AMERICAN FOREST
MANAGEMENT

Arborist Report
for
G.W. Williams Co.
7440 159th Pl. NE. Redmond, WA

March 4, 2019
UPDATED March 18, 2020

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Appendix

1. Introduction

American Forest Management was contacted by Scott Williams of G.W. Williams Co. and asked to compile an Arborist Report for a redevelopment project involving a parcel in the City of Redmond. The parcel number is 9270700080.

Our assignment is to prepare a written report on present tree conditions, and to provide appropriate recommendations for the protection of retained trees during construction.

This report encompasses all of the criteria set forth under the City of Redmond's tree regulations RZC 21.72.

Date of Field Examination: February 25th, 2019

2. Description

The assessed area is near the intersection of 159th Pl NE and Leary Way NE in Redmond. The topography of the subject property is mostly flat, and is adjacent to a preserved open space known as 'Heron Rookery'.

There are no significant trees on the subject property, but four neighboring trees with driplines that extend over the east property line were identified and assessed, one of which qualifies as a 'Landmark' tree by the City of Redmond. According to City of Redmond code, a significant tree is defined as any tree with a minimum diameter of 6 inches measured 4.5 feet above grade (DBH). Landmark trees are defined as any tree with a DBH of 30 inches or greater. DBH for multistem trees is measured by calculating the average DBH of each individual stem.

Tree tag numbers correspond with tree numbers on the attached Tree Summary Tables and the attached Tree Locator/Conditions map. The map identifies the extent of the study area.

3. Methodology

Each tree in this report was visited. Tree diameters were measured by tape for DBH. The tree heights were measured using a clinometer. Each tree was visually examined for defects and vigor. The tree assessment procedure involves the examination of many factors:

- The crown of the tree is examined for current vigor. This is comprised of inspecting the crown (foliage, buds and branches) for color, density, form, and annual shoot growth, limb dieback and disease. The percentage of live crown is estimated for coniferous species only and scored appropriately.

- The bole or main stem of the tree is inspected for decay, which includes cavities, wounds, fruiting bodies of decay (conks or mushrooms), seams, insects, bleeding, callus development, broken or dead tops, structural defects and unnatural leans. Structural defects include crooks, forks with V-shaped crotches, multiple attachments, and excessive sweep.

- The root collar and roots are inspected for the presence of decay, insects and/or damage, as well as if they have been injured, undermined or exposed, or original grade has been altered.

The three condition categories are described below:

Good: Free of significant structural defects, no disease concerns, minor pest issues, no significant root issues, good structure/form with uniform crown or canopy, foliage of normal color and density, average

or normal vigor, will be wind firm if isolated or left as part of a grouping or grove of trees, and is suitable for its location.

Fair: Minor to moderate structural defects not expected to contribute to a failure in near future, no disease concerns, moderate pest issues, no significant root issues, asymmetric or unbalanced crown or canopy, average or normal vigor, foliage of normal color, moderate foliage density, will be wind firm if left as part of a grouping or grove of trees, cannot be isolated, but is suitable for its location. Fair condition trees are considered viable.

Poor: Major structural defects expected to cause fail in near future, disease or significant pest concerns, decline due to old age, significant root issues, asymmetric or unbalanced crown or canopy, sparse or abnormally small foliage, poor vigor, not suitable for its location. Poor condition trees are considered non-viable.

The attached Tree Summary Table provides specific information on tree sizes, drip-line radius, and viability.

Critical Root Zone (CRZ) is the area around a tree where the majority of its roots are likely to be found. As a rule of thumb this is the area directly below the dripline. A more detailed assessment of the CRZ will take into account more information such as topography, tree physiology, and past impacts to the tree from pruning or trenching.

The Limit of Disturbance (LOD) is an assessment of the closest point at which root disturbance can take place without significant damage to the tree. This is usually at the CRZ, but can vary depending on the health of the tree and other environmental factors such as drainage or future planned impacts.

4. Observations

Neighboring trees:

Tree #101 is a fair condition big leaf maple (*Acer macrophyllum*) with a DBH of 23 inches. Its canopy is composed of two primary codominant stems which have not fully fused and create a large zone of included bark. This condition indicates the tree is more prone to large stem failure. The existing structure is 9 feet west of its trunk.

Tree #102 is a Douglas fir (*Pseudotsuga menziesii*) in fair condition. It has a pronounced sweep to the south and a relatively thin canopy. It is growing 11 feet east of the existing structure and has reached an overall height of 115 feet with a DBH of 27 inches.

Tree #103 is a 123 foot tall Douglas fir in good condition with codominant stems of 31 inches and 34 inches joined below 4.5 feet for an average DBH of 32.5 inches earning it ‘Landmark’ status.

Tree #104 is a big leaf maple in good condition with a DBH of 13 inches. It is relatively young and apparently vigorous with no visible dead branches and a full canopy. It is growing in the Right of Way and shows exposed roots from soil compaction at its base.

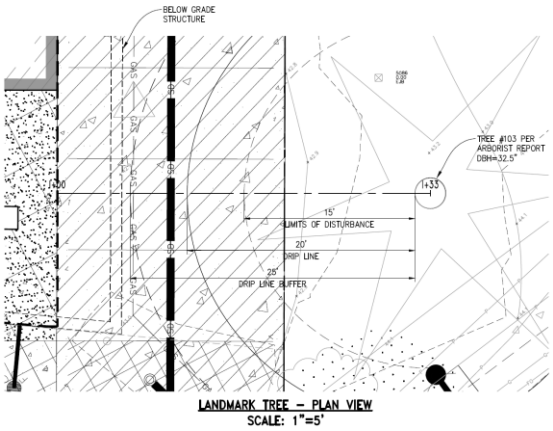
5. Discussion

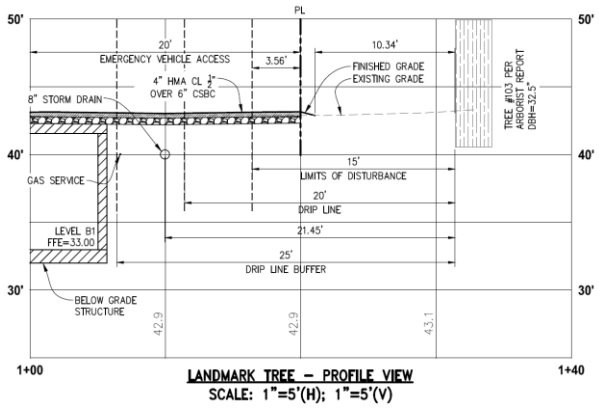
The site will undergo extensive re-development. The existing structure was built with no setback, so demolition and grading will take place up to the property line. Neighboring trees are located close to the property line, and significant structural roots likely extend onto the subject property including underneath the existing structure and adjacent paved parking area. In order to keep these neighboring trees in a structurally stable and viable condition, the tree protection measures outlined below are recommended.

Tree #101 is 9 feet, and #102 is 11 feet east of the existing structure. There may be significant roots extending from these trees below the concrete foundation and slab. Careful removal of the existing concrete without damaging the roots below is recommended to minimize damage to these trees. Tree protection fencing should be erected as shown on the attached tree locator map. No mechanical tilling of the existing grade should take place within these tree's CRZ during final landscape installation.

The proposed plan requires an Emergency Vehicle Access lane (EVA) approximately 10.5 feet west of Tree #103. Pavement from the existing parking lot currently extends to 3 feet west of this tree. This pavement will need to be carefully removed to prevent damaging roots found below. The grading and installation of this access lane should be accomplished in a way to minimize excavation or compaction which will lead to loss of roots within the CRZ. Utilizing a Cellular Confinement System (CCS) within the 6 inch CSBC layer shown in the profile view below will minimize compaction to this tree's CRZ. Further information regarding benefits and installation of CCS are outlined in the attached Site Guidance Note.

A storm drain pipe is proposed to be installed within the 5 foot dripline buffer west of Tree #103. All associated catch basins are planned to be installed outside of this dripline buffer. Large structural roots are not likely to be found in this far west of Tree #103 below the existing paved parking area. This installation is unlikely to negatively affect this tree if all tree protection measures outlined below are adhered to.





Tree #104 is growing in the Leary Way ROW. The access for the proposed EVA will require this tree to be removed.

6. Tree Retention Summary

There are no significant trees located on the subject property.

7. Tree Replacement

Replacement trees will not be required, but supplemental landscaping may be required to meet Downtown Design Standards per RZC 21.62.020.

8. Tree Protection Measures

The following guidelines are recommended to ensure that the designated space set aside for any preserved trees is protected and construction impacts are kept to a minimum. See the Redmond Zoning Code RZC 21.72.070 Tree Protection Measures.

- Tree protection barriers shall be initially erected at 5' outside of the drip-line prior to moving any heavy equipment on site.
- Tree protection fencing shall only be moved where necessary to install improvements, but only as close as the Limits of Disturbance, as indicated on the attached plan.

- Excavation limits should be laid out in paint on the ground to avoid over excavating.
- Excavations within the drip-lines shall be monitored by a qualified tree professional so necessary precautions can be taken to decrease impacts to tree parts. A qualified tree professional shall monitor excavations when work is required and allowed up to the "Limits of Disturbance".
- To establish sub grade for foundations, curbs and pavement sections near the trees, soil should be removed parallel to the roots and not at 90 degree angles to avoid breaking and tearing roots that lead back to the trunk within the drip-line. Any roots damaged during these excavations should be exposed to sound tissue and cut cleanly with a saw. Cutting tools should be sterilized with alcohol.
- Areas excavated within the drip-line of retained trees should be thoroughly irrigated weekly during dry periods.
- Preparations for final landscaping shall be accomplished by hand within the drip-lines of retained trees. Plantings within the drip lines shall be limited. Large equipment shall be kept outside of the tree protection zones.
- All impacted trees should be reassessed annually for a period of five years following construction to determine if their viability has been compromised.

There is no warranty suggested for any of the trees subject to this report. Weather, latent tree conditions, and future man-caused activities could cause physiologic changes and deteriorating tree condition. Over time, deteriorating tree conditions may appear and there may be conditions, which are not now visible which, could cause tree failure. This report or the verbal comments made at the site in no way warrant the structural stability or long term condition of any tree, but represent my opinion based on the observations made.

Trees within reach of improvements or human use areas may represent hazards that could lead to damage or injury.

Please call if you have any questions or we can be of further assistance.

Thank you,

Benjamin Mark
ISA Certified Arborist #PN-6976A
ISA Tree Risk Assessment Qualified

Big Leaf Maple #101, just east of the existing structure on the subject property. Note codominant leaders and included bark.

Canopy of edge trees in Heron Rookery

Douglas Fir #103. Note codominant stems joined low.

Tree Summary Table — **American Forest Management, Inc.**

For: 7440 159th PL NE Redmond, WA

Date: 2/25/2019

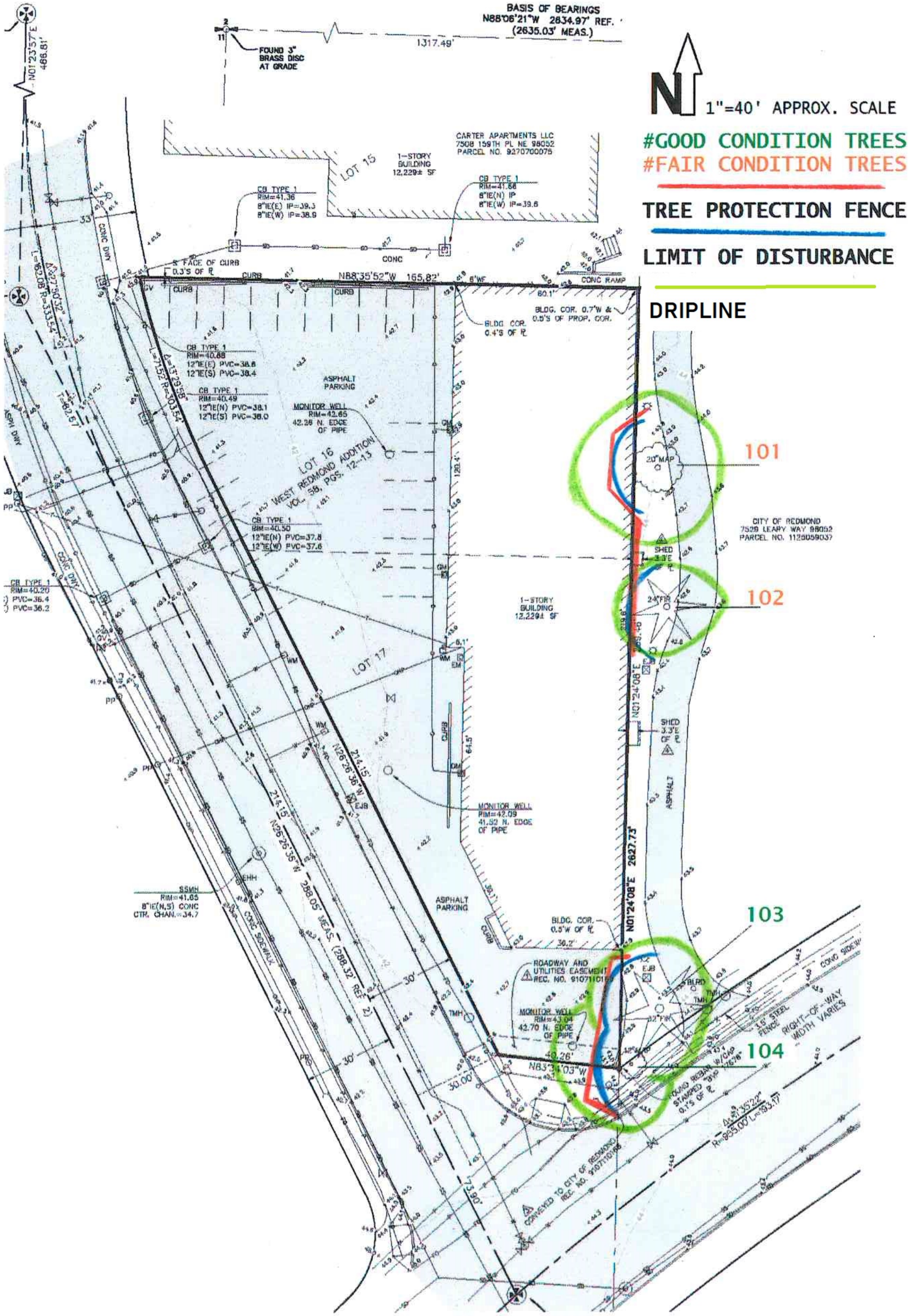
Inspector: Ben Mark

Tag #	ID	*Genus species*	DBH	Height	Drip-Line (feet) / Limit of Disturbance				Condition	Viable yes/no	Comments
					N	S	E	W			
101	Big Leaf Maple	*Acer macrophyllum*	23	64	22	22	17	25 / 12	Fair	Yes	Forked canopy, included bark. 9' east of existing building
102	Douglas Fir	*Pseudotsuga menziesii*	27	115	14	12	15	13 / 10	Fair	Yes	Sweeps south. Thin canopy. 11' east of building
103	**Douglas Fir**	***Pseudotsuga menziesii***	**32.5**	**123**	**19**	**19**	**15**	**20 / 15**	**Good**	**Yes**	**Codominant- 31", 34", joined low. Recent branch failure**
104	Big Leaf Maple	*Acer macrophyllum*	13	63	18	17	15	22 / 8	Good	Yes	Full canopy. Exposed roots

LANDMARK TREE

Drip-Line and Limits of Disturbance measurements from face of trunk

Calculated DBH for multistem trees: The DBH in BOLD is the average of the DBH of each individual stem


1"=40' APPROX. SCALE
#GOOD CONDITION TREES
#FAIR CONDITION TREES
TREE PROTECTION FENCE
LIMIT OF DISTURBANCE
DRIPLINE
101
102
103
104
BASIS OF BEARINGS
N88°06'21"W 2634.97' REF.
(2635.03' MEAS.)
FOUND 3" BRASS DISC AT GRADE
CARTER APARTMENTS LLC
7508 159TH PL NE 98052
PARCEL NO. 9270700075
LOT 15
1-STORY BUILDING 12,229± SF
LOT 16
WEST REDMOND ADDITION
VOL. 58, PGS. 12-13
LOT 17
ASPHALT PARKING
CITY OF REDMOND
7529 LEARY WAY 98052
PARCEL NO. 1125059037
20"MAP
24"FIR
N88°35'52"W 165.82'
N01°24'08"E 2627.73'
N26°26'36"W 214.15'
RIGHT-OF-WAY WIDTH VARIES

barrell TREE CONSULTANCY

Site Guidance Note 9: Installing/upgrading surfacing in root protection areas

SGN 9: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).
5. Design access to avoid soil compaction (See SGN 3 Ground protection).
6. Follow the guidance in SGN 4 Pollution control, if concrete is poured within or near RPAs.
7. Minimise excavation into original undisturbed soil (See SGN 7 Excavation in root protection areas).
8. Follow the guidance in SGN 8 Removing surfacing and structures in root protection areas, if existing surfacing is to be removed before installing new surfacing.
9. Follow the guidance in SGN 10 Installing structures in root protection areas, if the surfacing is to be installed on supports, i.e. piles, pads, or posts.

SGN 9: Summary guidance for site operatives

Important Reminders

10. For ground without existing surfacing, remove any loose material at the soil surface by hand and do not excavate into existing soil levels unless approved by the supervising arboriculturist.

11. For ground with a vegetation layer, excavations may be appropriate to remove the turf layer and surface vegetation, but this must be agreed by the supervising arboriculturist.

12. All new surfacing must be set back from trunks and buttress roots by at least 50 cm, unless otherwise agreed by the supervising arboriculturist.

13. Fill low points on undulating surfaces to an even level with any high points using an agreed granular material such as sand or stone.

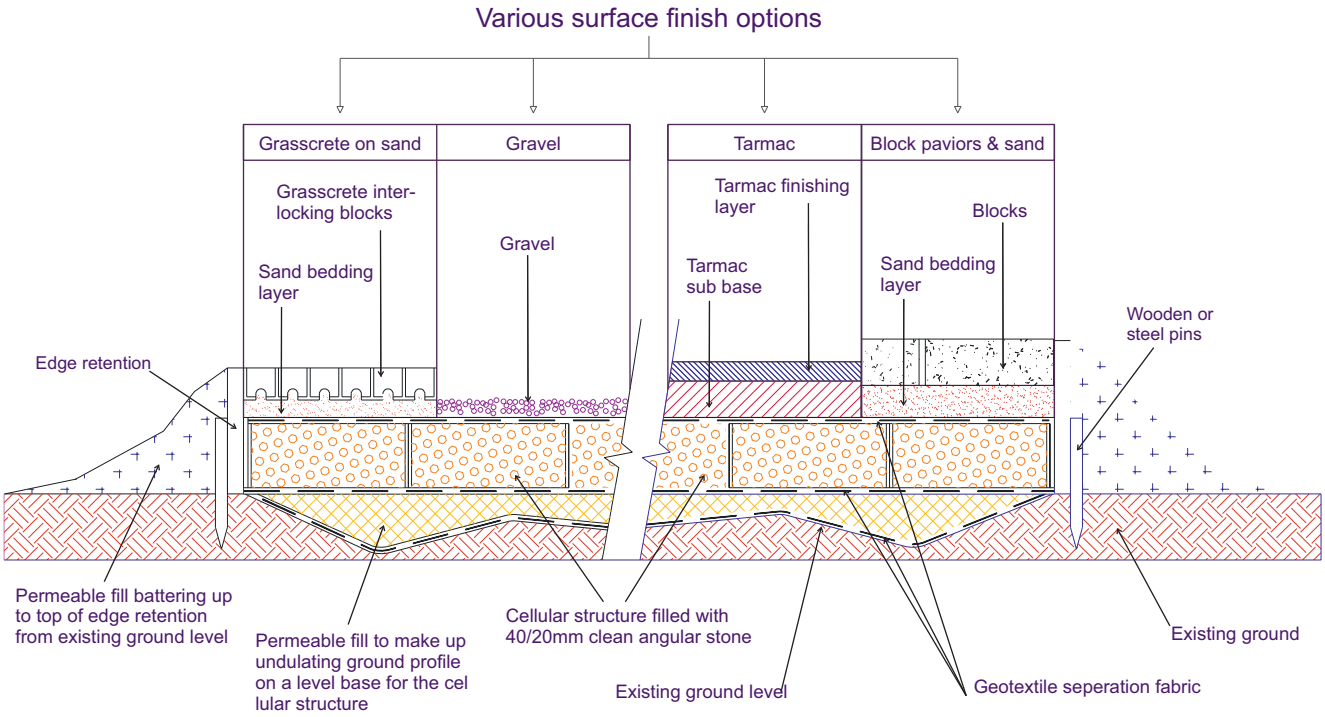
14. Do not mechanically compact new fill or existing soil.

15. If a three-dimensional cellular confinement system is used, install it according to the manufacturer's technical specification. Note: The cellular fill will be washed angular stone with no fines, as specified by the manufacturer.

SGN 9: Explanatory notes and examples

Purpose

SGN 9 describes the practical requirements for installing new surfacing and upgrading existing surfacing in RPAs, based on the recommendations in BS 5837 (7.4).



Illustrative specification for no-dig cellular confinement surfacing with examples of finishing options.
Note: The final design must be site specific and detailed by an appropriate specialist

BS 5837 recommends that three-dimensional cellular confinement systems are an appropriate sub-base for installing surfacing in RPAs. Most products are made from heavy-duty plastic that is pulled apart to open into cells. These are then filled with washed stone, after the product is spread over the ground and pinned in place. This forms a base layer that acts as a floating raft, spreading the load across the whole construction width. The base layer can be topped with a variety of finishes as illustrated in the cross-section.

Product suppliers: Protectaweb 3D cellular confinement product - https://wrekinproducts.com

SGN 9: Explanatory notes and examples

General principles and clarifications

Conventional surfacing installation based on excavating and compacting a supporting sub-base is unacceptable in RPAs because it can damage roots and the rooting environment. This harm is caused by killing roots, compacting soil structure, and impeding water/gaseous exchange through the soil. Adverse impact on trees will be reduced by minimising the extent of these changes in RPAs.

New surfacing solutions

Important elements of an effective design include protecting roots and the rooting environment during installation, a load spreading capability to prevent localised compaction, and providing adequate permeability for water and gasses to support living roots. The main approaches are:

- three-dimensional cellular confinement systems filled with washed stone laid directly onto the soil surface;
- concrete slabs cast directly onto the soil surface; and,
- surfacing supported above the soil surface on top of piles, pads, or posts.

The specific design of the chosen approach is an engineering issue that will take account of the bearing capacity of the soil, the intended loading, and the frequency of loading. The detail of product and specification are technical matters to be provided by an appropriate specialist.

Dealing with undulating surfaces and establishing a tolerable level of excavation

The precise location and depth of roots within the soil is unpredictable and will often only be known when careful digging starts on site. Ideally, all new surfacing in RPAs will be no-dig, i.e. requiring no excavation, but this can sometimes be difficult on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base will not be compacted as would happen in conventional surface installation. Some limited excavation can be necessary to achieve this and need not be damaging if carried out carefully and large roots are not cut. Tree roots and grass roots rarely occupy the same soil volume at the top of the soil profile, so the removal of an established turf layer up to 5cm from the surface is unlikely to be damaging to trees. However, this may not be possible where there is no grass because tree roots may grow right up to the soil surface. In some situations, it may be possible to dig to a greater depth,

SGN 9: Explanatory notes and examples

depending on local conditions, but this will be assessed by the supervising arboriculturist if excavation deeper than 5cm is anticipated.

On undulating surfaces, finished gradients and levels will be planned with sufficient flexibility to allow on-site adjustment if excavation of any high points reveals large unexpected roots near the surface. If the roots are less than 2.5cm in diameter, they can be cut and the base for the surfacing formed with the preferred minimal excavation of up to 5cm. However, if roots over 2.5cm in diameter are exposed, cutting them may be too damaging and further excavation may not be possible. If that is the case, the surrounding levels will be adjusted to take account of these high points by filling with suitable material. If this is not practical, the situation will be discussed with the supervising arboriculturist before a final decision is made.

Edge retention

Conventional kerb edge retention set in concrete-filled excavated trenches can cause damage to roots and will be avoided. Edge retention in RPAs will be designed to avoid any significant excavation into existing soil levels, with several approaches that are fit for this purpose. For block paviours, the use of pre-formed edging secured by metal pins is effective and can be reinforced by concrete supports if there is no excavation into the soil. Railway sleepers pinned in place or wooden boards offer alternative options, depending on the expected loading of the surfacing. If the edge retention needs to be battered down to lower surrounding ground levels, a permeable soil fill will be used, as agreed with the supervising arboriculturist.

Footpaths and surfacing without a load-spreading base layer

In some situations, limited-width floating concrete rafts constructed directly onto the soil surface may be acceptable for both pedestrian and vehicular access, but the design will not include any strip-dug supports. If concrete is poured directly, precautions must be taken to ensure that no toxic fluids can contaminate the adjacent soil, e.g. confining the concrete in an impermeable liner. Alternatively, elevated paths supported on low impact frames or post supports allow a decking surface to cross sensitive areas. Where paths are installed very close to trunks, provision will be made for distortion from future root growth through using flexible components for the supporting frame and surfacing.

Specific considerations for upgrading existing surfacing

When upgrading existing surfacing, the preferred option will be to leave it in place and install the new surfacing on top of it. If the retained surfacing is impermeable, it may improve conditions for tree roots if it

SGN 9: Explanatory notes and examples

is punctured before the new surfacing is laid, but this is detail to be agreed with the supervising arboriculturist. If the existing surfacing is to be removed, it will be excavated down to the soil level beneath following the guidance set out in SGN 8 (Removing surfacing and structures in root protection areas). The new surfacing will then be installed on this surface, as described above.

New surfacing near trunks

All new surfacing should be set back from trunks and buttress roots by at least 50cm to allow space for future growth and minimise the risk of distortion.

The flat-packed three-dimensional cells are pulled apart, spread across the area to be surfaced, and pinned in place ready for the washed angular stone fill (with no fines).

SGN 9-01

The stone-filled cells spread the load of traffic to prevent localised compaction. The permeable geotextile membrane on the ground allows the movement of water and gasses, but prevents the migration of stone into the soil profile.

SGN 9-02

SGN 9: Explanatory notes and examples

Although BS 5837 recommends a minimum distance of 50cm between new surfacing and buttress roots, there may be scope for flexibility in this separation for mature trees with little potential for future growth, if agreed by the supervising arboriculturist.

A conventional concrete haunching can be used to retain new surfacing if it is not dug into a trench - here it is placed on top of the three-dimensional cellular confinement layer.

This preparation for a new residential access drive shows the base formation above the original ground level, with the permeable geotextile layer covering the ground. The wooden boards are pinned in place, creating an informal and rustic surface edging.

SGN 9: Explanatory notes and examples

The three-dimensional cells have been installed and filled with washed stone, ready for the finished surface to be laid above. The ground beyond the drive edges has been profiled with backfilled topsoil.

SGN 9-06

An alternative to the flexible three dimensional cells is rigid interlocking plastic cells, again filled with washed stone and retained by pinned wooden edges.

SGN 9-07

Another option for wooden edges at corner points that allows for vehicles to accidentally track over the edge of the formal surfacing.

SGN 9-08

SGN 9: Explanatory notes and examples


SGN 9-09

This temporary access for heavy construction traffic on the outer edge of a RPA is a concrete slab cast above ground level and will be removed when the project is completed. This approach is particularly suitable for slopes where a three-dimensional approach may be more prone to distortion when carrying heavy loads.


SGN 9-10

In some situations, it may be appropriate to cast a free-floating concrete surface directly onto the soil surface provided provision is made to prevent soil contamination while the concrete is being poured.


SGN 9-11

The RPA of this oak extended about 12m from its trunk and was previously covered in tarmac as parking. This original surfacing was removed and replaced with a new patio set above the ground level, with provision for water and air input into the covered RPA.

SGN 9: Explanatory notes and examples

Where new surfacing is to be installed over existing, sometimes it may assist the movement of gasses and water if the existing surfacing is punctured. In this situation, exploratory digging showed important roots directly beneath the existing tarmac, which would have been damaged if the tarmac was removed.

SGN 9-12

An option for installing surfacing close to mature trees is to use a light metal frame with rubberised surfacing to allow the path to distort without failing as the roots grow.

SGN 9-13

Board walks supported on posts or a light frame are another way of providing pedestrian access across sensitive RPAs (photo courtesy of Philip van Wassenaer).

SGN 9-14

SGN 9: Explanatory notes and examples

SGN 9-15

New surfacing such as decking can be supported above the ground on posts leaving the soil surface beneath undisturbed.

SGN 9-16

Although this is only a temporary surface, railway sleepers pinned into the ground can be used to retain the edges of new surfacing.

SGN 9-17

Where space is restricted it is possible to use metal edging.

SGN 9: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. ***BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:***
   Clause 7.4 (Permanent hard surfacing within the RPA) recommends:
   - *7.4.2.1 New surface design should not require excavation other than the removal of the turf layer and surface vegetation. The design should be able to bear any anticipated loading, especially if it must carry construction traffic.*
   - *7.4.2.2 The design should evenly distribute the loading to avoid localised compaction.*
   - *7.4.2.7 The design should be resistant to or tolerant of deformation by tree roots, and should be set back from the stem and any root buttresses by a minimum of 50cm to allow for growth and movement. Levels can be made up using appropriate inert granular material.*
     ***NOTE** Piles, pads, elevated beams, and three-dimensional cellular confinement systems, can be used to support surfaces. If excavation is required, the location of roots greater than 2.5cm in diameter should be determined by exploratory investigations and retained if possible.*
   - *7.4.3 The conventional installation of kerbs, edgings, and haunchings, can damage tree roots and should be avoided either by using alternative methods of edge support or by not using supports at all.*
     ***NOTE** Examples of suitable edge supports include above-ground peg and board edging, sleepers, gabions, and other non-invasive ground-contact structures.*
   - *7.4.4.3 Ground levels should not be reduced to establish the new hard surface at the former ground level. Loose debris and turf should be removed carefully and the new surface should sit on top of the original soil.*
   - *7.4.4.4 Fill to raise levels should be a granular material which remains gas- and water-permeable throughout its design life.*
   - *7.4.4.5 Wet concrete should not be poured in the RPA unless an impermeable liner has been installed to prevent soil contamination from the toxic leachate.*