

## ROAD DESIGN NOTE

# Pit and pipe invert levels

## 1. Purpose

The purpose of this Road Design Note (RDN) is to clarify the meaning of pit and pipe invert levels on the pit schedules and drainage longitudinal drawings in order to ensure that construction personnel can correctly interpret the information.

Standard Drawing SD1002 (latest version) has been created for use by the pit builders for this purpose and is attached.

## 2. Scope

The convention for pit and pipe invert levels shall be applied to all road design drawings for VicRoads funded projects.

## 3. Background

The final drawing presentation standards for inlet and outlet pipe invert levels at a pit are specified in Section 2.12 of *VicRoads Final Drawing Presentation Guidelines*. As illustrated in SD1002, inset the invert levels to be shown on the drawings are NOT the actual invert levels of the pipes at the pit wall, but rather they are the imaginary levels of the pipe inverts extended to the centre of the pit shaft.

This policy created some confusion on site in interpreting the invert levels provided on the drawings, when there was no Standard Drawing available for inclusion in contract documentation which explained the practice.

## 4. The adopted standards

In order to clarify the situation, Standard Drawing SD1002 (attached) has been created to explain the meaning of the pit and pipe invert levels shown on the drawings. **The pit invert level has been changed to refer to the top of the pit base slab.** Corresponding changes have been made to VicRoads Final Drawing Presentation Guidelines to ensure that the information is consistent. The practice to be adopted is given below:

### 4.1 Pipe invert levels

The existing practice for depicting pipe invert levels, as indicated in Section 2.12 of the Final Drawing Presentation

Guidelines will continue to be adopted. That is, the pipe invert levels shown on pit schedules and drainage longitudinal are the imaginary invert levels of the pipes extended to the centre of the pit shaft. Standard Drawing SD1002 has been created to explain this practice.

For pipes laid on steep slopes and /or wide haunched pits, the actual inlet and outlet pipe invert levels at the pit walls may be shown on the drainage longitudinal and on the pit schedule, if requested by the project manager. In this case a note should be placed on the drawing clearly indicating where the levels have been given.

### 4.2 Pit invert levels

**The pit invert level is the level at the top of the pit base slab.** The old convention using the outlet pipe invert level at the centre of the pit shaft to represent the pit invert level is no longer applicable. Where the depth of pit 'D' is to be indicated in a pit schedule, it will now represent the true depth of pit, i.e., the difference between the pit invert level, and level of the pit set-out point at the top of the pit.

The relationship between the outlet pipe invert level at the centre of the pit shaft and the pit invert level is shown on Standard Drawing SD1002 and it is given below:

**Pit invert level = Outlet pipe invert level - X - T**

- where X is the level difference between the outlet pipe invert levels at the centre of the pit shaft and at the pit wall; and
- T is the level difference between the outlet pipe invert level at the pit wall and the invert level of the pit.

Dimension T nominally represents the pipe wall thickness with the intent being to lay the lowest pipe on top of the pit base slab. Pipe wall thicknesses are indicated in the table included on SD1002. In order to simplify invert level calculations and to aid in shaping the bottom of pits a minimum value of 60 mm is to be adopted for T.

No special provision needs to be made for spigot and socket pipes.

Dimension X is usually very small (less than 5mm) and can be neglected unless the outlet pipe is to be laid on a steep slope (1 in 70 or steeper) and/or the pit base is wider than the standard pit base of 750mm.

## References

Supersedes RDN 09-06a (March 1997)

Specified sections of AGRD Part 5

Specified sections of AGRD Part 5 – VicRoads Supplement

VicRoads Road Design Guideline Part 7

VicRoads Standard Drawings for Roadworks

## Approved by



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*Road Design Notes are subject to periodic review and may be superseded.*

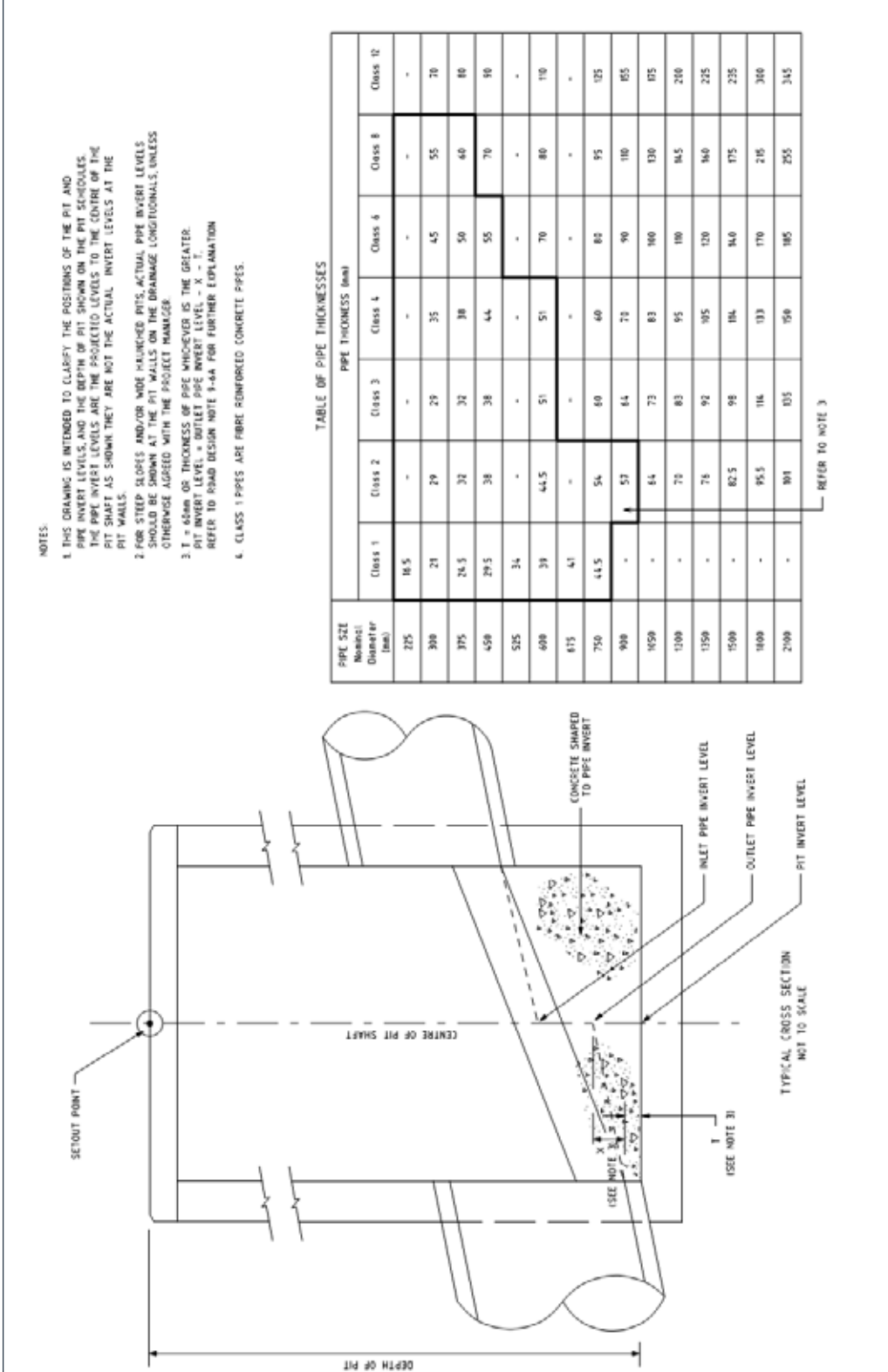


TABLE OF PIPE THICKNESSES

PIPE SIZE (Nominal) Diameter (mm)	PIPE THICKNESS (mm)									
	Class 1	Class 2	Class 3	Class 4	Class 6	Class 8	Class 10			
225	16.5	-	-	-	-	-	-			
300	21	29	29	35	45	55	70			
375	24.5	32	32	38	50	60	80			
450	29.5	38	38	44	55	70	100			
525	34	-	-	-	-	-	-			
600	39	44.5	51	51	70	80	110			
675	41	-	-	-	-	-	-			
750	44.5	54	60	60	80	95	125			
900	-	57	64	70	90	110	155			
1050	-	64	73	83	100	130	175			
1200	-	70	83	95	110	145	200			
1350	-	76	92	105	120	160	225			
1500	-	82.5	98	114	140	175	235			
1800	-	95.5	116	133	170	210	300			
2100	-	101	135	150	185	255	345			

REFER TO NOTE 3

- NOTES:
- THIS DRAWING IS INTENDED TO CLARIFY THE POSITIONS OF THE PIT AND PIPE INVERT LEVELS, AND THE DEPTH OF PIT SHOWN ON THE PIT SCHEDULES. THE PIPE INVERT LEVELS ARE THE PROJECTED LEVELS TO THE CENTRE OF THE PIT SHAFT AS SHOWN. THEY ARE NOT THE ACTUAL INVERT LEVELS AT THE PIT WALLS.
  - FOR STEEP SLOPES AND/OR WIDE HAUNCHED PITS, ACTUAL PIPE INVERT LEVELS SHOULD BE SHOWN AT THE PIT WALLS ON THE DRAINAGE LONGITUDINALS, UNLESS OTHERWISE AGREED WITH THE PROJECT MANAGER.
  - T = 65mm OR THICKNESS OF PIPE WHICHEVER IS THE GREATER.  
PIT INVERT LEVEL = OUTLET PIPE INVERT LEVEL - X - T.  
REFER TO ROAD DESIGN NOTE 9-6A FOR FURTHER EXPLANATION.
  - CLASS 1 PIPES ARE FIBRE REINFORCED CONCRETE PIPES.

		<b>STANDARD DRAWING</b> <b>PIT AND PIPE INVERT LEVELS</b>	
PROJECT NO. PROJECT NAME PROJECT LOCATION PROJECT NUMBER	DRAWING FILE NAME SCALE DATE	SHEET NO. SHEET TOTAL	CONTRACT NO. SHEET NO. SHEET TOTAL
GENERAL NOTES / CROSS REFERENCES 1. PIT DIMENSIONS AND SETTINGS NOT DETAILS 2. UNHAUNCHED PITS 3. HAUNCHED PITS 4. PIT COVERS 5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE		SD 80H SD 90H SD 105H SD 120H SD 150H	
APPROVED PROJECT MANAGER DATE		APPROVED DESIGN ENGINEER DATE	

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