



## **Tunnelwell® Arch System Installation Instructions** (Leach Drains only)

### **1. General Notes**

#### **1.1 General**

- 1.1.1 These instructions shall be read in conjunction with other consultants' drawings, specifications and written instructions provided by the engineer during the installation/contract period.
- 1.1.2. If in doubt, ask – call Tunnelwell® - 1300 4 TUNNEL.
- 1.1.3. Until all approvals from authorities are obtained, commencement of construction works should not commence.
- 1.1.4. Unless varied by the project specification, all materials and workmanship shall be undertaken in accordance with the relevant Australian standards and the by-laws and ordinances of the relevant building authorities or authorities having jurisdiction over the works. An approval from the Local Government Authority and the Health Department of Western Australia is essential prior to commencing any leach drain installations. Multiple leach drain installations and distances between each leach drain shall comply with Health Department Regulations.
- 1.1.5. All dimensions indicated within these instructions shall be verified on site by the installing contractor.
- 1.1.6. Prior to commencing works on site, the contractor shall verify the position of all services in the area to ensure that the construction does not interfere with any of those buried services.
- 1.1.7. During construction and transport to site the arches shall be maintained in a stable condition with no part becoming overstressed or permanently deformed.
- 1.1.8. The structural components detailed on these instructions have been designed for the following loads:

In non-trafficable areas: Zero surcharge  
Leach drains cannot be installed in trafficable areas.

#### **1.2 Subgrade or base of leach drain**

- 1.2.1 The design of the Tunnelwell® Arch System (TWAS) has been based on a subgrade which is a naturally occurring cohesive soil material of minimum allowable bearing capacity 150 kPa for non-trafficable subgrades. For subgrades which consist of soils without cohesion, the minimum requirement for the foundation material is that it shall pass 6 blows from a Perth Sand Penetrometer (PSP). Subgrades are to be approved by a suitably qualified geotechnical engineer shall be uniform in nature free from significant irregularities. It is noted that preparation of the subgrade shall consist of the removal of any topsoil, organic material, and the like with the naturally occurring subgrade material exposed prior to placing the TWAS over. The contractor shall be mindful of on-site drainage to ensure that ponding of water around the subgrade does not occur.
- 1.2.2 In circumstances where rock or limestone is apparent, the TWAS requires an additional excavation of 600mm below the underside of the arch with 600mm of compacted base course extending to 300mm beyond the side walls of the arch.



Pictures showing base layer compaction testing.

## 2. Trench installation and pinning arches into place

Once the TWAS excavation has been prepared and meets design criteria as well as criteria set out in Section 1, General Notes, level the compacted base area and begin to lift in the arch sections starting at one end with the female lip at the end point. Next section will then be placed over the male end lip at the other end. Repeat this process until the required lengths have been installed in a straight line. The recommended sequence of installation is:

- a. Place first section as above at correct invert level but allow room for end cap to fit over the end of the first section placement. Provide 600mm clear space for backfill and compaction all around the arches for the entire length of arches being installed.
- b. Do not install end caps until the TWAS is completed to allow an internal visual inspection of the arches being installed to ensure that all sections are connected correctly, and male and female lips are locking up correctly.
- c. A layer/bed of 20mm sieve sized blue stone must be installed and placed directly below the first arch section and end cap where an inlet pipe is to be connected to the TWAS. The blue stone must be the width of the arch and 900mm long and at least 100mm deep and cover the end cap area as well. Alternatively use 2 x 600mm x 600mm x 40mm concrete slabs.
- d. As each arch section is installed, insert steel pins to hold the arch in place as you proceed along the trench. These are driven in by using a hammer or pneumatic hammer once the steel pin has been placed firmly through the pre-set hole in the toe of each arch section. Then drive the pins to refusal. Make sure each arch section is fitted properly to the last section prior to setting the steel pins in place.  
Note: Tunnelwell has the purpose made pin/peg drivers available for purchase at \$60.00 each + GST which fit most electric/battery SDS chuck hammer drills.
- e. If the arches are laid in areas where rock subgrade is apparent, refer clause 1.2.2 for subgrade preparation.
- f. The minimum trench width adjacent to the side of the arch to allow compaction using a plate compactor is 600mm. If a larger plate compactor is being used, adjust clearance to suit. Refer to Section 1, General Notes for further clarification.



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Pictures showing laying.

### 3. Sealing arch joints with the foam strip

Each arch must have the foam strip (supplied 2560x35x25) fitted between the joints as per drawings after the arches have been installed prior to any backfilling commencing. The arches must be clean and free from sand over toe piece as shown in picture above. The foam strip simply pushes into the joint gap by hand with the 25mm wide section being the width and the 35mm section being the height. Push foam in firmly covering the whole joint/arch section – a fly screen spline roller or other similar tool helps. This can be done after each section is installed but it is more efficient to do all arches once laying has been completed. If there is overhang at the base due to any stretching this can be trimmed with a "Stanley" knife if required. Once this has been done, backfill can commence. Make sure backfilling does not dislodge any foam strips during the process.

### 4. Backfilling and Compaction to the top of the arches

Appropriate backfilling and compaction are critical elements for the successful installation of the TWAS. The compaction over the TWAS must meet good practise industry standards and backfill practices.

**IMPORTANT NOTE:** The TWAS does not use gravel, blue stone, or reconstituted concrete over the arches to provide load support which means heavy loads are not permitted over the arches in this type of installation being less than the minimum cover requirements and compaction to support heavy loads. The maximum load to be applied over the arched with only 100mm of cover is the equivalent of a 1.5 tonne mini excavator. Any larger load being applied could lead to product failure. If the installation could be subject to heavier vehicle loads in the future used by maintenance staff or others, then this installation manual shall not be used and the Contractor should contact Tunnelwell® and ask for a load bearing installation manual.

The backfill material must be a free draining material and meet the requirements of the Health Department and Local Government approvals.

Compaction must be in 300mm deep compacted layers and compacted to a minimum of 4-6 blows to the foot/300mm for a PSP. Each compacted layer of backfill must be installed evenly

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on each side of the TWAS prior to going to the next layer of back fill and compaction. Repeat this process until the crest of the arches is reached. Ensure that the compactor is kept a minimum of 100mm from the edge of the vibrating plate away from the arch side walls.

**DO NOT** install backfill using a front-end loader or backhoe bucket directly over the top of the arches.



Pictures showing correct backfill method.

At this stage make connections to end caps as required. An end cap connection should be at the top of end cap preformed circle of 100mm diameter or smaller for a rising main or pumped connection.

After end cap connections are completed continue to backfill to the top of the arches.

**Note:** Connections to end caps; inlet pipes must be long enough to discharge over the blue stone bedding inside the arch and or end cap area. Refer to section 2 c.

### 5. Final Backfilling and Compaction above the top of the arches

Once the backfill has reached the top crest of the arches, backfill the final 100-200mm layer and lightly compact over the whole surface of the arches. Lower the vibration intensity of the compactor when going over the actual crests of the arches as the compactor will tend to “bounce” over the tops of the arches. A minimum cover of 100mm of sand is required over the top of leach drains. The PSP testing must be done on the sides of the arches not right over the top of the arch. The offset from centre of the arch to the compaction test point is 600mm. See table below:

Tunnelwell Arch Systems (TWAS) Compaction Regime	
Cover over the arch	Test Point - Offset or Centreline
Minimum cover – 600mm	Offset from centreline of 600mm
600mm to 900mm	Offset from centreline of 600mm
≥ 900mm to 2500mm	Centreline



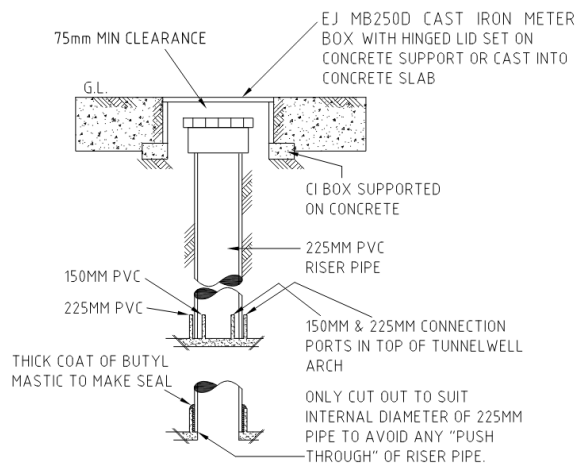
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## 6. Inspection or Cleaning Access

All sealed leach drain chambers should be designed to allow for inspection/monitoring and or cleaning provisions. Then inspection access should be incorporated using the pre-set holes in the top of each arch section to connect to that opening provision and extend a 100mm pipe to the surface and provide an inspection point to the TWAS – refer to diagram 2 below. The number of inspection points should be established by the design engineer. If no engineer is engaged for the design, provide at least 1 x 100mm inspection point to each end as a minimum requirement as shown in the picture below.



**DIAGRAM 2**



DETAIL OF TUNNELWELL ACCESS POINT  
FOR INSPECTION AND CLEAN OUT (NTS)

**Note:** Diagram 2 above shows 225mm pipe. Use same installation principles for 150mm sized pipes.