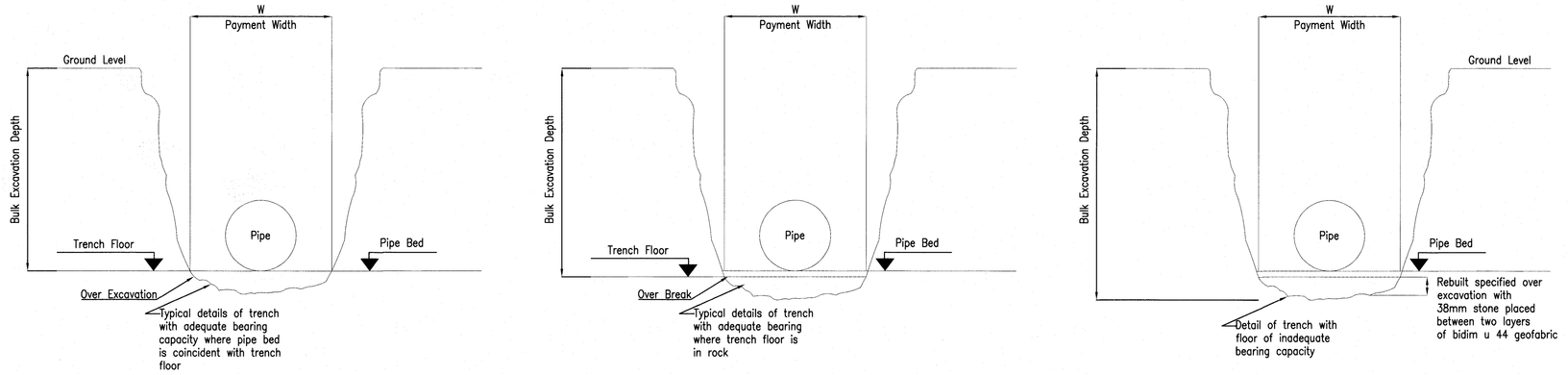
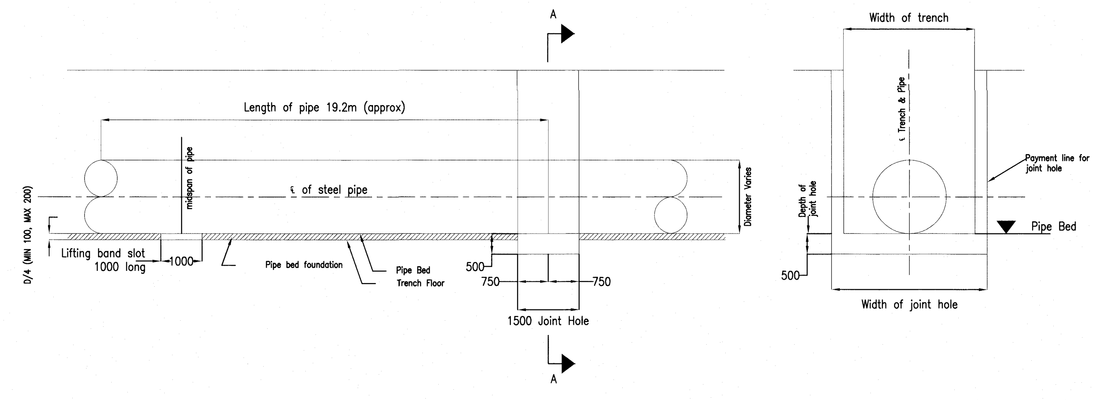
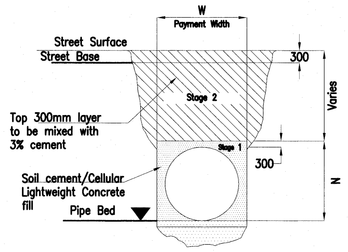


DETAILS OF CONSTRUCTION FOR THE ABOVE SHALL BE ACCORDANCE WITH THE FOLLOWING:

ITEM	Composition Of Fill Material	Maximum Finish Thickness Of Compacted Layer	Degree Of Compaction Required-Mod Aashto Density At Optimum Moisture Content	Position Of Layer Relative To Pipe Bed	Constructive Tolerances Relative To Prescribed Levels	
Over Excavation	Selected Fill Class I (Stage 1)	200	90	Below Pipe Bed	−0	−50
Over Excavation	Selected Fill Class I (Stage 1)	200	90	Below Trench Floor	−0	−50
Over Break: Either	Selected Fill Class I (Stage 1)	200	90	Below Trench Floor	−0	−50
Or	38mm Stone	200	–	Below Trench Floor	−0	−50
Specified-Over Excavation	38mm Stone	200	–	−150 To −1000	−0	−50
Pipe Bed Foundation	Selected Fill Class I (Stage 1)	150	90	−4 To −150	−0	−50
Pipe Bed Middle	Selected Fill Class I (Stage 1)	60	90	Pipe Bed Level	−10	−10
Pipe Bed Foundation	Soilcrete	200	90	Pipe Bed Level	−10	−10

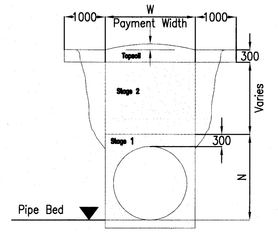


TYPICAL SECTION OF TRENCH FOR STEEL PIPES

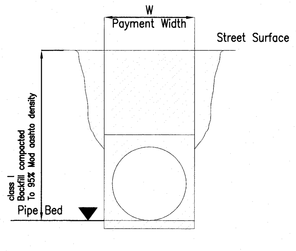


DETAILS OF FILLING FOR PIPE INSTALLED N A NARROW TRENCH AND AS PER THE ENGINNEER'S INSTRUCTION

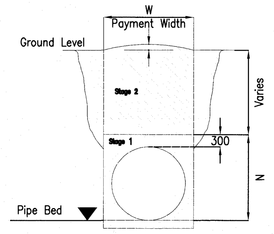
NOTE :- THE BEARING CAPACITY OF THE TRENCH FLOOR IS CONSIDERED INADEQUATE WHEN :-
a. A D.C.P TEST GIVES A PENETRATION OF > 15mm
OR
b. A PLATE BEARING TEST GIVES A SOIL MODULUS (E VALUE) < 15 MPa (N/mm²)



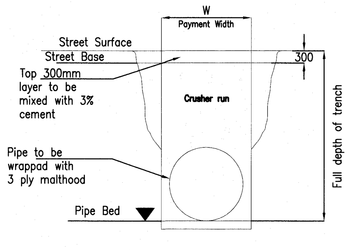
TYPICAL DETAILS OF TRENCH FILLING WHERE TOPSOIL IS TO BE REMOVED AND/OR CULVERTED GRASS TO BE SODDED AND REPLACED



DETAILS OF FILLING FOR PIPE AT MINOR STREET CROSSINGS (minor rood)



TYPICAL DETAILS OF TRENCH FILLING WHERE TOPSOIL IS NOT REINSTATED



DETAILS OF FILLING FOR PIPE AT MINOR STREET CROSSINGS OR ALONG TOWNSHIP STREETS (minor rood)

NOTE: STREET BASES TO BE CONSTRACTED BY CONTRACTOR AND STREET WEARING SURFACES TO BE REINSTALLED AS PER THE WAYLEAVE CONDITIONS FROM THE CONTROLLING AUTHORITY

TABLE OF TRENCH WIDTHS FOR PIPE INSTALLATION

PIPE DIAMETER	W (R)	PIPE BED FOUNDATION
200	900	150
300	1000	150
450	1100	150
600	1200	150
700	1300	200
800	1600	200
900	1700	200
1000	1800	200
1100	2100	200
1200	2200	200
1300	2400	200
1400	2500	200
1500	2600	200
1600	2600	200
1700	2700	200
1800	2800	200
1900	2900	200
2000	3000	200
2100	3300	200
2200	3400	200
2300	3500	200
2500	3700	200

DETAILS OF FILLING FOR PIPE INSTALLED ALONG TOWNSHIP STREETS IN A NARROW TRENCH (minor rood)

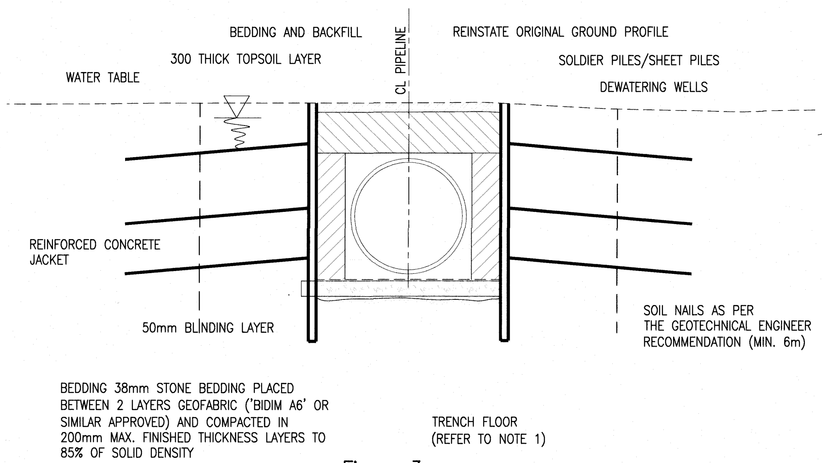


Figure 3a
TYPICAL CROSS SECTION THROUGH TRENCH – STABILISATION IN SAND WITH WATERTABLE (SOIL ANCHORS)

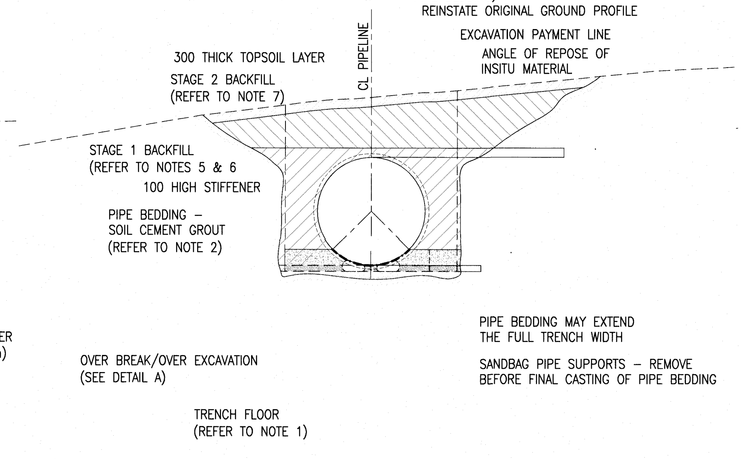


Figure 1a
TYPICAL CROSS SECTION THROUGH TRENCH IN ADEQUATE SOIL OR ROCK (ALTERNATE PIPE BEDDING MATERIAL)
FOR STIFFENED PIPE

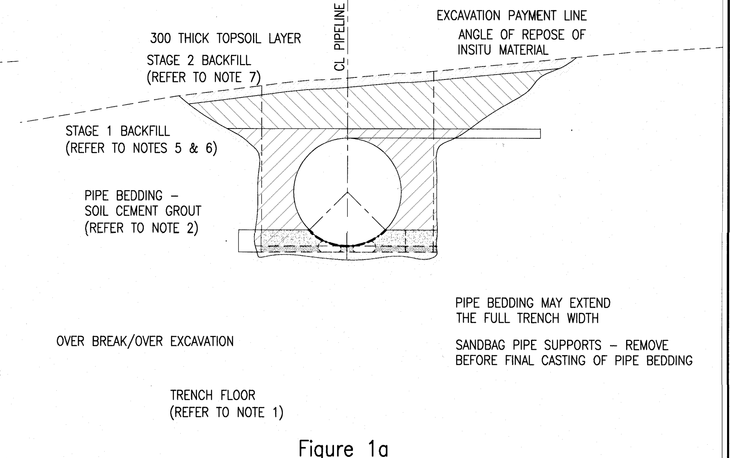
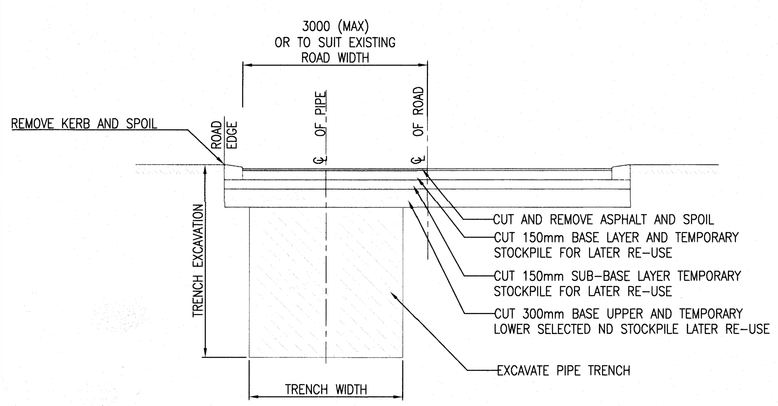
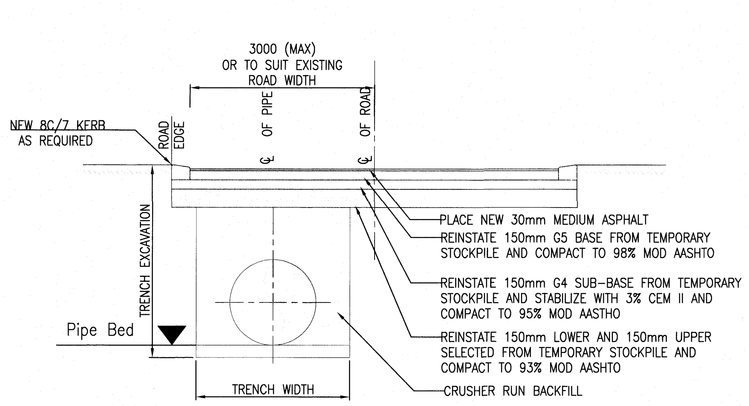


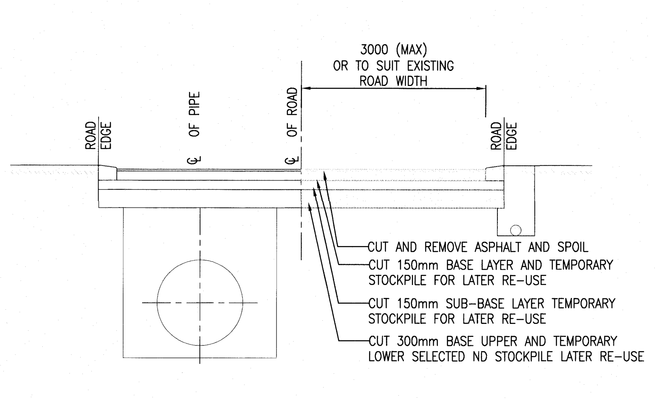
Figure 1a
TYPICAL CROSS SECTION THROUGH TRENCH IN ADEQUATE SOIL OR ROCK (ALTERNATE PIPE BEDDING MATERIAL)
FOR UNSTIFFENED PIPE



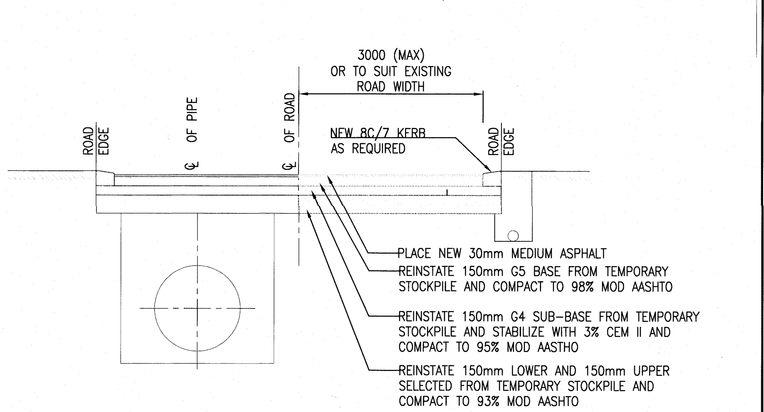
DETAILS OF ROAD EXCAVATION
PHASE I



DETAILS OF TRENCH AND ROAD HALF WIDTH LAYER REINSTATEMENT
PHASE II



DETAILS OF ROAD HALF WIDTH EXCAVATION
PHASE III



DETAILS OF ROAD HALF WIDTH LAYER REINSTATEMENT
PHASE IV

DRG No. RO 27141

NOTES:

1. TRENCH FLOOR :
TRENCH BOTTOM TO BE FREE FROM DEBRIS AND WATER BEFORE PLACING PIPE BEDDING. LEVEL TRENCH FLOOR TO ALLOW THE USE OF SIDE SHUTTERS (IF REQUIRED)

2. PIPE BEDDING :
FOAM CEMENT MORTAR:- CASTING DENSITY 1200kg/m3 TO BE MIXED AND PLACED IN ACCORDANCE WITH THE APPROVED SUPPLIERS SPECIFICATIONS
OR
SOIL CEMENT GROUT :- THIS SHALL BE A FLOWABLE MIX AND ACHIEVE A 28 DAY DESIGN STRENGTH OF BETWEEN 0,7 AND 0,9 MPa. THE MIX SHALL CONTAIN 3% BY MASS OF PORTLAND CEMENT CEM1 COMPLYING WITH SANS 50197-1:2000 / EN 197-1:2000.

THE FLOWABILITY OF THE MIX SHALL BE TESTED USING A 150mm LONG SEGMENT OF PIPE WITH AN INSIDE DIAMETER OF 75mm. WHEN THE FILLED PIPE IS LIFTED AWAY FROM AN END PLATE, AN EVEN SPREAD OF MIX SHALL FLOW TO A DIAMETER OF 200mm.

THE SOIL CEMENT GROUT OR THE CELLULAR LIGHTWEIGHT CONCRETE MIX SHALL BE DESIGNED IN A LABORATORY AND APPROVED BY THE ENGINEER

3. 1 LAYER OF GEOFABRIC ('BIDIM GRADE A6' OR SIMILAR APPROVED) BOND BREAKER TO BE INSTALLED UN-BONDED TO THE EXTERNAL PIPE COATING AND SHALL EXTEND 50mm MINIMUM ABOVE THE SOIL CEMENT GROUT LAYER.

THE BOND BREAKER IS TO BE FIXED TO THE PIPE WITH AN APPROVED NYLON STRAPPING TAPE

4. STAGE 1 BACKFILL :
SELECTED GRANULAR MATERIAL COMPACTED TO 90% OF MOD AASHTO DENSITY IN 200mm MAX. THICK LAYERS

5. SELECTED GRANULAR MATERIAL FOR STAGE 1 BACKFILL SHALL COMPRISE LOOSE FINE SOIL BEING MAINLY SANDY OR CLAYEY-SAND MATERIAL WITH A PLASTICITY INDEX NOT EXCEEDING 15. THE SELECTED GRANULAR MATERIALS SHALL CONTAIN NO OULKLIP OR MATERIALS CHEMICALLY DELETERIOUS TO THE PIPE AND SHALL BE FREE OF PEBBLES, STONES AND FRAGMENTS OF SHATTERED ROCK WITH MAXIMUM DIMENSIONS EXCEEDING 10mm.

IN TERMS OF THE UNIFIED SOIL CLASSIFICATION SYSTEM THE SOIL FOR STAGE 1 BACKFILL SHALL BE WELL GRADED WITH THE COEFFICIENT OF UNIFORMITY, Cu >5 AND THE COEFFICIENT OF CURVATURE, Cc IN THE RANGE : 1 <Cc <3

THE MAXIMUM DRY DENSITY OF THE SOIL FOR STAGE 1 BACKFILL DETERMINED FROM THE MOD. AASHTO-T180 TEST SHALL BE GREATER THAN 1950 kg/m³

IF THE TRENCH IS EXCAVATED IN HARD ROCK MATERIAL THEN THE STAGE 1 MATERIAL SHOULD BE FOAM CEMENT MORTAR OR SOILCRETE.

6. STAGE 2 BACKFILL :
SELECTED FILL MATERIAL COMPACTED TO 85% OF MOD AASHTO DENSITY IN 300mm MAX. THICK LAYERS

7. IF THE DIFFERENCE IN PIPE DIAMETERS MEASURED BEFORE AND AFTER BACKFILLING SHOWS THAT THE PIPE DEFLECTION EXCEEDS 1,5% OF THE ORIGINAL PIPE DIAMETER, THE CONTRACTOR RESPONSIBLE FOR THE WORK SHALL REMOVE, REPLACE AND RE-COMPACT MATERIAL FOR THE FULL DEPTH OF BACKFILLING OVER THE LENGTH OF PIPE AFFECTED.

8. THE SPRINGLINE ANGLE FOR ALL TRENCH CONDITIONS WILL BE 90° FOR PAYMENT LINE AND MEASUREMENT PURPOSES.

REVISIONS

No	DATE	CHECKED	APPROVED	DESCRIPTION

REFERENCE DRAWINGS

NUMBER	TITLE

RAND WATER
BOX 1127
JOHANNESBURG
2000
TEL: 011-682-0911
C.TUMBARE
DESIGN OFFICE MANAGER

SAP No.		CHECKED	
CONTRACT No.		SECTION HEAD	
ORIGINATOR	T.PHUTHA	APPROVED	Pr. Eng/Tech
DRAWN BY	D. KATSKY	CAPACITY	
DATE	09/12/2016	DATE	10/04/2017

PIPELINES AND BOOSTERS
TYPICAL DETAILS
TRENCH EXCAVATION AND BACKFILLING

STATION | WKS | DOC. TYPE
P | L | | | | | | | | | | | | | D | C | G |

SCALE N.T.S.

DRG No. RO 27141

REVISION 0