

City of **Perth**

Design and Construction Note **Book 700**

Street Trees and
Reticulation Design
Version 1.2

Book 700 - Amendments

<i>Version 1.0</i>		<i>29/06/2018</i>
V1.0	Book 700	29/06/2018
	<i>Issued For Use</i>	
<i>Version 1.1</i>		<i>10/10/2018</i>
V1.1	Book 700	17/10/2018
	<i>Backdrafted & Re-issued For Use</i>	
<i>Version 1.2</i>		<i>06/12/2018</i>
V1.2	Book 700	06/12/2018
	<i>Backdrafted & Re-issued For Use</i>	

Street Trees and Reticulation Design
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Irrigation System Materials Specification

All equipment, materials and accessories shall conform to the appropriate current Australian Standards.

1) PVC pipe

- a) All underground piping shall be uPVC piping manufactured to *AS1477:2006*
- b) mPVC pipes conforming to *AS4765:2007* will be accepted in 100mm and 150mm sizes of class 12 and above.
- c) Mainlines and Sub-mains Piping supplied and installed by the Contractor shall be in accordance with the following:
 - i) Installed in accordance with the manufacturer's recommendations.
 - ii) A minimum of PN12 pressure rating.
 - iii) Joined using rubber ring socketed pipe for 80mm or larger.
 - iv) Solvent welded for pipe work up to and including 50mm.
- d) Lateral pipe work installed on the down-stream side of the solenoid control valves, supplied and installed by the Contractor shall be in accordance with the following:
 - i) Installed in accordance with the manufacturer's recommendations.
 - ii) A minimum of PN12 pressure rating.
 - iii) Joined using solvent welded joint.

2) PVC Pipe Fittings

- a) Fittings supplied and installed in underground pipe work for mainlines and sub-main pipes up to 50mm diameter shall be in accordance with the following:
 - i) PVC solvent weld manufactured & installed in accordance with *AS1477:2006*.
 - ii) Compatible with PVC pipe produced in accordance with the Standard.
 - iii) Manufactured to a minimum of PN18.
- b) Fittings supplied and installed in underground pipe work for mainlines and sub-main pipes, 80mm diameter or larger shall be in accordance with the following:
 - i) Bends: PVC rubber ring jointed long radius, Cat. No. P12 or rubber ring ductile iron.
 - ii) Tees: Rubber ring joint, ductile iron cement lined and bitumen coated or approved equivalent.
 - iii) Tapping Bands: Single branch & cross tapping bands shall be screwed bronze.
 - iv) Reducers: Rubber ring jointed ductile iron.
 - v) Flanged Connectors: All flanged connectors shall be table "E" rubber ring joint ductile iron.
 - vi) Lateral Line Fittings: Lateral pipe work fittings located downstream of solenoid control valves shall be PN18 moulded PVC fittings with solvent cement joints.

3) Solvent Cements

Solvent cements supplied shall be in accordance with the manufacturer's recommendations for the climatic conditions that prevail during the installation of the system.

4) Priming Fluid

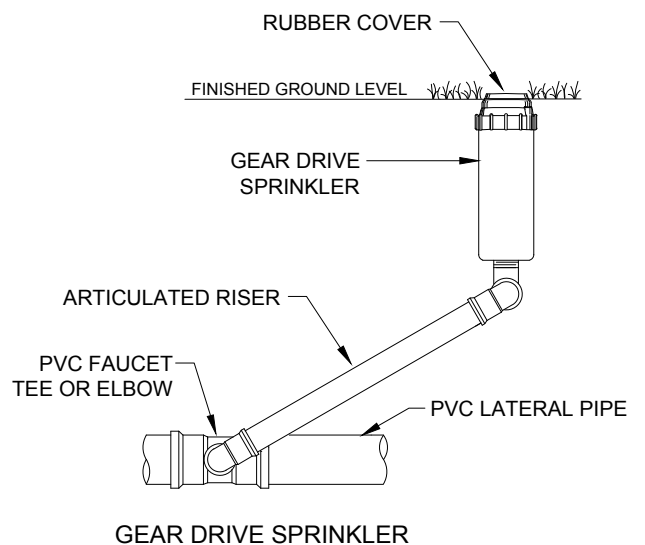
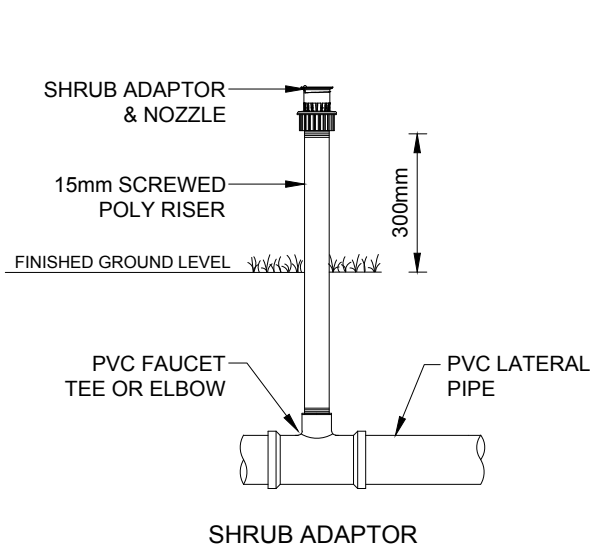
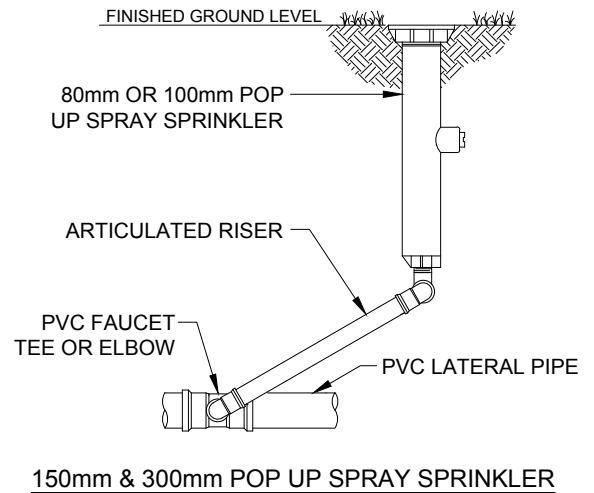
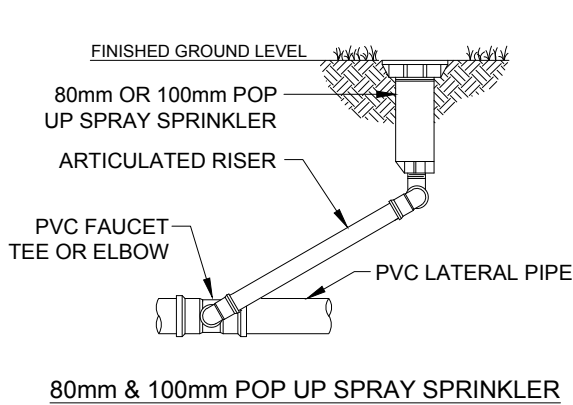
Priming or cleaning fluids shall be as recommended by the pipe manufacturer.

5) Rubber Rings & Rubber Ring Lubricant

- a) Rubber rings supplied for pipes and fittings shall comply with *AS1646-2007*.
- b) Contractors shall include, in the cost of supplying pipe and fittings, o-ring lubricant as recommended by the manufacturer of the pipe or fittings.

6) Sprinkler Heads & Sprinkler Risers

- a) Sprinklers shall meet the type, performance and qualities as shown on the drawings. All rotary pop-up sprinkler heads shall be fitted with non-drain valves.
- b) Sprinkler risers shall be articulated type of sufficient length to ensure that the riser is inclined at an angle of 45° to the horizontal. Riser diameter shall be equivalent to the sprinkler inlet thread size.



7) Solenoid Decoders

Solenoid decoders shall be as provided by Rain Bird as specified on the project drawing.

8) 2-WIRE Cable

Solenoid control cable shall be a Rain Bird approved 2-Wire cable.

9) Low Voltage Cables

Solenoid valve control cables shall be Tyflo multi-strand copper conductors sheathed in polyethylene or polypropylene suitable for direct burial. Cable sizes shall be:

- a) Common Wires: Minimum of 2.5mm² conductor or as specified.
- b) Active Wires: 1.5mm² if less than 400 metres in total length, or 2.5mm² if greater than 400 metres in total length.
- c) Larger size cable may be used to ensure the reliable operation of solenoid valves.

A different colour of active wire shall be used for each solenoid valve with an individual cable being installed to each valve. Common wire shall be black. Spare wires are to be terminated in 910 Valve Box.

10) Wire Connectors

All wire joints and connections to control valves are to be 3M DBY or DBR gel filled waterproof connector. Alternative sealant kits shall not be used unless authorised by the City's Representative.

11) Conduit

All conduits shall be a minimum of 25mm MD conduit. Long radius bends are to be installed for all conduit changes of direction including entry to valve boxes.

12) Cable pits

All cable pits shall be FCO5 size constructed of fibro cement or plastic and fitted with reinforced concrete lids.

13) Backflow Device

Where the irrigation system is connected to mains water supply, a Water Corporation approved backflow device is to be installed.

14) Pipe Sleeves

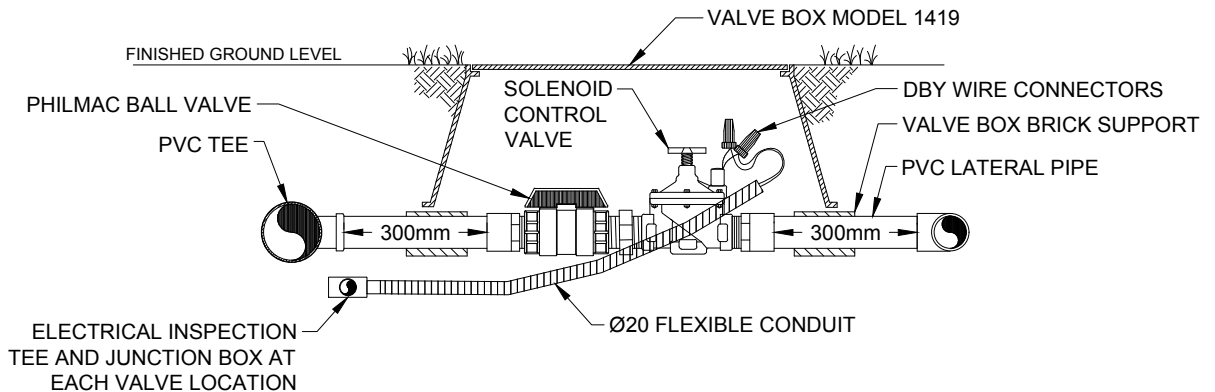
Pipe sleeves shall be a minimum of Class PN9 PVC SWJ sized as specified.

15) Bolts and Nuts

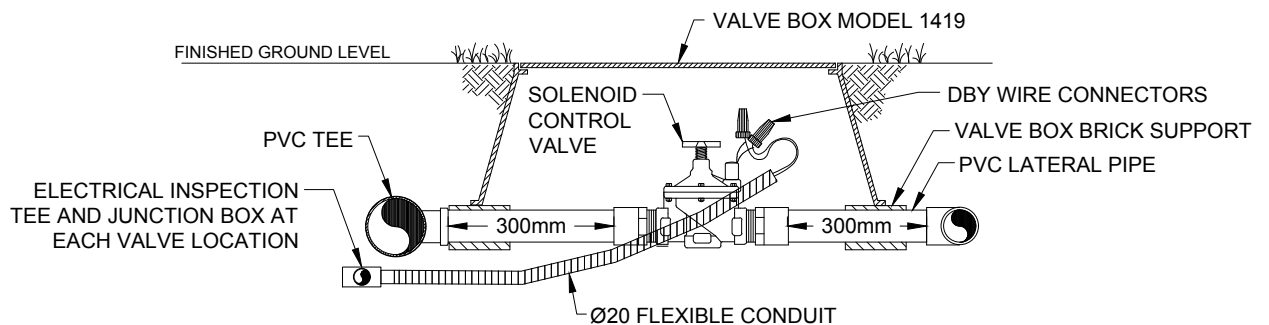
All bolts, nuts and washers shall be in accordance with *AS1110.1:2015*, *AS1110.2:2015*, *AS1111.1:2015*, *AS1111.2:2015*, *AS1112.1-2000*, *AS1112.2-2000*, *AS1112.3:2015* and *AS1112.4-2000* and hot dipped galvanised in accordance with *AS1214-1983*. Bolts, nuts and washers shall be of similar material. Washers shall be fitted to all bolts and shall be tapered where necessary to give the heads and nuts of bolts a satisfactory bearing surface. The threaded portion of each bolt shall project through the nut by at least one full thread and not more than a distance equal to the bolt diameter.

16) Solenoid Control Valves

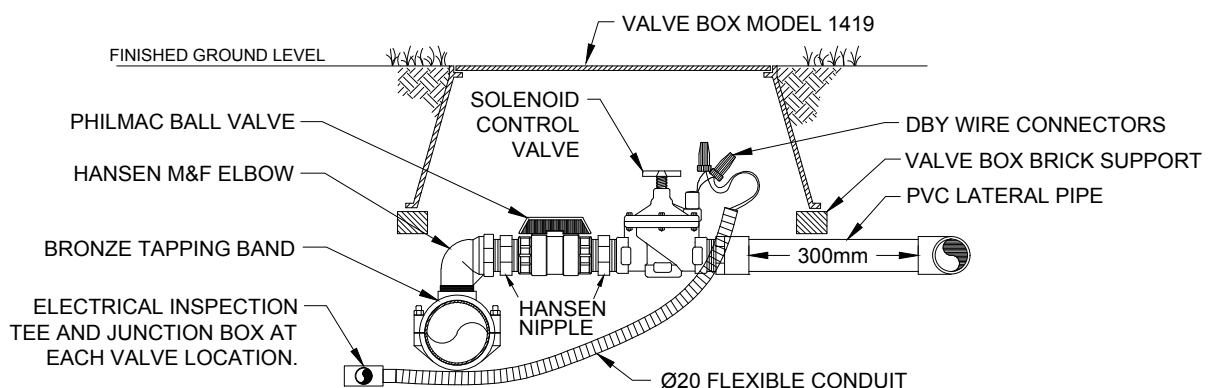
Solenoid control valves shall be glass reinforced nylon of the type specified on the project drawing. All control valves are to be fitted with flow control stem and a manual bleed facility. Only one make of 24-volt AC valve is to be installed for each project.



SOLENOID VALVE ON SWJ MAINLINE WITH BALL VALVE



SOLENOID VALVE ON SWJ MAINLINE



SOLENOID VALVE ON RRJ MAINLINE

17) Valve Boxes

MDPE valve boxes without pipe portals shall be supplied, with overlay style lockable lids with stainless steel locking bolts. Valve boxes shall have minimum dimensions in accordance with the following models:

Model 1419-12: to be fitted to all solenoid valves, flushing valves and air release valves.

Model 910: to house all isolation valves.

Model 1420: to house other equipment as specified on the project drawing.

Carson Brooks or HR Products valve boxes that meet the specification are acceptable. The valve box lid shall clearly identify the box as being either Carson Brooks or HR Products.

18) Isolation Valves

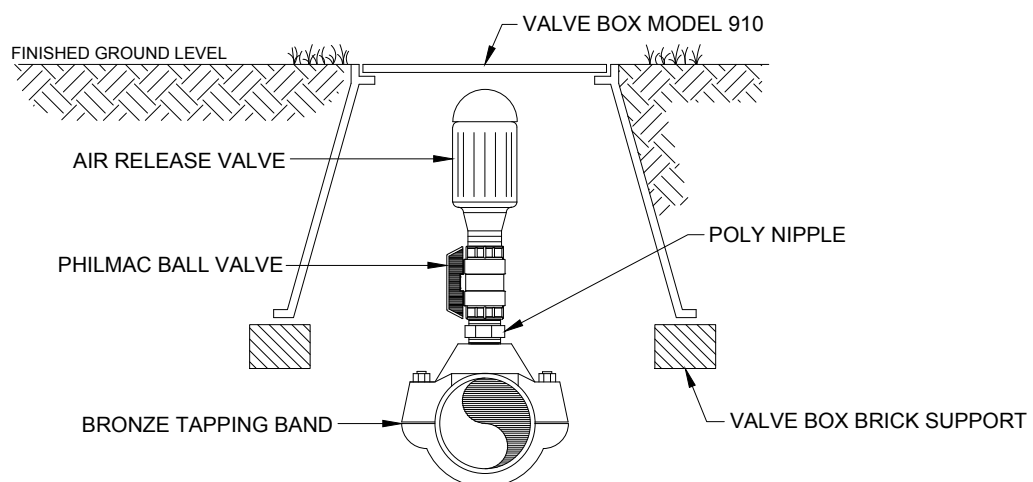
Isolation ball valves installed on the inlet to solenoid control valves and on mainline up to 50mm diameter shall be Philmac nylon ball valves or approved equivalent.

Isolation valves installed on the PVC mainline, 80mm or greater, are to be flanged ductile iron resilient seated valve with spindle cap. Valves shall be 'clockwise turning' to close and the top of the spindle cap shall have an embossed arrow indicating the direction to turn for closing.

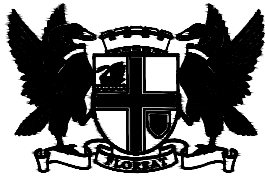
Isolation valves shall be installed at junctions of mainlines where shown on the project drawings. The price for supply and installation of isolation valves shall include gaskets, nuts & bolts. Access to valve assemblies located below the bottom of valve boxes shall be provided by the installation of a short piece of PVC 'Ribloc' pipe or equivalent.

19) Air Valves

Air/Vacuum release valves shall be Bermad, ARI or Nelson sized as specified on the project drawing. An isolation ball is to be located immediately beneath the air valve and the ball valve shall be left in the open position.



AIR RELEASE VALVE



City of Perth

Design and Construction Note

701.05

Street Trees and Reticulation Design

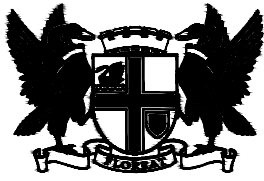
Reticulation Design

Notes

Reviewed: 06/12/2018

Referenced Australian Standards

AS 1110.1:2015	<i>ISO Metric hexagon bolts and screws - Product grades A and B - Bolts</i>
AS 1110.2:2015	<i>ISO Metric hexagon bolts and screws - Product grades A and B - Screws</i>
AS 1111.1:2015	<i>ISO Metric hexagon bolts and screws - Product grade C - Bolts</i>
AS 1111.2:2015	<i>ISO Metric hexagon bolts and screws - Product grade C - Bolts</i>
AS 1112.1-2000	<i>ISO Metric hexagon nuts - Style 1 - Product grade A and B</i>
AS 1112.2-2000	<i>ISO Metric hexagon nuts - Style 2 - Product grade A and B</i>
AS 1112.3:2015	<i>ISO Metric hexagon nuts - Product grade C</i>
AS 1112.4-2000	<i>ISO Metric hexagon nuts - Chamfered thin nuts - Product grade A and B</i>
AS 1477:2006	<i>PVC Pipes and Fittings for Pressure Applications</i>
AS 1646-2007	<i>Elastomeric Seals for Waterworks Purposes</i>
AS 4765:2007	<i>Modified PVC (PVC-M) Pipes for Pressure Applications</i>



City of Perth

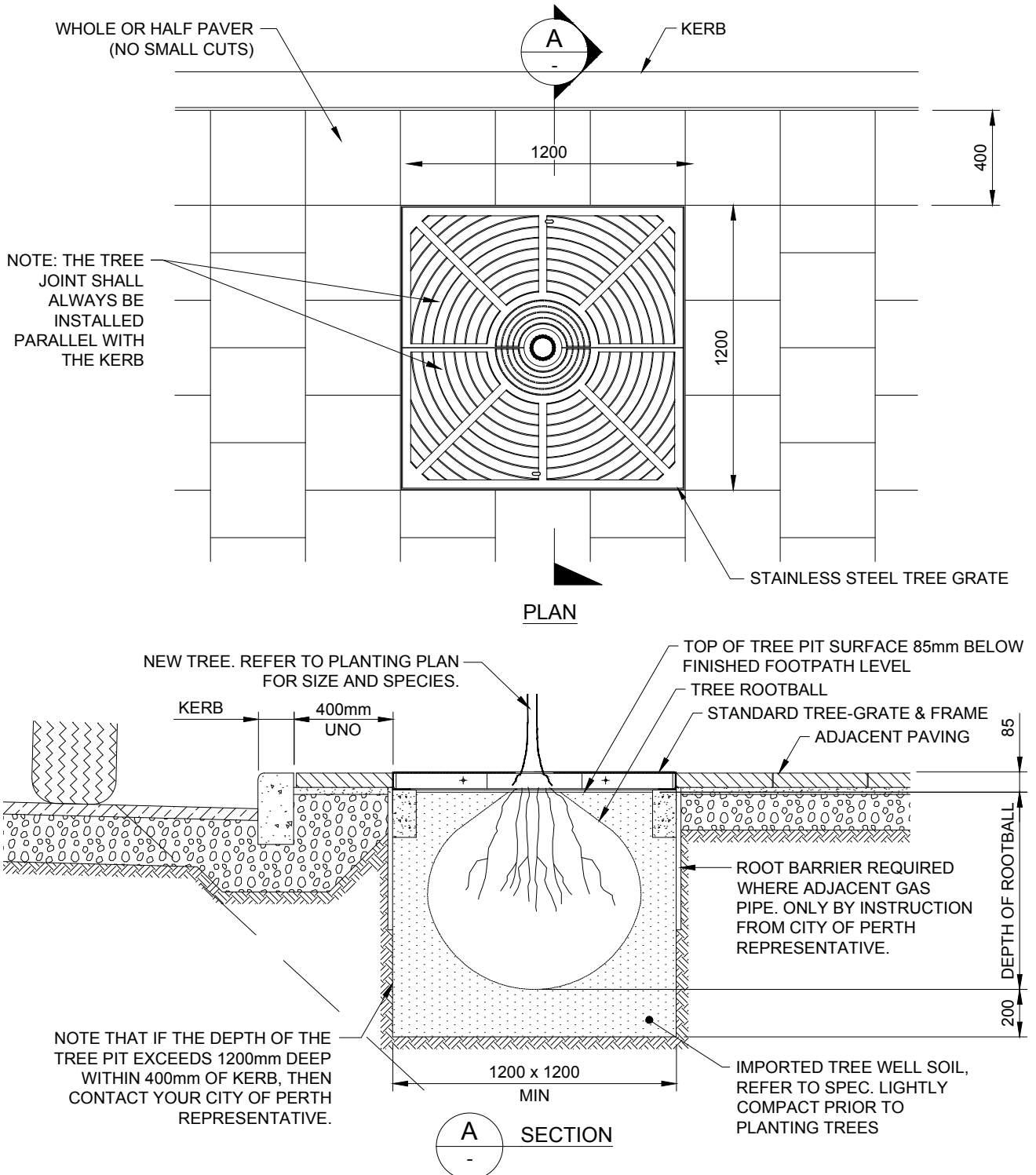
Design and Construction Note

702.00

Street Trees and Reticulation Design

Standard Tree-Pit

Reviewed: 06/12/2018

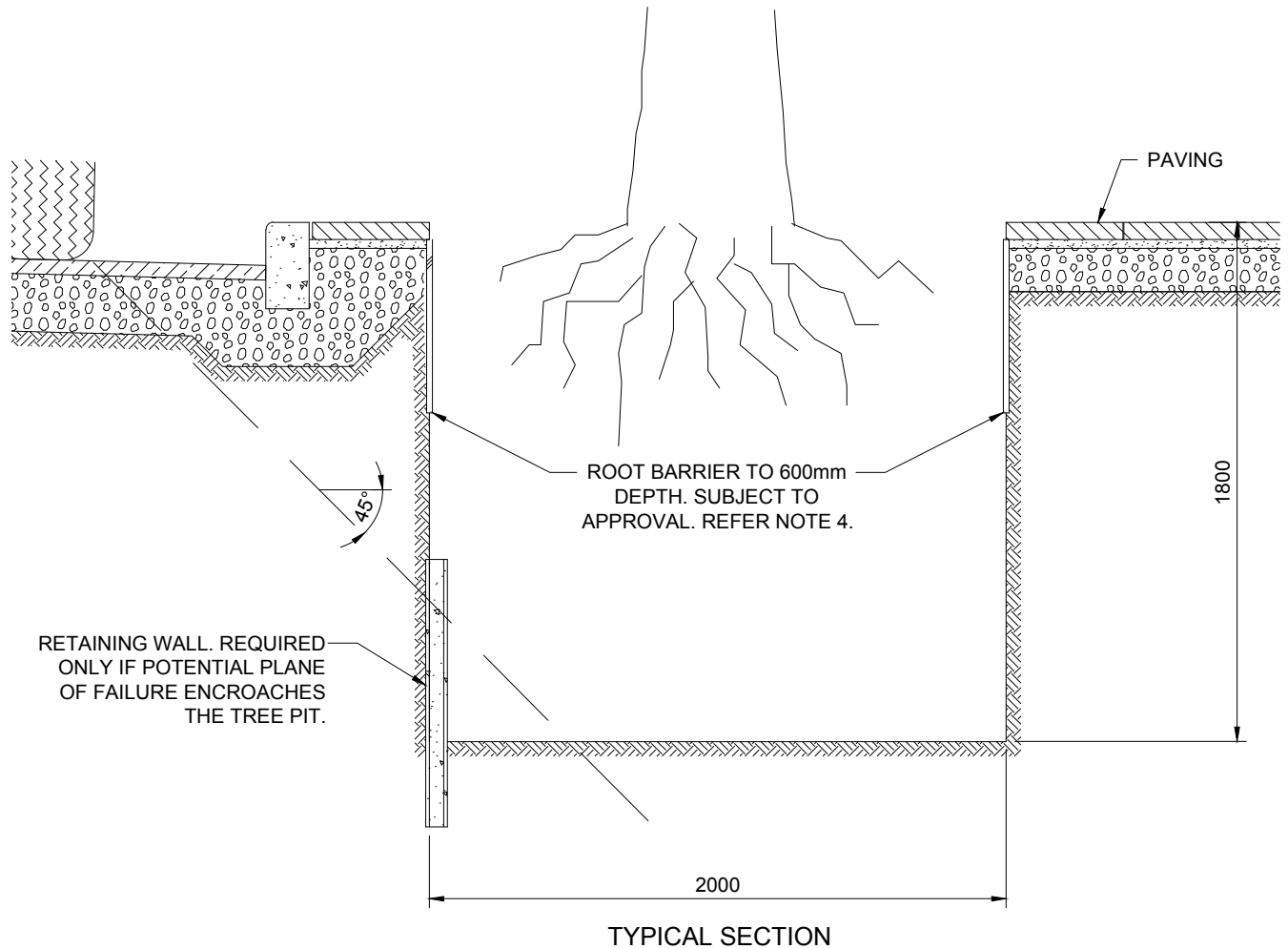


General Notes

1. The soil used to fill tree pits shall be installed and lightly compacted prior to planting trees.
2. Preferred minimum dimensions of tree pit: 1200mm Wide x 1200mm Long x 1200mm Deep.
3. Road and footpath construction shall be completed prior to digging tree pits.
4. It is preferred that tree pits be a minimum of one full paver back from the back of kerb.
5. Root barrier (600mm deep around pit walls) shall only be used at locations where there is a higher risk of roots disrupting the stability of nearby pavements and shall only be installed with approval from the City of Perth.

SOIL MIXTURE SPECIFICATIONS

- Refer to the Co-ordination & Design Unit at the City of Perth. CDU@cityofperth.wa.gov.au

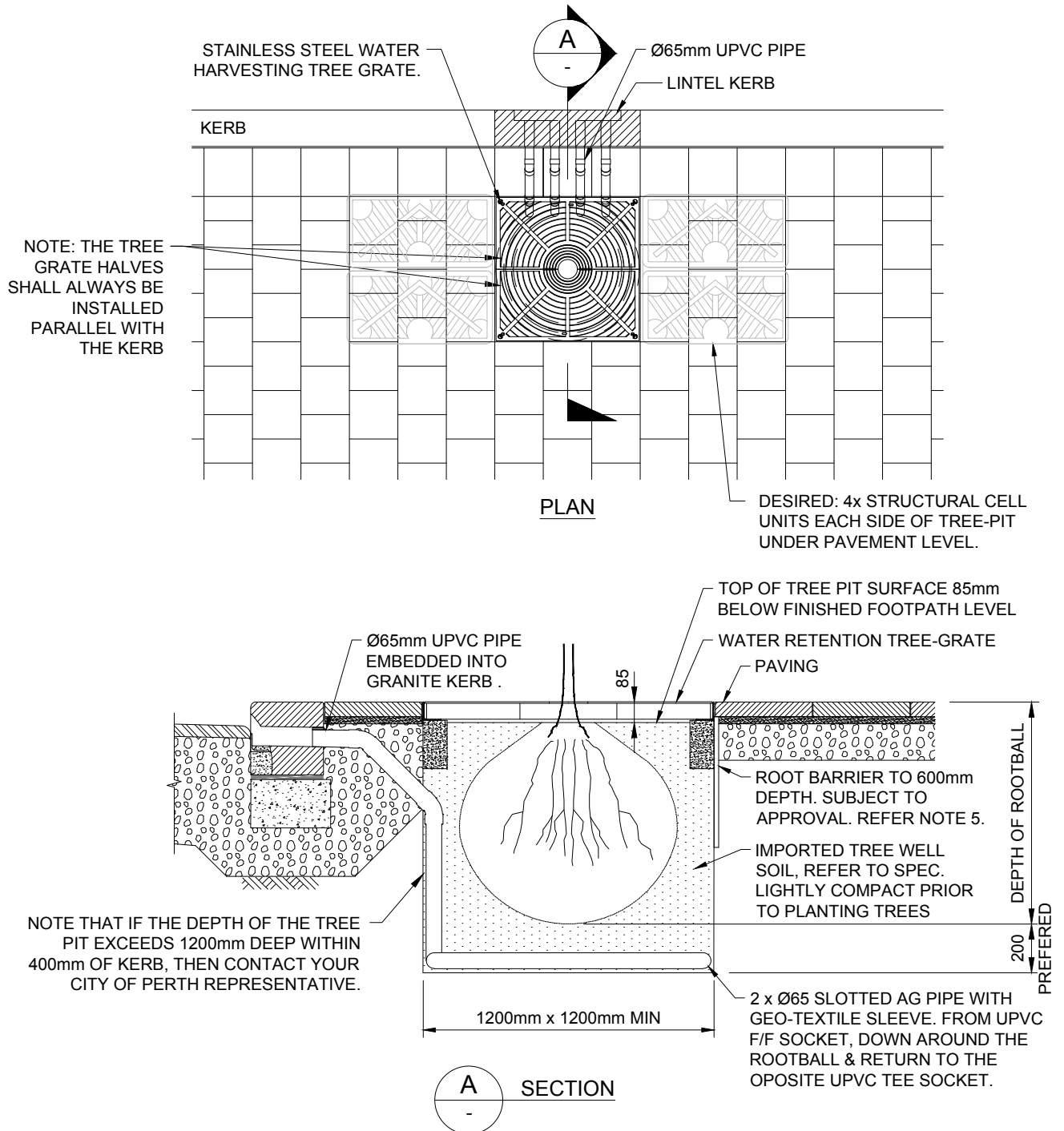


General Notes

1. The soil used to fill tree pits shall be installed and lightly compacted prior to planting trees.
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3. It is preferred that tree pits be a minimum of one full paver back from the back of kerb.
4. Root barrier (600mm deep around pit walls) shall only be used at locations where there is a higher risk of roots disrupting the stability of nearby pavements and shall only be installed with approval from the City of Perth.
5. If tree pits are enlarged so that the potential plane of failure encroaches on the side of the tree-pit, 'Twinside' or similar approved concrete retaining walls shall be installed at the base of the pit on the traffic side.

SOIL MIXTURE SPECIFICATIONS

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CDU@cityofperth.wa.gov.au

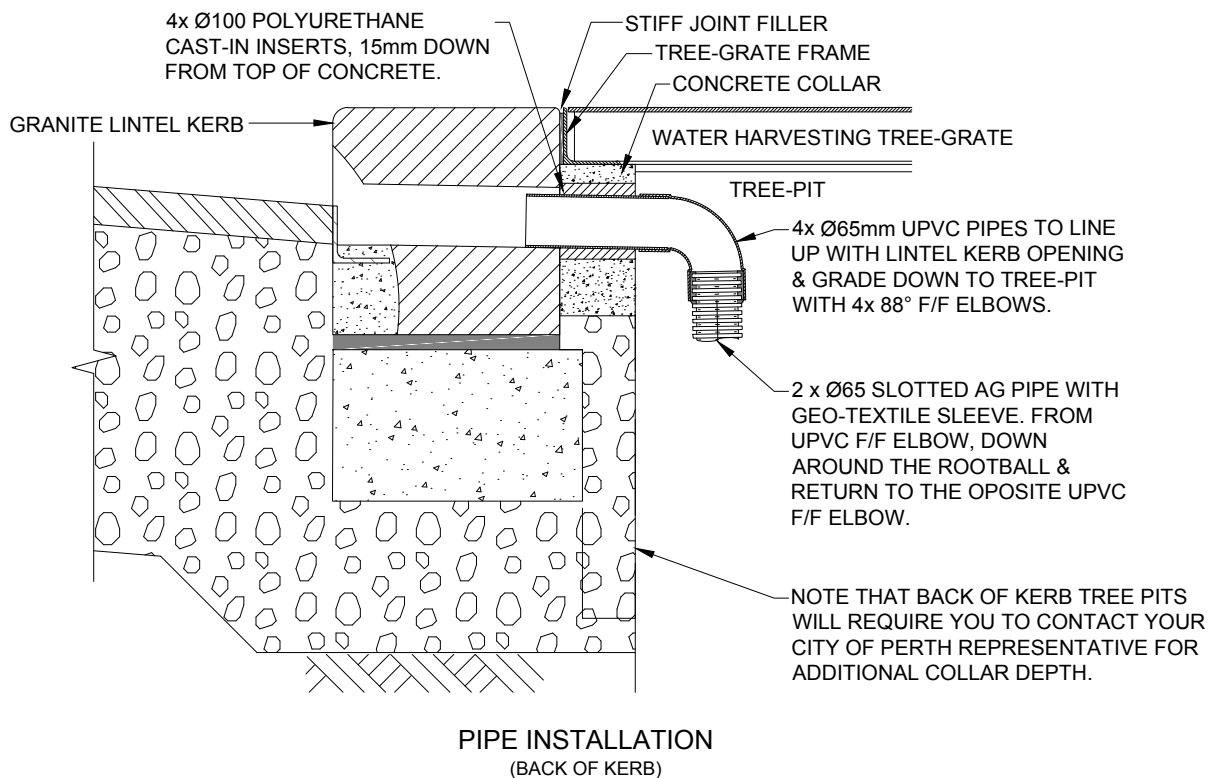
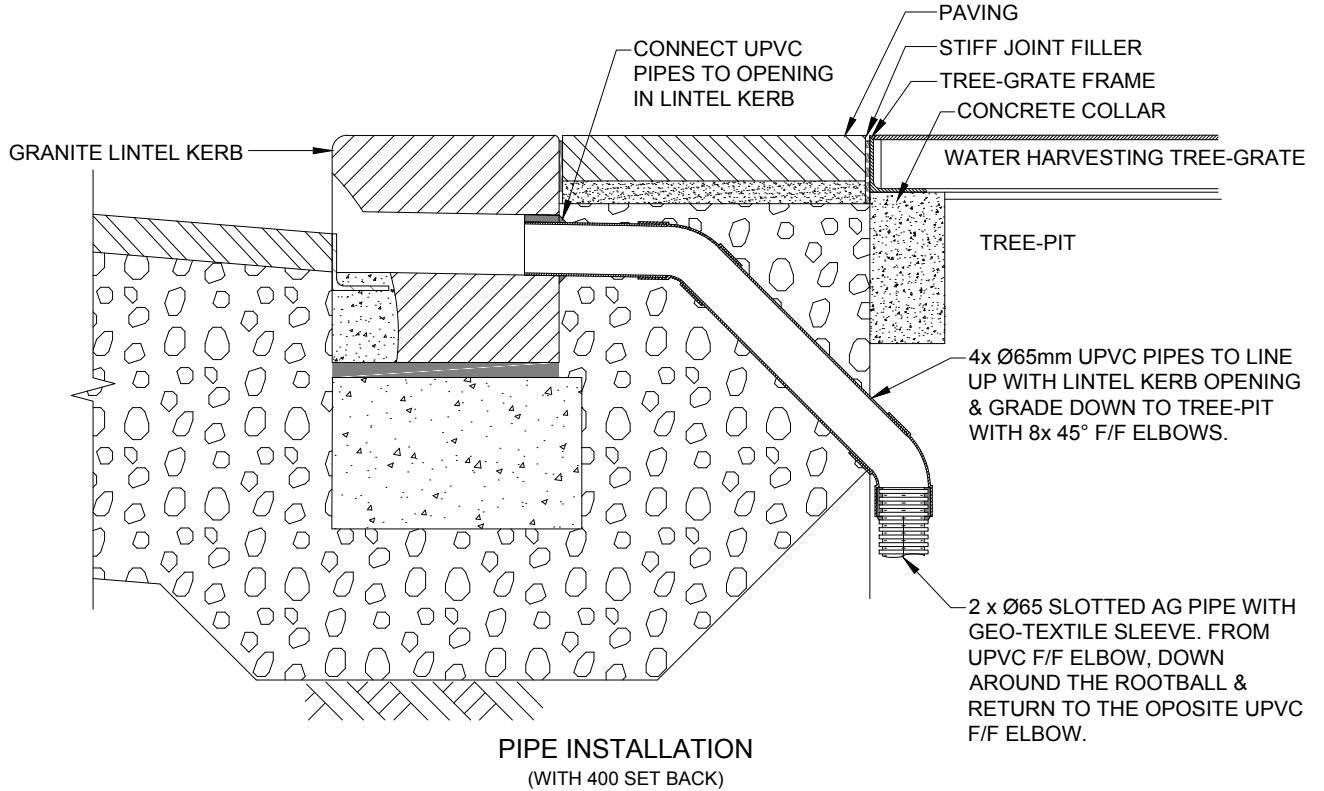


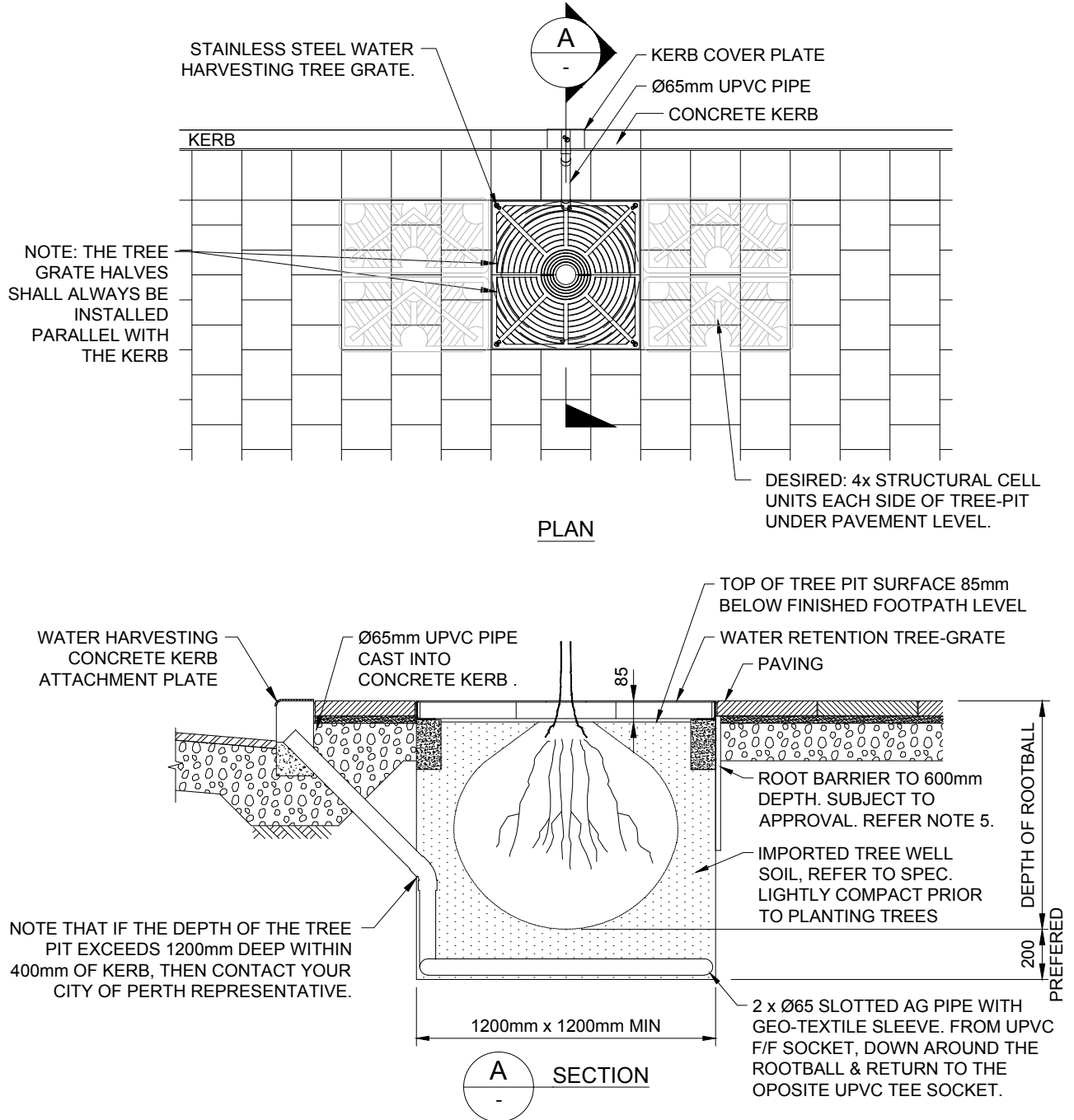
General Notes

1. The soil used to fill tree pits shall be installed and lightly compacted prior to planting trees.
2. Minimum dimensions of tree pit shall be 1200mm Wide x 1200mm Long x 1200mm Deep.
3. Road and footpath construction shall be completed prior to digging tree pits.
4. It is preferred that tree pits be a minimum of one full paver back from the back of kerb.
5. Root barrier to be installed where tree located 0.5-1m of gas pipe. Barrier to extend 250mm deeper than gas pipe. refer to City of Perth representative.
6. Prior to the use of structural cells, underground exploration must be undertaken to ensure that there sufficient space free of services.
7. The use of structural cells will be considered on a case by case basis and shall only be installed with approval from the City of Perth.

SOIL MIXTURE SPECIFICATIONS

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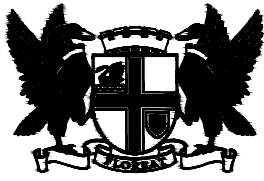




General Notes

1. The soil used to fill tree pits shall be installed and lightly compacted prior to planting trees.
2. Minimum dimensions of tree pit shall be 1200mm Wide x 1200mm Long x 1200mm Deep.
3. Road and footpath construction shall be completed prior to digging tree pits.
4. It is preferred that tree pits be a minimum of one full paver back from the back of kerb.
5. Root barrier to be installed where tree located 0.5-1m of gas pipe. Barrier to extend 250mm deeper than gas pipe. refer to City of Perth representative.
6. Prior to the use of structural cells, underground exploration must be undertaken to ensure that there sufficient space free of services.
7. The use of structural cells will be considered on a case by case basis and shall only be installed with approval from the City of Perth.

- SOIL MIXTURE SPECIFICATIONS**
- Refer to the Co-ordination & Design Unit at the City of Perth. CDU@cityofperth.wa.gov.au



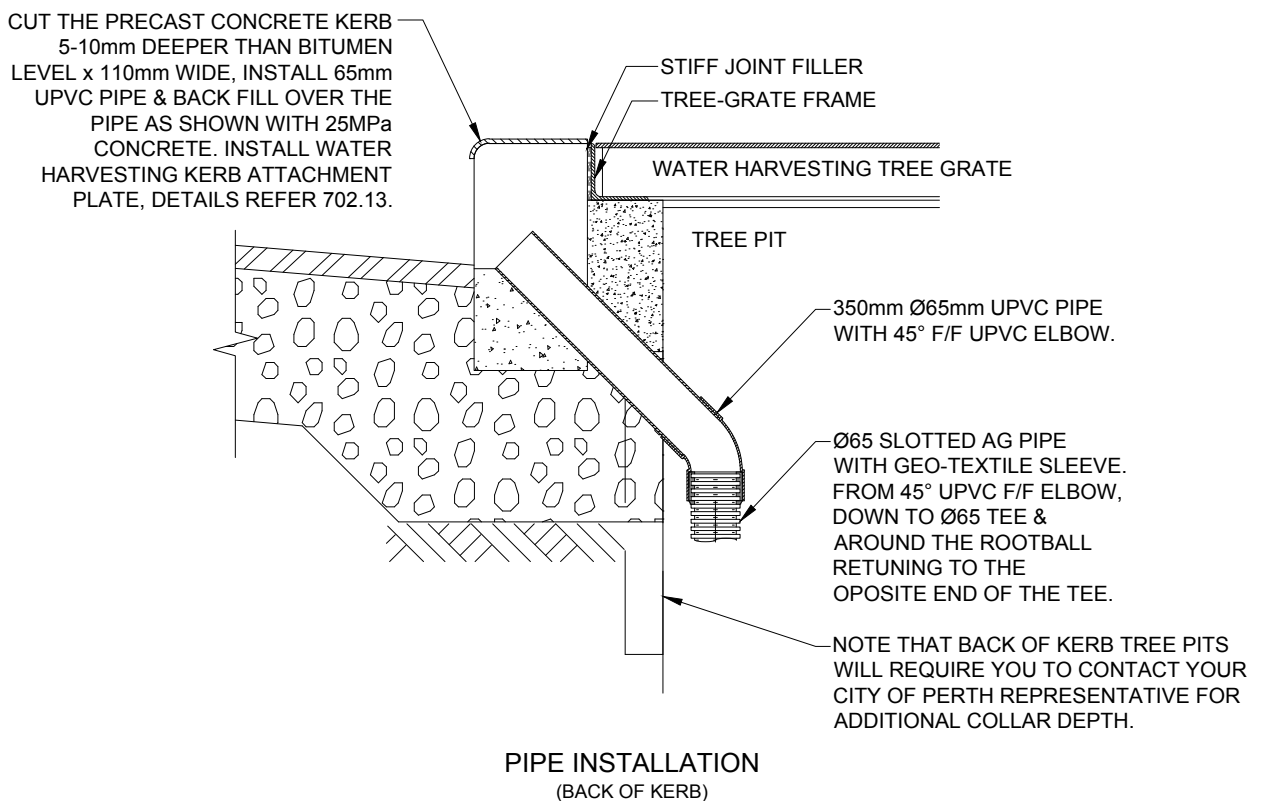
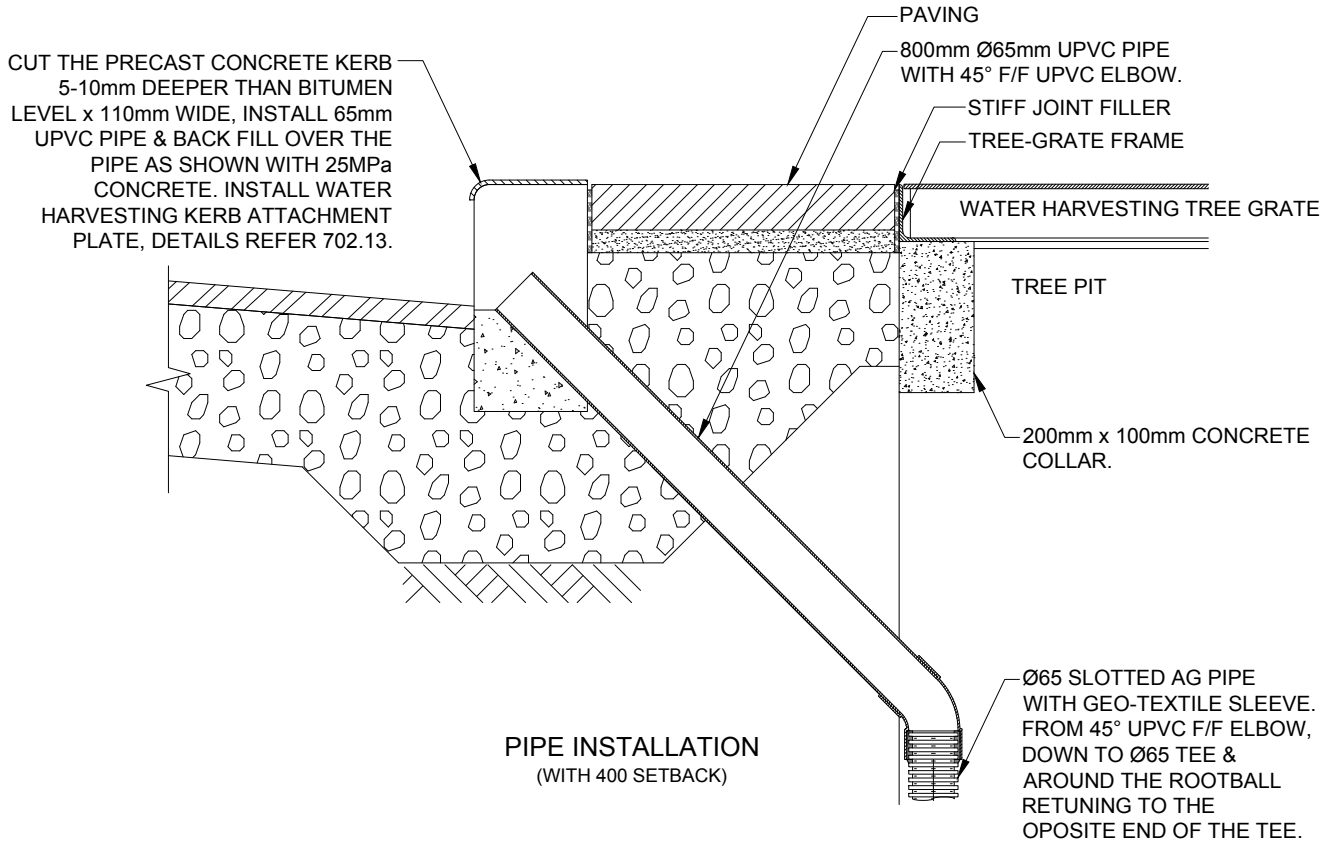
City of Perth

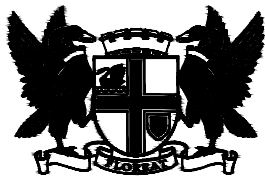
Design and Construction Note

702.05

Street Trees and Reticulation Design Water Retention Tree-Pit in Concrete Kerbs

Reviewed: 06/12/2018





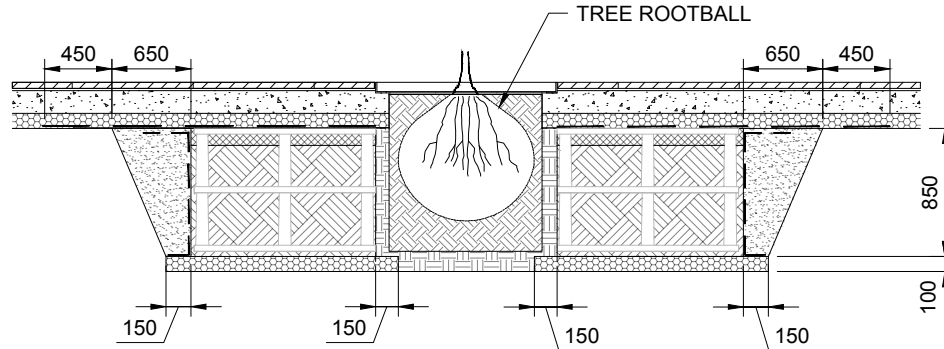
City of Perth

Design and Construction Note

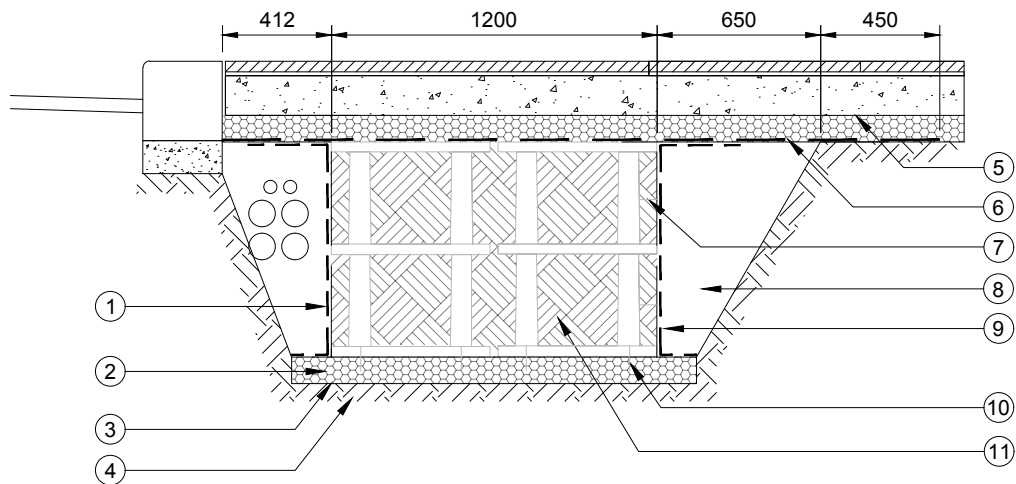
702.06

Street Trees and Reticulation Design Underground Structural Cells

Reviewed: 06/12/2018



LONG-SECTION



CROSS-SECTION

Cross-Section Notes:

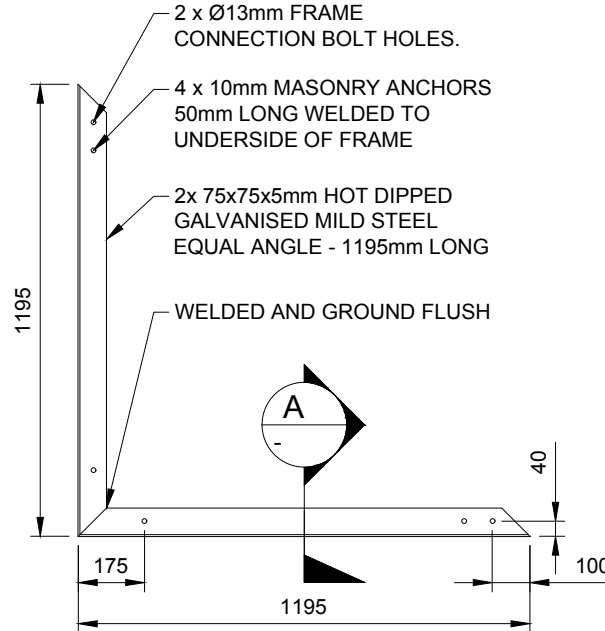
- ① Geogrid. 150mm min below backfill at base. overlap 300mm min at top of cells
- ② 100mm depth - Crushed rock, compacted to 95% or by 3 passes with plate compactor, whichever is greater.
- ③ Structural cell base slope to match cross-slope or flow-line slope, whichever is greater, to max 5%.
- ④ Sub-grade below crushed rock, compacted to 95% or by 3 passes with plate compactor, whichever is greater.
- ⑤ Paving, base and compacted sub-grade.
- ⑥ Geotextile - min 450mm overlap past excavation.
- ⑦ 5mm x 300mm Cable ties attaching geogrid to structural cells at each level and at cell deck.
- ⑧ Backfill using surplus excavated material installed in 200mm max lifts (2 lifts per cell) compacted to 95%.
- ⑨ Geogrid. 150mm min below backfill at base. overlap 300mm min at top of cells.
- ⑩ Anchor each structural cell to the ground with 4x 250mm spikes $\varnothing < 10$ mm. supplied by manufacturer of cells. see cell base for spike holes.
- ⑪ Planting soil. installed in 200mm lifts (2 lifts per cell).

SOIL MIXTURE SPECIFICATIONS

- Refer to the Co-ordination & Design Unit at the City of Perth. CDU@cityofperth.wa.gov.au

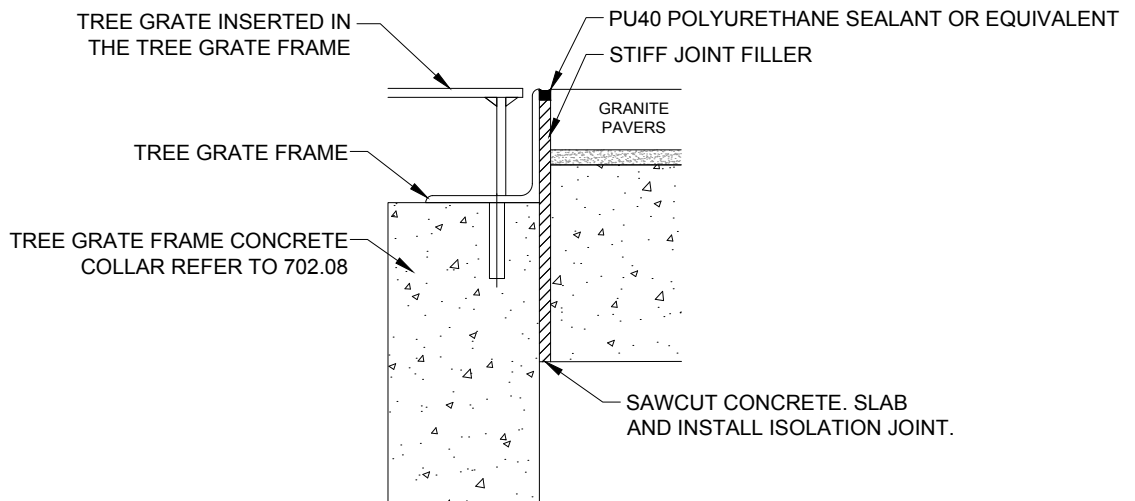
General Notes

1. The planting soil mix used to fill the structural cells is to match the planting soil mix for the tree-pit.
2. Prior to the use of structural cells, underground exploration must be undertaken to ensure that there is sufficient space free of services.
3. The use of structural cells will be considered on a case by case basis and shall only be installed with approval from the City of Perth.
4. Additional structural cells may be installed where site constraints allow, in order to achieve greater volumes of soil.
5. Tree cell installation is preferred before the construction of adjacent road. If the adjacent road is an existing road, then the contractor must exercise precaution such as shoring (designed and signed off by experienced engineer) to prevent disturbance of adjacent road/kerb and the underlying subgrade/soil causing future settlement/failure of road.
6. Tree cell manufacturer must provide test certificate to ascertain the cells are able to withstand vertical and lateral traffic loading found in the adjacent road.



STANDARD TREE-GRATE FRAME

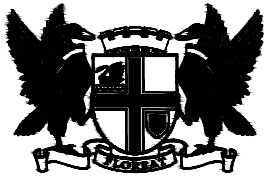
NOTE: TREE-GRATE FRAME TO COME IN TWO SEPARATE 'L' SHAPED PIECES AND INSTALLED SNUG TOGETHER. CHECK SQUARE (1690mm ACROSS CORNERS) BEFORE SETTING IN CONCRETE FOOTING.



A SECTION

INSTALLATION DETAIL (GRANITE PAVING)

NOTE: THIS DETAIL TO BE USED FOR STANDARD TREE-PITS AND WATER HARVESTING TREE-PITS LOCATED IN AREAS WITH GRANITE PAVING.



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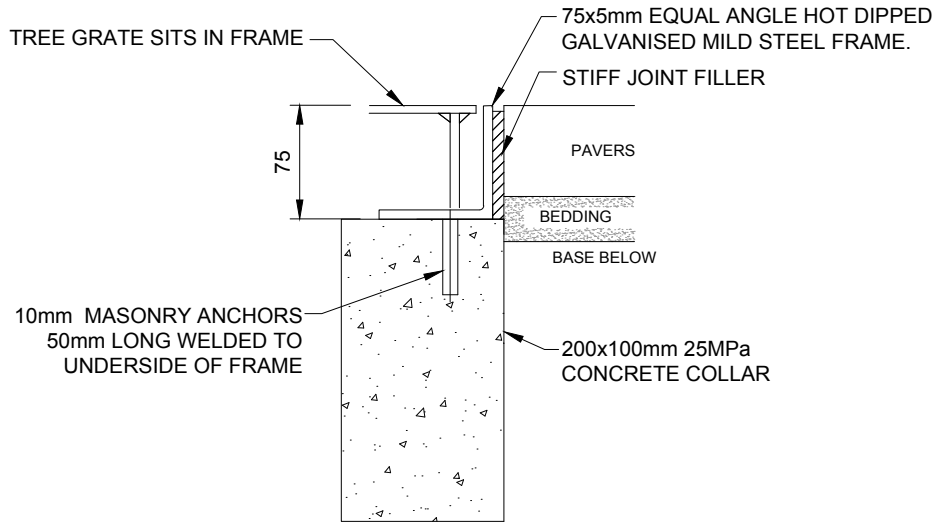
Design and Construction Note

702.08

Street Trees and Reticulation Design

Tree-Grate Frame - Installation

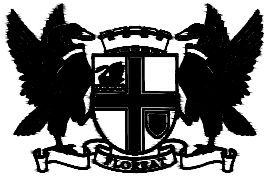
Reviewed: 06/12/2018



A SECTION
702.07

INSTALLATION DETAIL (CITY GREY PAVING)

NOTE: THIS DETAIL TO BE USED FOR ALL NEW TREE-PITS U.N.O.



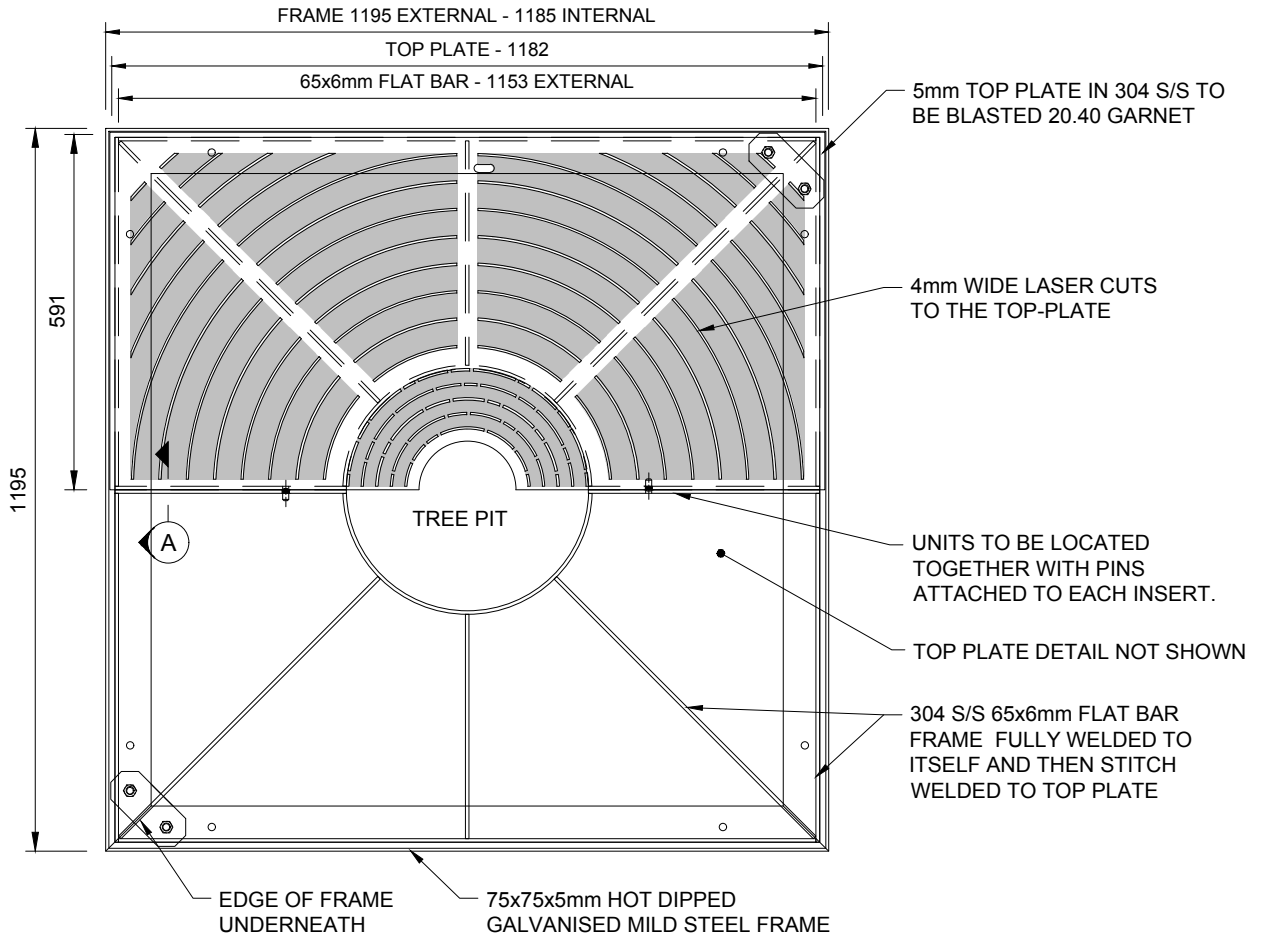
City of Perth

Design and Construction Note

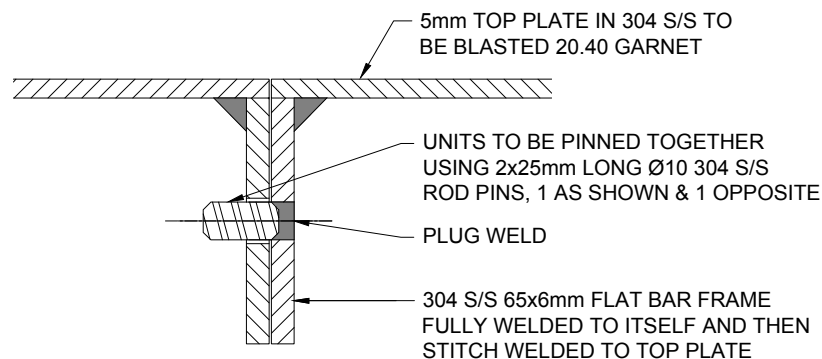
702.09

Street Trees and Reticulation Design Stainless Steel Tree-Grate

Reviewed: 06/12/2018



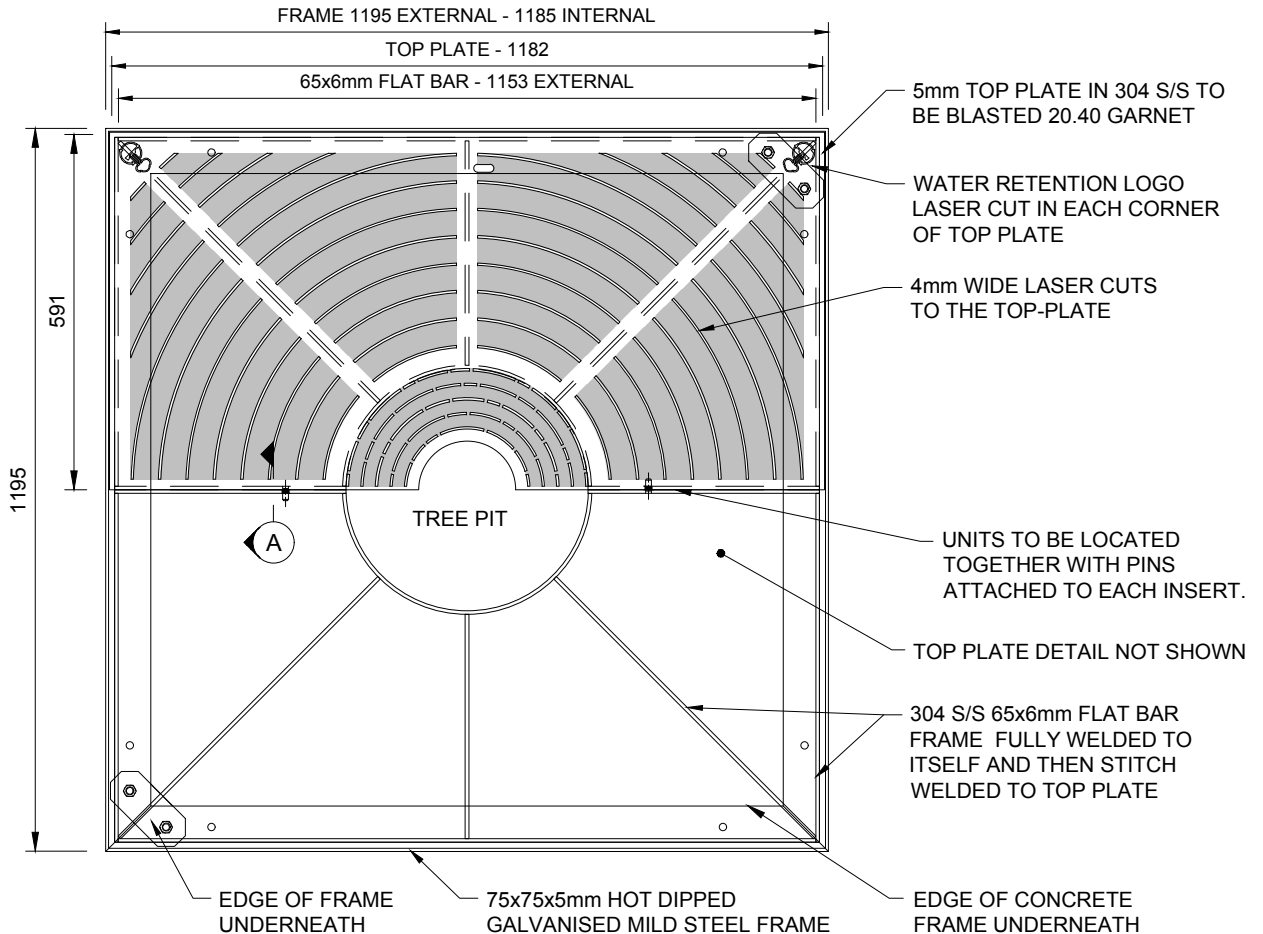
TREE-GRATE ASSEMBLY



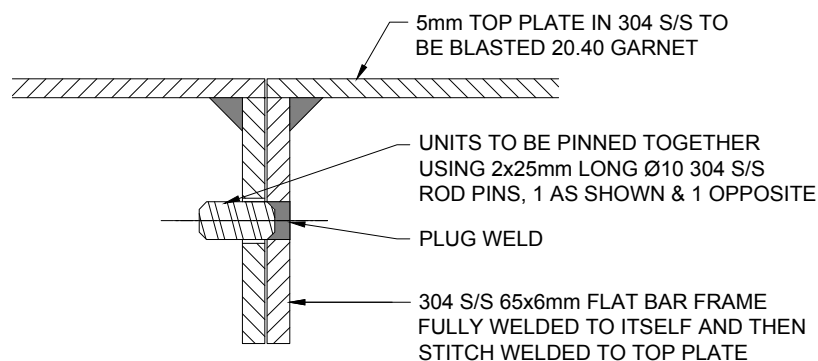
SECTION A - ASSEMBLY DETAIL (BOLTS)

General Notes

1. All flat bars, fixings and surfaces to be 304 stainless steel with mill finish.
2. All flat bars to be TIG welded.
3. Manufacture and installation to comply with all appropriate Australian Standards - including slip resistance and load bearing.
4. For manufacturing details & specifications, contact Co-ordination & design, City of Perth (CDU@cityofperth.wa.gov.au).



TREE-GRATE ASSEMBLY



SECTION A - ASSEMBLY DETAIL (BOLTS)

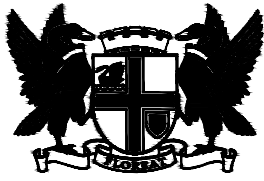
General Notes

1. All flat bars, fixings and surfaces to be 304 stainless steel with mill finish.
2. All flat bars to be TIG welded.
3. Manufacture and installation to comply with all appropriate Australian Standards - including slip resistance and load bearing.
4. For manufacturing details & specifications (DWG No. 15021-TREE-GRATE-SS_G-FD), contact Principal Engineer, COP.
5. Water Retention (Reinforced) Tree-Grate is to be used at all water harvesting tree-pits.



General Notes

1. Tree Guards are only to be installed in high risk vandalism area, outside of the central CBD.
2. Approval from the Coordination and Design Unit, COP is required prior to installation.



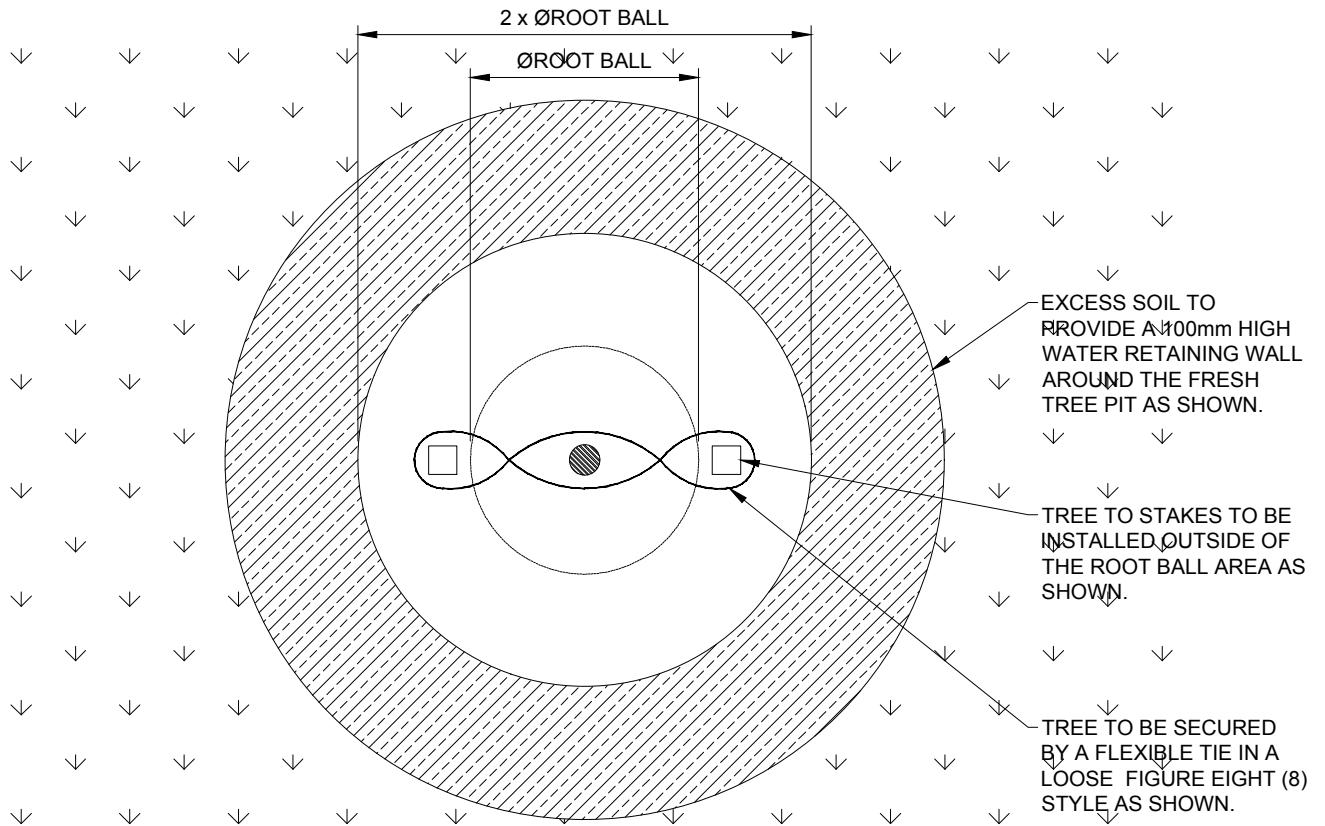
City of Perth

Design and Construction Note

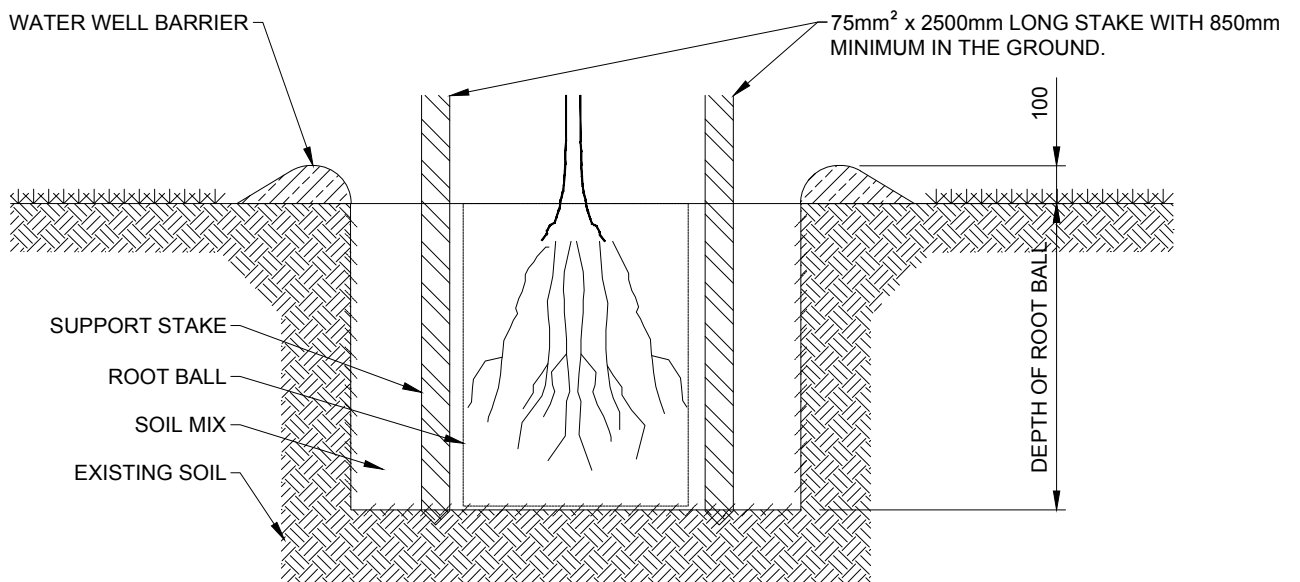
702.12

Street Trees and Reticulation Design Soft installation of Trees

Reviewed: 06/12/2018



PLAN VIEW



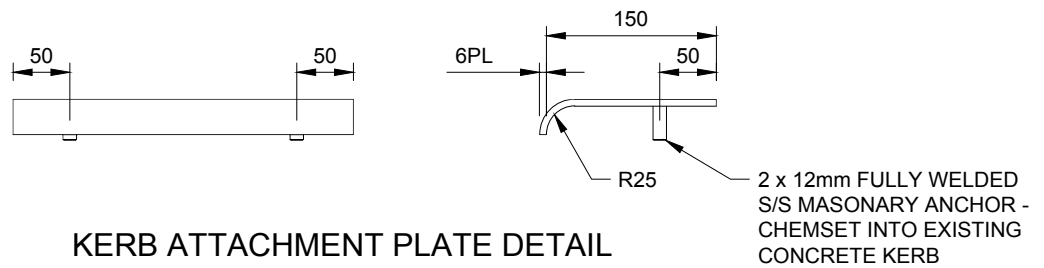
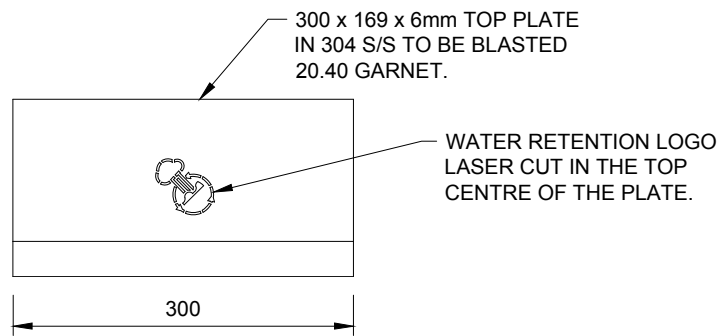
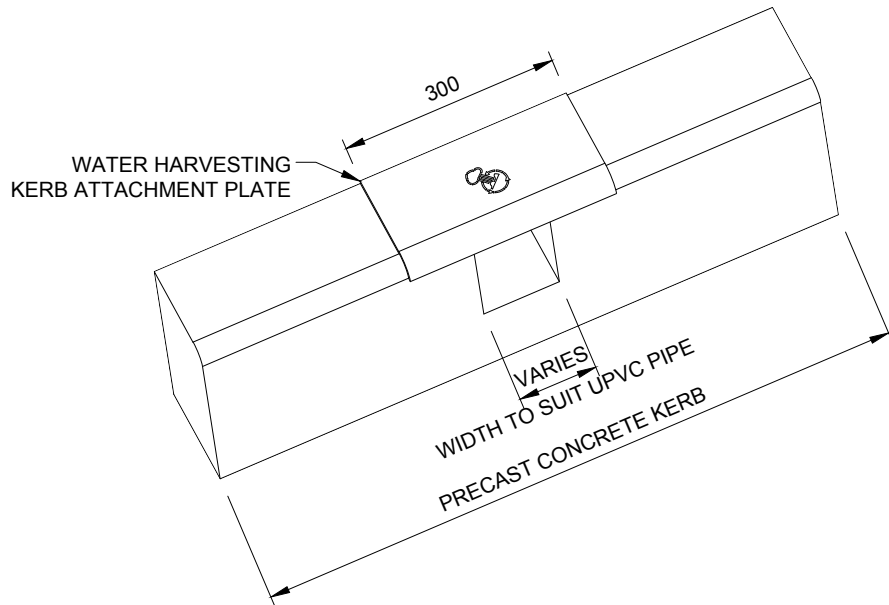
CENTRE SECTION ELEVATION

GENERAL NOTES

1. Refer to Specification 700 & Book 700 for Irrigation requirements.
2. Refer to Specification 700 for Soil specifications.

SOIL MIXTURE SPECIFICATIONS

- Refer to the Co-ordination & Design Unit at the City of Perth.
CDU@cityofperth.wa.gov.au



KERB ATTACHMENT PLATE DETAIL