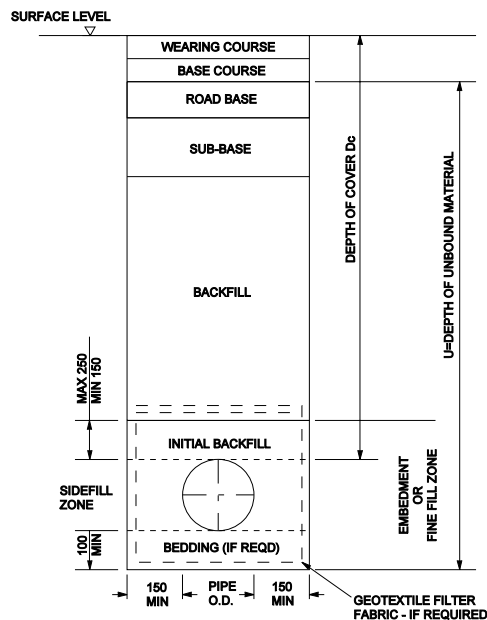
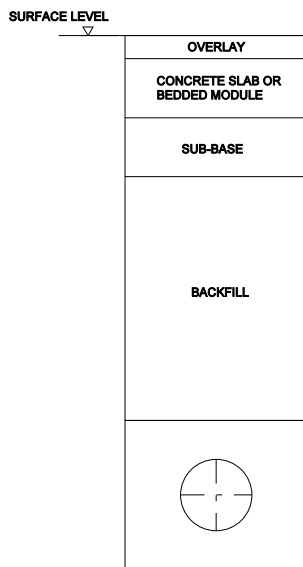


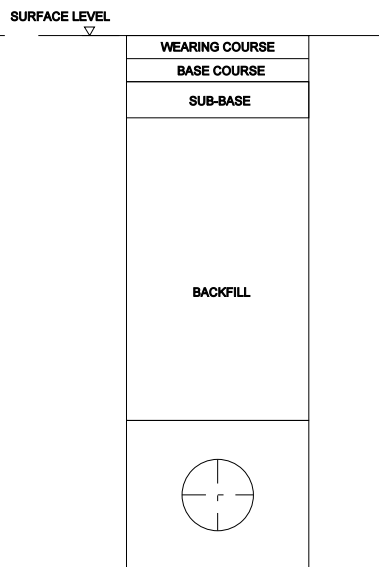
TYPICAL TRENCH CROSS SECTIONS:-



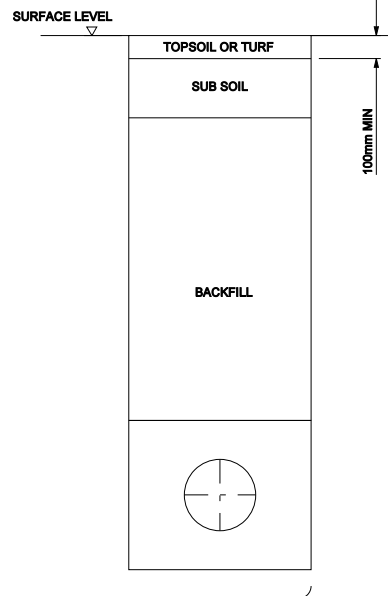
ROAD - FLEXIBLE OR COMPOSITE CONSTRUCTION



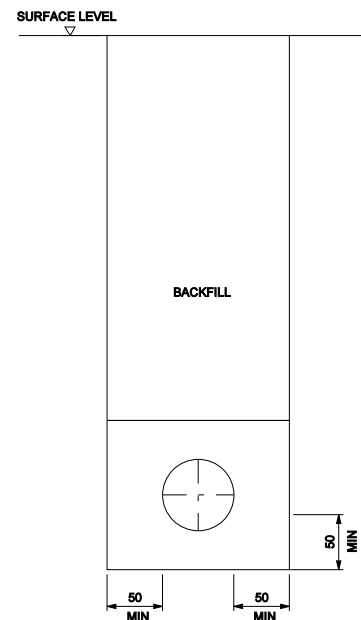
ROAD - RIGID OR MODULAR CONSTRUCTION



FOOTWAY AND CYCLEWAY



ROAD VERGE OR FIELD



NARROW TRENCHING - MINIMUM REQUIREMENTS BED AND SURROUND

DO NOT SCALE - IF IN DOUBT ASK

NOTES

1.0 PIPE BED

1.1 PIPES SHALL BE LAID ON A BED OF MATERIAL WHICH WILL PROVIDE EVEN AND CONTINUOUS SUPPORT. IN SUITABLE SOILS THIS CAN BE ACHIEVED BY HAND TRIMMING THE BASE OF THE TRENCH WITH ANY PREDOMINANTLY HARD OR SOFT SPOTS BEING REMOVED AND REPLACED BY COMPACTED FINE MATERIAL  
1.2 WHERE SUCH TRIMMING CANNOT BE EASILY AND RELIABLY ACHIEVED THE TRENCH SHALL BE EXCAVATED A MINIMUM OF 100mm BELOW THE BOTTOM OF THE PIPE AND THE PIPE SUPPORTED ON A BED OF COMPACTED FINEFILL MATERIAL

2.0 SIDEFILL

2.1 SIDEFILL MATERIAL SHALL BE IMPORTED GRANULAR OR AS DUG MATERIAL COMPACTED TO ACHIEVE THE REQUIRED VALUE FOR MODULUS E' AND TO LIMIT SETTLEMENT AS REQUIRED BY THE DESIGN  
2.2 COMPACTION PLANT USED SHALL BE APPROPRIATE FOR USE IN LIMITED ACCESS WIDTHS BETWEEN PIPE AND TRENCH WALL  
2.3 IF COMPACTION OCCURS BEFORE TRENCH SUPPORTS ARE WITHDRAWN A VALUE OF E'=0kN/m² SHALL BE ASSUMED

3.0 BACKFILL

3.1 BACKFILL MATERIAL SHALL COMPLY WITH CLASS A TO D OF THE HAUC SPECIFICATION  
3.2 BACKFILL SHALL BE PLACED IN LAYERS NOT MORE THAN 100mm AND NOT LESS THAN 75mm THICK AND COMPACTED IN ACCORDANCE WITH APPENDIX A8 OF THE CODE OF PRACTICE  
3.3 MATERIALS SUBJECT TO FROST HEAVE SHALL NOT BE USED WITHIN 450mm OF THE SURFACE, OR 300mm IF UNDER BITUMINOUS SURFACING  
3.4 CLAY STANKS OR OTHER MEANS SHALL BE INSTALLED AT INTERVALS ALONG THE ROUTE OF THE TRENCH TO PREVENT SIGNIFICANT ALTERATION TO THE EXISTING GROUNDWATER FLOW PATTERNS

4.0 REINSTATEMENT

4.1 REINSTATEMENT SHALL BE TO HAUC SPECIFICATION  
4.2 EXISTING ROAD CONSTRUCTION SHALL BE CONFIRMED WITH HIGHWAY AUTHORITY  
4.3 TOPSOIL AND SUBSOIL SHALL BE STRIPPED SEPARATELY REGARDLESS OF THICKNESS, STORED SEPARATELY AND REINSTATED SEPARATELY TO ORIGINAL LEVELS

5.0 GENERAL

5.1 THIS DRAWING IS INTENDED TO COVER THE MAJORITY OF SITUATIONS.  
5.2 MATERIAL FOR PIPE BED AND SURROUND MAY BE SELECTED GRADED AS DUG MATERIAL.  
5.3 MATERIALS FOR PIPE BED SURROUND AND TRENCH BACKFILL SHALL BE APPROVED BY THE THAMES WATER PROGRAMME MANAGER  
5.4 UP TO 250mm OD PE PIPE, 50mm BED AND SURROUND, 10mm SINGLE SIZE PEA SHINGLE  
5.5 PE PIPE < 250mm MAY BE LAID USING NARROW TRENCHING TECHNIQUES. PIPE SHALL BE FULLY SURROUNDED WITH 10mm SINGLE SIZE PEA SHINGLE  
5.6 MATERIAL FOR TYPE 1 MAY BE RECYCLED MATERIAL  
5.7 THE MARKER TAPE SHALL BE PLACED ON THE TOP OF THE PIPE SURROUND

GUIDANCE NOTE

A. THIS DRAWING DETAILS BEST PRACTICE AND SHALL BE ADHERED TO WHERE EVER PRACTICABLE.  
DEROGATION OF THE CONTENT ON INTENT OF THIS DRAWING REQUIRES WRITTEN CONSENT FROM THE TECHNICAL LEAD.

B. PIPE BED AND SURROUND MATERIALS SHALL COMPLY WITH WIS 4-08-02. SEE ALSO IGN 4 -08-01

C. MATERIAL THAT IS NOT INERT, EG ASPHALT PLANINGS, SHALL NOT BE USED FOR PIPE BED AND SURROUND OR ON ANY WATER SITE DUE TO THE POSSIBILITY OF ACTIVE COMPONENTS / CONTAMINANTS LEACHING INTO THE PIPEWORK OR AQUIFER.

D- WHERE APPLICABLE ALL MATERIALS SHALL BE FROM THAMES WATER FRAMEWORK SUPPLIERS.

ABSTRACT FROM WIS 4-08-02 TABLE A2

PROCESSED GRANULAR BEDDING AND SIDEFILL MATERIALS FOR FLEXIBLE PIPES

PIPE NOMINAL BORE (mm) SEE NOTE (d)	NOMINAL MAXIMUM PARTICLE SIZE (mm)	MAXIMUM CF VALUE FOR ACCEPTABILITY SEE NOTE(b)	MATERIALS SPECIFIED IN BRITISH STANDARDS SEE NOTE (a)
100	10	0.15	10mm NOMINAL SINGLE-SIZE
OVER 100 TO 150	15	0.15	10 OR 14mm NOMINAL SINGLE-SIZE OR 14mm TO 5mm GRADED
OVER 150 TO 300	20	0.15	10, 14 OR 20mm NOMINAL SINGLE-SIZE OR 14mm TO 5mm GRADED OR 20mm TO 5mm GRADED
OVER 300 TO 550	20	0.15	14 OR 20mm NOMINAL SINGLE-SIZE OR 14mm TO 5mm GRADED OR 20mm TO 5mm GRADED
OVER 550	40	0.15	14, 20 OR 40mm SINGLE-SIZE OR 14mm TO 5mm GRADED OR 20mm TO 5mm GRADED OR 40mm TO 5mm GRADED

NOTES  
(a) PROCESSED GRANULAR MATERIALS TO INCLUDE AGGREGATES TO BS 882, AIR-COOLED BLASTFURNACE SLAG TO BS1047 AND LIGHTWEIGHT AGGREGATES TO BS 3797  
(b) COMPACTION FRACTION VALUE (CF), SEE WIS No 4-08-02  
(c) FOR THE PURPOSE OF THIS TABLE, PE PIPES OF 630mm OD CAN BE REGARDED AS HAVING NOMINAL BORES OF OVER 650mm, IRRESPECTIVE OF WALL THICKNESS  
(d) NOMINAL BORE IS USED IN PREFERENCE TO DN BECAUSE OF THE DIFFERENT NOMINAL SIZE CLASSIFICATIONS FOR FLEXIBLE PIPES  
(e) FOR PE80 AND PE100 POLYETHYLENE PIPE COMPLYING WITH CURRENT RELEVANT WATER INDUSTRY SPECIFICATIONS, THE MAXIMUM SIDEFILL PARTICLE SIZE MAY BE INCREASED TO 10% OF THE PIPE NOMINAL SIZE  
(f) FOR E' VALUES FOR PROCESSED GRANULAR MATERIALS REFERENCE SHOULD BE MADE TO TABLE A.3 WHERE SPECIFIC SITE TESTS HAVE NOT BEEN PERFORMED  
(g) FOR FERROUS AND CEMENTITIOUS PIPELINE MATERIALS, THE SULPHATE CONTENT OF BEDDING AND SIDEFILL MATERIALS SHOULD NOT BE GREATER THAN 0.3% AS SULPHUR TRIOXIDE

ABSTRACT FROM WIS 4-08-02 TABLE A3

TYPICAL MODULUS VALUES FOR PROCESSED AND AS-DUG BEDDING AND SIDEFILL MATERIALS FOR USE IN FLEXIBLE PIPELINE DESIGN

DESCRIPTION	MATERIAL CASAGRANDE SYMBOL SEE NOTE (d)	MODULUS OF SOIL REACTION E' (MN/M²) SEE NOTE (a2)			
		DEGREE OF COMPACTION			
		UNCOMPACTED SEE NOTE (a1)	80% MODIFIED PROCTOR	85% MODIFIED PROCTOR	90% MODIFIED PROCTOR
GRAVEL SINGLE-SIZED	GPu	5	7	7	10
GRAVEL GRADED	GW	3	5	7	10
SAND AND COARSE GRAINED SOIL WITH LESS THAN 12% FINES	GP SW SP	1	3	5	7
COARSE GRAINED SOIL WITH MORE THAN 12% FINES	GM GC SM	*	1	3	5
FINE GRAINED SOIL WITH MEDIUM TO NO PLASTICITY AND CONTAINING MORE THAN 25% COARSE GRAINED PARTICLES (LL<50%) SEE NOTE (e)	CL,ML MIXTURES ML/CL AND ML/MH	*	1	3	5
FINE GRAINED SOIL WITH MEDIUM TO NO PLASTICITY AND CONTAINING LESS THAN 25% COARSE GRAINED PARTICLES (LL<50%) SEE NOTE (f)	CL,ML MIXTURES ML/CL AND ML/MH	*	*	1	3

\* NO RELIABLE MODULUS VALUES FOR THESE MATERIALS  
(a1) FOR ANY SITUATION WHERE BEDDING AND SIDEFILL TRENCH MATERIAL MUST BE PLACED AND COMPACTED WITHIN TEMPORARY TRENCH SUPPORTS, THE VALUE CHOSEN FOR E' SHOULD BE THAT ASSOCIATED WITH UNCOMPACTED MATERIAL  
(a2) REFER TO ER201E FOR THE MEANING AND USE OF MODULUS OF SOIL REACTION, E'  
(b) BS 1377, 'DETERMINATION OF DRY DENSITY/MOISTURE CONTENT RELATIONSHIP (4.5kg RAMMER METHOD)', IS USED TO DETERMINE THE MODIFIED PROCTOR DENSITY  
(c) SEMI-RIGID PIPES CAN BE DESIGNED AS EITHER FLEXIBLE OR RIGID  
(d) GPu - POORLY GRADED UNIFORM GRAVEL  
GW - WELL GRADED GRAVEL  
GP - POORLY GRADED GRAVEL  
SW - WELL GRADED SAND  
SP - POORLY GRADED SAND  
GM - VERY SILTY SAND  
GC - VERY CLAYEY GRAVEL  
SM - VERY SILTY SAND  
CL - CLAYS WITH LOW PLASTICITY  
ML - SILTS WITH LOW PLASTICITY  
CI - CLAYS WITH INTERMEDIATE PLASTICITY  
MI - SILTS WITH INTERMEDIATE PLASTICITY  
CL-ML - MIXTURES OF ML AND CL  
CI-MI - MIXTURES OF MI AND CI

RECOMMENDED MAXIMUM DEPTHS OF COVER FOR VARIOUS VALUES OF E'

		DIAMETER (IN mm)	DUCTILE IRON	SDR11 MDPE HPPE	SDR17.6 MDPE HPPE
FIELD	E' = 0	UP TO 600 ID	4.0M	3.2M	0
		UP TO 600 ID	>5.0M	>5.0M	4.4M
		600 TO 900 ID	5.0M	-	-
ROAD	E' = 3kN/m²	900 TO 1800 ID	4.0M	-	-
		UP TO 600 ID	>5.0M	4.2M	1.7M
		600 TO 900 ID	4.5M	-	-
	E' = 5kN/m²	900 TO 1800 ID	3.5M	-	-
		UP TO 600 ID	>5.0M	>5.0M	4.1M

RECOMMENDED TRENCH WIDTHS

PIPE OD (IN mm)	DESIGN TRENCH WIDTH
UP TO 220	450
225 TO 360	600
365 TO 690	PIPE OD + 300
700 TO 990	PIPE OD + 400
1000 TO 1700	PIPE OD + 600

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**Thames Water Utilities**  
**ASSET MANAGEMENT**  
CLEAR WATER COURT  
VASTERN ROAD, READING RG1 8DB

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Project Group: TECHNICAL STANDARDS		Sub Process:	
Location / Town:			
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