



EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

DEVELOPMENT IMPACT ASSESSMENT REPORT

PROPOSED AWNING

BLOCK 2 - ONE CENTRAL PARK – 26-98 BROADWAY, CHIPPENDALE

June 2011

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Member International Society of Arboriculture - Australian Chapter (ISAAC)
Member Local Government Tree Resources Association (LGTRA)*



1 INTRODUCTION

- 1.1.1 This report was commissioned by Aspect Oculus Pty Ltd on behalf of Watpac Construction (NSW) Pty Ltd to assess the health and condition of six (6) street trees located on the verge/nature strip adjacent One Central Park, 26-98 Broadway, Chippendale. The report has been prepared to aid in the assessment of a Section 75W modification of a Part 3A approval for the construction of an awning on the façade of 'Block 2' of the One Central Park development.
- 1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

2 THE SITE

- 2.1.1 The subject property is a former industrial site (Carlton United Brewery site) known as 26-98 Broadway, Chippendale, now known as 'One Central Park'. For the purposes of this report the subject property will be referred to as "the Site". The subject trees are located within the road reserve on the Broadway frontage adjacent proposed Block B, on the south side of the road between the intersections of Kensington and Balfour Streets. The verge is fully paved with asphalt from the property boundary to the kerb. Each of the trees is growing in a small opening pavement (1.2 x 0.5 metres), offset approximately 750mm from the kerb.
- 2.1.2 The landscape and soils of this area have been extensively disturbed and modified by human activity. Remnant soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of shallow to moderately deep (less than 1000 mm) *Red & Brown Podzolic Soils* on crests, upper slopes and well drained areas. Soils on lower slopes and areas of poor drainage consist of deep (1500-3000 mm) *Yellow Podzolic Soils and Soloth Soils* derived Wianamatta Group & Hawkesbury Shales.¹ The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade. The site is close to the transition between Hawkesbury Sandstone.
- 2.1.3 The original vegetation of this area consisted of Turpentine-Ironbark Forest, most of which was cleared in the nineteenth century.² Dominant locally- indigenous tree species formerly occurring in this area included *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark). Other species found in this association may include *Eucalyptus resinifera* (Red Mahogany), *Angophora costata* (Sydney Red Gum) and *Eucalyptus globoidea* (White Stringybark).

3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 7th June 2011. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 8**), based on the survey prepared by Frank M. Mason Pty Ltd, Dwg. Ref No. 32642-44 dated 20/05/2011. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 6**) and the Tree Protection and Removal Plan (Dwg No. JAT-LS-DR-IN-G00-102 Revision A), prepared by Turf Design Studio. Photos of each tree are shown in **Appendix 2**.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

- 4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.³ All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.
- 4.1.2 The following information was collected for each tree:-
- Tree Species (Botanical & Common Name);
 - Approximate height;
 - Canopy spread; measured using a metric tape and an average taken.
 - Trunk diameter (measured at 1.4 metres from ground level);
 - Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).
 - Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
 - Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
 - Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

This information is presented in a tabulated form in **Appendix 6**.

4.2 Safe Useful Life Expectancy (SULE)

- 4.2.1 The remaining Safe Useful Life Expectancy⁴ of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area in Sydney, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 6**.
- 4.2.2 The following ranges have been allocated to each tree:-
- Greater than 40 years (Long)
 - Between 15 and 40 years (Medium)
 - Between 5 and 15 years (Short)
 - Less than 5 years (Transient)
 - Dead or immediately hazardous (defective or unstable)

4.3 General Observations

- 4.3.1 Most of the trees are in good health and condition, with exception of T3 (European Ash) which is in relatively poor health and condition, exhibiting poor form and habit. All of the trees have been previously pruned on the southern side of the trees to clear the former building façade (now demolished). The pruning appears to have resulted in the removal of about 20% of the crown on the southern side of the trees. All of the pruning work has been undertaken in accordance with AS 4373:2007 (Pruning of Amenity Trees). T4 exhibits a moderate wound and cavity in the lower trunk, probably resulting from a previous mechanical injury. A secondary termite infestation has resulted in a moderate open cavity in the lower trunk, however the tree still appears to be structurally sound and stable. The trees are surrounded by asphalt pavement, with relatively small pavement openings. The roots of T1 are growing over the kerb, and displacing and uplifting the asphalt pavement. The remaining trees are causing minor damage to the adjacent asphalt and kerb.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

- 5.1.1 The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure in a consistent approach, the assessment criterion shown in **Appendix 1** have been used in this assessment.
- 5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-
1. **Significant**
 2. **Very High**
 3. **High**
 4. **Moderate**
 5. **Low**
 6. **Very Low**
 7. **Insignificant**

5.2 Environmental Significance

5.2.1 Tree Preservation Order

A Tree Preservation Order (TPO) applies to all land within the City of Sydney Local Governmental Area (LGA), made pursuant to Clause 8 of the *Environmental Planning and Assessment Act 1979* Model Provisions as adopted in Clause 16 of the City of Sydney Local Environment Plan (LEP) 1996 and Clause 32 of the South Sydney LEP 1998. The TPO generally protects all trees of a height of five (5) metres or greater or with a trunk circumference of 300mm (95mm in diameter) or greater or 100mm (31mm in diameter for multi-trunked trees). Some exemptions apply. However, all of the subject trees are protected under Council's TPO.

It should be noted that Council has granted consent for the removal of T3 *Fraxinus excelsior* (European Ash) [Council's Asset Id No. 6596] and T6 *Celtis australis* (European Hackberry) [Council's Asset Id No. 6599] (refer Council Consent No. MP09-0078). The species have been incorrectly identified in Council's letter.

5.2.2 Wildlife Habitat

All of the subject trees are exotic species that would be of little benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation.

5.2.3 Noxious Plants & Environmental Weeds

None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993. Whilst *Celtis spp.* (Hackberry) [T2, T4, T5 & T6] is considered an Environmental Weed Species within the Sydney City LGA, this species is protected under Council's TPO where greater than 10 metres in height. All of these trees are greater than 10 metres in height.

5.2.4 Threatened Species & Ecological Communities

All of the trees assessed are planted exotic species. None of the trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities under the provisions of the *Threatened Species Conservation Act 1995* (NSW) or the *Environmental Protection and Biodiversity Conservation Act 1999*.

5.3 Heritage Significance

5.3.1 Heritage Items

Neither the site nor the subject trees are listed as Heritage Items under Schedules 2, 3 or 4 of the Draft City of Sydney Local Environment Plan (LEP) 2002. However, a chimney stack within the former Irving Street Brewery (part of the former Carlton United Brewery) [c.1912] and the No.1 Gate Portal on the Broadway frontage [c.1939] are listed as Heritage Items on Schedules 3 & 4 of the LEP. The adjoining property at 100-102 Broadway (Australian Hotel) constructed c. 1938 is also listed as a Heritage Item on Schedule 2 of the LEP. Broadway was realigned in the 1930's, so all of the trees would have been planted after this time. Tree No.s T2, T4, T5 & T6 (European Hackberry) and T3 (European Ash) were probably planted c.1950-60. T1 (London Plane), is a more recent planting (c.1990).

5.3.2 Significant Tree Register

None of the trees assessed are listed on Council's Register of Significant Trees Volume 2 (Significant Street Trees)⁵

5.4 Amenity Value

- 5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE RETENTION VALUES

- 6.1.1 The Retention Values shown in **Appendix 6** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table One**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

	Landscape Significance Rating						
Estimated Life Expectancy	1	2	3	4	5	6	7
Long - Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short - 5 to 15 years				Low Ret. Value			
Transient - Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

7 TREE PROTECTION ZONES

- 7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 7**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).⁶
- 7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms of soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

- 7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 7**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).
- 7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Incursions to the Tree Protection Zone.

- 7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 5**. Greater incursions to the TPZ may result in an adverse impact on the tree.
- 7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable.

7.1 Acceptable Incursions to the Canopy.

- 7.1.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.
- 7.1.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding or hoarding to be erected during construction (typically 1.5-3 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 PROPOSED DEVELOPMENT

- 8.1.1 The proposed development includes the construction of a steel and glass awning to the northern façade of Block 2, projecting three (3) metres to the north, perpendicular to the building façade (2.55 metres south of the face of the road kerb) at RL 24.69 (approximately 7.9-8.9 metres above footpath level). It is understood that the awning has been placed at this height about grade to clear the No.1 Gate Portal, which is listed as a Heritage Item.

9 IMPACT ASSESSMENT

- 9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No.	Date
<i>Block 2 West – Level 2 – Plan</i>	PTW Architects	209.065 A-P-129 Rev 9	17/06/2011
<i>Block 2 East– Level 2 – Plan</i>	PTW Architects	209.065 A-P-130 Rev 8	17/06/2011
<i>Block 2 Awning Sections (Section 2 Awning Section North)</i>	PTW Architects	209.065 A-P-979 Rev 3	17/06/2011
<i>North Eastern Façade Study – Elevations and Perspectives</i>	PTW Architects	209.065 SK-904 Rev 1	13/05/2011

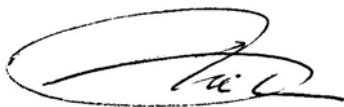
- 9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 7**. The following criteria have been examined as part of this assessment:-
- Existing Relative Levels (R.L.);
 - Tree Protection Zone (TPZ);
 - Structural Root Zone (SRZ);
 - Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
 - Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
 - Incursions to the tree canopy from the building envelope and temporary structures; and
 - Assessment of the likely impact of the works on existing trees.
- 9.1.3 Consent for the removal of Tree No.s T3 (European Ash) and T6 (European Hackberry) has already been granted by Council. As such, the potential impact of the proposed awning on these trees has not been considered as part of this report.
- 9.1.4 The pruning of T1 (London Plane) is limited to one secondary branch of 50mm in diameter, one secondary branch of 100mm in diameter, and a few small tertiary branches of 20-30mm in diameter on the southern side of the crown (refer to Plate 1 in **Appendix 4**). This pruning is not substantial and should not result in any adverse impact on this tree provided that the required pruning work is undertaken as recommended.
- 9.1.5 The pruning of T2 & T4 (European Hackberry) to clear the awning is limited to minor pruning of a few tertiary branches (refer to Plates 2 & 3 in **Appendix 4**), which would not result in any detrimental impact on these trees. In order to avoid adverse impact on these trees, all required pruning should be undertaken in accordance with Section 12.10. No pruning of T5 (European Hackberry) is required to clear the awning (refer to Plate 4 in **Appendix 4**).
- 9.1.6 No other trees will be adversely affected by the proposed development.

10 CONCLUSIONS

- 10.1.1 A total of six (6) street trees stand on the nature strip area adjacent the northern façade of Block 2. Council's consent for the removal of two of these (T3 & T6) has already been granted (refer Council Consent No. MP09-0078). The remainder of the trees are all exotic species in fair to good health and condition. T2, T4 & T5 were probably planted c. 1950-60 and T1 c. 1990. None of these trees have any special heritage or ecological significance, but all of the trees make a positive contribution to the amenity of the streetscape.
- 10.1.2 The required pruning of T1, T2, T4 & T5 is relatively minor and should not result in any adverse impact on these trees provided that the required pruning work is undertaken in accordance with Section 12.10.

11 RECOMMENDATIONS

1. The following Tree Protection Measures (**Appendix 3**) should be implemented to ensure the long term survival of all trees within the site to be retained as part of the development.
2. All pruning of T1, T2, T4 & T5 required to clear the proposed awning should be undertaken in accordance with Section 12.10.



Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
23rd June 2011

REFERENCES:-

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- ¹ GA Chapman & CL Murphy (1989)
Soil Landscapes of the Sydney 1:100,000 Sheet
Soil Conservation Service of NSW. Sydney
- ² Benson, Doug & Howell, Jocelyn (1990)
Taken for Granted: the Bushland of Sydney and its Suburbs.
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW
- ³ Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
The Stationery Office, London, England
- ⁴ Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA
- ⁵ Ruting, Noel (November 2005)
Register of Significant Trees – Part 2 of 4; Significant Street Trees (City of Sydney)
Landarc Pty Ltd & the Council of the City of Sydney, Sydney NSW
- ⁶ Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 1

CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

The level of landscape significance has been determined using the following key criteria as a guide:

1. SIGNIFICANT

- The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance; or
- The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or
- The subject tree is scheduled as a Threatened Species as defined under the *Threatened Species Conservation Act 1995* (NSW) or the *Environmental Protection and Biodiversity Conservation Act 1999*; or
- The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or
- The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.

2. VERY HIGH

- The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally-indigenous species, representative of the original vegetation of the area and forms part of the assemblage of species of an Endangered Ecological Community;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.

3. HIGH

- The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value;
- The subject tree has a large live crown size exceeding 100m²; and
- The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and
- The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.

4. MODERATE

- The subject tree has a medium live crown size exceeding 40m²; and
- The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; and
- The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms.
- The tree has no known or suspected historical association

5. LOW

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse); and
- The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.

6. VERY LOW

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. INSIGNIFICANT

- The tree is a declared Noxious Weed under the *Noxious Weeds Act* (NSW) 1993; or
- The tree is completely dead and has no visible habitat value.

APPENDIX 2 – SUBJECT TREES



T1 – *Platanus x hybrida* (London Plane)



T3 – *Fraxinus excelsior* (European Ash)



T5 - *Celtis australis* (European Hackberry)



T2 – *Celtis australis* (European Hackberry)



T4 - *Celtis australis* (European Hackberry)



T6 - *Celtis australis* (European Hackberry)

APPENDIX 3

12 TREE PROTECTION MEASURES

12.1 Tree Protection Zones

12.1.1 The Tree Protection Zones are recommended for all trees within the site to be retained shall be equivalent to the Tree Protection Zone as specified in Appendix 5. This is a radial distance measured from the centre of the trunk of the subject tree.

12.1.2 The following activities should be avoided within specified Tree Protection Zones:-

- Excavations and trenching (with exception of the approved foundations and underground services);
- Ripping or cultivation of soil;
- Mechanical removal of vegetation;
- Soil disturbance or movement of natural rock;
- Soil level changes including the placement of fill material (excluding any suspended floor or slab);
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;
- Affixing of signage or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

12.2 Tree Protection Fencing

12.2.1 All trees within the site to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy to the full extent of the Tree Protection Zone (excluding the footprint of the proposed works and areas within adjoining properties). As a minimum the fence should consist temporary chain wire panels 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate.

12.2.2 Appropriate signage shall be installed on the fencing to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone.

12.2.3 A 50mm layer of woodchip mulch shall be installed to the full extent of the Tree Protection Zone of all trees to be retained. Mulch shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone.

12.3 Trunk Protection

12.3.1 Where provision of tree protection fencing is in impractical due to its proximity to the proposed building envelope, trunk protection shall be erected around the tree to avoid accidental damage. As a minimum, the trunk protection shall consist of two metre lengths of hardwood timbers (100 x 50mm) spaced at 100-150mm centres secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in any way) to avoid mechanical injury or damage. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period.

12.4 Tree Damage

12.4.1 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

12.5 Demolition Works within Tree Protection Zones

12.5.1 Demolition of pathways and paved areas within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The pavement surface and sub-base shall be stripped-off in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved

method to avoid damage to underlying roots and minimise soil disturbance. The machine shall work within the footprint of the existing pathway to avoid compaction of the adjacent soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and damage to woody roots.

- 12.5.2 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels (where required). Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile.
- 12.5.3 Demolition of low masonry walls within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The walls shall be demolished using equipment on the street side of the wall. Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the existing walls.

12.6 Excavations within Tree Protection Zones

- 12.6.1 Excavations within the Tree Protection Zone of any tree to be retained shall be avoided wherever possible.
- 12.6.2 Excavations for foundations and pavement sub-grade within the Tree Protection Zone of any tree to be retained shall be undertaken by hand or using an Air-spade[®] device to locate and expose roots along the perimeter of the foundation or pavement prior to any mechanical excavation. All care shall be undertaken to preserve root systems intact and undamaged. Any roots less than 50mm in diameter shall be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise stress on the tree.
- 12.6.3 Where large woody roots (greater than 50mm diameter) are encountered during excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor on piers, cantilevered slab, etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ.
- 12.6.4 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars.
- 12.6.5 For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

12.7 Underground Services

- 12.7.1 All proposed stormwater lines and other underground services should be located as far away as practicable, or suspended beneath the floor of the building where possible, to avoid excavation within the Tree Protection Zone of trees to be retained.
- 12.7.2 For underground services, where the incursion to the Root Zone is less than 20% of the total TPZ (i.e. beyond the Minimum Setback Distance), a chain trenching device may be used. A backhoe or skid steer loader is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (eg by sub-surface boring beneath roots or re-routing the service etc).
- 12.7.3 Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the arborist to determine continued health and stability of the subject tree.
- 12.7.4 If trees show signs of stress or deterioration, remedial action shall be taken to improve the health and vigour of the subject tree (s) in accordance with best practice arboricultural principles

12.8 Pavements

- 12.8.1 Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage. Pavement sub-base material should be as per Section 12.8.

12.9 Fill Material

- 12.9.1 Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent to provide some aeration to the root zone. Note that Roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material should be placed in direct contact with the trunk.

12.10 Canopy & Root Pruning

- 12.10.1 All pruning work required shall be carried out in accordance with Australian Standard No 4373-2007 – Pruning of Amenity Trees (refer to detail in **Appendix 4**). Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).
- 12.10.2 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.
- 12.10.3 Where root pruning is required, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

12.11 Tree Removal

- 12.11.1 The approval of City of Sydney Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.
- 12.11.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.
- 12.11.3 Stumps shall be grubbed-out where required using a mechanical stump grinder without damage to the root system of other trees. Where trees to be removed are in close proximity to trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained should **not** be removed using excavation equipment or similar.

APPENDIX 4 – SHOWING REQUIRED PRUNING



Plate 1 – Showing required pruning of T1 (London Plane) to accommodate 3 metre wide awning.

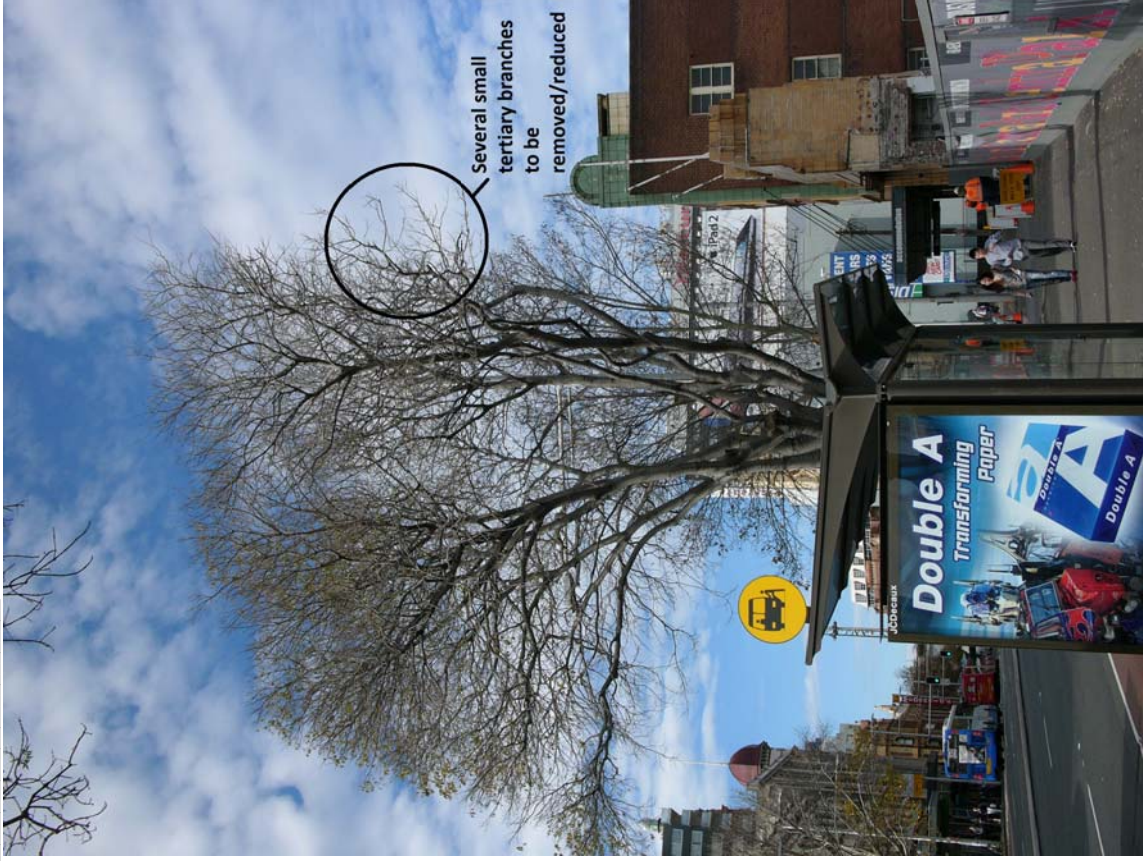


Plate 2 – Showing required pruning of T2 (European Hackberry) to accommodate 3 metre wide awning.

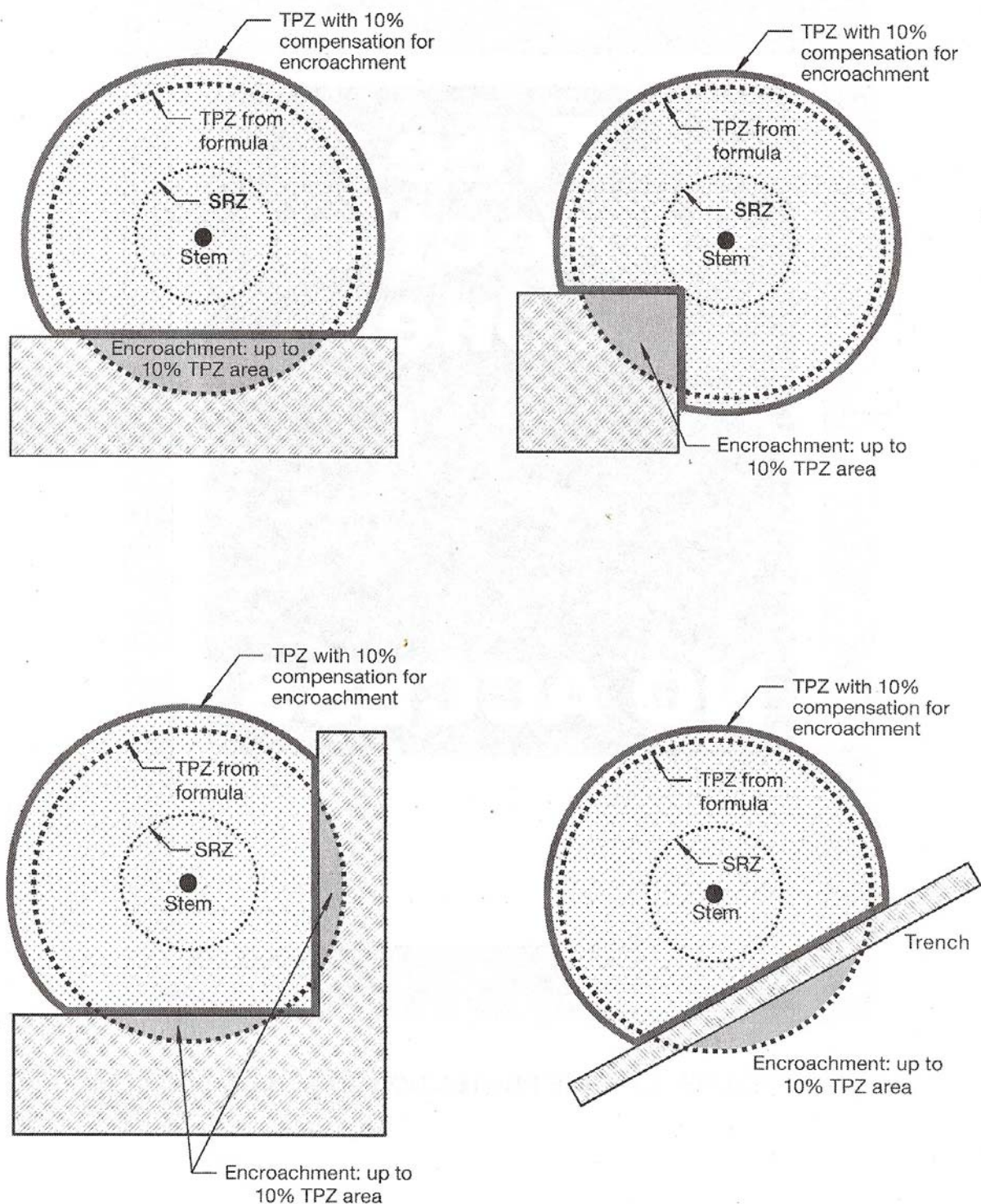


Plate 3 - Showing required pruning of T4 (European Hackberry) to accommodate 3 metre wide awning



Plate 4 - No pruning of T5 (European Hackberry) should be required to accommodate the proposed 3 metre wide awning

APPENDIX 5 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
 Standards Australia, Sydney

APPENDIX 8 - TREE LOCATION PLAN

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M.G.A.



STREET



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