported rootball at least 90% of the soil volume shall remain intact.

3.21 Rootball depth
Rootball depth assessment for containers/rootballs 45 litres or larger must:
(a) have a depth of less than or equal to the maximum depth specified for palms;
(b) have a diameter greater than or equal to their depth; and
(c) have rootballs (regardless of volume) which do not exceed 600mm in depth.

3.22 Height of root crown
Ensure that the trees root crown is at the surface of the rootball and free from suckering.

3.23 Non-suckering rootstock
Grafted cultivars/varieties: Supply trees grafted onto non-suckering rootstock.

3.24 Rejection of non-conforming specimens
Any tree not conforming to the specifications and standards listed in this specification shall be rejected and suitable replacements provided. If non-conforming trees are provided, the City may require new stock that complies to be supplied and planted.
4 TREE PLANTING

4.1 General

This specification describes the appropriate techniques to be used to install new street trees within newly constructed tree pits. Tree pits shall be designed and constructed in accordance with the requirements of Part 2 Tree Pit Design.

There may be allowance for some variation in the techniques to be used, however any change to the techniques from those described here must be submitted in a Work Method Statement for approval by the Project arborist.

Tree planting works shall be undertaken by an arborist or horticulturist with minimum certification in accordance with Australian Qualifications Framework Level 3, and certified as complete to an acceptable standard by the Project arborist.

4.2 Statutory requirements

TfNSW is responsible for compliance with all relevant statutory requirements.

TfNSW shall be able to demonstrate clear working programs and sequences. Site specific pedestrian and vehicular traffic control plans are to be implemented where necessary and shall conform to NSW Roads and Maritime Services guidelines and any other statutory requirements. These plans shall include any requirements for parking of worksite vehicles and the delivery of materials.

Approval from the NSW Police Service and the NSW Roads and Maritime Services may be required when the work has an impact on traffic flow.

4.3 Environmental controls

TfNSW shall ensure that all materials and the execution of the work are ecologically sound, environmentally benign and consistent with the principles of sustainable development.

TfNSW shall take all practical precautions to ensure that dust and noise caused by the works are kept to a minimum. The installer shall be responsible for all localised sediment and erosion control of work and stockpiles under their control and use.

TfNSW must comply, and make sure that sub-contractors comply, with the general provisions of this clause and any other environmental protection provisions within the requirements of any statute, by-law, standard and the like related to environmental protection.

4.4 Site investigations, existing services and structures

In accordance with NSW electricity and gas supply regulations, all excavations for tree planting require the review of underground service plans sourced from Dial Before You Dig service. Specialist service location tools or expertise may be required when underground service plans are insufficiently detailed or where plans indicate that services are close to the intended planting location. TfNSW shall be responsible for the rectification of all pavement surfaces where inspections have been undertaken including the making good of any excavation or site markings.
TfNSW shall notify the City of Sydney immediately upon discovery of services or obstructions that prevent any planned tree planting. All services shall be considered live until determined otherwise.

In the event of any damage to any service, TfNSW shall as soon as practicable notify the relevant authority and the City of Sydney and satisfy all requirements of the authority concerned.

TfNSW shall be liable for all damage caused by the tree installation works to all existing buildings and structures. TfNSW shall make good all damage caused by its activities at its expense.

4.5 Planting conditions

Do not plant in unsuitable weather conditions such as extreme heat, cold wind or rain. Avoid planting where unseasonable and adverse weather is forecast within 24 hours of the operations. No trees are to be planted on days exceeding temperatures of 30° Celsius. Generally tree planting is preferred during the cooler months from March to October.

4.6 Watering

Thoroughly water the tree rootballs before planting and then immediately after planting. Prevent the rootballs from drying out during the planting phase.

Apply water so as not to disturb the soil. Raise the moisture within the root zone to field capacity. Ensure potted rootball is thoroughly wet through the entire soil profile. Continue watering at a rate and frequency as required to avoid water stress in the plant.

4.7 Lifting of trees

It is preferred that all trees are carried or slung via the root ball. In the event that the trees have to be repositioned or lifted by the trunk, the installer shall provide adequate soft padding to the trunk in the form of underfelt, carpet or rubber wrapping and use only soft slings during the lifting.

4.8 Placement

When the tree pit is excavated and the hole is the correct size, place the rootball in its final position. Ensure the trees are centred and plumb and the top of the rootball level with the finished surface of the surrounding soil mix.

Do not use the trunk of the tree as a lever in positioning or moving the tree in the planting hole.

4.9 Alignment and orientation

Position the tree at the setout distances as indicated in the details. Ensure trunks are set vertically and aligned with other new or existing trees.

Orientate the trees trunk north where indicated by supplied markings where applicable (+/- 20°). Adjust within the above tolerances so that the primary lowest branches are generally aligned parallel with the kerb and footways (NOT extending into footways).
4.10 Formative pruning

The Project Arborist shall assess the planted trees for any remedial pruning required to correct minor structural defects or damage. Any pruning specified shall be performed by an Arborist with minimum certification in accordance with Australian Qualifications Framework Level 3 and in accordance with Australian Standard 4373 (2007) Pruning of amenity trees.

4.11 Root trimming

Determine if final stage root pruning has occurred at the supply nursery prior to delivery. If root pruning has not already occurred, all trees shall have the outer 10-25mm of the external root ball faces pruned or sliced away using sectateurs or a sharp and clean spade. Avoid excessive disturbance to the remaining rootball during this trimming and discontinue if excessive rootball soil begins to fall away. Do not leave the rootballs exposed for extended periods. Cover the rootball with moist hessian if backfilling cannot occur immediately.

4.12 Backfilling

Backfill with soil mix as specified in the approved tree pit design detail and in accordance with other relevant details and specifications. Lightly compact the soil to ensure all voids around rootballs are filled and that no air pockets are retained.

Ensure that the backfill soil is not paced over the top of the potted rootball. The top of the rootball and plant stem must be kept level with the top of the backfill.

4.13 Mulch

Any mulch specified in the tree pit design detail shall be free of deleterious and extraneous matter, including soil, weeds, rocks, twigs and the like. Lay mulch to nominal 80mm depth. Place the mulch so that it is not in direct contact with the trunk. Feather mulch away from trunk at base of root ball.

5 TREE ESTABLISHMENT AND MAINTENANCE

5.1 Tree establishment period

The tree establishment period commences at the date of practical completion for a period of 24 months.

All trees shall also be maintained immediately following their installation, as per the specifications below, up until the above tree establishment period commences. Tree maintenance works shall be undertaken by an Arborist or Horticulturist with minimum certification in accordance with Australian Qualifications Framework Level 3.

5.2 Tree establishment program

The service provider shall submit a program prior to the commencement of the tree establishment period. The program shall detail all works required during the planting establishment period including:

(a) Rectification of defects;
5.3 Maintenance

Throughout the tree establishment period, the installer must continue to maintain new trees and carry out maintenance work including, but not limited to:

(a) weeding and rubbish removal from tree pits and grates;
(b) fertilising;
(c) pest and disease control;
(d) replanting
(e) adjustment, removal or replacement of tree guards or grates;
(f) formative and selective pruning to AS 4373; and
(g) mulching to maintain and reinstate to depth specified.

Watering and/or monitoring of an irrigation system shall be incorporated into the regular maintenance schedule, with the soil moisture content of the tree pits to be maintained at a level to support optimal tree establishment and growth. The installer will allow for a minimum of 2 maintenance visits per week.

Inspection results and the maintenance procedures shall be recorded and submitted to the City of Sydney every 2 months. The various on-going maintenance practices shall be carried out to the satisfaction of City of Sydney.

5.4 Tree replacement

TINSW shall provide 7 days’ notice to the City of Sydney of any works to replace trees as part of planting establishment.

5.5 Fertilising

Tree pit soil shall be fertilised to address any nutrient deficiencies of the existing site soil and/or imported soil mixes, and to promote vigorous growth and rapid establishment. A program shall be developed with reference to the soil specification and recommendations contained within Part 2 Tree Pit Design.

Fertilisers should typically be coated slow release landscape fertilisers suitable for trees and shrubs (Osmocote or approved equivalent). The fertiliser should be incorporated into upper 100mm of the soil profile at rates recommended by the manufacturer, and reapplied when necessary to maintain adequate nutrient levels available for plant use.
5.6 Tree replacements

Where trees are:

(a) damaged by TfNSW; or

(b) die or fail to maintain vigorous growth typical of the species due to neglect or inadequate maintenance by TfNSW prior to or during the tree establishment period, TfNSW shall replace, replant and maintain trees of the same species, size and quality.

For clarity, TfNSW is not required to replace trees which are damaged or destroyed by third parties, including by vandalism, after planting.
ANNEXURE H

GEORGE STREET PEDESTRIANISED AREA TRACK ALIGNMENT DESIGN PRINCIPLES

The following principles will be adopted to design the final alignment of the trackway in the pedestrianised area of George St:

1. The distance from the property line to the outside edge of the DKE on each side of the trackway will be a minimum of:
   (a) 13.00 metres in the block between Bathurst St and Park Street;
   (b) 6.85 metres in the blocks from Park St to King Street; and
   (c) 6.60 metres in the blocks from King Street to Hunter Street.

2. Subject to principle 1, the track horizontal alignment must be central between the property lines but adjustment from the centre is permitted to:
   (a) reduce the impact of the trackway on existing underground utilities;
   (b) provide for curves in the track where George St changes horizontal alignment; or
   (c) balance pedestrian levels of service on the eastern and western sides of George Street at the Wynyard Stop.

3. The centreline row of trees and Smartpoles® will be 900mm from the outside of the DKE.

4. For the area 900mm from the outside of the DKE, the paving layout must be in accordance with the final paving layout developed by TfNSW in accordance with the principles in Section 1.6.2 of Schedule 7.

5. Furniture (e.g. bench seats, rubbish bins) will not be located within the area that is 300mm immediately adjacent to the DKE. Furniture may be located in the 600mm area that is from 300mm to 900mm outside of the DKE, but should not present as a barrier for pedestrian movement.

6. As part of the development of the Design Documentation, TfNSW must undertake (at its cost) pedestrian modelling for all pinch points along the Light Rail route in the local government area administered by the City for the Project (including without limitation the Wynyard Stop and the World Square Stop) to assess and ensure pedestrian safety and (without affecting the minimums set out in Section 1.6.9 of the Technical Specifications) adequate footpath widths. TfNSW must give the City a copy of the pedestrian modelling.
ANNEXURE I

GEORGE STREET AND ALFRED STREET PRELIMINARY TREE AND POLE LAYOUT
Typical Tree & Smartpole set out in vehicular zone

Note:
1. New City of Sydney custom 'Castle' tree grates and guards supplied by Citygreen Systems Ltd.
2. Refer to City of Sydney technical specifications for street tree and smartpole set out from kerb in vehicular zone.
3. Tree pit & grate size to be coordinated with paving units and sets.
ANNEXURE J

INDICATIVE PROJECT PROGRAM

<table>
<thead>
<tr>
<th>Program item</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appointment of the contractor for the Early and Preparatory Works</td>
<td>Early 2014</td>
</tr>
<tr>
<td>Commencement of the Early and Preparatory Works, subject to Planning Approval</td>
<td>Mid 2014</td>
</tr>
<tr>
<td>Appointment of the operator for the Project</td>
<td>End 2014</td>
</tr>
<tr>
<td>Completion of the Works, including commissioning and commencement of operations</td>
<td>2019-2020</td>
</tr>
</tbody>
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ANNEXURE K

PROTOTYPE STOP DRAWING