

PART C

STANDARD DETAILS FOR ENGINEERING WORKS

Map Symbolology

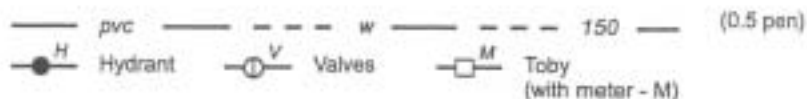
Survey Lines



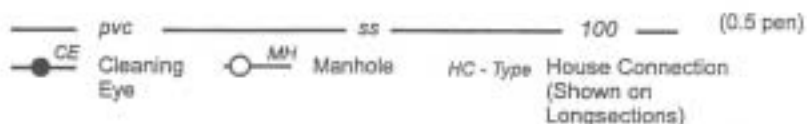
Boundaries



Watermains



Sanitary Sewer



Stormwater Sewer



Electricity



Telecommunications



Valuation Ass.



Street Numbers



Colour Coding for Earthworks in Section

FILLING	Green	Symbol =	
CUTTING	Red	Symbol =	
REPLACEMENT GRAVEL	Brown	Symbol =	
BASECOURSE	Blue	Symbol =	

NOTE:
Colour code primarily for use on white paper.
All inks used should be suitable for dyeline reproduction.
Symbol is for reproduction

Diagram C100

Rainfall Distribution Chart TM61 Calculations

THE DISTRIBUTION OF
10 MINUTE RAINFALL (mm) OF RETURN
PERIOD 5 YEARS
(FOR DURATION OF 5 TO 29 MINUTES)

FOR LONGER DURATION PERIODS
REFER WATER AND SOIL PUBLICATION NO.19

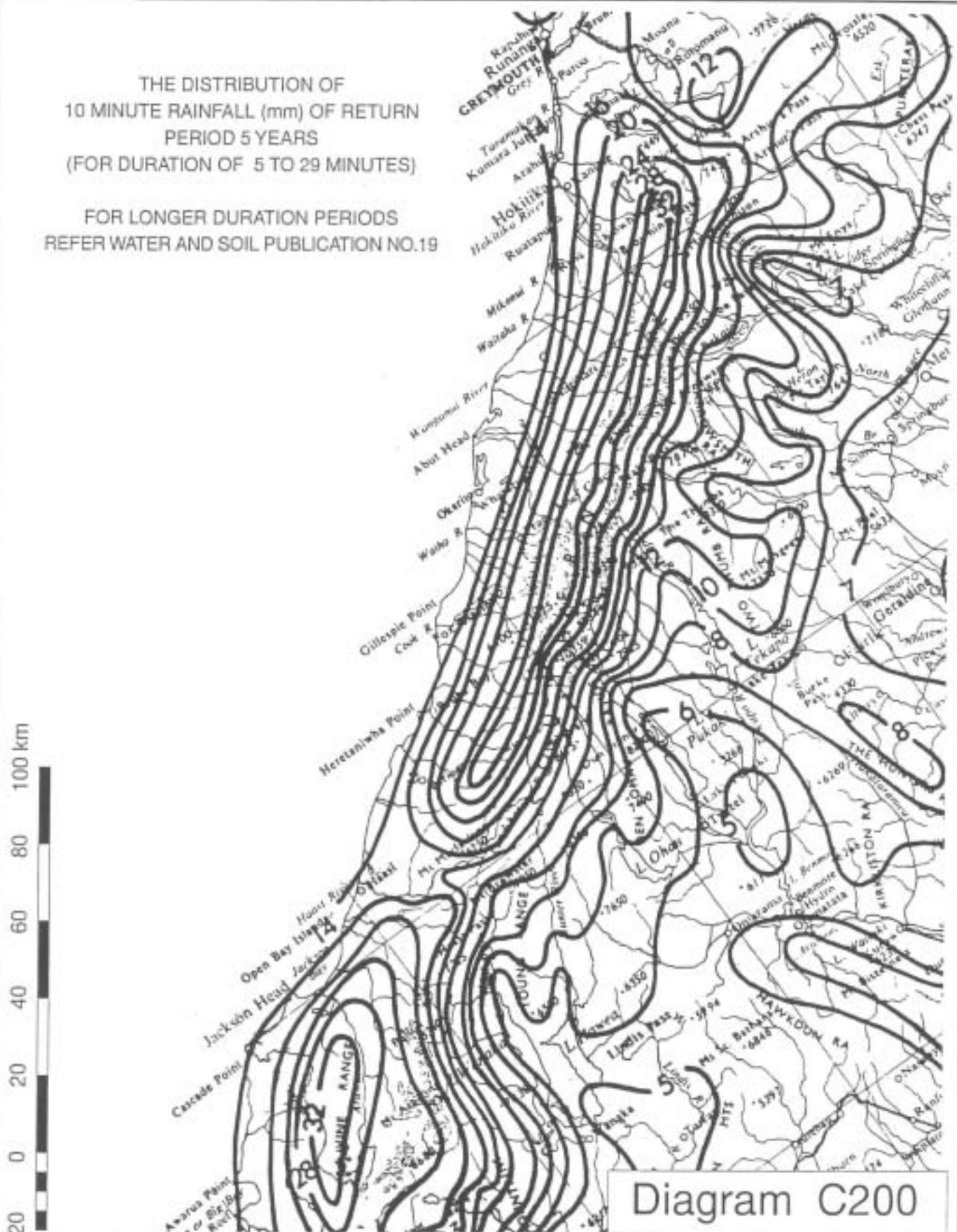


Diagram C200



WESTLAND
DISTRICT COUNCIL

November 1995

Stormwater
Reticulation Details

Rainfall Distribution Chart

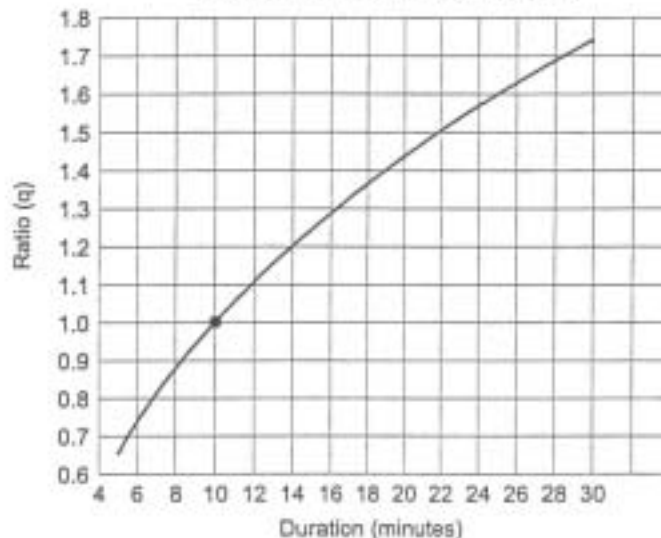
TM61 Calculations

◀ To use this map (C200 - previous page)

1. Take the 5 year period value (p) from this map.
The standard error for p is $\sigma_p = 0.08 \times p$
2. Take the rainfall duration ratio (q) and its standard error (σ_q) from the graph.
3. Take the return period conversion ratio (r1) and its standard error (σ_r) from the Return Period Conversion Table.
4. The desired estimate is then given by PP, where $PP = p \times q \times r1$.
5. The standard error of PP is given by $\sigma_{pp} = \sqrt{p^2 \times \sigma_q^2 + q^2 \times \sigma_p^2 + r1^2 \times \sigma_r^2}$, and $s = q \times r1$, and $\sigma_s = \sqrt{q^2 \times \sigma_r^2 + r1^2 \times \sigma_q^2}$

RAINFALL DURATION FACTOR

Standard error of (q) is $0.20 \times |q - 1|$



RATIO TO THE 10 - MINUTE RAINFALL FOR RAINFALLS OF
5 TO 29 MINUTE DURATION AND 5 YEAR RETURN PERIOD

RETURN PERIOD CONSERVATION TABLE

Return Period (years)	Ratio to 5 year Value (r1)	Standard Error of Ratio (σ_r)
1.1	0.425	0.099
1.5	0.614	0.067
2.0	0.726	0.048
2.3	0.777	0.039
3.0	0.855	0.025
4.0	0.939	0.011
5.0	1.000	0.000
10.0	1.182	0.031
15.0	1.284	0.049
20.0	1.356	0.062
25.0	1.411	0.071
30.0	1.456	0.079
40.0	1.527	0.091
50.0	1.582	0.101
60.0	1.626	0.108
70.0	1.664	0.115
80.0	1.696	0.120
90.0	1.725	0.125
100.0	1.751	0.130

Diagram C201



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DISTRICT COUNCIL

November 1995

Stormwater
Reticulation
Details

High Intensity Rainfall Design Depths

Rainfall Depths

LOCATION: 42.75S 171.00E - HOKITIKA

RAINFALL DEPTHS (mm)

ARI				DURATION							
(y)	10m	20m	30m	1h	2h	3h	6h	12h	24h	48h	72h
2	11	16	18	24	35	45	64	84	111	137	152
5	15	22	25	34	47	60	85	111	147	183	203
10	18	26	29	40	55	70	99	130	172	213	236
20	21	30	33	46	62	79	112	147	195	242	268
30	22	32	36	49	67	85	120	157	209	259	287
50	24	35	39	53	72	92	129	170	225	279	310
60	25	36	40	55	74	94	133	175	231	287	318
70	25	37	41	56	76	96	136	178	236	293	325
80	26	37	42	57	77	98	138	182	241	298	331
90	26	38	42	58	78	100	140	185	245	303	336
100	27	38	43	59	79	101	142	187	248	307	341

LOCATION: 43.83S 169.00E - HAAST

RAINFALL DEPTHS (mm)

ARI				DURATION							
(y)	10m	20m	30m	1h	2h	3h	6h	12h	24h	48h	72h
2	10	15	17	24	35	57	80	108	143	177	196
5	14	20	24	33	46	76	107	143	190	236	261
10	17	24	28	39	54	89	125	167	221	274	304
20	19	27	33	45	61	101	142	190	251	312	346
30	20	29	35	48	66	107	151	203	269	333	369
50	22	32	38	52	71	116	163	219	290	360	399
60	23	33	39	54	73	119	168	225	298	369	410
70	23	34	40	55	74	122	171	230	304	377	419
80	24	34	41	56	76	124	175	234	310	384	426
90	24	35	42	57	77	126	177	238	315	391	433
100	25	35	42	58	78	128	180	241	319	396	439

LOCATION: 43.33S 170.17E - FRANZ JOSEF

RAINFALL DEPTHS (mm)

ARI				DURATION							
(y)	10m	20m	30m	1h	2h	3h	6h	12h	24h	48h	72h
2	22	32	39	53	77	90	126	176	233	289	320
5	31	45	53	73	103	119	168	234	310	384	426
10	37	53	63	86	120	139	196	273	361	448	497
20	42	61	72	99	136	158	222	310	410	509	564
30	45	65	78	106	145	169	237	331	438	544	603
50	49	71	84	116	157	182	257	358	474	587	651
60	50	73	87	119	161	187	263	367	486	603	668
70	51	74	89	122	164	191	269	375	497	616	683
80	52	76	90	124	168	195	274	382	506	627	696
90	53	77	92	126	170	198	278	388	514	637	707
100	54	78	93	128	173	200	282	393	521	646	717

Diagram C202

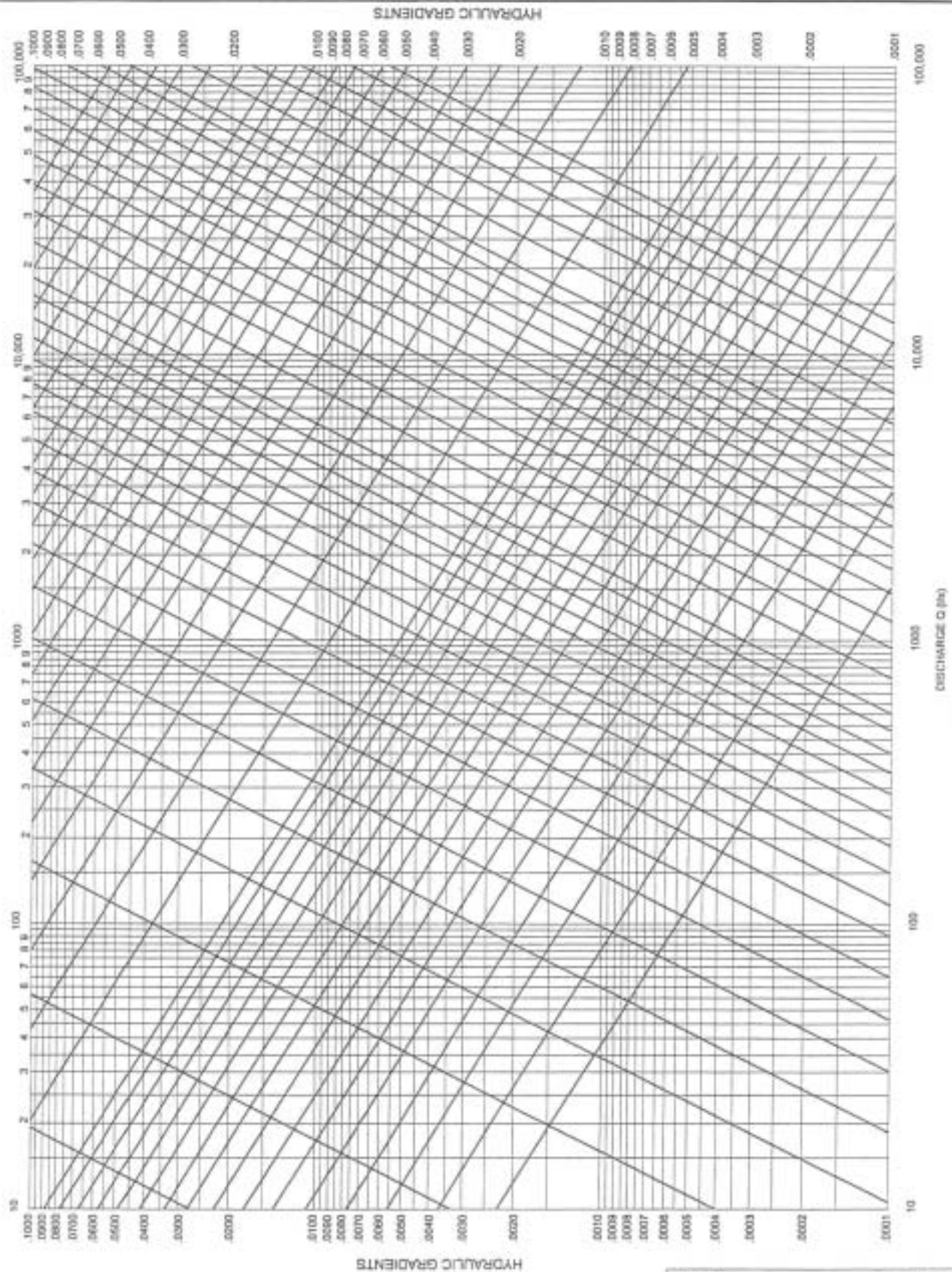


WESTLAND
DISTRICT COUNCIL

November 1995

Stormwater
Reticulation
Details

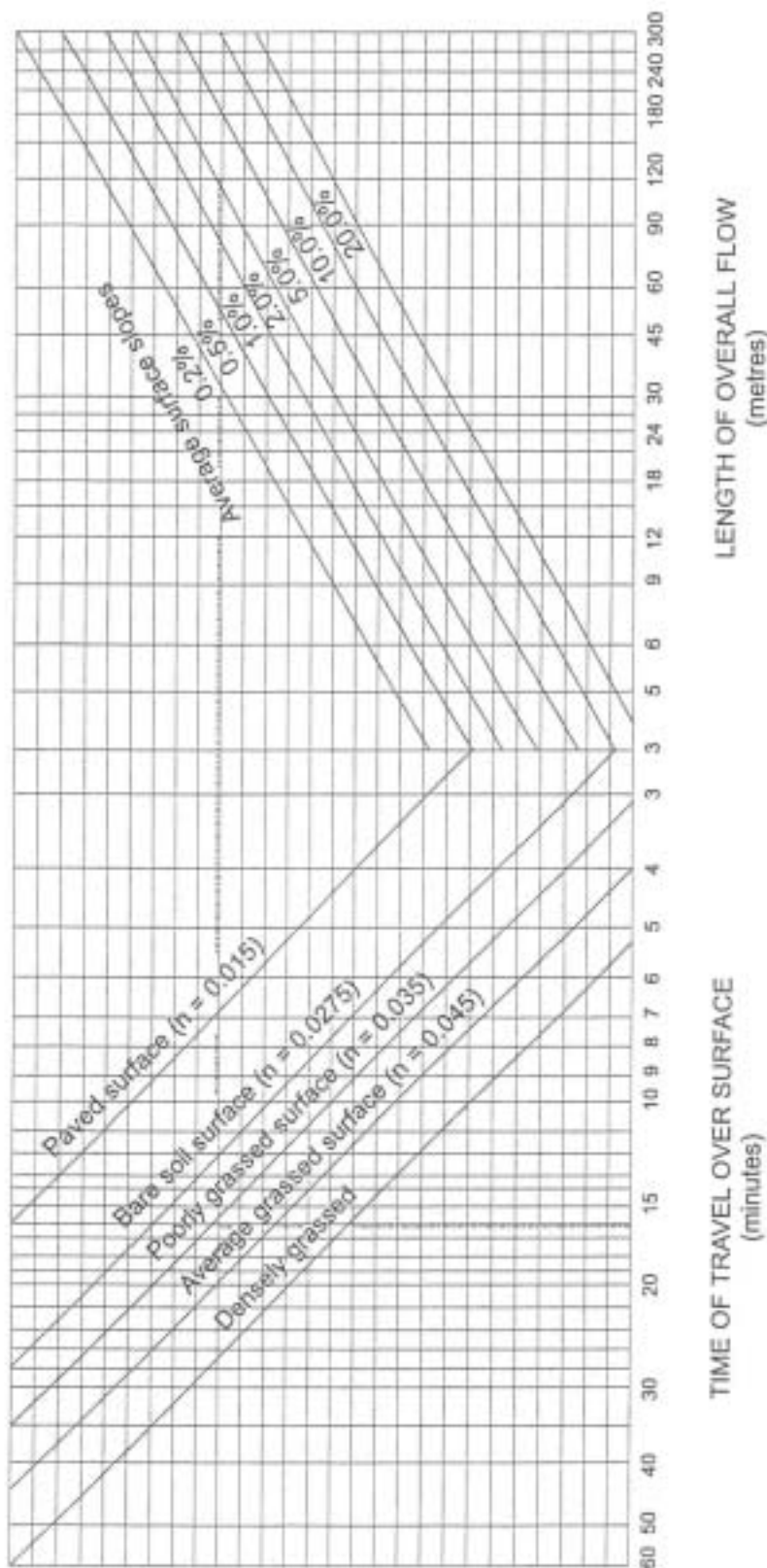
Capacity Calculations for Circular Concrete Pipes



COLEBROOK-WHITE FORMULA $k = 0.60 \text{ mm}$

Diagram C203

Times for Surface Flow



FORMULA $t = 107 n \sqrt[3]{L}$

where t = time to travel over surface in minutes
 n = Hortons values for the surface
 L = length of flow in metres
 S = slope of surface in %

EXAMPLE

length of overland flow = 120 m
 average slope of surface = 2%
 poorly grassed surface

TIME OF TRAVEL = 16.3 minutes

Data attributed to US Dept. of Agriculture 1942

Nomograph published in 'Municipal Utilities' September 1951.

Formula and values of 'n' added by J.A. Friend 19 November 1954.

Diagram C204



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November 1995

Stormwater
Reticulation
Details

Gutter Flow Times

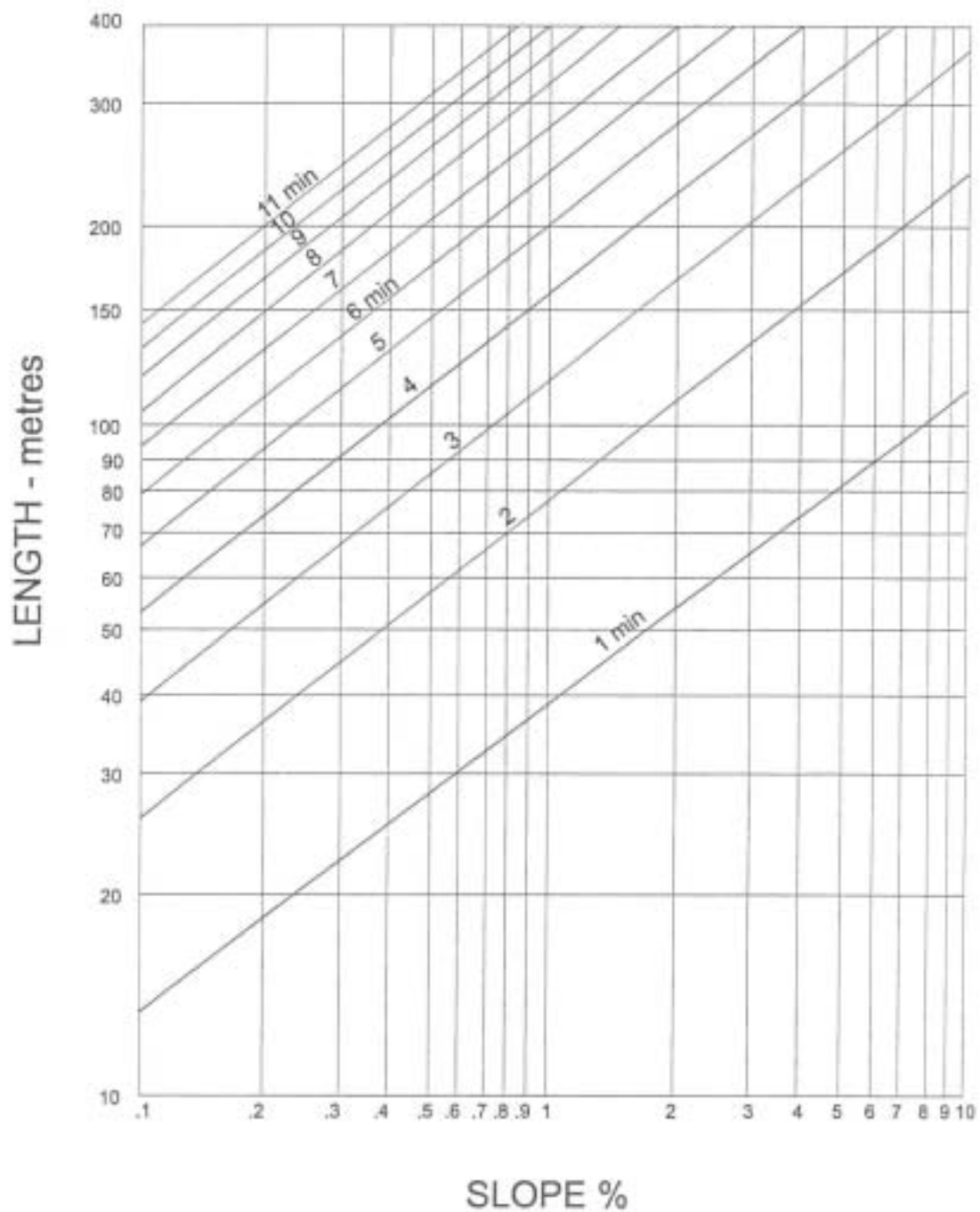


Diagram C205



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November 1995

Stormwater
Reticulation
Details

Standard Sump (also known as Double Sump)

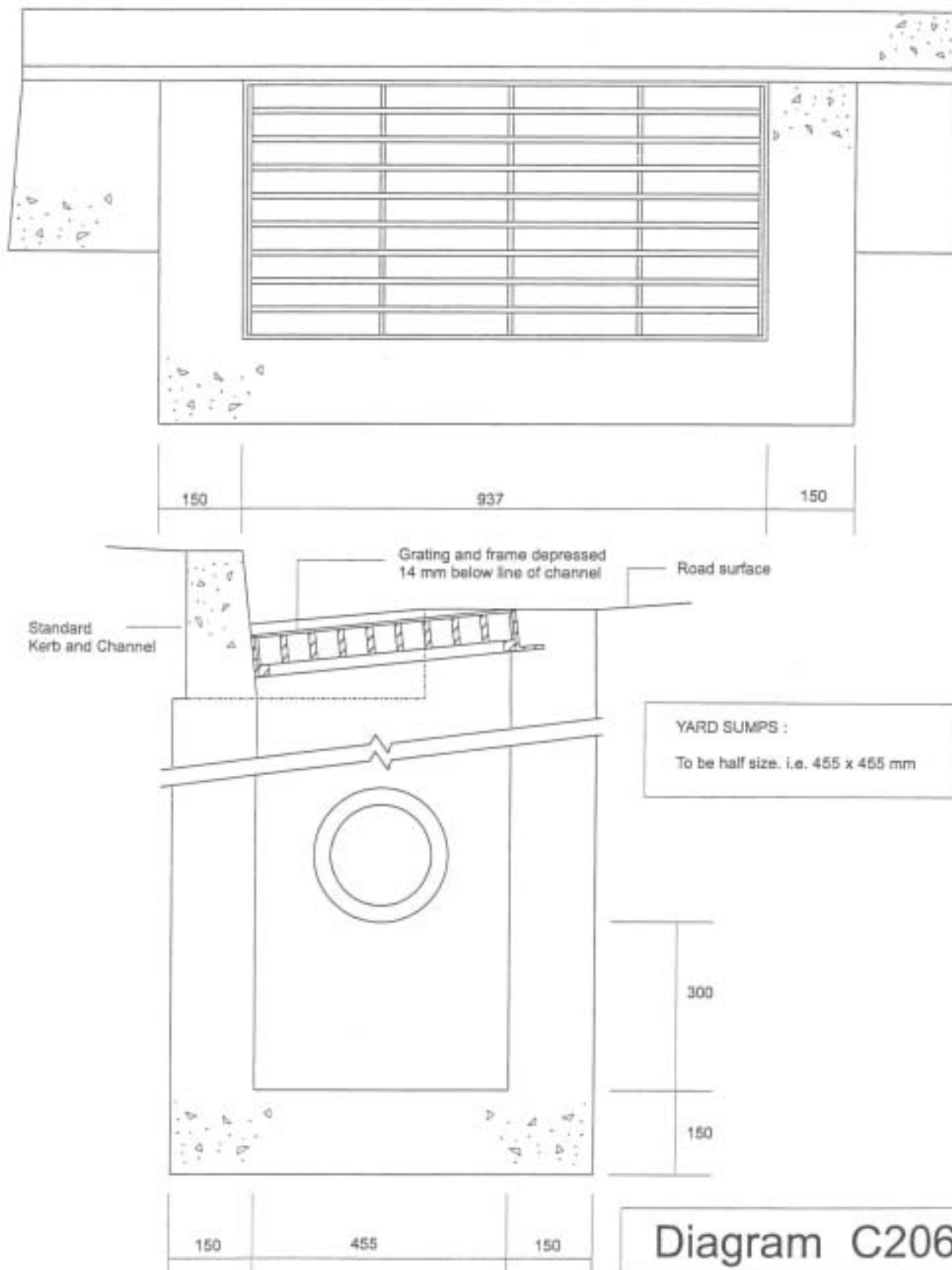


Diagram C206



WESTLAND
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November 1995

Stormwater
Reticulation
Details

Standard Sump Top and Grating

NOTE: Details shown for welded frame. Similar sized alternatives are acceptable i.e. cast iron etc ...

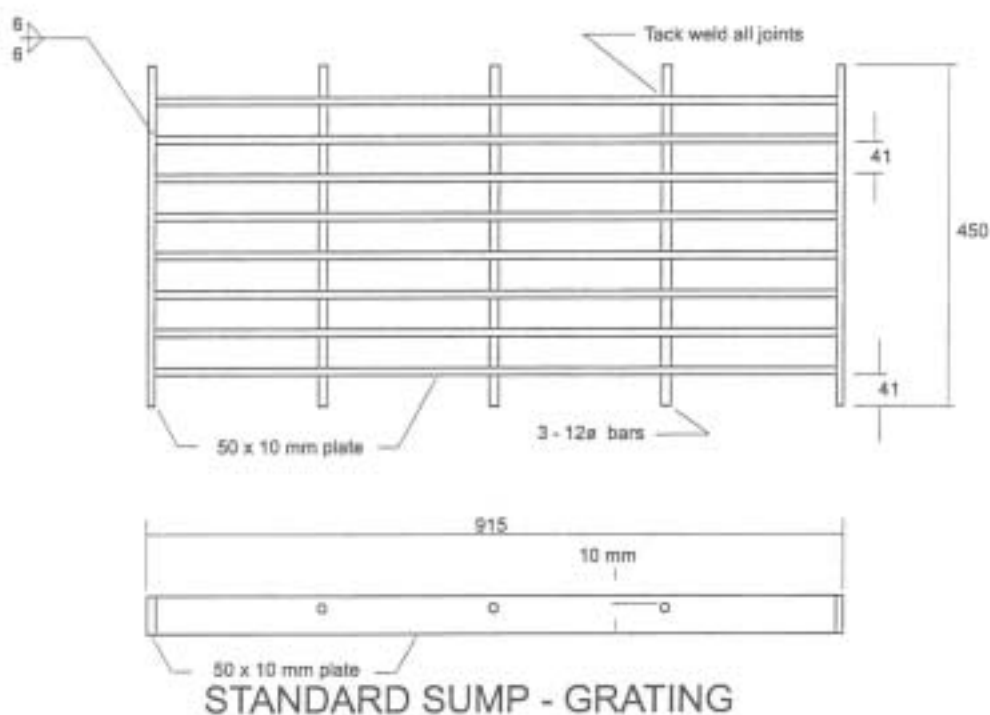
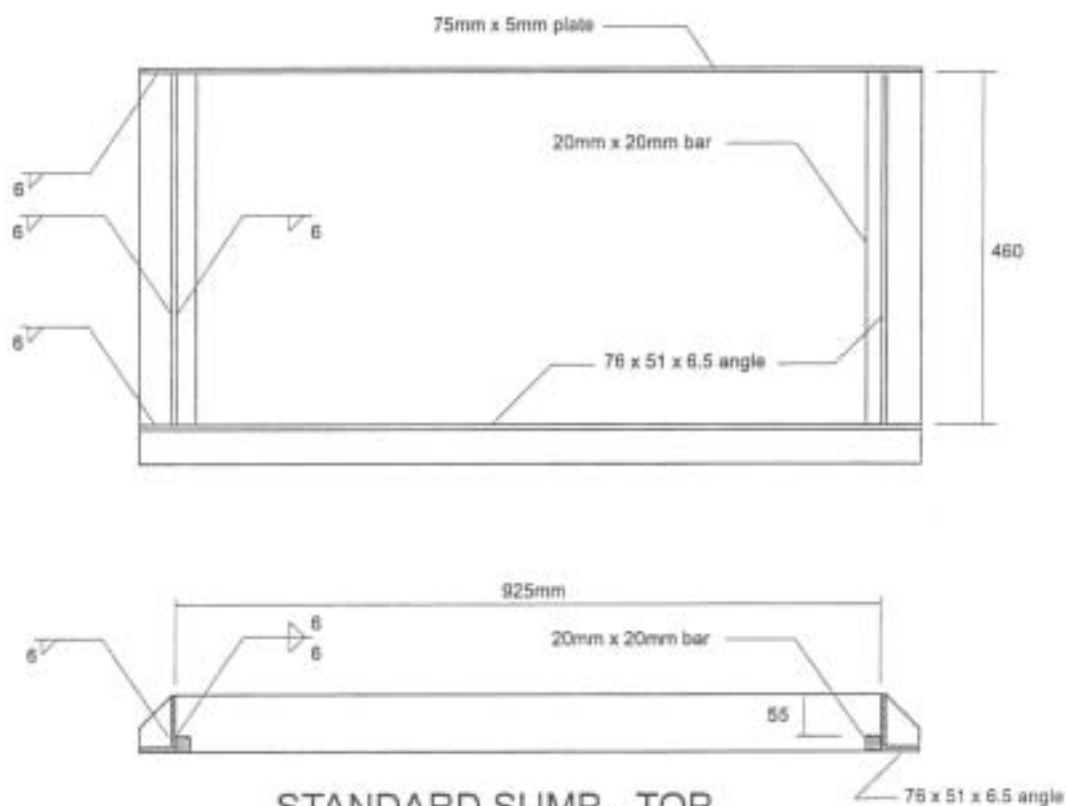


Diagram C207

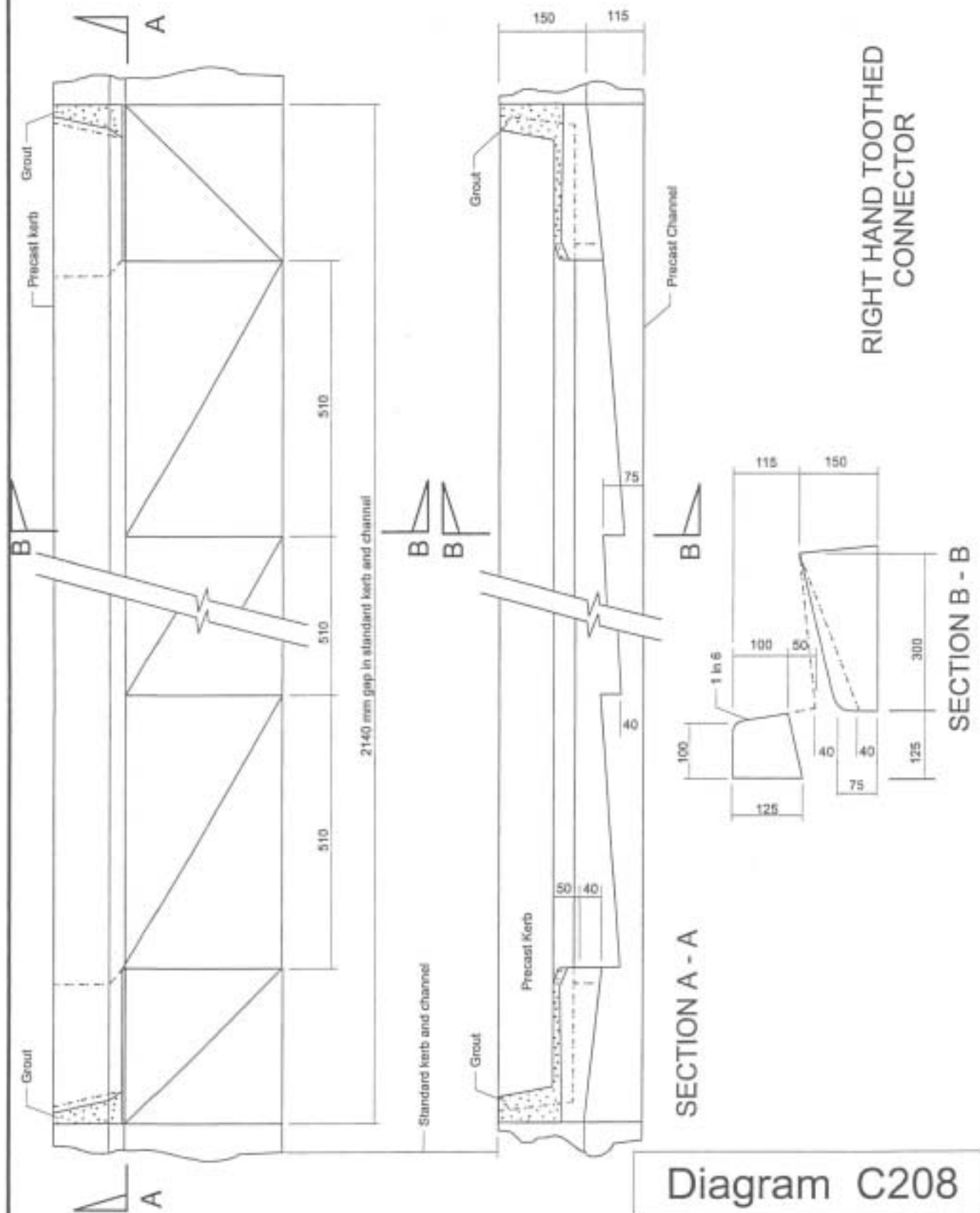


WESTLAND
DISTRICT COUNCIL

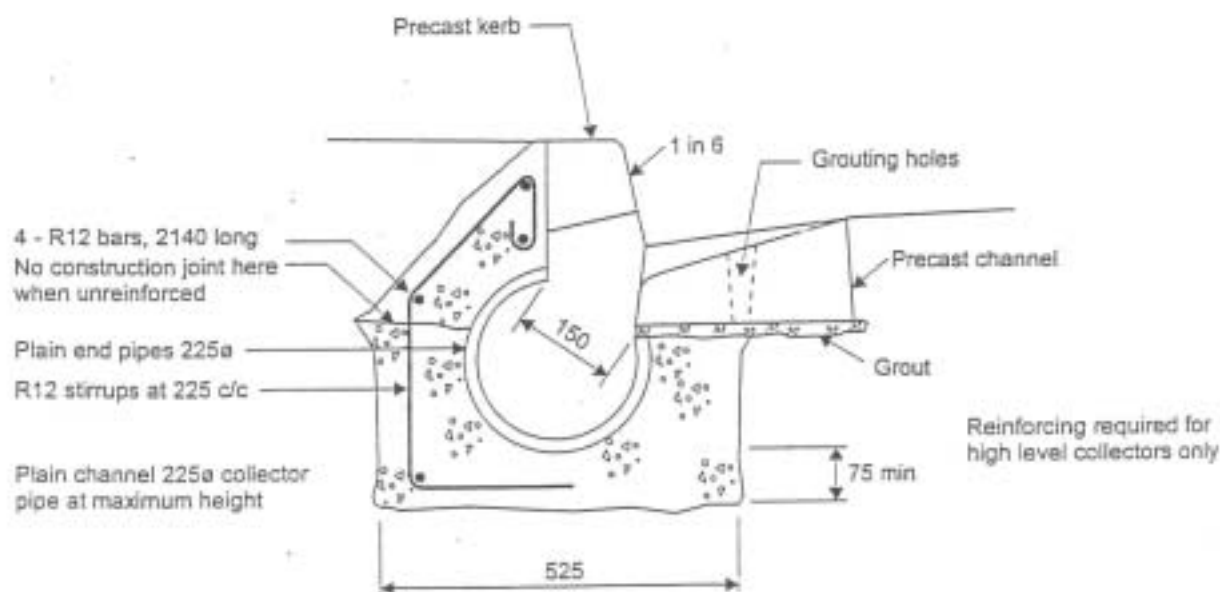
November 1995

Stormwater
Reticulation
Details

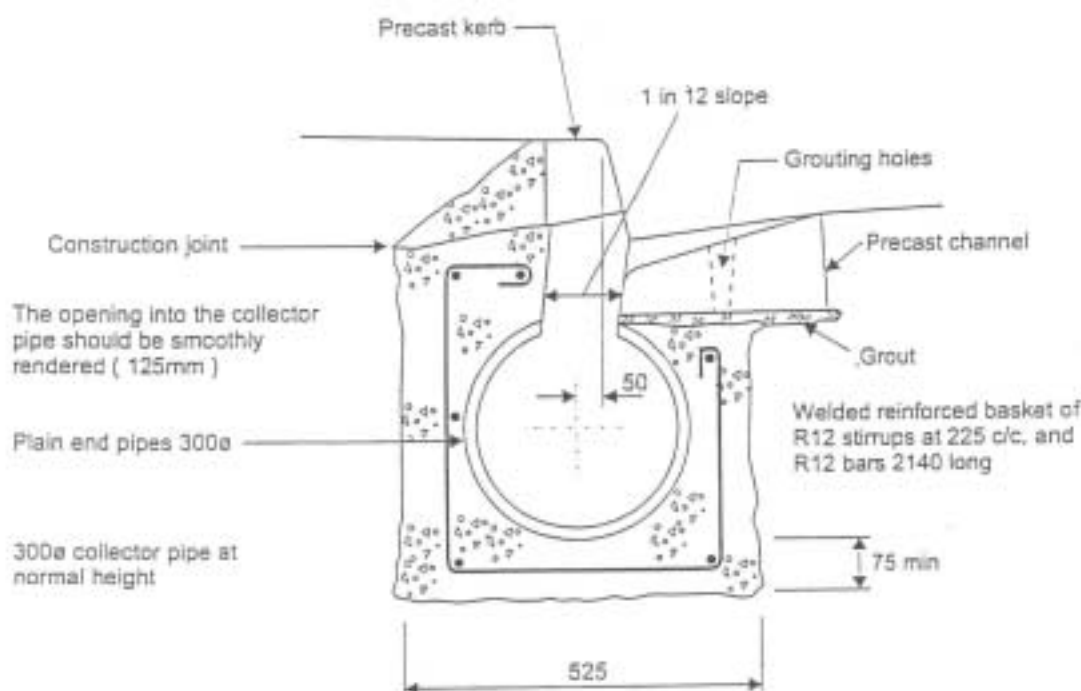
Standard Toothed Connector



Standard Intake Section of Toothed Connector



SPECIAL SHALLOW SECTION OF TOOTHED CONNECTOR



STANDARD INTAKE SECTION OF TOOTHED CONNECTOR

NOTE:

Reinforcing steel to be used
when required by the Engineer

Diagram C209

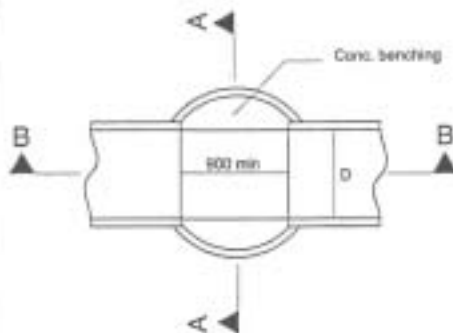


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DISTRICT COUNCIL

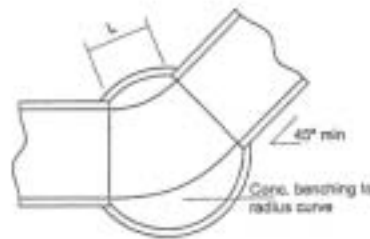
November 1995

Standard
Stormwater
Details

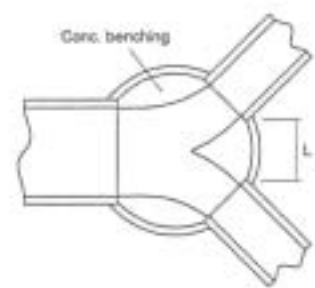
Manhole Details



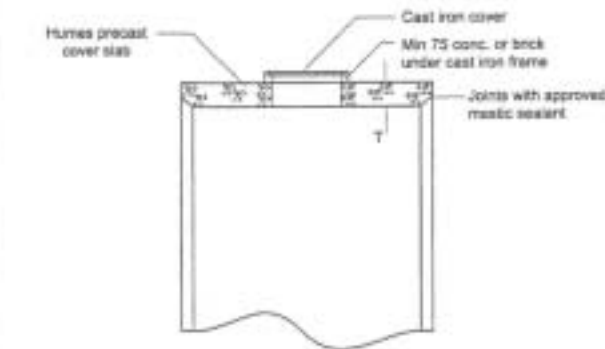
TYPE A
(Through channel one pipe dia.)



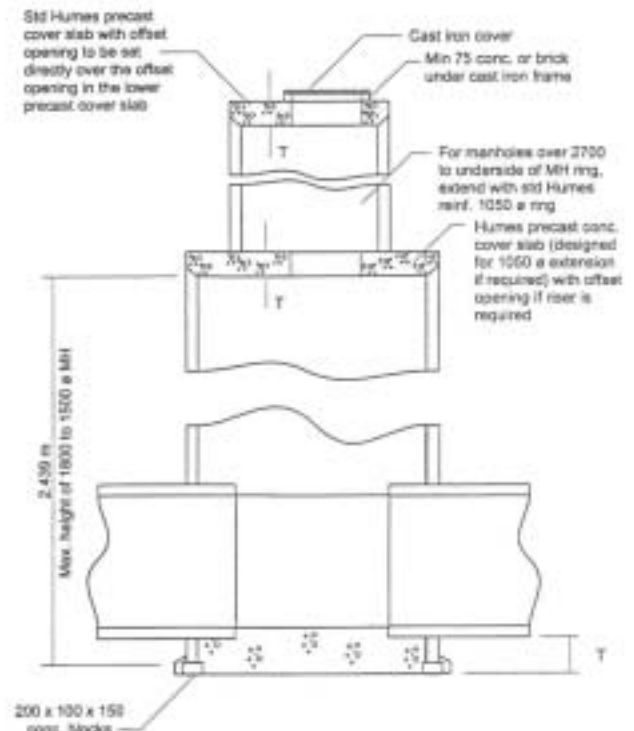
TYPE B
(Angle channel one pipe dia.)



TYPE C
(Typical junction manhole)



TYPICAL SECTION A - A



TYPICAL SECTION B - B

NOTES:

- For pipes up to and including 450 ø, MH details are as for soil sewer manholes.
- For pipes over 1200 ø and for situations where this standard cannot be met, cast-in-situ manholes are to be designed.
-

MH ø	L (min)	T (min)	D (max)
1800	850	200	1200
1500	500	200	1050
1350	400	200	750
1050	350	150	450

Diagram C210

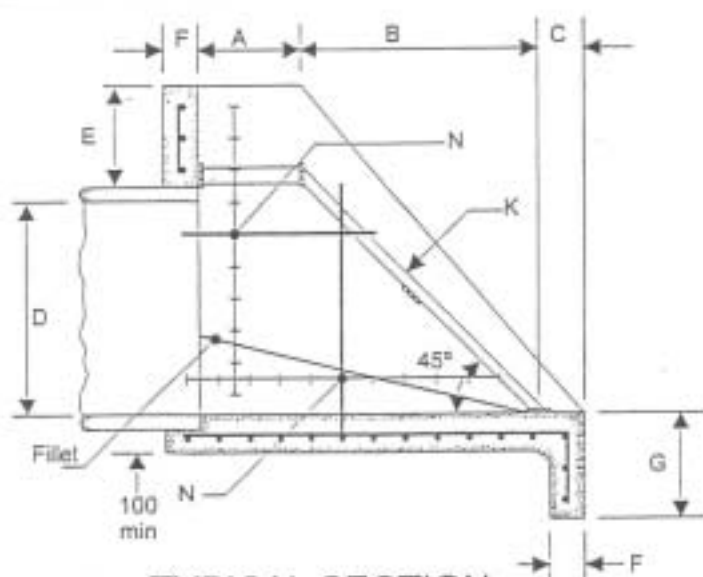


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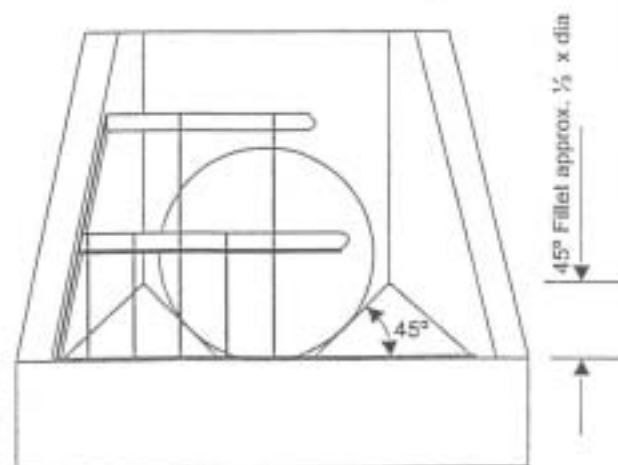
November 1995

Stormwater
Reticulation
Details

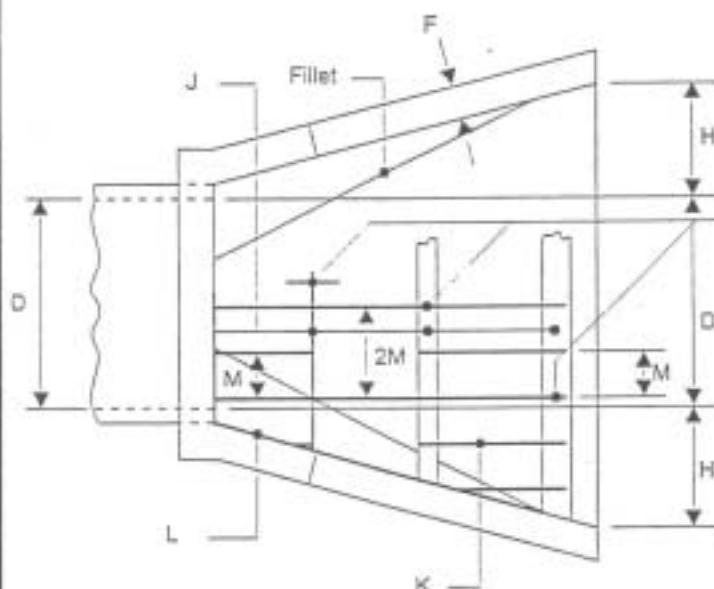
Typical Stormwater Inlet Structure Details



TYPICAL SECTION



TYPICAL ELEVATION



TYPICAL PLAN

NOTES:

1. Skew and / or very steep approach inlets will require detail design based on this standard.
2. Reinforcing is minimum and retaining wall must be designed for individual circumstances.
3. All reinforcement to be placed centrally in walls and floor, and to be continuous between walls and between floor and walls.
4. At least 2 horizontal bars to be placed over the pipe in the end wall.
5. Grade of apron to be not less than grade of pipe.
6. Dimensions of grill to be fully detailed for each case.
7. Full headwalls and sidewalls to be provided as case requires in addition to minimum requirement shown.
8. This standard shows minimum requirements; the details of approach, depth, stability of ground and other factors in each case must be taken into account in the design.

PIPE INLET SCHEDULE

NOMINAL PIPE Ø	300 ø	375 ø	450 ø	525 ø	600 ø	675 ø	750 ø	825 ø	900 ø	1050 ø	1200 ø	1350 ø	1500 ø	1875 ø	1800 ø
DETAIL A	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
B	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
C min	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
D	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
E min	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
F min	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
G min	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
H min	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
J	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5	75 x 10 M5
K	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5	25 x 10 M5
L	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5	50 x 10 M5
M	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
N	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
10	300	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1875	1800
100 bars Layer	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø
100 bars Layer	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø	3 x 12ø

Approved Precast Inlet Structures May Be Used.

Diagram C211

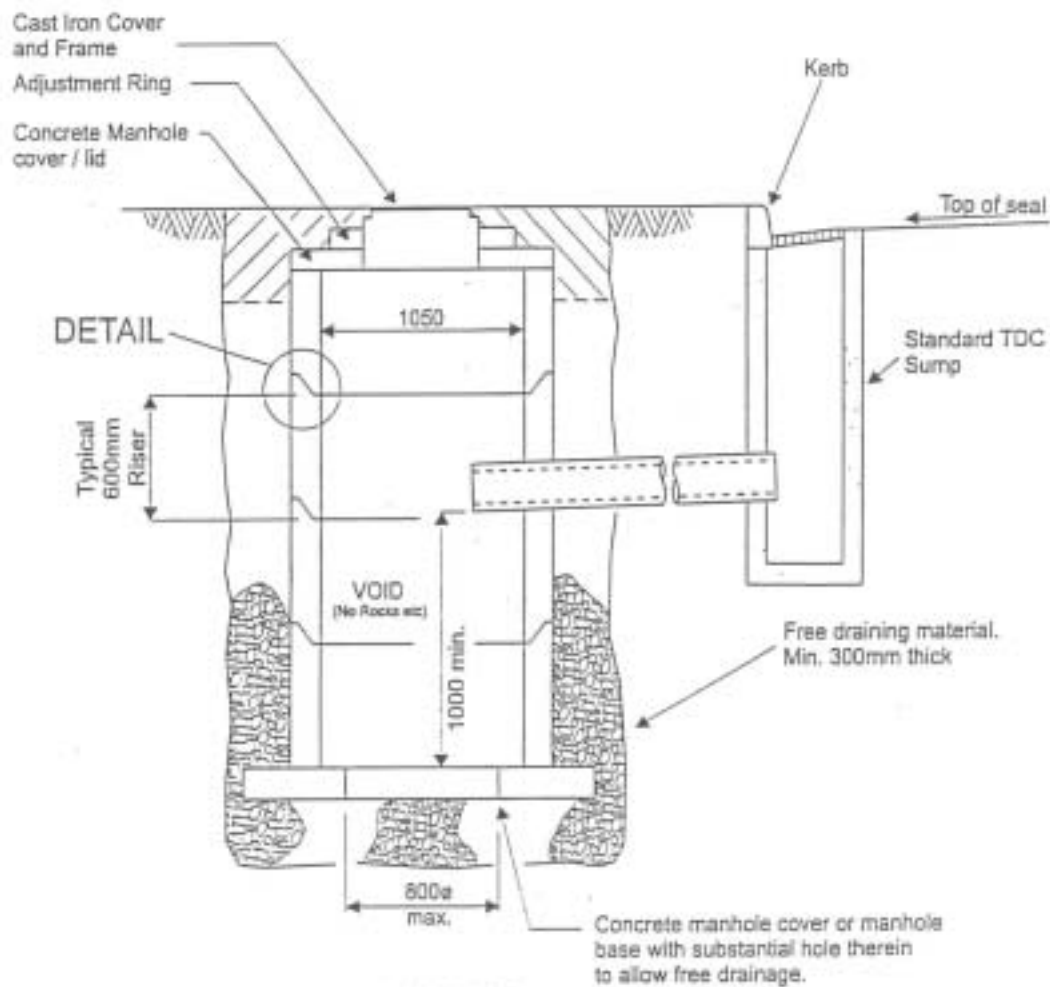


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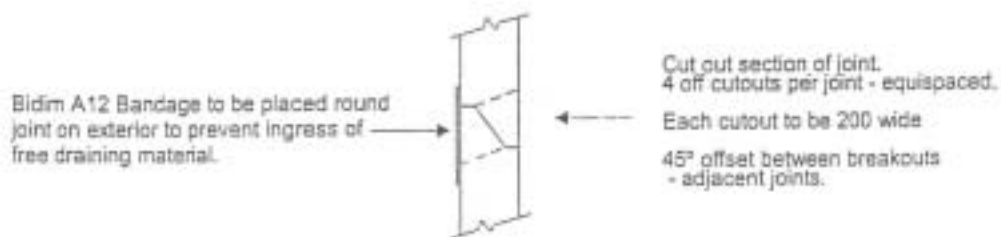
November 1995

Stormwater
Reticulation
Details

Standard Soakpit Details



LAYOUT



DETAIL

NOTES:-

1. Dimensions are in millimetres unless noted
2. Do not scale
3. Min. depth of Soak Chamber is 1800 unless otherwise approved.
4. Soak Pit shall be designed in accordance with the building code Document E.1 - Surface Water Section 3.6
5. Soakage test results and all design calculations shall be submitted for checking and approval.
6. Subsoil investigation (bore log or auger) may be required.

Diagram C212

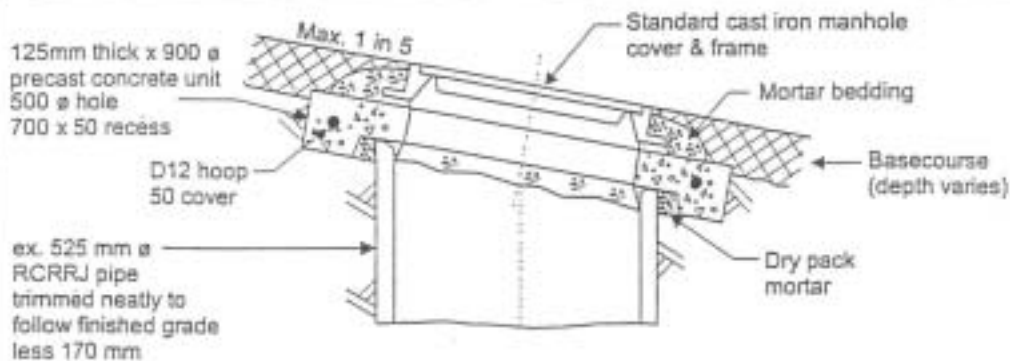


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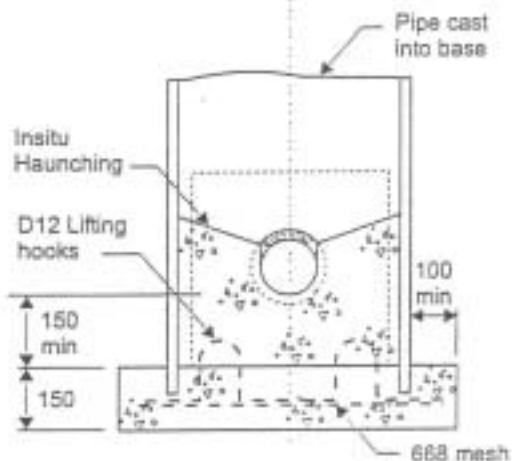
November 1995

Stormwater
Reticulation
Details

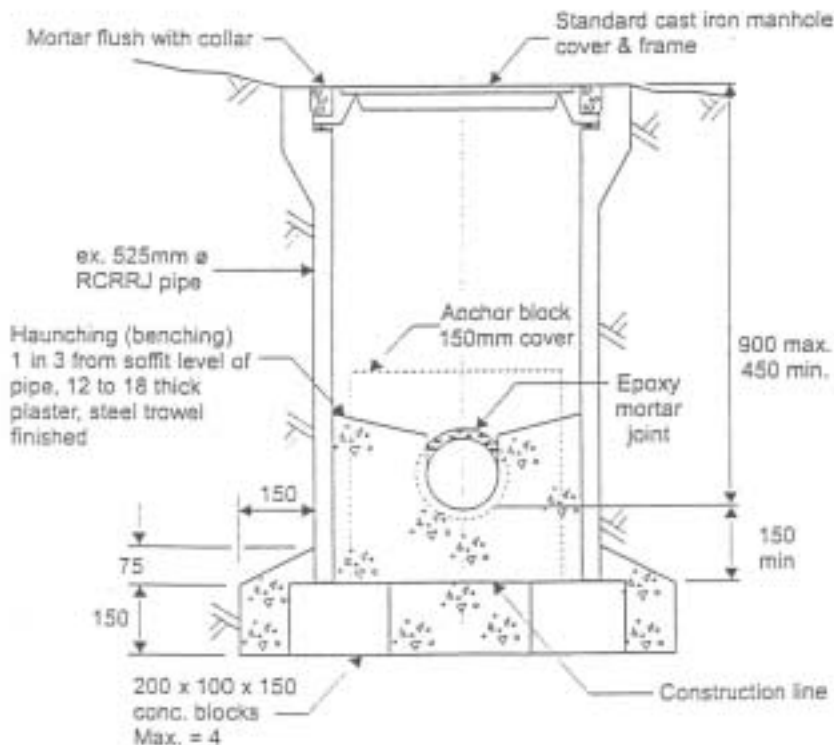
Shallow Mini Manholes



TOP FOR DRIVEWAYS
OR RIGHT OF WAYS



ALTERNATIVE
PRECAST UNIT



CAST INSITU BASE

1. Approved pre-formed plastic inspection chambers may be used as mini-manholes for pipe sizes 100 and 150 a suitable for foul sewer & stormwater sewers.
2. Mini-manholes are not to be assumed to replace Standard Manholes.
3. Mini-manholes shall not be used in areas subject to vehicular traffic, except in formed residential driveways or right of ways for light domestic vehicles.
4. The use of mini-manholes is to be limited, and at the discretion of Council:
 - a) Manholes less than 1m deep
 - b) The maximum pipe sizes of 150a for sewers, and 225a for stormwater drains
 - c) Manholes at the head of a line
 - d) Straight through manholes
 - e) Changes of grade
5. Concrete mini-manholes as detailed are not to be used in foul sewers at:
 - a) Junctions
 - b) Deflections greater than 45°

Diagram C213

Pipe Laying and Bedding Details

TOP LAYER OF TRENCHES:

1. Final layer to be restored to original condition and type i.e. hot mix seal, chip seal etc.
2. Roads and streets - 300mm crushed BASECOURSE
House Driveways - 150mm crushed BASECOURSE
Under Pathways - 75mm crushed BASECOURSE
3. Grassed and garden areas = 75mm min. of previously stripped top layer of trench.
Grass seed mix = 2 parts Chewing Fescue to 1 part Brown Top.
Application rate = 35g / m² minimum.

300 min. before
mech. compact.
can be used

Above pipe: Screened excavated material
complying with NZS 4452: 1988

Below pipe: Compacted granular bedding
complying with NZS 7643: 1979

100mm
min.
100mm
min.

$D + 300$ mm.

D = outside diameter of pipe.

NOTE: Trench base shall be cleared of loose material,
walls shall be vertical to top of bedding.

STANDARD TRENCH DETAIL

Finish trench surface to same
standard as surrounding surface

Selected compacted backfill:

ROAD AND STREET CROSSINGS

Imported graded river run or equivalent
with maximum stone size of 75mm.

See specification.

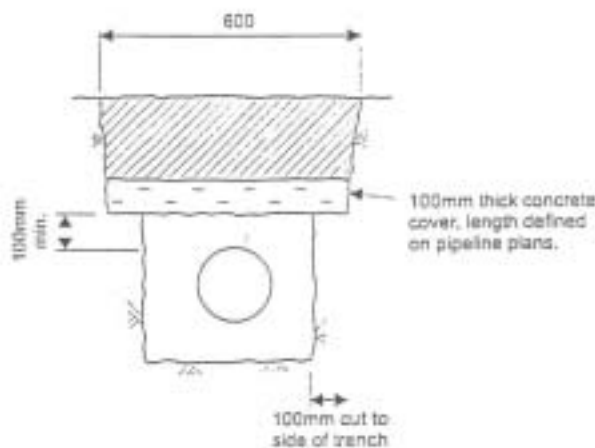
OTHER TRAFFICABLE AREAS

Suitable previous excavated material may
be used if approved by the Engineer,
otherwise imported graded river run or
equivalent with maximum stone size of 75mm.
See specification.

OTHER AREAS - Grassed etc.

Previous excavated material may be used.

Bed and surround pipe with bedding materials
as shown. Compact as directed. Socket holes
shall be formed in the bedding material of
sufficient size to permit jointing of the pipe
and to allow the pipe barrel to rest firmly on
the bedding over its entire length.

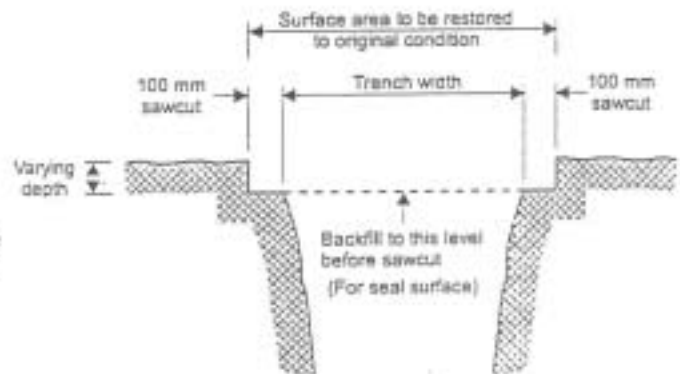


CONCRETE PROTECTION DETAIL

NOTE: Pipes shall generally be laid with sockets
pointing upstream, i.e. towards the source of flow.



PIPE DIRECTION DETAIL



Sealed and concreted surfaces to be sawcut 200 mm wider
than trench as follows:

Sealed: AFTER excavation and backfill to level shown
Concrete: BEFORE excavation commences.

CONCRETE / SEALED SURFACE DETAIL

NOTES:

1. Min. cover to pipes mm
 - a) Roads and streets 750
 - b) Driveways and similar areas
subject to traffic 600
 - c) Footpaths, gardens and
open country 500
2. Minimum grades for Gravity mains:

100 mm ø	= 1 in 200
150 mm ø & above	= 1 in 300
3. All concrete detailed shall have a minimum
specified compressive strength of 20 MPa
after 28 days.

Diagram C300



**WESTLAND
DISTRICT COUNCIL**

November 1995

Sewerage
Reticulation
Details

House Connections, Lateral Junctions and Design Notes

1. Pipe bedding for house connections shall conform to bedding details for main pipelines.
2. Ends of house connections shall be indicated by g.t. timber stake extending from pipe invert to 300mm above ground level. Stake shall be painted red.
3. House connections are to be coded on the longsections as follows:

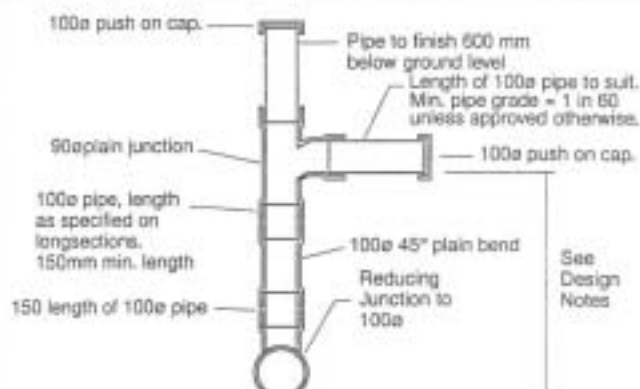


4. House connections from mains outside properties shall terminate 300 - 500mm inside the property boundary. The final 300 - 500mm shall be tunnelled under the boundary if necessary to avoid disturbance to existing fences, shrubs, gardens etc.
5. Minimum difference between invert level of main and invert level of house connections:

Main Ø	HC / LJ 1	HC / LJ 1A
150	200	350
150	250	350
200	300	400
250	400	550
300	470	600

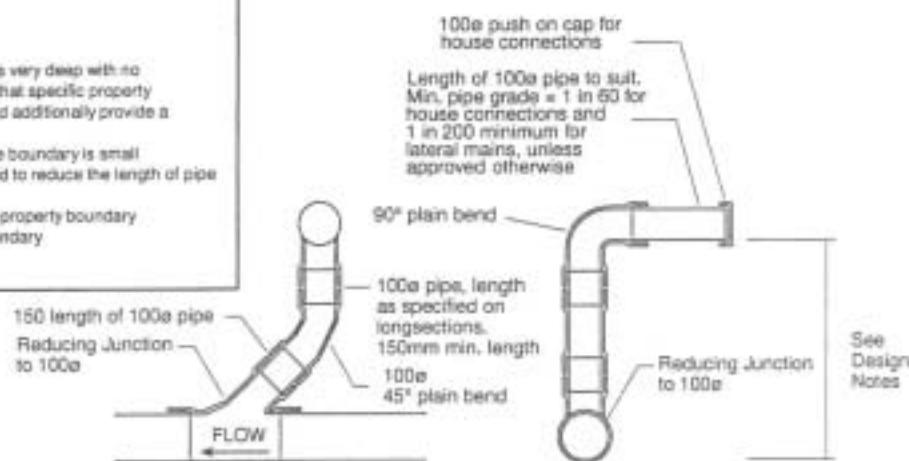
6. House Connection Usage:
 HC1 Standard Connection off main
 HC1A Standard Connection to be used where main is very deep with no requirement to maintain that depth in order to service that specific property
 HC1B Connection to service property as per HC1A and additionally provide a clearing eye access point
 HC2 Connection to a lateral where the distance to the boundary is small
 HC2A Connection to a lateral, additional 45° bend used to reduce the length of pipe required to reach the boundary
 HC3 Standard Connection to main located within the property boundary
 HC3A As for HC1A but main is within the property boundary
- 7.

DESIGN NOTES



END ELEVATION

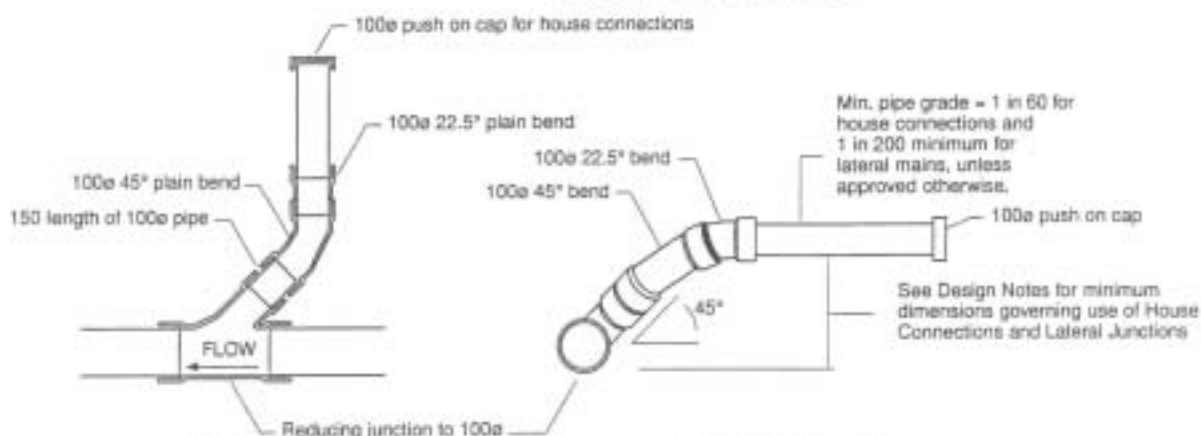
HOUSE CONNECTION TYPE 1B
CODE : HC 1B



ELEVATION

END ELEVATION

HOUSE CONNECTIONS / LATERAL JUNCTIONS TYPE 1A
CODE: HC 1A LJ 1A



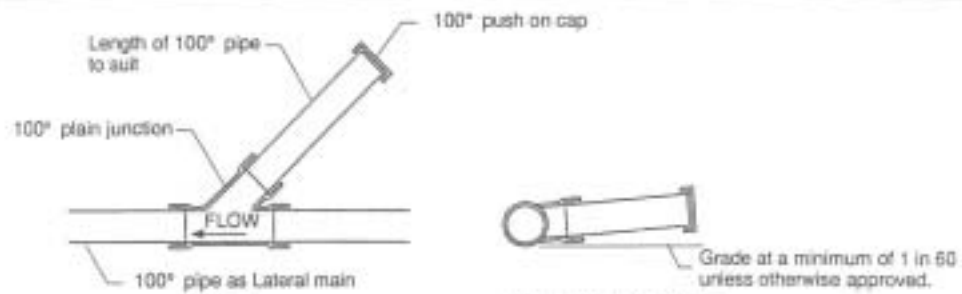
PLAN

END ELEVATION

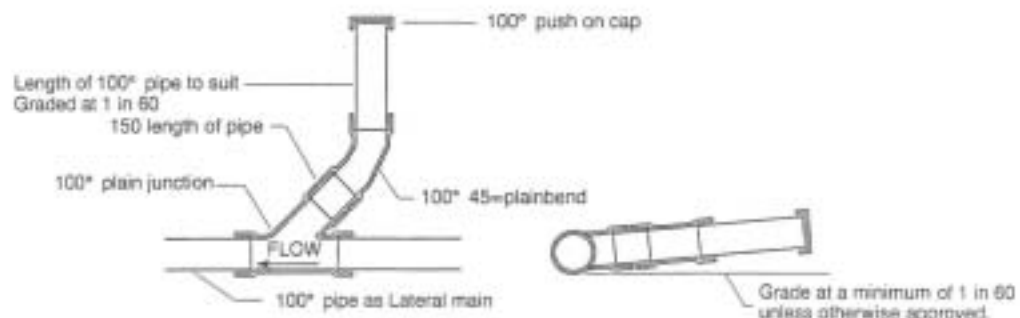
HOUSE CONNECTIONS / LATERAL JUNCTIONS TYPE 1
CODE: HC1 LJ1

Diagram C301

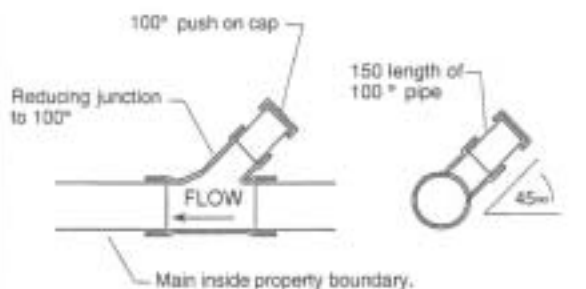
House Connection Details (continued)



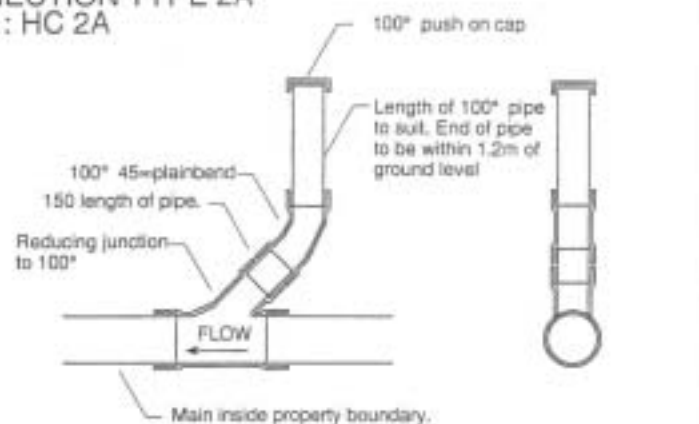
PLAN
HOUSE CONNECTION TYPE 2
CODE : HC 2



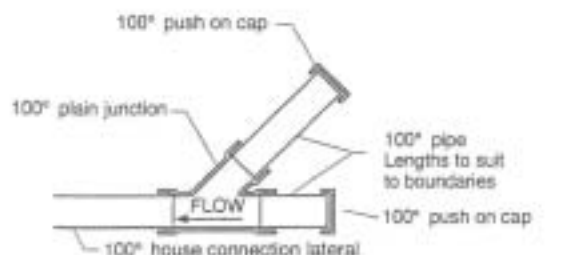
PLAN
HOUSE CONNECTION TYPE 2A
CODE : HC 2A



PLAN
HOUSE CONNECTION TYPE 3
CODE : HC 3



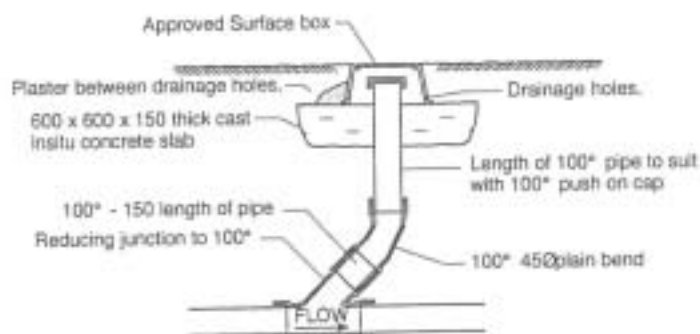
ELEVATION
HOUSE CONNECTION TYPE 3A
CODE : HC 3A



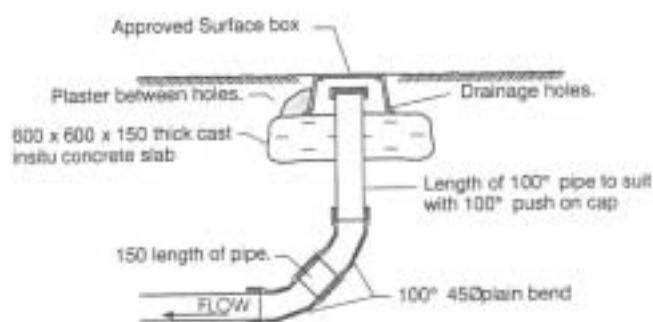
DOUBLE HOUSE CONNECTIONS
CODE : DHC

Diagram C302

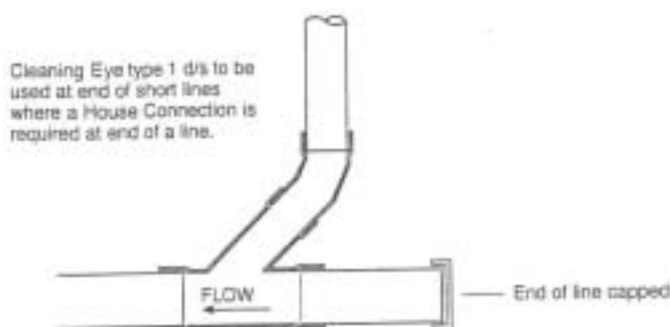
Cleaning Eyes, Change in Pipe Diameter Details



CLEANING EYE TYPE 1
CODE: CE1



CLEANING EYE TYPE 1A
CODE: CE1A

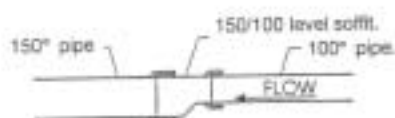


CLEANING EYE TYPE 1 DOWNSTREAM
CODE: CE1 D/S

NOTES:

Min. depths to invert of pipes necessary to accommodate assembled fittings for CE's 1, 1 D/S, and 1A.
When designing pipelines - these depths shall be considered in conjunction with the min. depths of cover.

Main	Min. depth to invert CE1	Min. depth to invert CE1A & CE1 D/S
100	690	690
150	730	-
200	820	-
250	920	-
300	960	-



CHANGE IN PIPE DIAMETER
CODE: CPD

Diagram C303



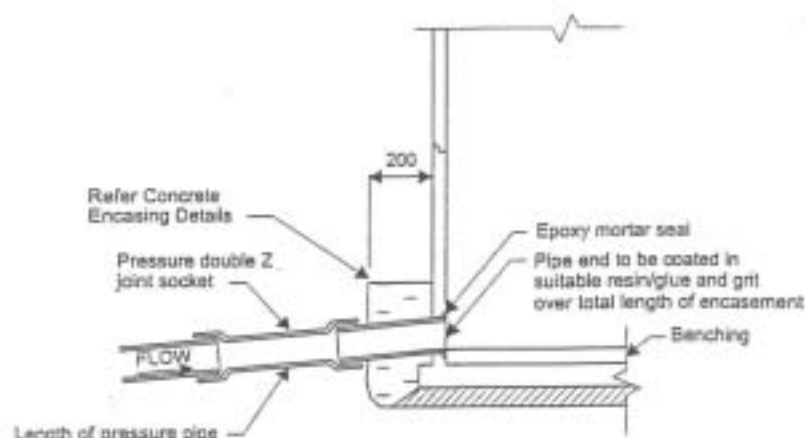
WESTLAND
DISTRICT COUNCIL

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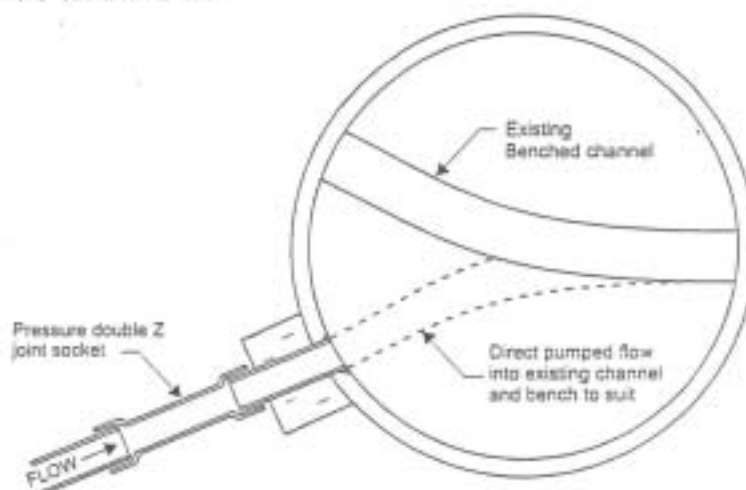
Sewerage
Reticulation
Details

Sewerage Reticulation Details

Pressure Main Connection Mass Concrete Requirements



PRESSURE MAIN CONNECTION
TO MANHOLE



PLAN VIEW OF
PRESSURE MAIN CONNECTION
TO MANHOLE

M.H. I.L. DEPTH (as shown on plans)	M.H. DIA. 1050	M.H. DIA. 1200	M.H. DIA. 1500
1.2			Volume = 0.2m ³ (500 x 500 x 500)
1.4			
1.6		Volume = 0.2m ³ (500 x 500 x 500)	Volume = 0.3m ³ (600 x 600 x 600)
1.8	Volume = 0.2m ³ (500 x 500 x 500)		Volume = 0.4m ³ (700 x 700 x 700)
2.0		Volume = 0.3m ³ (600 x 600 x 600)	Volume = 0.5m ³ (800 x 800 x 800)
2.2			Volume = 0.6m ³ (850 x 850 x 850)
2.4	Volume = 0.3m ³ (600 x 600 x 600)	Volume = 0.4m ³ (700 x 700 x 700)	Volume = 0.7m ³ (900 x 900 x 900)
2.6			Volume = 0.8m ³ (950 x 950 x 950)
2.8	Volume = 0.4m ³ (700 x 700 x 700)	Volume = 0.5m ³ (800 x 800 x 800)	Volume = 1.0m ³ (1.0 x 1.0 x 1.0)
3.0			

NOTE: 1. Table indicates minimum extra mass of concrete required to prevent flotation
2. Concrete to be evenly spread around base of manholes.

MASS CONCRETE REQUIREMENTS
AT MANHOLES

Diagram C305



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Sewerage
Reticulation
Details

Water Barriers in Trenches

NOTE:

To be provided **ONLY** as
required by the Engineer.

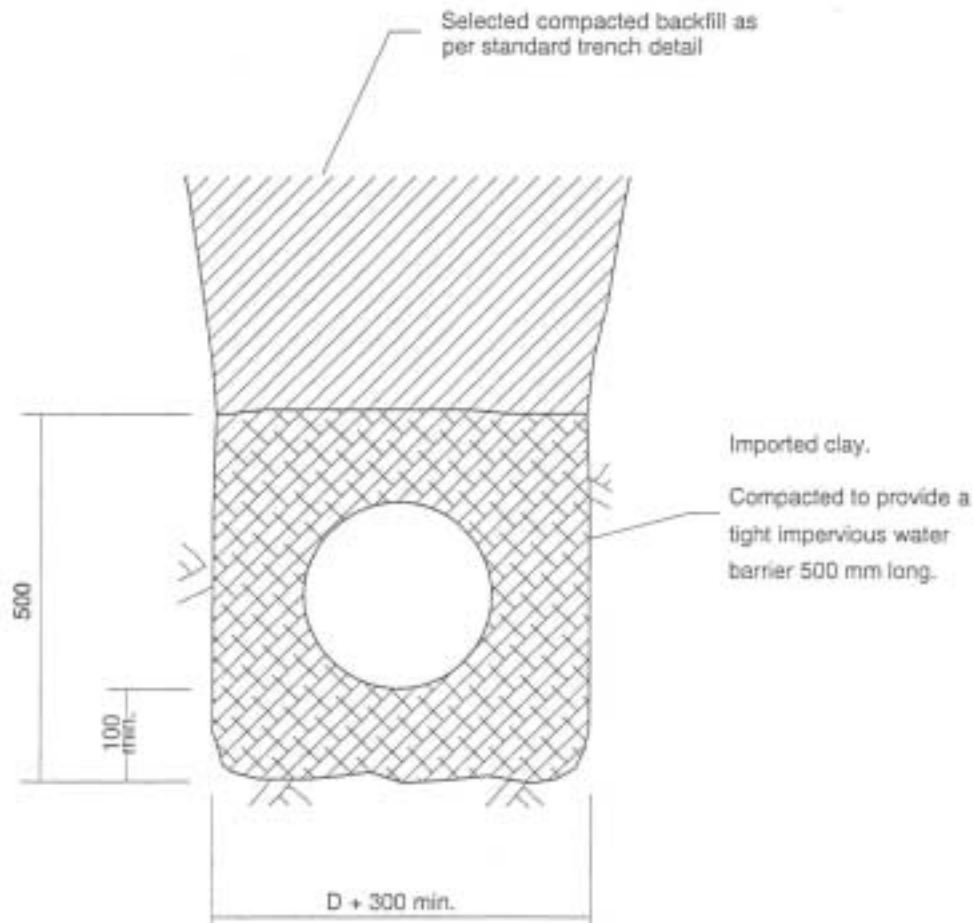


Diagram C306

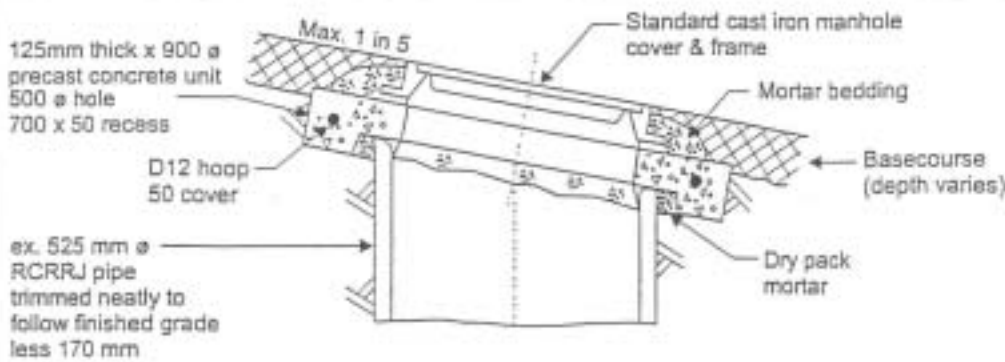


WESTLAND
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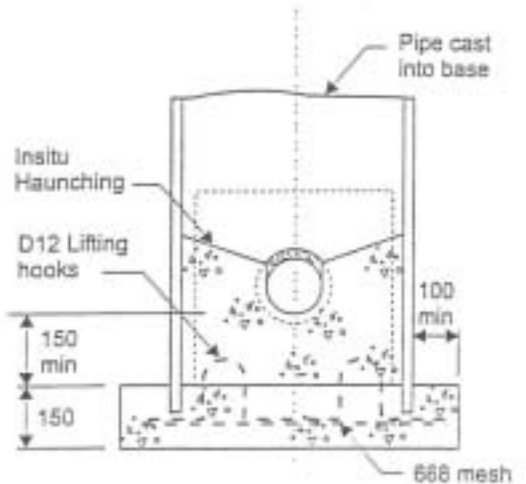
November 1995

Sewerage
Reticulation
Details

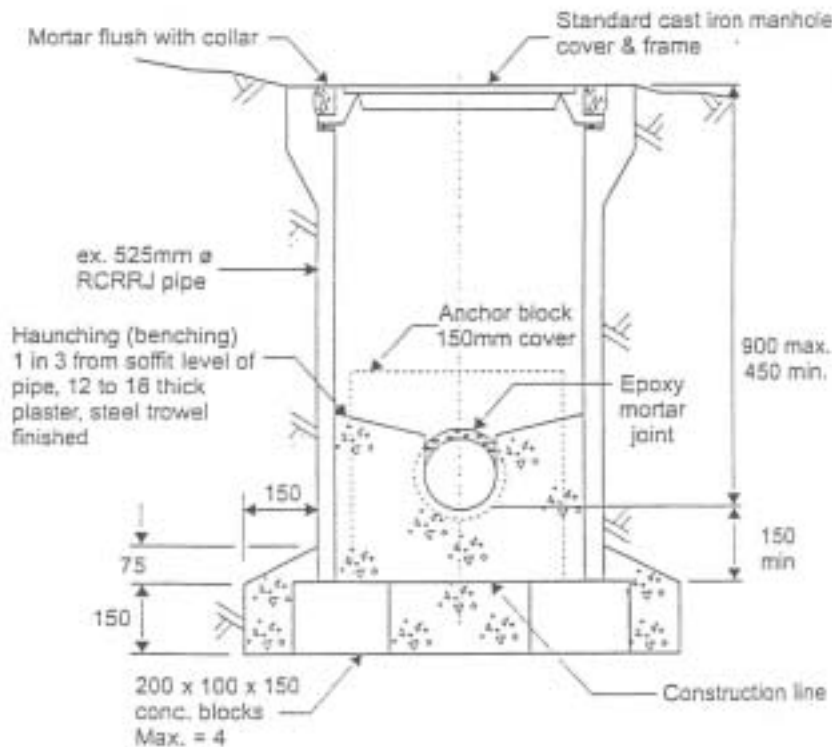
Shallow Mini Manholes



TOP FOR DRIVEWAYS OR RIGHT OF WAYS



ALTERNATIVE
PRECAST UNIT



CAST INSITU BASE

1. Approved pre-formed plastic inspection chambers may be used as mini-manholes for pipe sizes 100 and 150 a suitable for foul sewer & stormwater sewers.
2. Mini-manholes are not to be assumed to replace Standard Manholes.
3. Mini-manholes shall not be used in areas subject to vehicular traffic, except in formed residential driveways or right of ways for light domestic vehicles.
4. The use of mini-manholes is to be limited, and at the discretion of Council:
 - a) Manholes less than 1m deep
 - b) The maximum pipe sizes of 150a for sewers, and 225a for stormwater drains.
 - c) Manholes at the head of a line
 - d) Straight through manholes
 - e) Changes of grade
5. Concrete mini-manholes as detailed are not to be used in foul sewers at:
 - a) Junctions
 - b) Deflections greater than 45°

Diagram C307

Pumping Station External Valve Chamber

*This page to be read in
conjunction with C310*

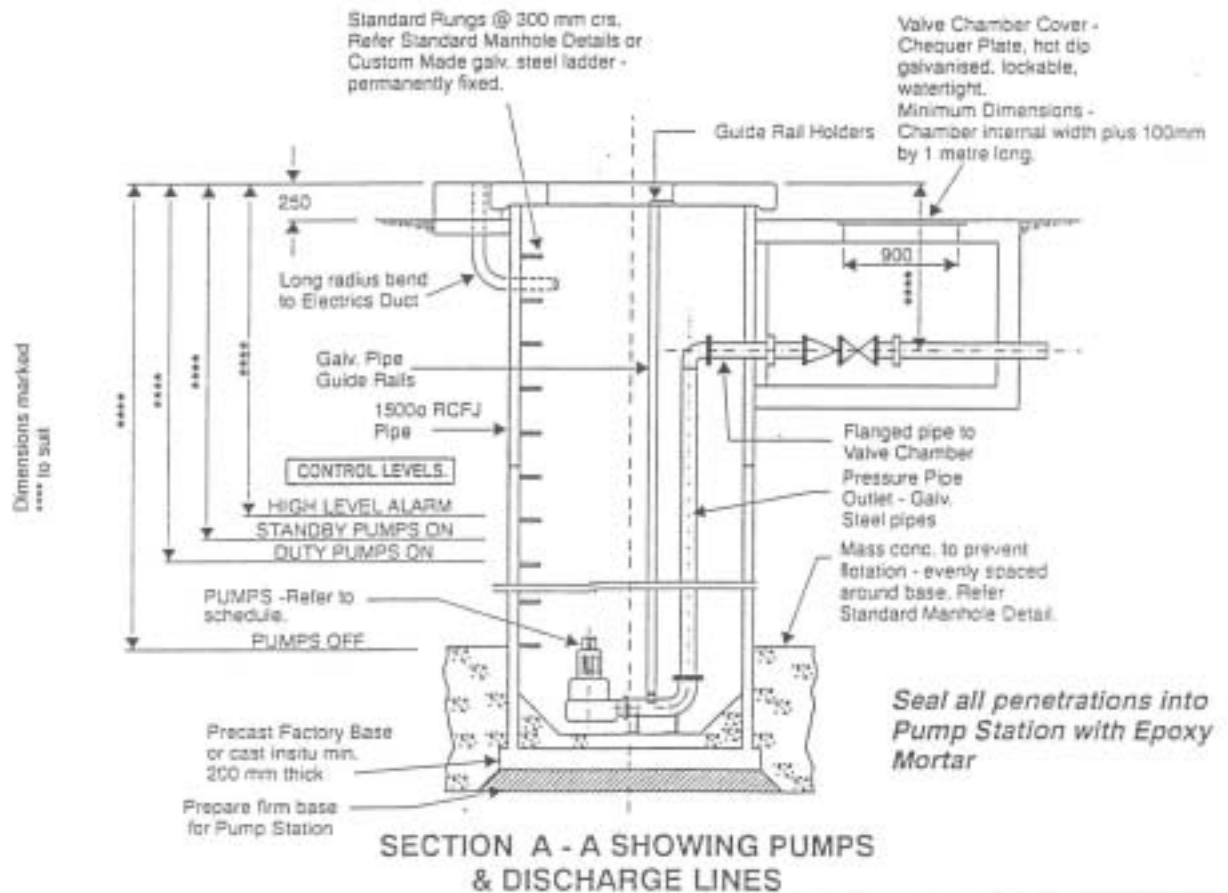
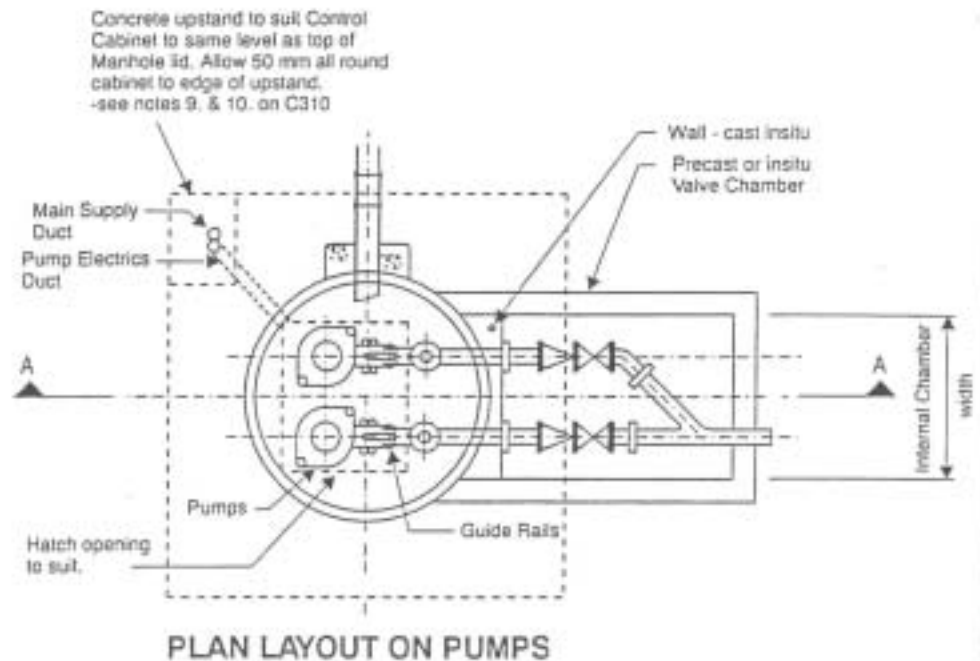


Diagram C308



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November 1995

**Sewerage
Reticulation
Details**

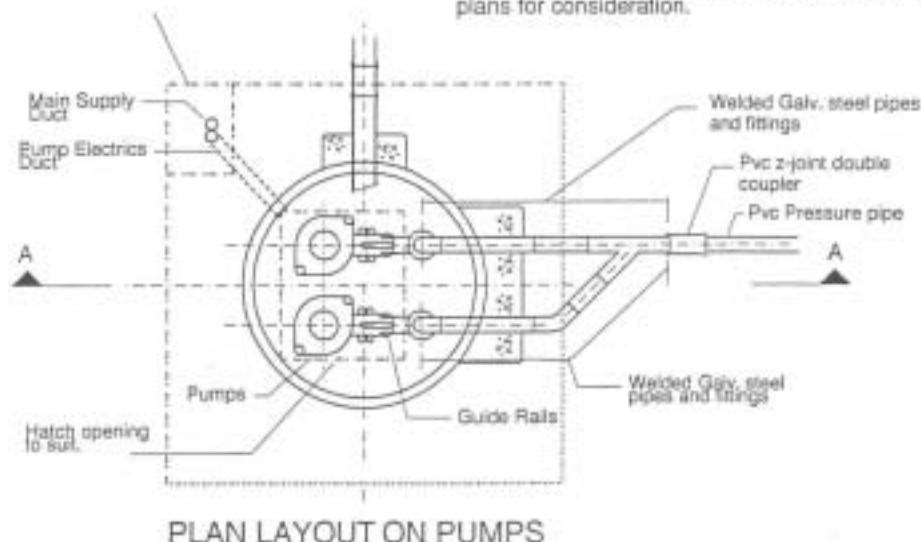
Pumping Station Internal Valve Assembly

This page to be read in
conjunction with C310

Concrete upstand to suit Control
Cabinet to same level as top of
Manhole lid. Allow 50 mm all round
cabinet to edge of upstand -
see notes 9 & 10. on C310

NOTE:

For situations where there are only a few houses
being served, smaller Pump Wells with free standing
pumps and flexible hose discharge pipes may be
considered. Seek prior approval before submitting
plans for consideration.



Standard Rungs @ 300 mm c/s.
Refer Standard Manhole Details or
Custom Made galv. steel ladder -
permanently fixed.

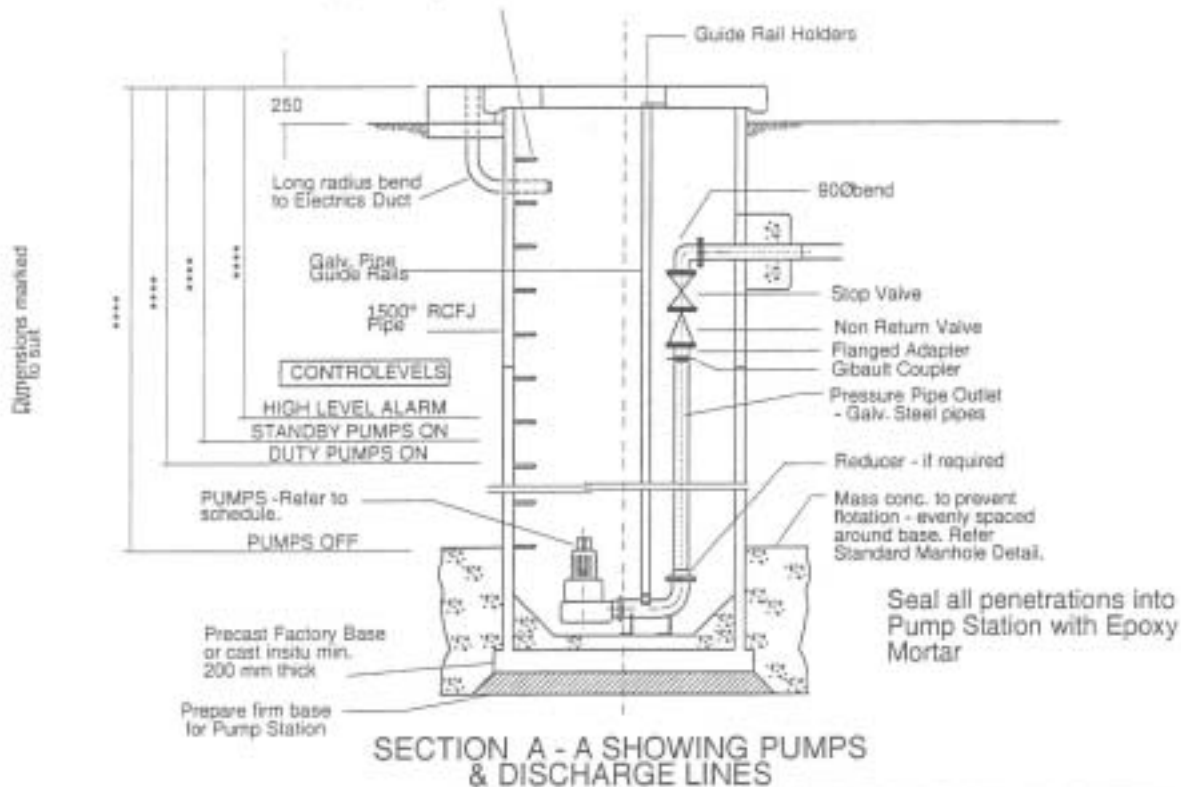
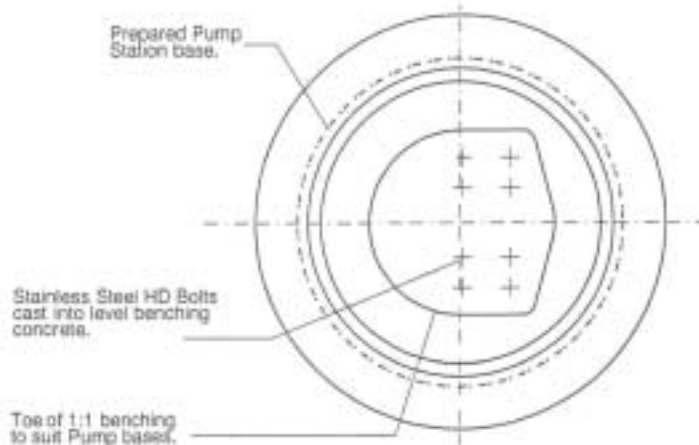


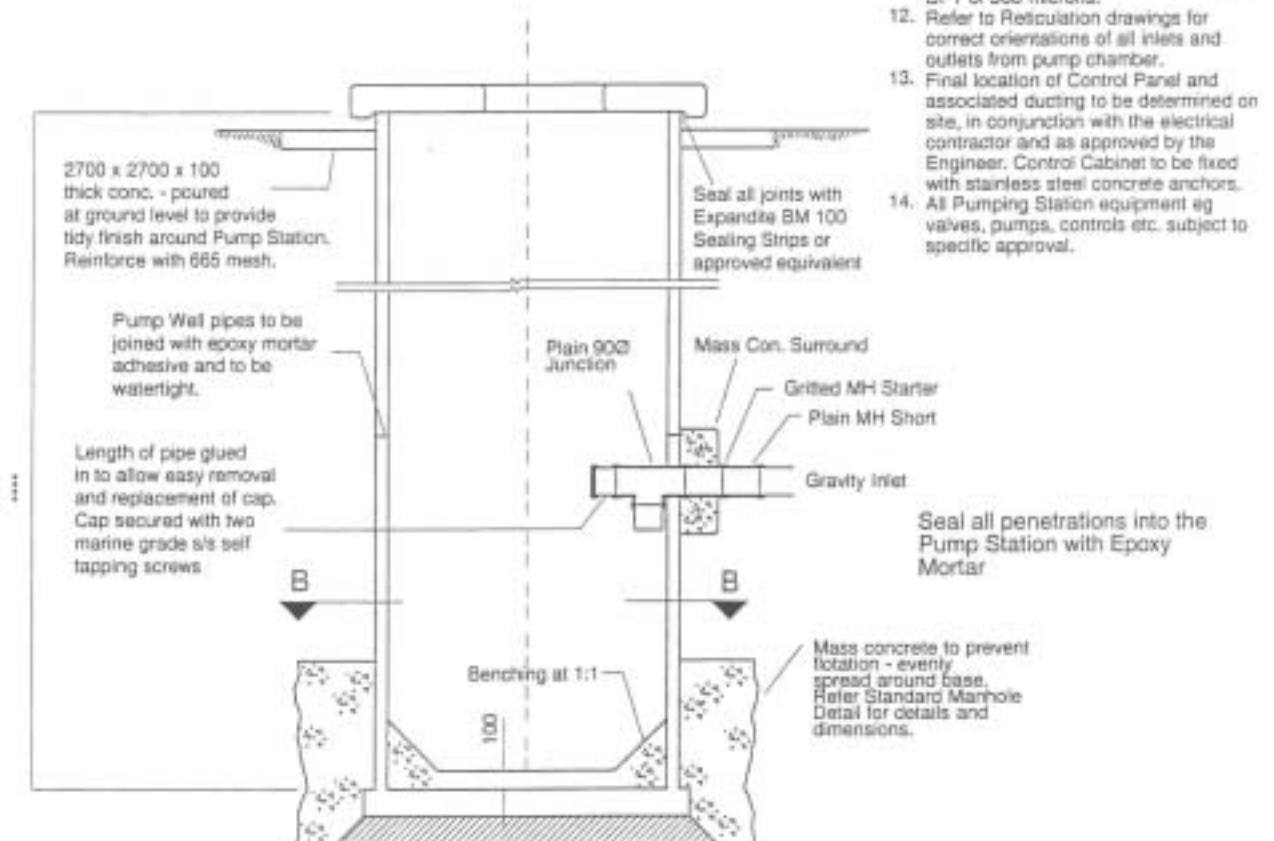
Diagram C309

Pumping Station Typical Section

This drawing to be read in conjunction with C308 or C309.



SECTION B - B



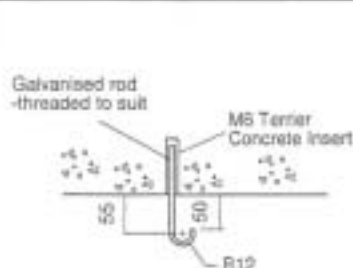
TYPICAL SECTION
CONSTRUCTION DETAILS

NOTES:

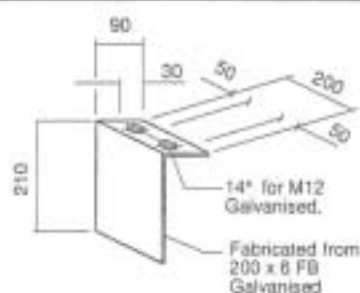
1. Dimensions noted thus : **** to suit.
2. Do not scale.
3. A 20mm chamfer shall be provided on all external corners.
4. Concrete cover to reinforcing shall be 50mm minimum.
5. Reinforcing shall be grade 300 deformed mild steel.
6. Concrete shall have a specified compressive strength of 25 MPa after 28 days standard cured.
7. Spacing of reinforcing is nominal, generally equally spaced between limits, and displaced to suit embedded items.
8. On completion of construction the inside walls of the chamber shall be coated with one coat of Epiglass Epiguard 199 primer/surfacer then one topcoat of Epithane 343 polyurethane in accordance with the manufacturers instructions.
9. All backfill around Pump Station to be placed and compacted in 150mm layers.
10. All nuts, bolts, washers etc. on standby pumps on level to be stainless steel. All nuts, bolts, washers etc. above this level to be hot dipped galvanised.
11. All steelwork to be hot dip galvanised. All galvanised steelwork exposed to the inside of the pumpwell including the underside of the hatch covers shall be thoroughly cleaned, etch primed and painted with two coats of Devshield 235 Epoxy Coating to give a minimum total DFT of 300 microns.
12. Refer to Reticulation drawings for correct orientations of all inlets and outlets from pump chamber.
13. Final location of Control Panel and associated ducting to be determined on site, in conjunction with the electrical contractor and as approved by the Engineer. Control Cabinet to be fixed with stainless steel concrete anchors.
14. All Pumping Station equipment eg valves, pumps, controls etc. subject to specific approval.

Diagram C310

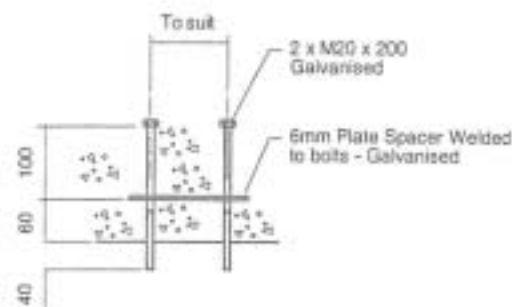
Pump Station Chamber Lid Details



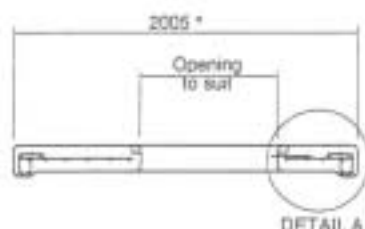
LIFTING HOOK
2 REQUIRED
TO BE INSERTED AFTER
PLACING OF LID ONTO CHAMBER



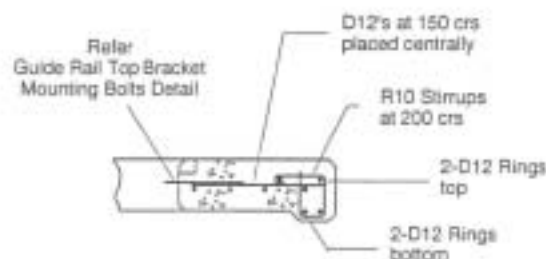
PLUG BRACKET
1 REQUIRED



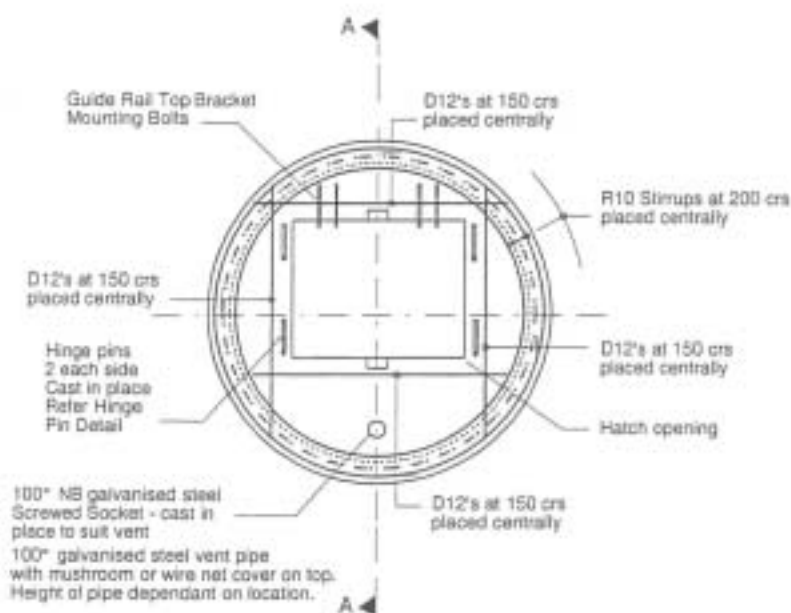
**GUIDE RAIL TOP BRACKET
MOUNTING BOLTS DETAIL**
2 REQUIRED



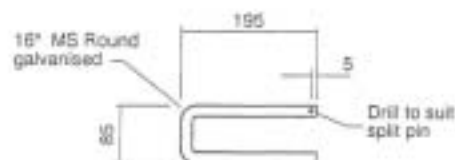
SECTION A - A



DETAIL A



**LID PLAN &
REINFORCEMENT**
REFER NOTE 8



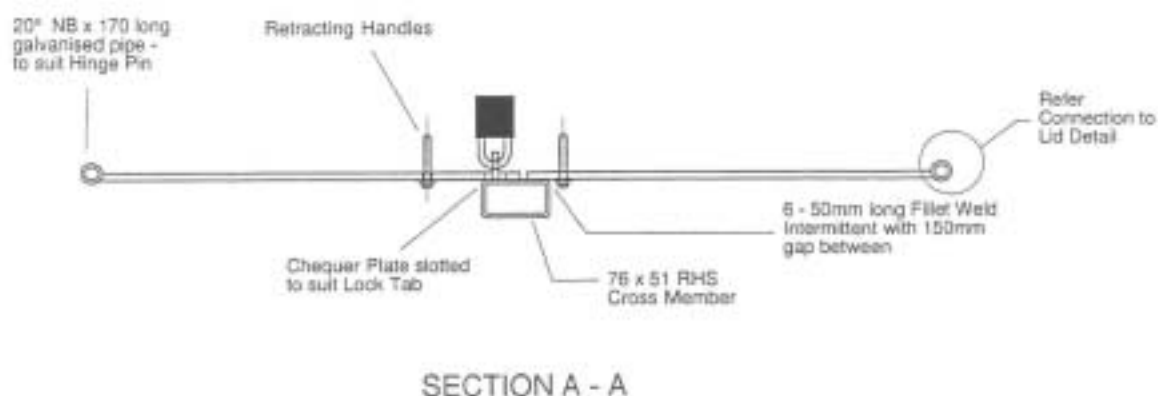
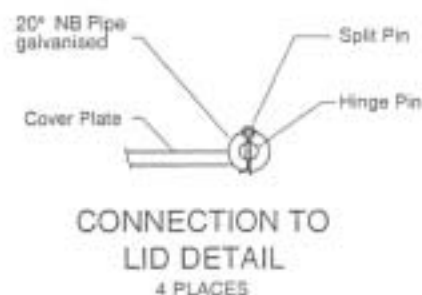
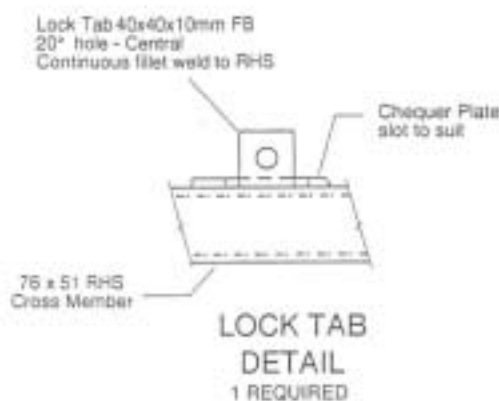
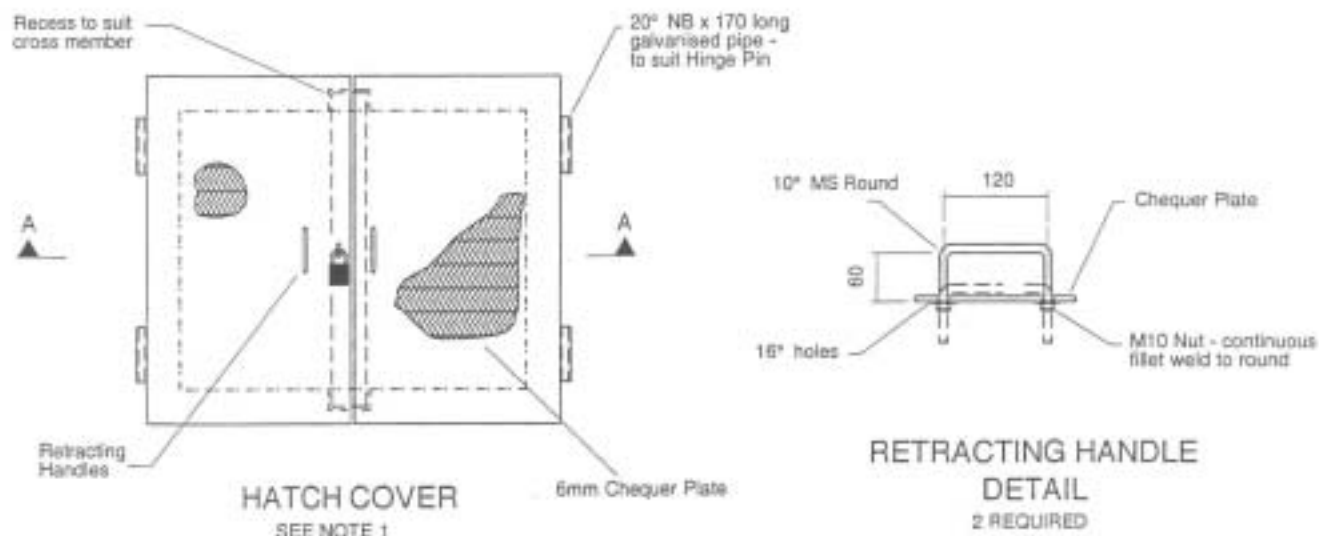
HINGE PIN DETAIL
4 REQUIRED

NOTES:

1. Do not Scale.
2. A 20mm chamfer shall be provided on all external corners. Concrete cover to reinforcing shall be 50mm min.
3. Reinforcing shall be grade 300 deformed mild steel.
4. Concrete shall have a specified compressive strength of 25MPa after 28 days standard cured.
5. Spacing of reinforcing is nominal, generally equally spaced between limits, and displaced to suit embedded items. All steelwork to be hot dip galvanised after fabrication.
6. Fittings to be located in underside of lid include the following:
7. 2 - Lifting Hooks
8. 1 - Plug Bracket
9. 4 - M16 Galvanised Inserts for future services. Location and setout determined by pumps used.

Diagram C311

Pump Station Chamber Hatch Cover Details

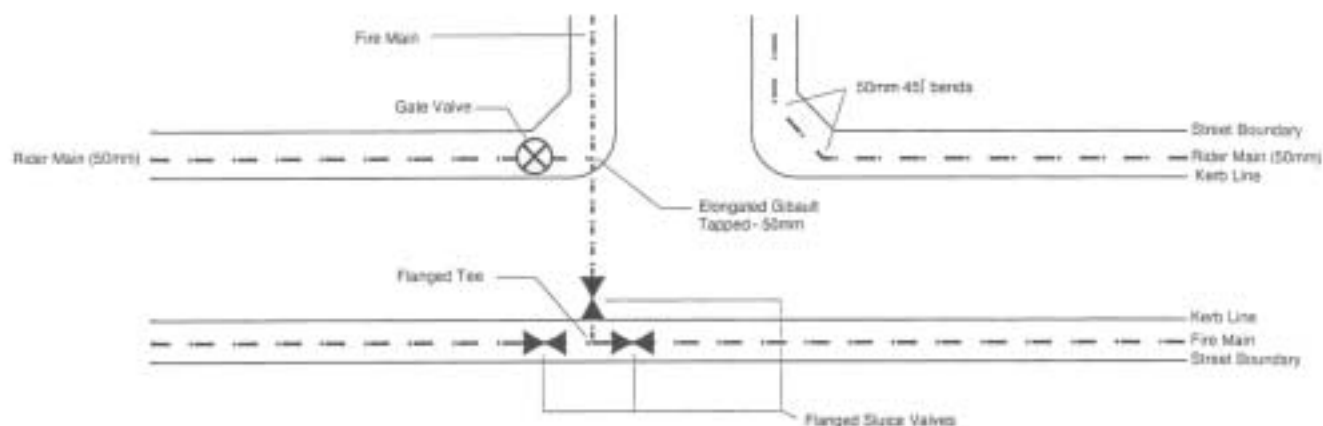


NOTES:

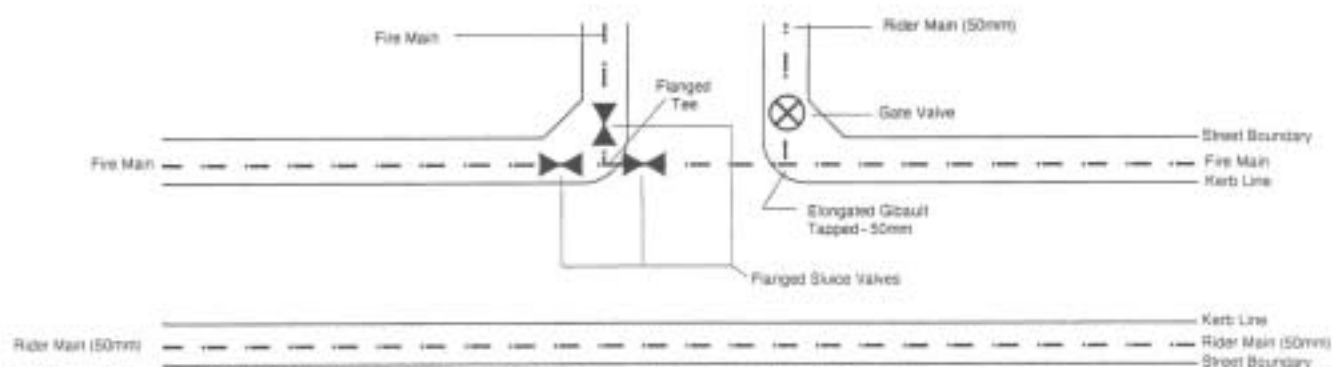
1. Hatch Cover shall be Chequered Plate, lockable, watertight, hot dip galvanised.
2. All welds continuous fillet unless specified otherwise.

Diagram C312

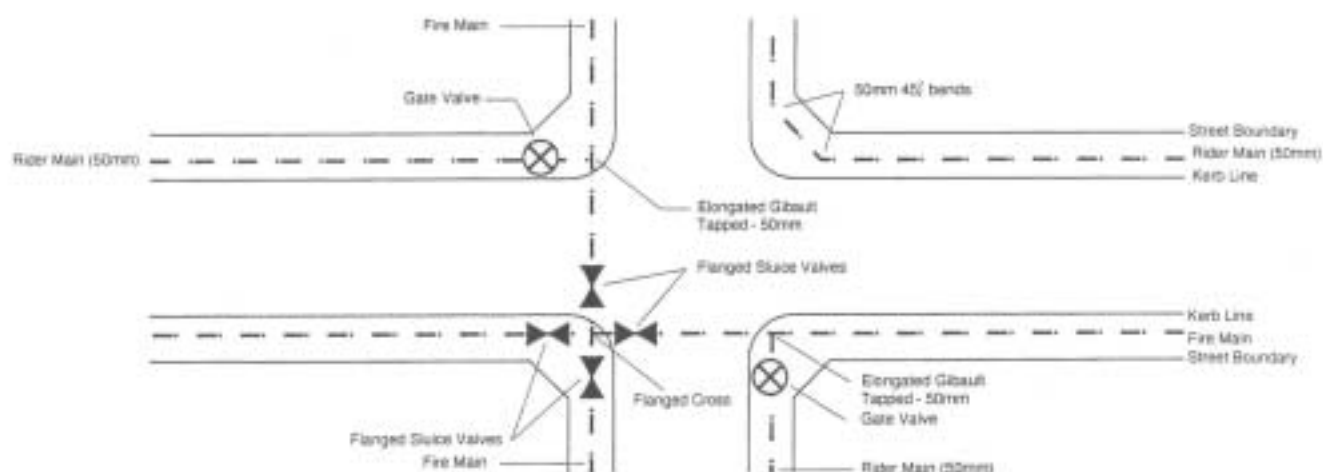
Water Main Locations at Intersections



TEE INTERSECTION No. 1



TEE INTERSECTION No. 2



CROSS INTERSECTION

NOTE: Principal Mains - Flanged Valves to be installed on each branch of Tees and Crosses.

Diagram C400

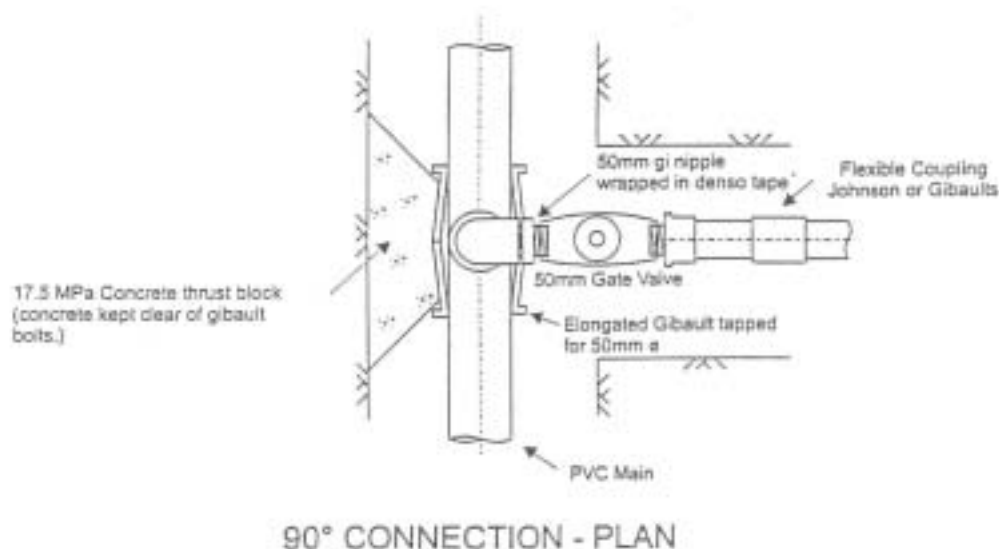
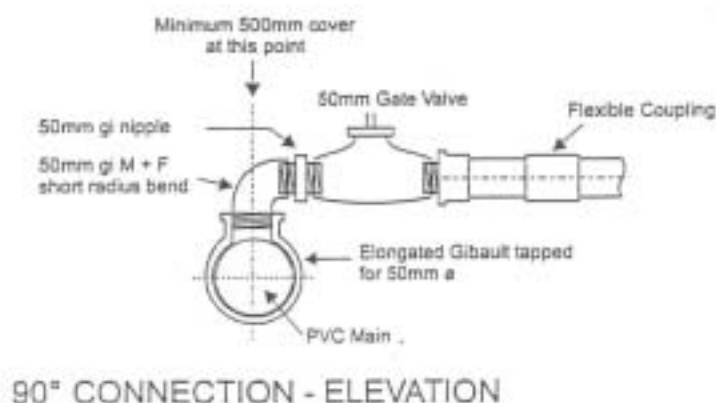
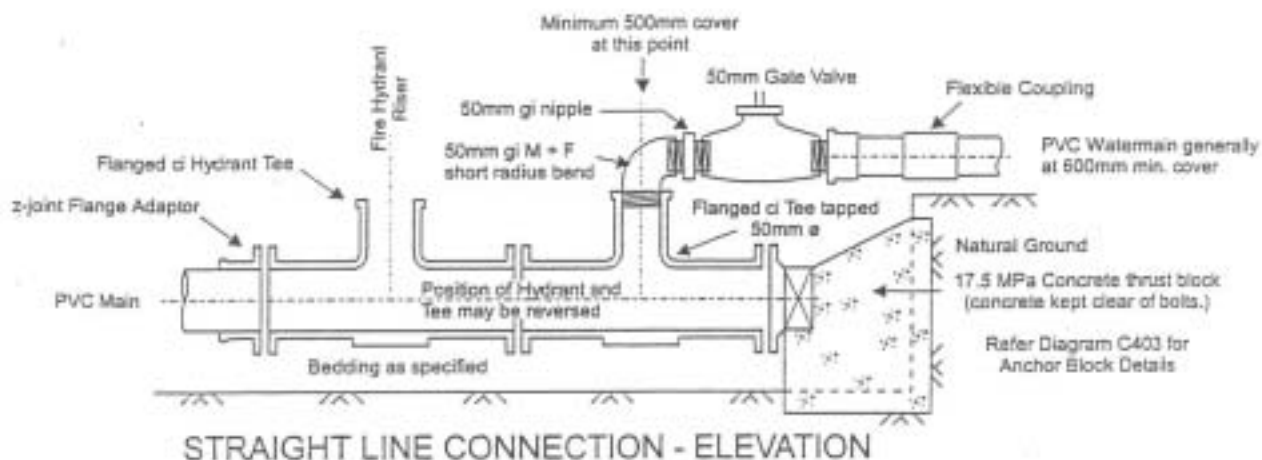


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Water
Reticulation
Details

Rider Main Connections to Principal Main



NOTE:

All galv. iron fittings shall be wrapped in denso tape

Diagram C401



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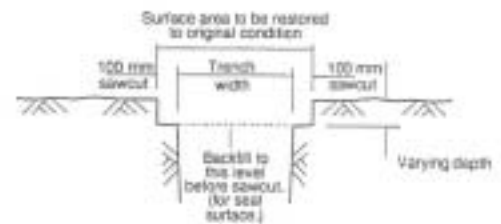
November 1995

Water
Reticulation
Details

Bedding, Backfilling and Restoration Details

TOP LAYER TO TRENCHES

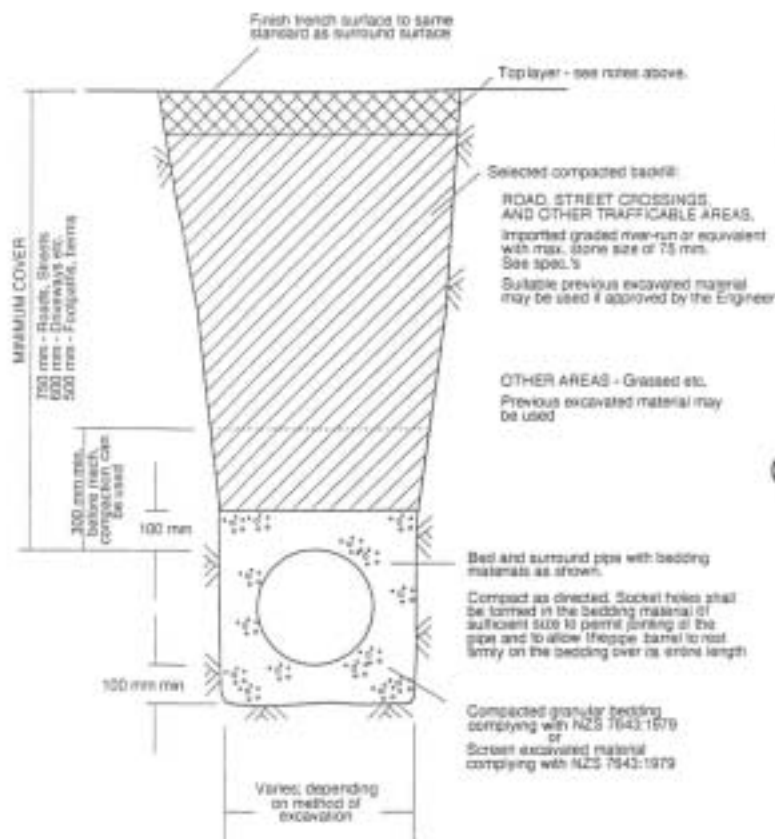
1. Final surface to be restored to original condition and type i.e. hot mix seal, chip seal, etc.
2. Roads and streets - 200 mm crushed BASECOURSE
House driveways - 100 mm crushed BASECOURSE
Under pathways - 75 mm BASECOURSE
3. Grassed and garden areas - 75 mm min. of previously stripped top layer of trench or equivalent topsoil
- Grass seed mix - 2 parts Chewing Fescue to 1 part Brown Top
- Application Rate - 35 g/m² minimum



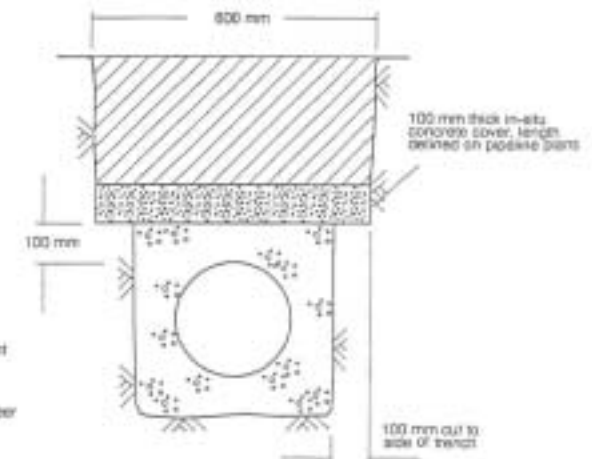
Sealed and concrete surfaces to be SAWCUT 200 mm wider than trench as follows:

Sealed: AFTER excavation, and backfill to level shown
Concrete: BEFORE excavation commences

SURFACE RESTORATION DETAILS



NOTE:
Trench seal shall be cleared of loose material,
walls shall be vertical to top of bedding



CONCRETE PROTECTION DETAILS

PIPE TRENCHING DETAILS

Diagram C402

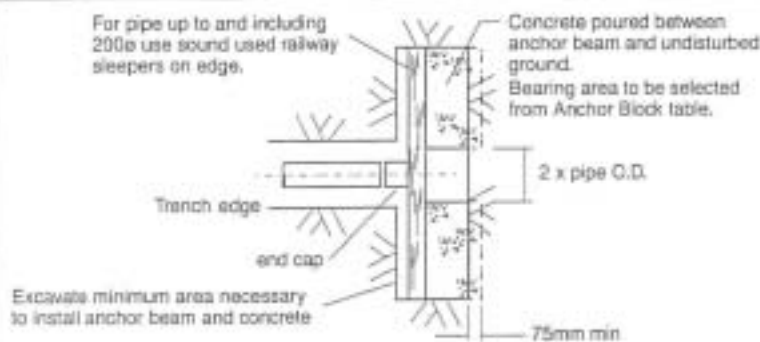


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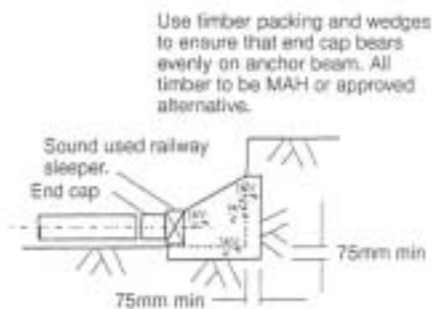
November 1995

Water
Reticulation
Details

Anchor Block Details



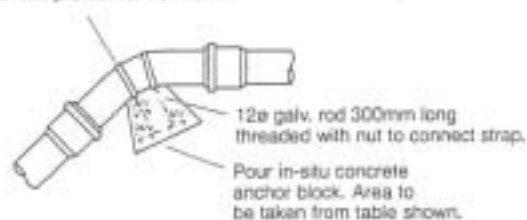
PLAN



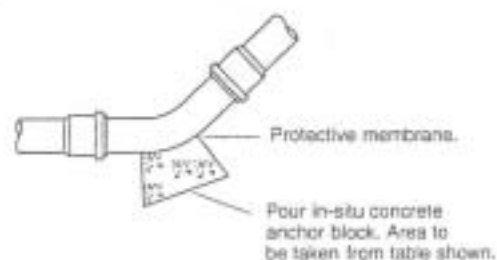
SECTION

END STOP

25 x 6 galv. m.s. flat restraining straps with protective membrane

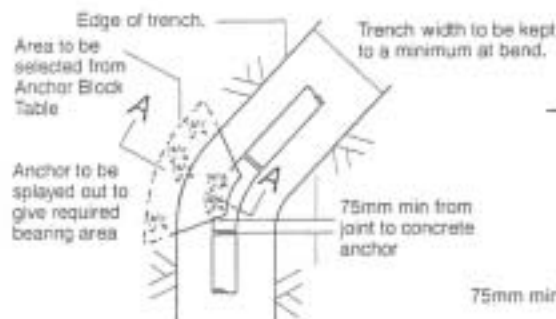


ANCHOR DETAILS

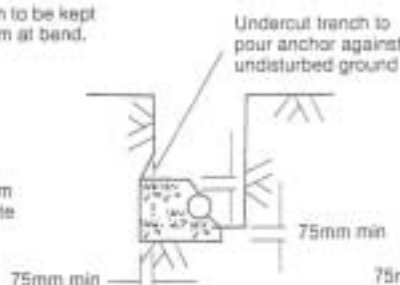


THRUST DETAILS

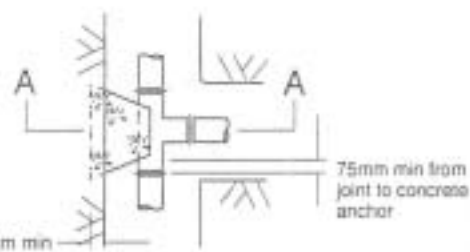
VERTICAL PLANE BENDS



BEND PLAN



SECTION A - A



TEE PLAN

BENDS AND TEES

NOTES:

1. The Engineer or his representative will direct the Contractor as to the actual area to be used in each case.
2. All concrete shall be in accordance with NZS 3109 with minimum strength of 17.5 MPa at 28 days
3. Protective membrane to be placed between uPVC and concrete.
4. All pouring shall be done against undisturbed ground, to a minimum of 75mm into trench wall and base.

Pipe ø	90° bend	45° bend	22.5° bend	11.25° bend	End cap or Tee
100	0.41	0.22	0.12	0.08	0.29
150	0.87	0.46	0.24	0.12	0.60
200	1.44	0.77	0.41	0.19	1.01

ANCHOR BLOCK - BEARING AREAS (m²)

Based on assumed ground pressure of 50 kPa
Test pressure: 120 metres head.

Diagram C403

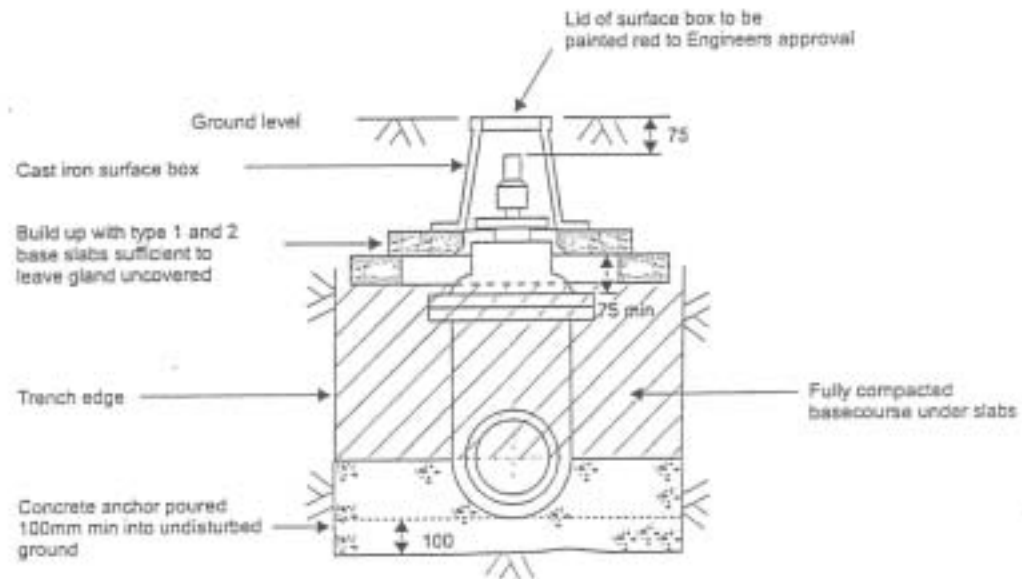


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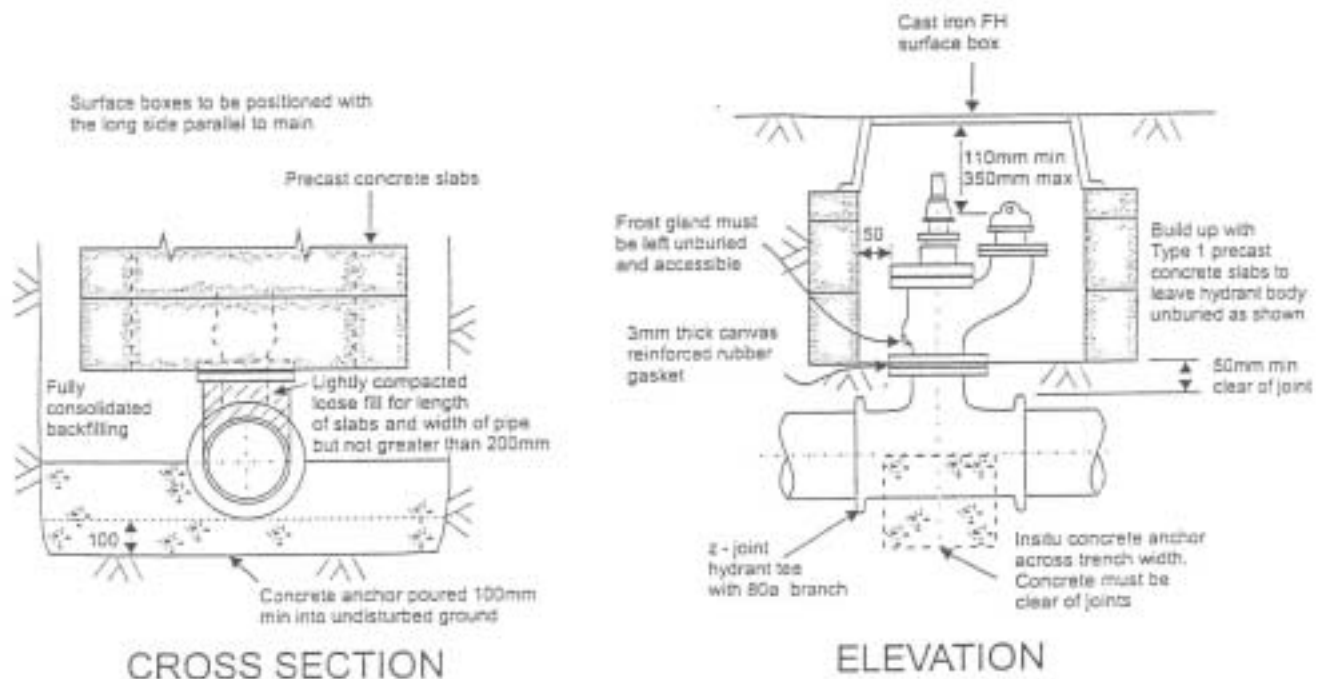
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Water
Reticulation
Details

Installation of Fire Hydrants, Sluice Valves



SLUICE VALVES



FIRE HYDRANTS

Diagram C404

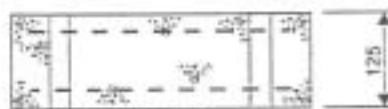
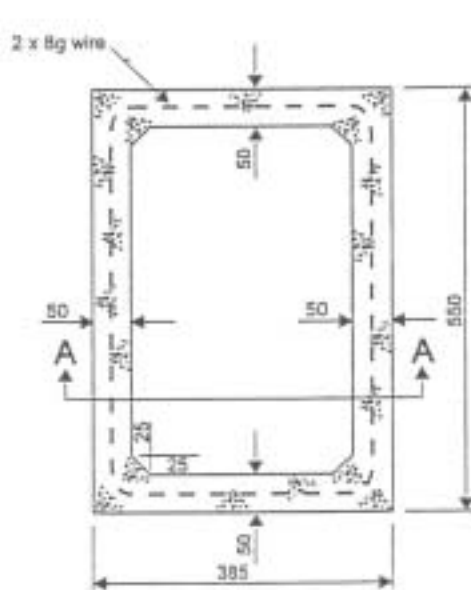


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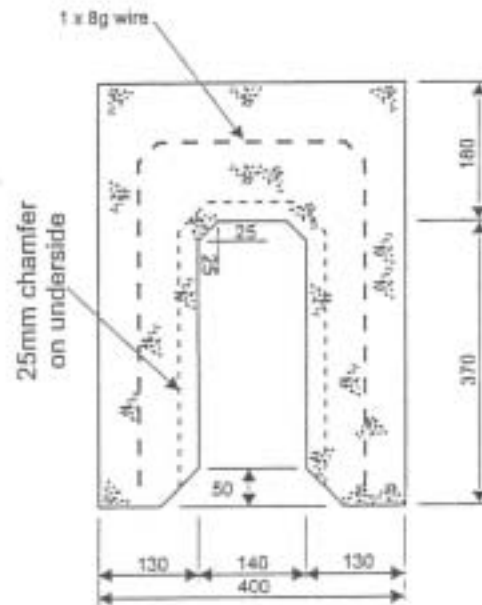
Water
Reticulation
Details

Precast Concrete Slabs



SECTION A - A

TYPE 1 SLAB



TYPE 2 SLAB
50mm thick

NOTES:

Before casting any slabs, the Contractor shall check the dimensions of valves and hydrants and adjust the dimensions of the slabs to ensure that clearances required for valves and hydrants are maintained

Diagram C405



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Water
Reticulation
Details

Water Supply Service Connection

Backfill:

1. Concrete seal, asphalt or hard paved, with AP20 crushed basecourse

2. Grass or garden, with suitable excavated material

Excess slot to be sealed with adhesive tape at both ends of box



15mm LDPE

50mm

Surface restoration to match existing ground

90mm

300mm to boundary

180 approx

flow

1m of 15mm LDPE pipe on property side for joining to - without disturbing meter box

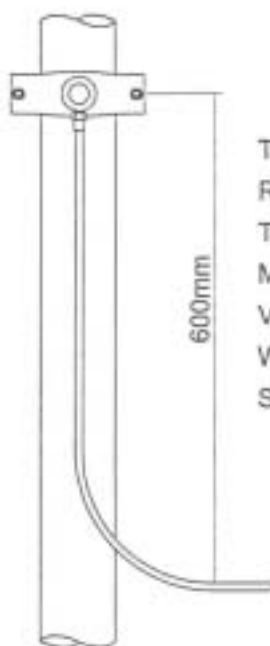
Plastic "Coreflute" base to meter box, on compacted layer of crushed green-metal or similar approved material.
Max. size 10mm

ELEVATION

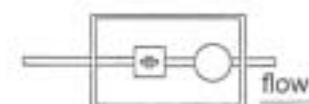
MATERIALS

Tapping band
Reducing bush - 20mm x 15mm if required
Talbot Ferrule - 15mm
Male Couplers - 15mm (RX type). 3 req.
Valve - 15mm approved ball valve
Water meter - 15mm (Socam 510 PR or Kent PSM)
Socket - 15mm

Meters only required when specifically requested.
Elsewhere install 15mm approved ball valve in approved toby box.



600mm



PLAN

Power box

Boundary

NOTE: Steel plate meter boxes only - should be installed in trafficable areas.

Diagram C406



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Water
Reticulation
Details

Service Locations

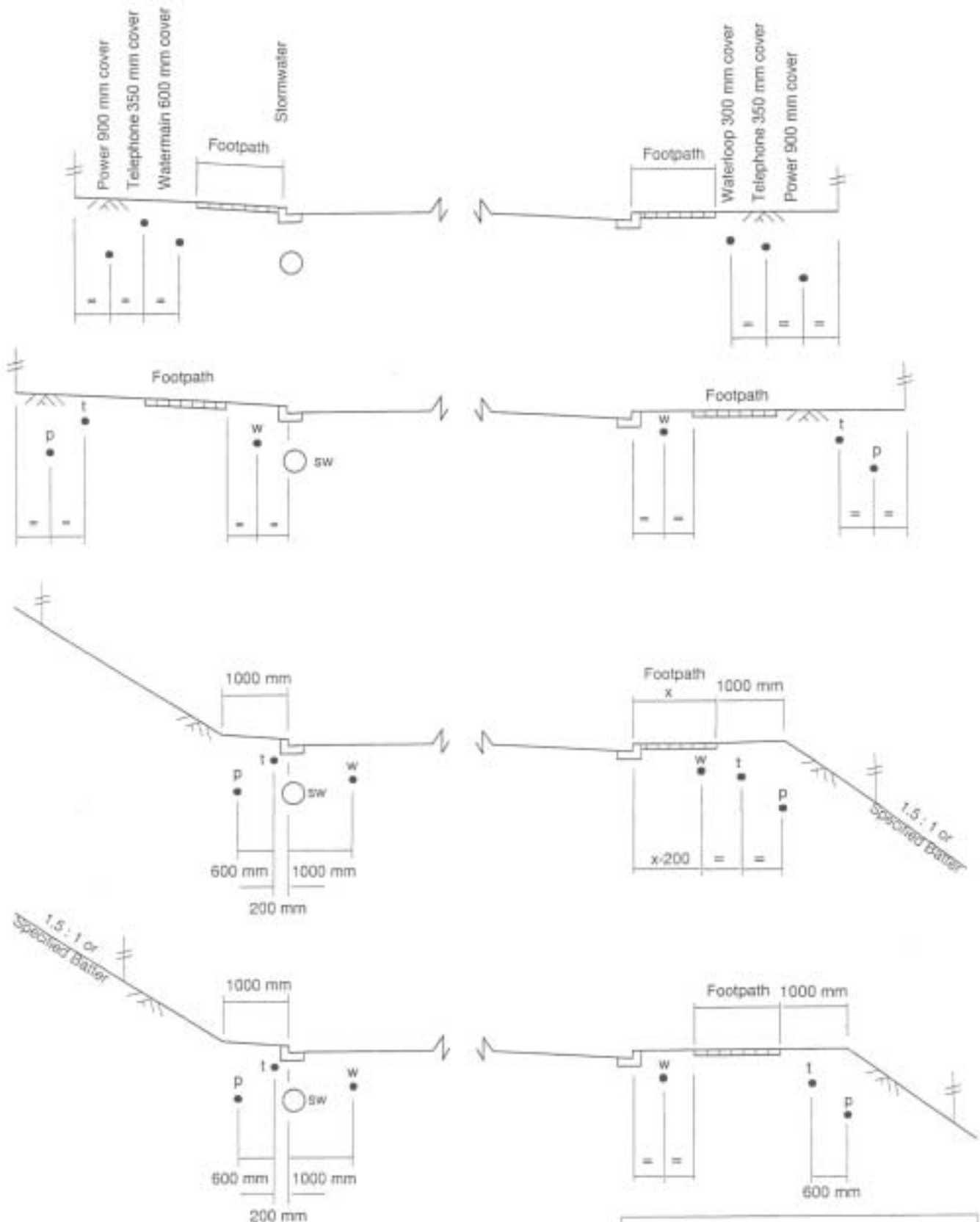


Diagram C500

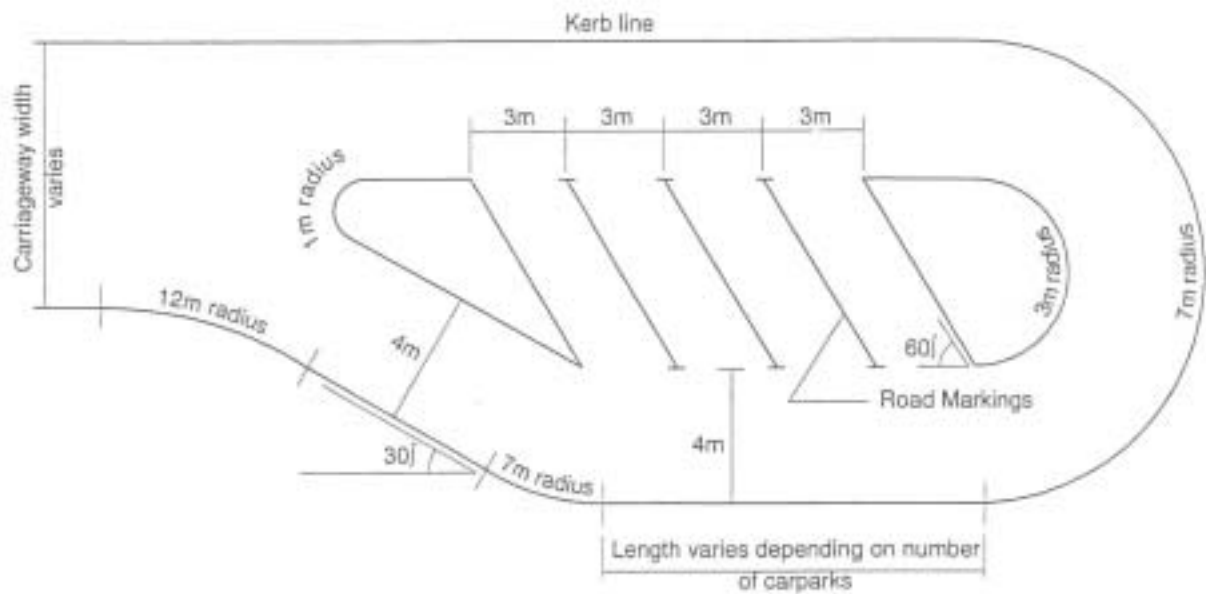


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Street and Footpath
Design Details

Cul de Sac Turning Circles



NOTE:

No kerbside parking within the turning circle

All road marking to be 100mm wide white painted lines

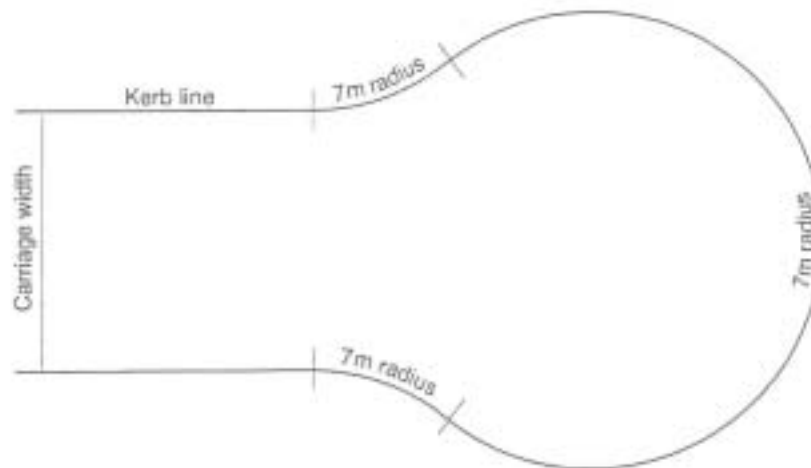


Diagram C501

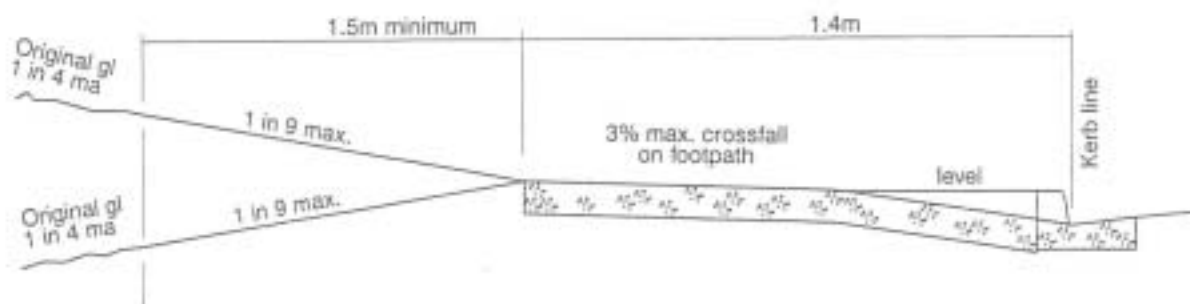


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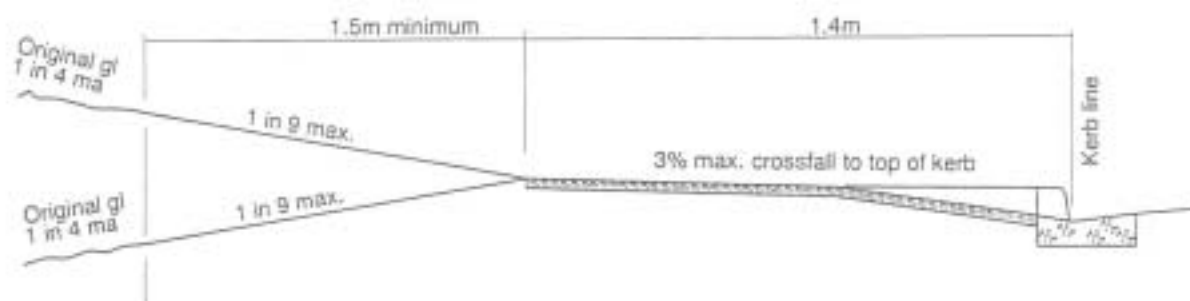
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Street and Footpath
Design Details

Standard Entranceway Profiles



Profile of Entrance
across Concrete Footpath



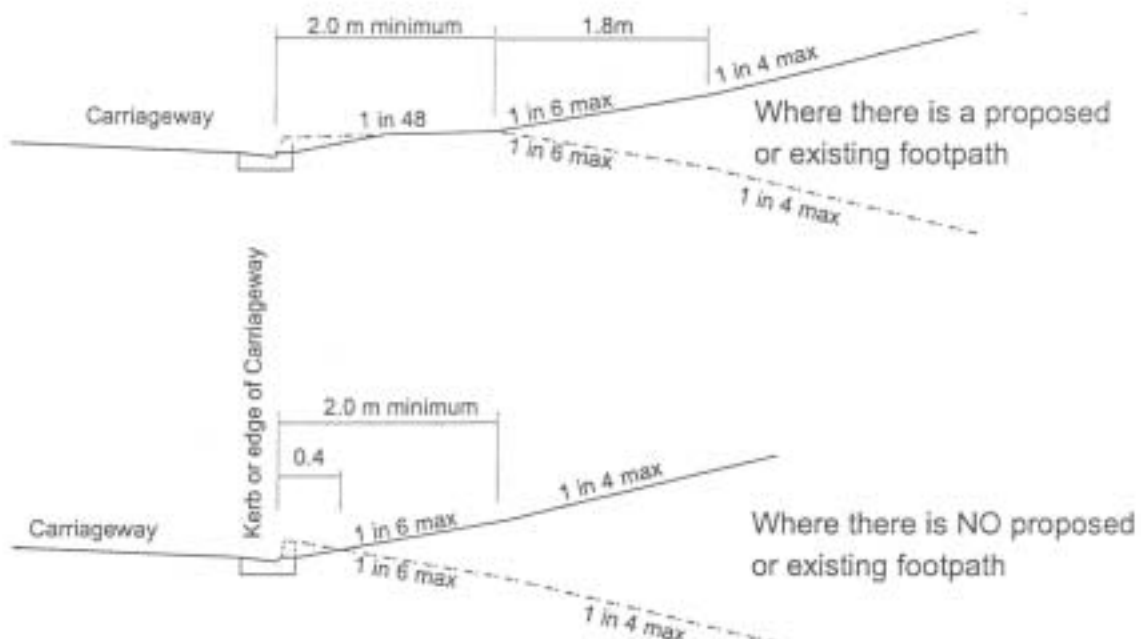
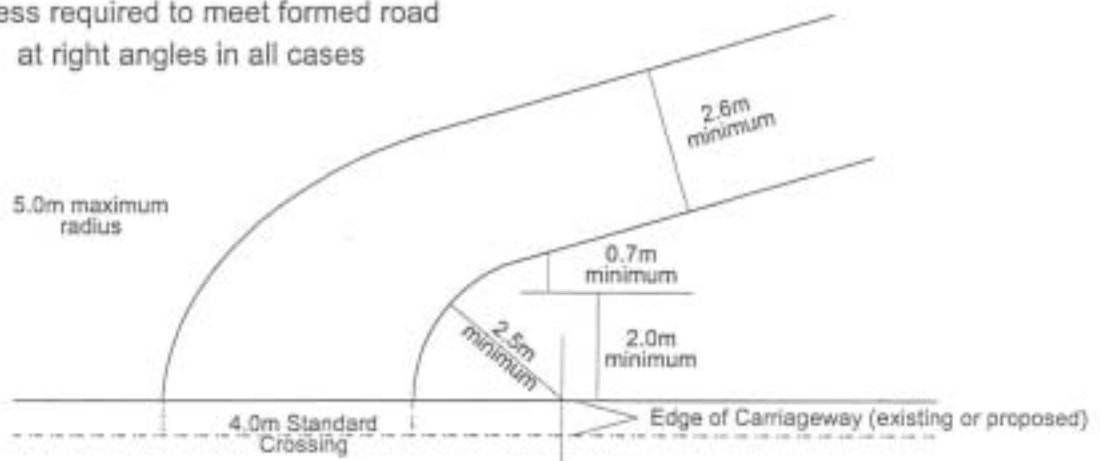
Profile of Entrance
across Asphaltic Footpath

Diagram C502

Vehicular Entrances

VEHICLE ACCESS TO PARKING SPACES FROM ROADWAY FORMATION

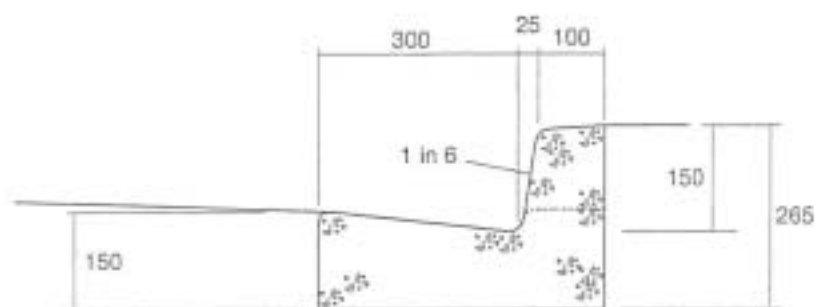
Access required to meet formed road
at right angles in all cases



GRADIENT OF ACCESS
(along side inside edge of driveway)

Diagram C503

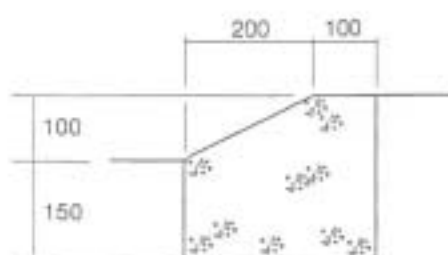
Standard Kerb and Channelling Details



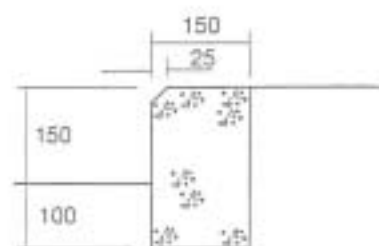
STANDARD PROFILE



LOW PROFILE



LAYBACK KERB



UNMOUNTABLE KERB

Diagram C504

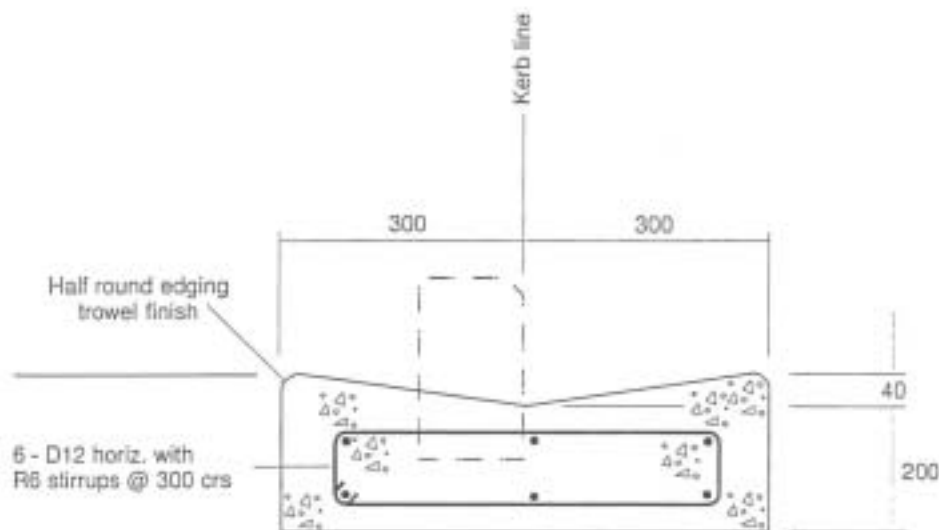


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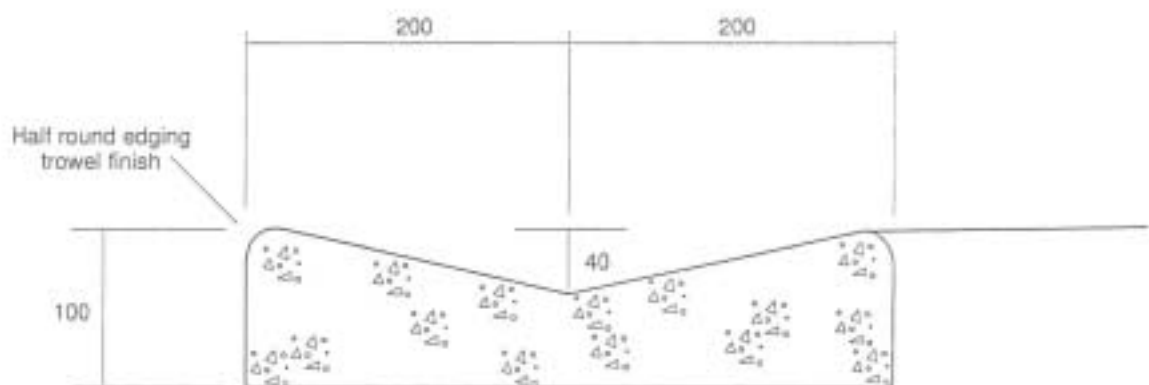
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Street and Footpath
Design Details

Standard Dished Channel Details (Swales)



DISHED CHANNEL



DISHED CHANNEL
FOOTPATHS

Diagram C505

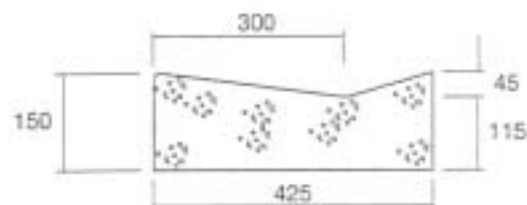
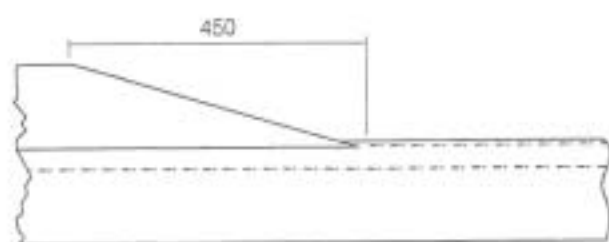


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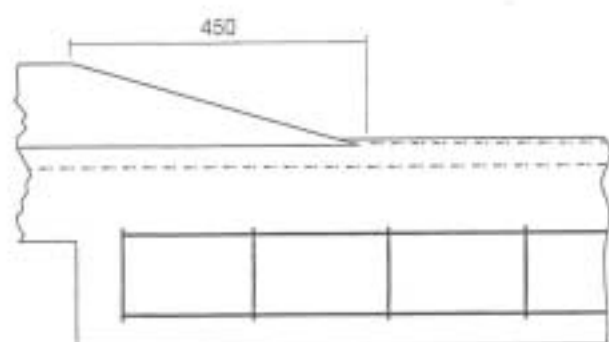
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Street and Footpath
Design Details

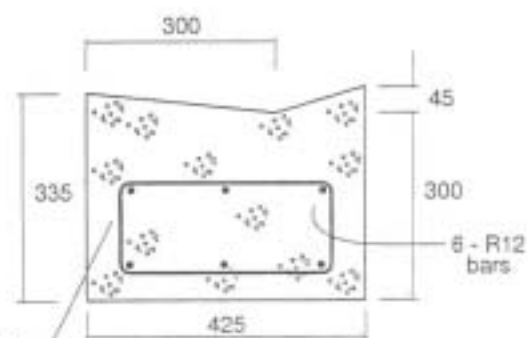
Standard Kerb and Channel Crossings



STANDARD RESIDENTIAL CROSSING

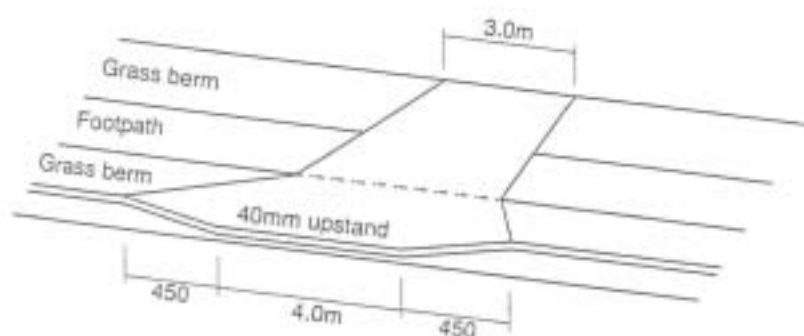


Increase depth at crossing
28 MPa @ 28 days concrete strength



R6 stirrups at
200 c/c with
50 min. cover

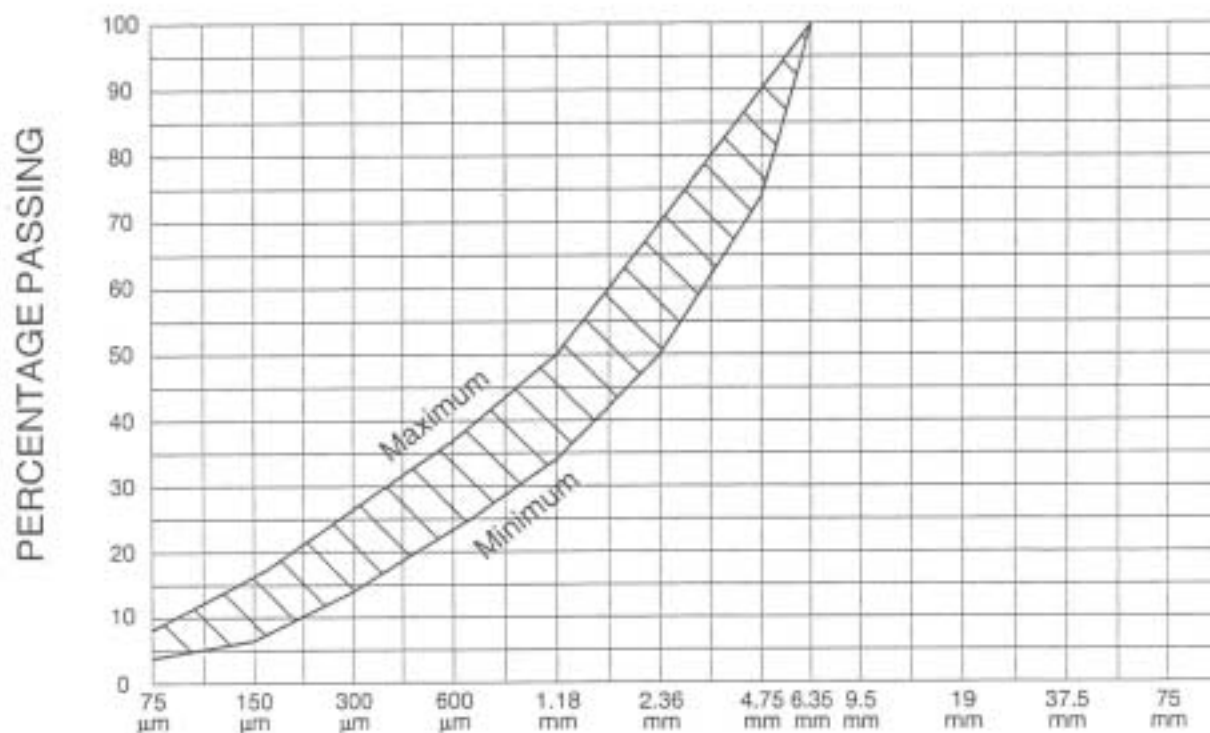
STANDARD INDUSTRIAL CROSSING



SCHEMATIC DIAGRAM OF STANDARD RESIDENTIAL CROSSING

Diagram C506

6.35mm Asphaltic Concrete for Footpaths



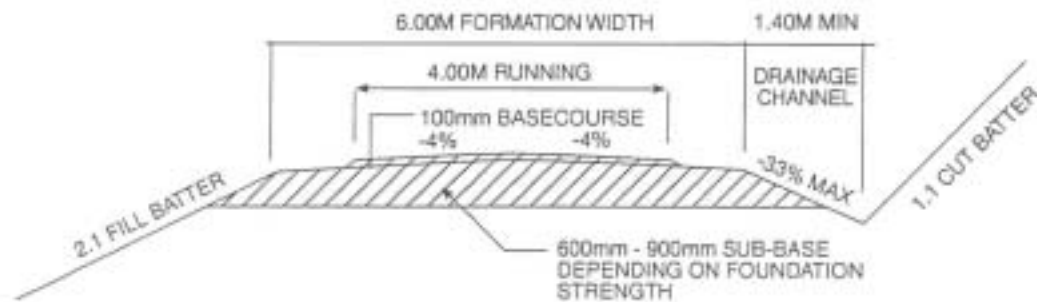
STANDARD SQUARE SIEVE OPENING

NOTE:

- Material to comply with NRB M/10
- Bitumen content 7 - 7.5%

Diagram C507

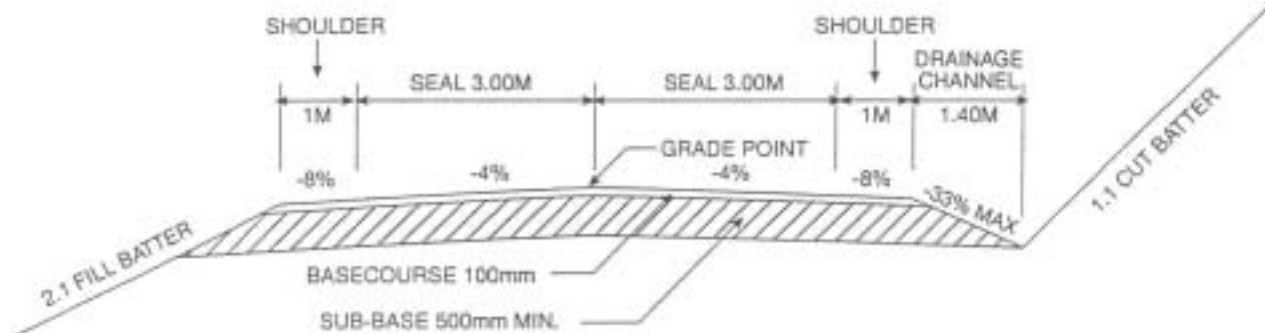
Unsealed Minor Rural Road



Standard Typical Cross Section

Diagram C520

Sealed Minor Rural Road



Standard Typical Cross Section

Diagram C521

Standard Rural Private Access

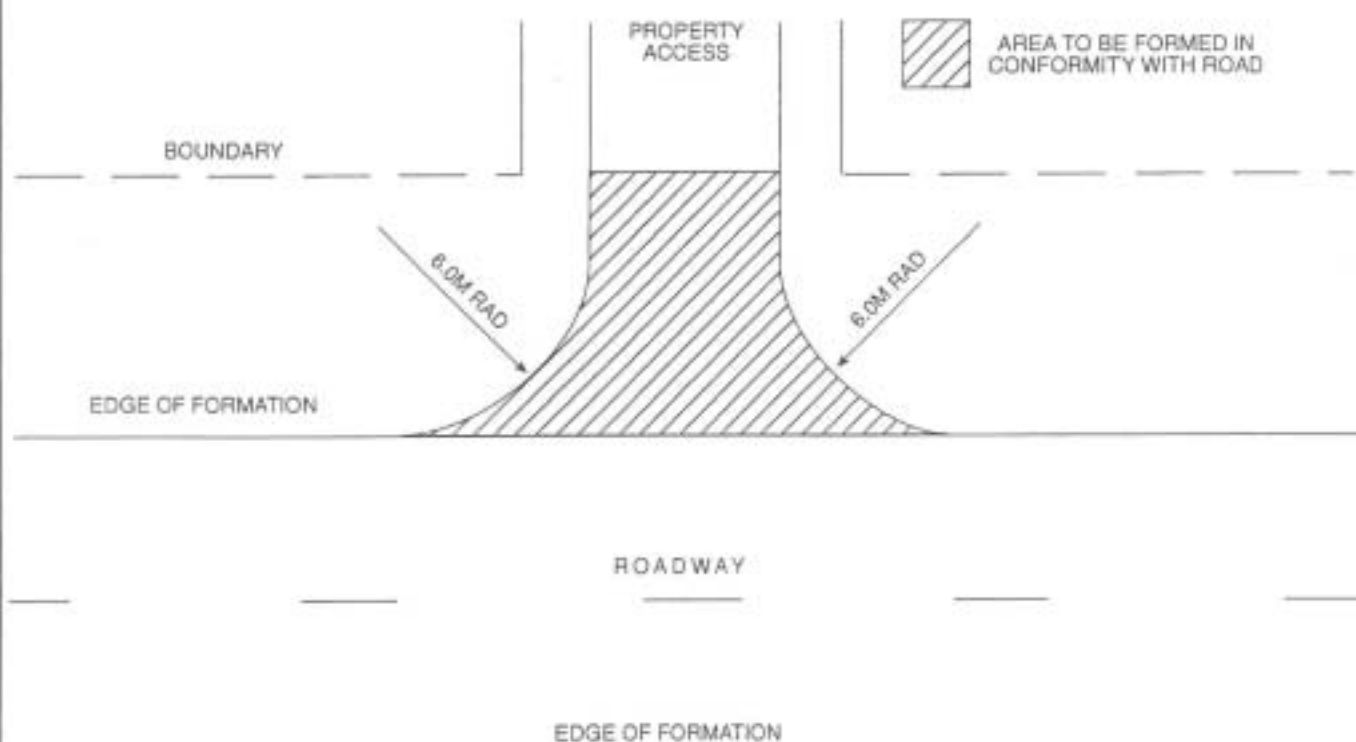


Diagram C522



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Street and Footpath
Design Details