



# Condron Concrete Works

CONDRON CONCRETE WORKS IS A TRADENAME FOR CONDRON CONCRETE LTD.

ARDEN ROAD, TULLAMORE, CO. OFFALY, IRELAND.

## CONCRETE PIPES





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## CONTENTS PAGE

### Table of Contents

CONTENTS PAGE.....	2
INTRODUCTION.....	3
PRODUCTION OF CONCRETE PIPES.....	4
QUALITY CONTROL AND TESTING.....	5
QUALITY CONTROL AND TESTING.....	6
TECHNICAL SPECIFICATIONS.....	7
LAMELL RUBBER GASKET.....	8
LAMELL RUBBER GASKET.....	9
POSITIONING OF RUBBER GASKET.....	10
INCORRECT POSITIONING OF RUBBER GASKET.....	11
PRECAST CONCRETE MANHOLES TO I.S.420.....	16
PRECAST CONCRETE MANHOLES TO I.S.420: 1989.....	17
AVAILABLE MANHOLE BASE PLANS IN 1200MM Ø BASES.....	18
MANHOLES.....	19
CONDRON CORBEL SLABS/ADJUSTING UNITS.....	20
CONDRON MANHOLE COVER.....	21
CATCH PITS.....	22
RECTANGULAR GULLIES TO BS 5911 – 6:2004.....	23
CIRCULAR GULLIES TO BS 5911 – 6: 2004.....	24
CONDRON HEADWALL.....	25
CONDRON HEADWALL.....	26
HANDLING / PIPE JOINTING.....	27
LAYING PIPES.....	28
LAYING PIPES.....	29
LAYING PIPES.....	30
LAYING PIPES.....	31
SITE TESTING AND INSPECTION OF PIPELINE.....	32
SITE TESTING AND INSPECTION OF PIPELINE.....	33
STRUCTURAL DESIGN.....	34
STRUCTURAL DESIGN.....	35
STRUCTURAL DESIGN.....	36
STRUCTURAL DESIGN / BEDDING CLASSES.....	37
STRUCTURAL DESIGN.....	38
STRUCTURAL DESIGN.....	39
STRUCTURAL DESIGN.....	40
HYDRAULIC DESIGN.....	41
HYDRAULIC DESIGN.....	42
HYDRAULIC DESIGN.....	43
HYDRAULIC DESIGN.....	44
PRODUCT DATA SHEET.....	45
SAFETY.....	45
CONCRETE ROOF TILES.....	46



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## INTRODUCTION

Condron Concrete Works is a 100% Irish owned Private Company founded in 1969 by John Condron. It is located just outside Tullamore, Co. Offaly, Ireland. The Company manufactures Concrete Pipes, Manholes and Gully Traps as well as Concrete Roof Tiles and Accessories.

Production can be divided into four main categories:

- **OGEE** pipes which are used mainly for Surface Water Drainage, Land Drainage etc. Diameters range from 150mm to 1200mm with perforated pipes available up to 600mm.
- **Spigot and Socket (S&S)** pipes used for Foul and Surface Water Sewers and Culverts and are produced in diameter sizes from 150mm to 2100mm.
- **Manhole bases, rings and covers. Gullies, Bends, Saddles and Junctions**, as well a wide range of sealing methods.
- **Concrete Roof Tiles** are produced in seven different profiles – Concrete Pantiles, Concrete Slate Tiles, Concrete Bullnose Slate Tiles, 3 in 1 Tile / Cladding Tiles Concrete Plain Tiles / Cladding Tiles, M Profile and Condron Slate. Colours ranging through Black, Grey, Brown, Red, Marigold, Terracotta, and a range of Streaky colours are available. Details are in our Concrete Tile Brochure which is available by contacting our office or on our website.

Specials of all products can be manufactured and supplied "to order".

Ogee pipes are manufactured a metre long. S&S vary from 1.25 metres for 150mm and 225mm diameter, to 2 metres for 300mm diameter, and 2.5 metres for all other sizes.

All our pipes are manufactured and certified to relevant European (EN) and Irish (IS) Standards Specifications and are regularly inspected by officials from National Standards Authority of Ireland (NSAI). Daily routine Quality Control is also carried out by our own team of engineers to ensure that highest standards are maintained at all times.

Certificates of Compliance to the relevant Standard on which the products comply are available on request.

Information on all our piping products is given in the following pages and further information is available, if required, from our office at Arden Road.

The information contained within this brochure is available on our web site.

Condron Concrete Works  
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Telephone: + 353 (0) 57 93 49000-9  
Fax: + 353 (0) 57 9341565  
E-mail: [condronconcrete@eircom.net](mailto:condronconcrete@eircom.net)  
Web: [www.condronconcrete.com](http://www.condronconcrete.com)





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## PRODUCTION OF CONCRETE PIPES

### Materials

All our products are manufactured using highest quality aggregates, which come from our own quarries and sand pits. Our batching and mixing procedures are fully computerised producing low water to cement ratio, high strength, concrete.

### Reinforcement

Reinforcement cages required for the Spigot & Socket pipes are produced from Cold Drawn High Tensile Steel on our automatic welding machines.

### I.S.6: Concrete Sewer Pipe

This specification deals with the manufacture and properties of flexible jointed concrete pipes and fittings, either reinforced with steel or unreinforced, intended to be used for the conveyance of sewage, or sewage and surface water at atmospheric pressure. These test requirements may be found in I.S. 6: 2004 and are to be used in conjunction with ISEN 1916: 2004. These new Standards are also be available from NSAI.

### Material Comparison

To assist in choosing between rigid and flexible pipes, consider the following:

Table 1

Attribute	Concrete	Plastic
Proven Durability	YES	NO
Non-Flammable	YES	NO
High Impact Strength	YES	NO
Structural Strength Principally in pipe rather than surround	YES	NO
Rigid Under Load	YES	NO
Copes with poor quality installation	YES	NO
Copes with high pressure water jetting	YES	NO
Contains Rats in sewers	YES	NO
Self weight inhibits floatation	YES	NO
Diameters from DN 225 To DN 2100	YES	NO
Availability of complete pipeline system	YES	NO



Reinforcement Cage for 1500ø I.S. 6 Pipe



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## QUALITY CONTROL AND TESTING

### Quality Control and Testing

The requirements of I.S.6 2004 and ISEN 1916 are such that the pipes are tested at the place of manufacture to ensure that they are adequate for the purpose intended.

The following tests are carried out in compliance with the Standard on a daily basis by our Quality Control Team and are audited regularly by N.S.A.I. to ensure full compliance with the current Standard.

Table 2

Test	Purpose
Crush Test (proof)	To ensure reinforced pipes stand up to 80% of the minimum Crush Load before developing cracks.
Crush Test (min.)	To ensure all pipes are capable of withstanding the specified minimum Crush Load without collapse.
Hydrostatic Test	To assess the permeability of the pipe walls.
Water Absorption	To assess the quality and density of the concrete.
Joint Deflection	To ensure the flexibility of the pipe joints to the minimum angular deflection specified.
Joint Straight Draw	This enables us to guarantee joints will remain watertight with a 20mm gap between pipes.
Joint Shear	To prove that a joint will remain watertight when a load is applied.
Cover to Reinforcement	To monitor that all the reinforcement is protected by minimum of 15mm cover.



Gauging of 1050mm Ø Pipe



In-house Material Testing



Quality Control Inspection



Production Quality Control

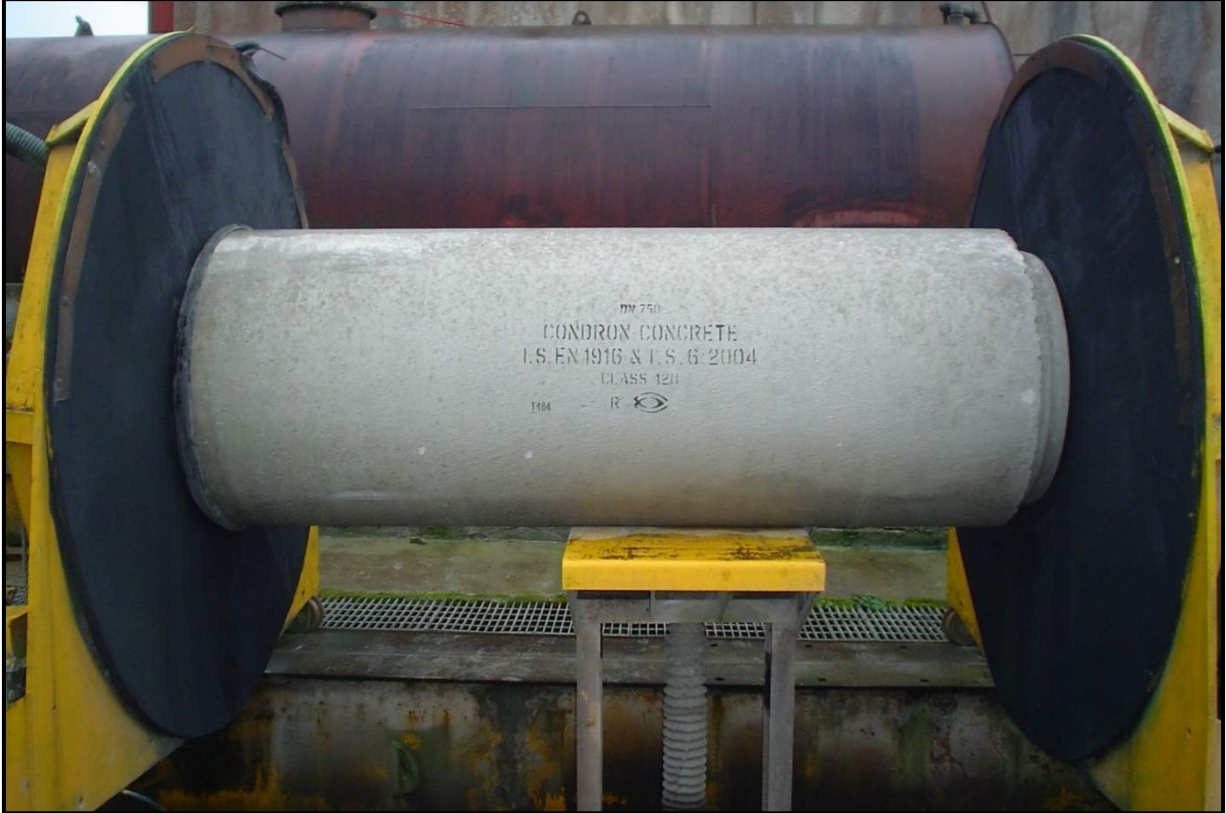


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## QUALITY CONTROL AND TESTING



**750mm  $\varnothing$  I.S. 6 Pipe undergoing Hydrostatic Test**

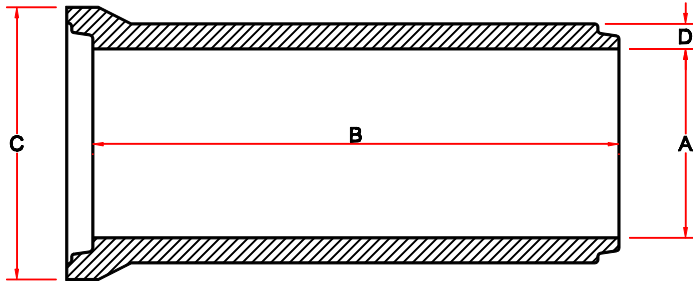


**1200mm  $\varnothing$  I.S. 6 Pipe undergoing Crush Test**

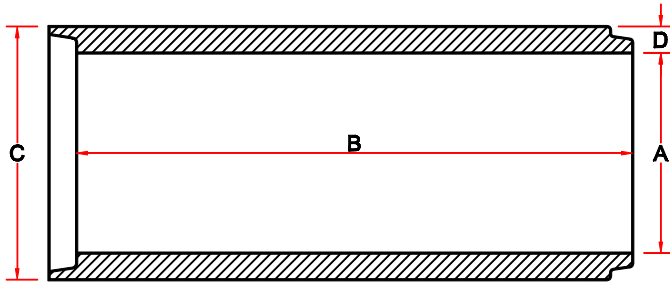


## TECHNICAL SPECIFICATIONS

### FLEXIBLE JOINTED PIPES



### Spigot and Socket Type Pipe (S & S)



### Rebated Type Pipe

### OGEE PIPES

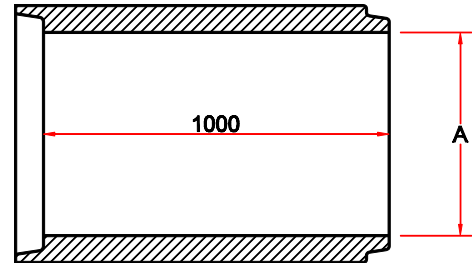


Table 4

"A" Internal Diameter	B Length	Approx. Wall Thickness (mm)	Approx. Weight in kgs
225mm	1 Metre	35	65
300mm	1 Metre	37	86
375mm	1 Metre	38	124
450mm	1 Metre	46	167
525mm	1 Metre	47	210
600mm	1 Metre	54	278
750mm	1 Metre	75	470
900mm	1 Metre	95	710
1050mm	1 Metre	100	870
1200mm	1 Metre	110	1110

Table 3

A Pipe -	B Length (m)	C Approx. Outside - (mm) O/D	D Approx. Wall Thickness (mm)	Approx. Weight in kgs	Pipe Type
150mm	1.25	290	33	80	S & S
225mm	1.25	392	38	122	S & S
300mm	2.0	505	60	358	S & S
375mm	2.5	606	65	565	S & S
450mm	2.5	707	69	730	S & S
525mm	2.5	808	77	980	S & S
600mm	2.5	909	91	1240	S & S
675mm	2.5	1008	97	1520	S & S
750mm	2.5	1016	111	1840	S & S
900mm	2.5	1183	122	2380	S & S
1050mm	2.5	1420	128	3040	S & S
1200mm	2.5	1605	138	3880	S & S
1350mm	2.5	1805	152	4640	S & S
1500mm	2.5	2012	150	5800	S & S
1650mm	2.5	2155	178	6900	S & S
1800mm	2.5	2310	203	8240	S & S
2100mm	2.5	2525	211	9560	Rebated
2400mm	2.5	2866	230	11600	Rebated

I.S. 6: 2004 is to be used in conjunction with ISEN 1916:

These pipes can also be manufactured to customers' own specification if so required.

Rockers and Butt pipes are also available in 1-metre length in all sizes.

Ogee pipes are manufactured to I.S. 166: 1972 specification



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## LAMELL RUBBER GASKET

The newcomer, which gives your concrete pipe uplift.

1. Wide arc of sealing with a special profile: Larger angular deflection than obtainable with traditional rubber joints – and more axial movement in the joint.

2. A special surface structure: Ensures absolute tightness even if the joint has minor scratches.

3. Easily and simply placed direct on spigot end of the pipe before installation. No wrong placing possible – and it stays where it is placed.

4. The sliding mantle rests between jointing surfaces of the socket and the spigot: takes over and distributes shear forces from for example traffic load over an angle up to 180° (patented) and functions as an elastic force transfer element.

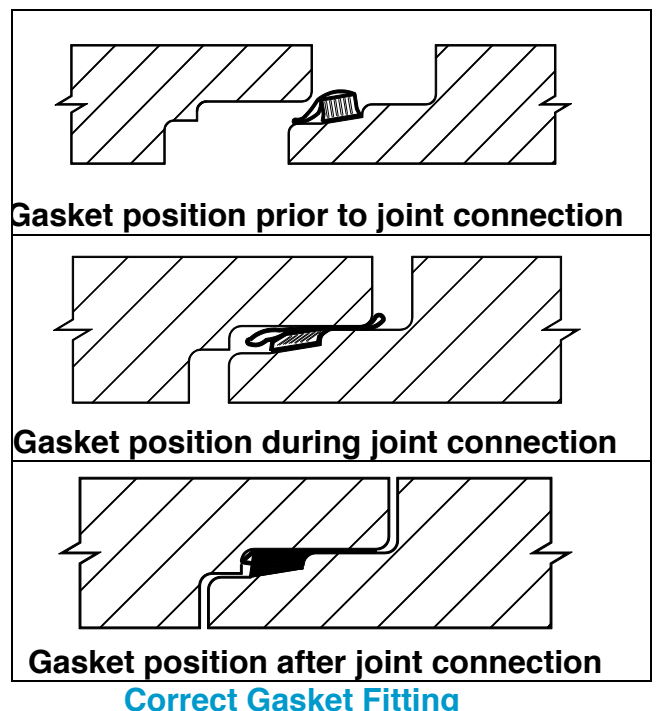
5. The closed sliding mantle contains a lubricant inside: Lamell is clean and easy to handle (no extra lubricant needed) and it functions like a sliding ring. Together with the special design of the joint, it makes the alignment during jointing operation fast and efficient.

6. Internal Locking bars in the mantle; ensures that the joints are locked in home position.

Today, it is normal to use either roll-in type or sliding ring joints on concrete pipes. Both of them have well-known advantages as well as disadvantages. But the demands for tightness and strength of pipe systems have been increased, however. The inventor of the brilliant Lamell system has considered this. The Lamell joint has been developed in cooperation with contractors, concrete pipe manufacturers, and pipe machine producers. This ensures that the Lamell joint combines the advantages of all known types of joint without having their disadvantages.

Because of the design of the Lamell joint and the elasticity and the configuration of the Lamell gasket, the compression of the Lamell gasket will always be within the needed limits, as well as the tightening area will not change within the tolerance limits. This ensures an absolutely tight pipeline.

The Lamell joint can be used in connection with all known dimensions and shapes of pipes for sewer and low head pressure systems as well as for manhole systems.







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## LAMELL RUBBER GASKET

1



Ensure Spigot is clean. Position gasket as outlined on supplied illustration to suit Spigot Type A or B

2



Check that gasket is equally tensioned around pipe

3



Ensure gasket is NOT protruding onto higher lip.

The Lamell gasket is patented.

Because of the combined strength and elasticity of the Lamell gasket, and because the limited annular space between the concrete surfaces formed by the socket and spigot is occupied by the sliding mantle, the intrusion of root webs from plants and trees is prevented automatically.

Furthermore the joint is designed for automatic and mechanical installation of pipes in order to reduce the manual handling in the trench.

The Lamell gasket meets for example the specifications of: D.S.421.2 - SS 367611 - B.S.I.2494 (2) - ASTM 443 - ASTN 505 - ISO/DIS 4633 - ASTM-361.

The Lamell gaskets are normally delivered in a SBR-rubber compound and are resistant to all substance normally found in ordinary drainage and sewer systems and are resistant to microbiological attacks from anaerobes.

Lamell gaskets can be delivered in an oil resistant Neoprene quality as well as in an EPDM-quality.

Please ask for more technical details if necessary.



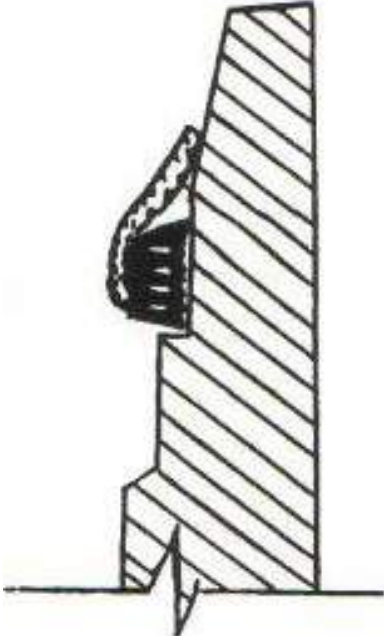
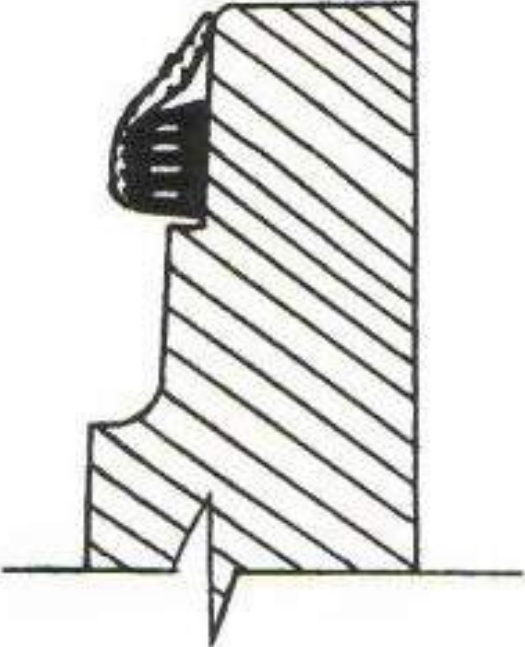
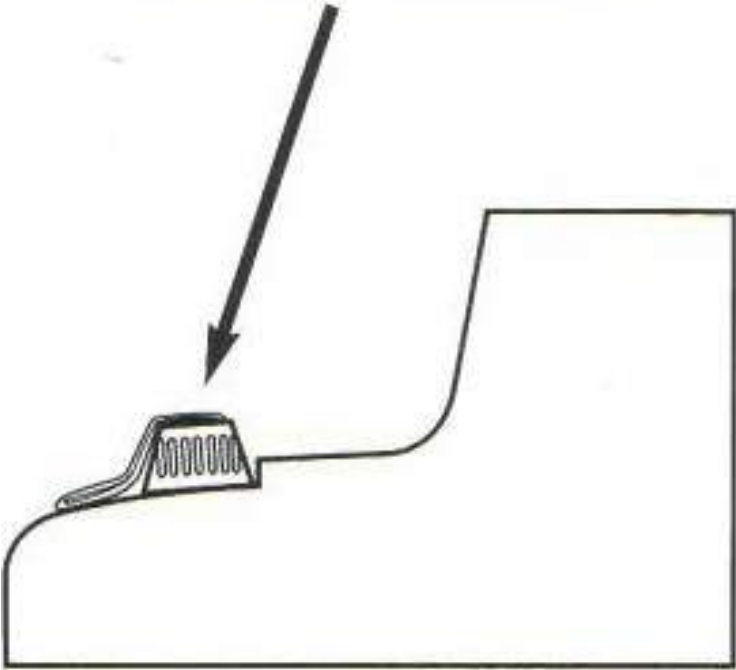
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## POSITIONING OF RUBBER GASKET

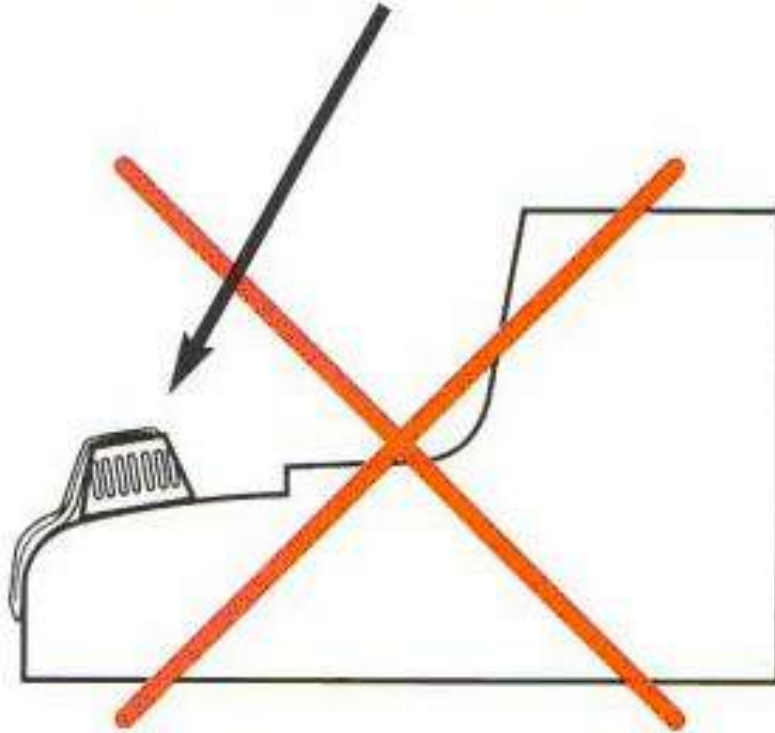
Illustration shows the correct position of the Rubber Gasket

<b>Spigot Type A</b> (225, 300, 375, 450, 525, 750, 900mm)	<b>Spigot Type B</b> (600, 675, 1050, 1200, 1350, 1500, 1800, 2100mm)
	
<p><b>CORRECTLY PLACED SEAL</b></p> 	<p><b>Application of gasket.</b></p> <ol style="list-style-type: none"><li>1. Clean the Spigot and the Socket of the previous pipe with a damp cloth ensuring no debris will interfere with the joint.</li><li>2. Apply the gasket as illustrated for spigot type A or type B. No lubricant required.</li><li>3. Check that the gasket is evenly tensioned all the way round.</li><li>4. Finally check to ensure that the gasket has not protruded onto the higher lip of the Spigot.</li><li>5. When jointing check for proper horizontal and vertical alignment of the two pipes so the gasket rolls correctly and neatly into position giving a watertight joint.</li><li>6. Prior to the pipe being fitted into its final position all gaskets should be checked to ensure twisting has not occurred, particularly if the alignment of the pipe has been altered.</li></ol>
<p><b>Spigot</b></p>	<p><b>Correct Gasket Fitting</b></p>



## INCORRECT POSITIONING OF RUBBER GASKET

INCORRECTLY PLACED SEAL



Spigot end of I.S. 6 Pipe



INCORRECT POSITIONING OF GASKET



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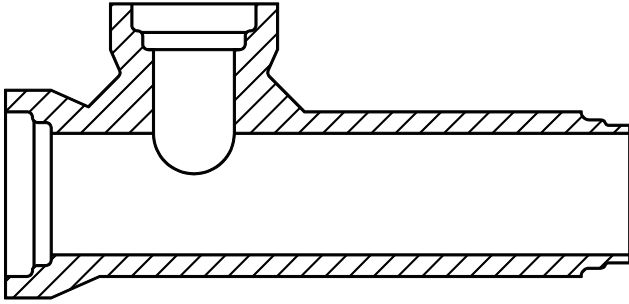
## JUNCTIONS

Branches from 100mm upwards, can be fitted for either Ogee, Spigot and Socketed or Rebated Pipes

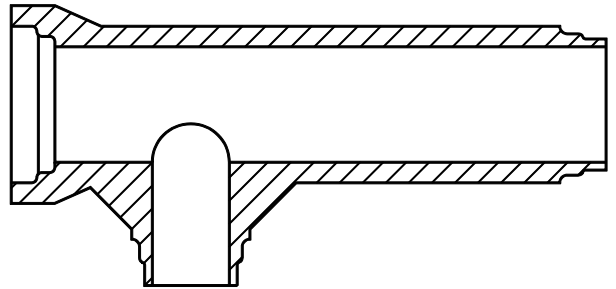
Junctions are normally produced in 150/225/300mm range with branches from 100mm to 300mm. Junctions in larger diameters can be produced to customers' requirements.

Junctions are only fitted to full-length pipes.

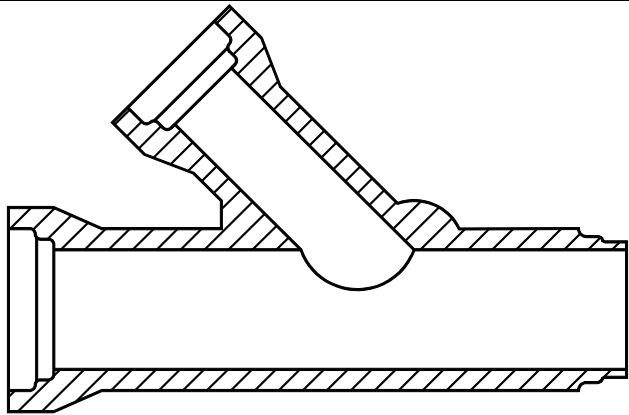
We also supply saddles in 100/150/225mm diameters, which can be adopted to fit all pipe sizes.



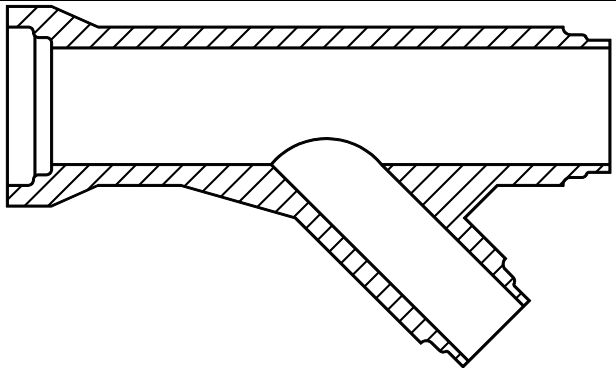
**T Junction - Socketed**



**T Junction - Spigot**



**Y Junction - Socketed**



**Y Junction - Spigot**



**Y Junction - T Junction Socketed -  
T Junction PVC Socketed**



**Junction**



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## BENDS AND BACKDROPS

### Permissible angles under I.S.6: as follows:

Table 6

Nominal Size mm	Permissible Angle
150	90°, 45°, 22½°
225	90°, 45°
300/600	45°

Bends are produced in any angle at request.

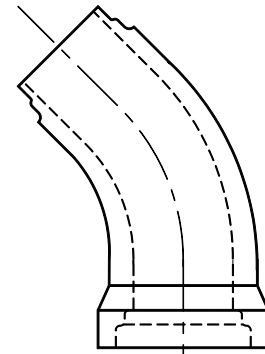
**Larger diameter bends can be made**

Bends are manufactured for both Ogee and S&S joints and are so designed as to include 100mm straight section on both spigot and socket ends, so as to improve the hydraulic characteristics of the bend.

Table 7

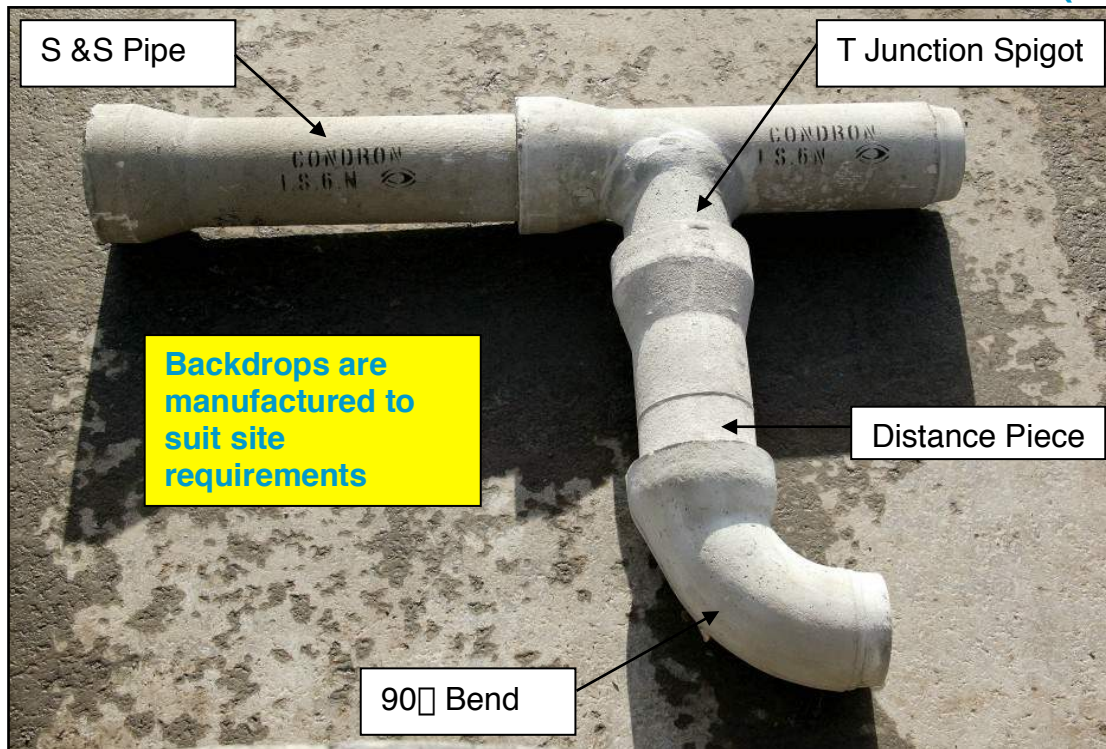
### Minimum Invert-to-Invert Backdrops.

Pipe Diameter mm	Drop Size	T +2 x 45° Bends (min)
225mm Ø	225mm	725mm
300 to 450mm Ø	300mm	800mm
300 to 450mm Ø	375mm	1180mm
525 to 675mm Ø	450mm	1180mm
525 to 675mm Ø	525mm	1380mm
750 to 900mm Ø	600mm	1500mm



**S & S Bend (45°)**

Shallower inverts can be supplied by using a Y backdrop and a 45° bend.



### Backdrop Junction

Junctions and Bends are manufactured in accordance with I.S.6. They have the same wall thickness and internal diameters as the pipes with which they are to be used. Junctions are manufactured from components produced by the vertically cast process, but the whole of the branch, the main incorporating the branch, and bends, should be encased in a concrete surround designed to withstand external loads.



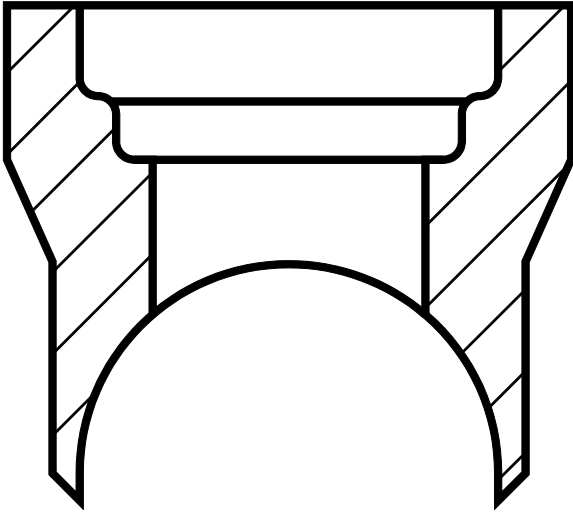
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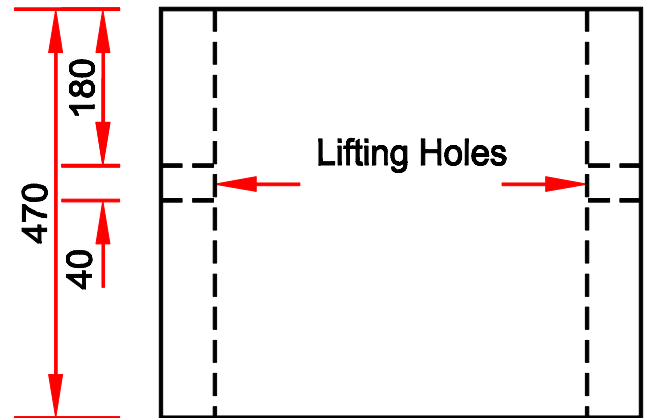
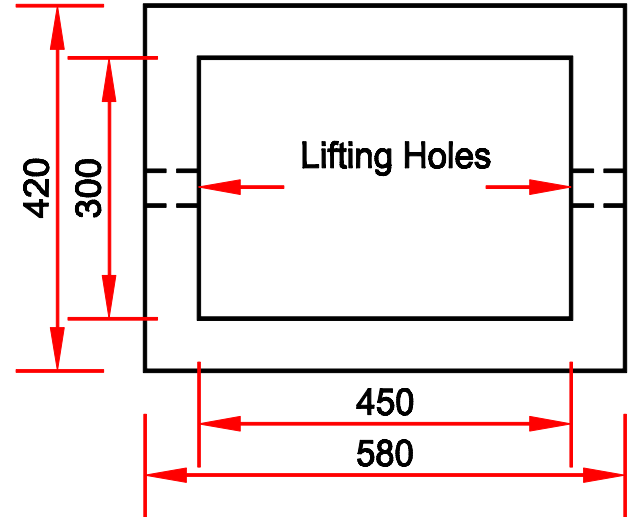
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## DATA SHEET – SADDLE AND HYDRANT BOX

### Saddle



### Hydrant Box



**Bends – Saddles Double Spigot –  
Gulley Cover Slab**



**Hydrant Box**



## SULPHATE RESISTANT / BITUMEN COATED PIPES

### SULPHATE RESISTANT (S.R.) PIPES

In the rare conditions where sulphuric acid is present in the ground water or where internal acid attack is thought likely, Sulphate Resistant concrete pipes should be used. These are made to order and to comply with sulphate class 4b of I.S. 6: 2004 Table 2 and give a high-class resistance to attack. High Sulphate Resistant Hydraulic Cement is used in concrete exposed to severe sulphate action, principally where soils or ground waters have high sulphate content. It gains strength more slowly than General Use hydraulic cement. Use of a low water-to-cementing-materials ratio and low permeability are critical to the performance of any concrete exposed to severe sulphate attacks. Like other Portland cements, it is not resistant to acids and other highly corrosive substances.

Ground Granulated Blastfurnace Slag (GGBS) is added to concrete by addition at the concrete mixer, along with ordinary cement, aggregates and water. The normal ratios and proportions of aggregates and water to cementitious material in the mix remain unchanged. Mixing times are the same as for ordinary cement. Both wet mixing and dry mixing processes can be used for making concrete with GGBS.

GGBS is used as a direct replacement for ordinary cement, and replaces ordinary cement on a one-to-one basis by weight. Replacement rates for GGBS vary from 30% to up to 85%. Typically 50% is used in most instances. Higher replacement rates up to 85% are used in specialist applications such as in aggressive environments and to reduce heat of hydration.

Sulphate Class	Cement Group	Minimum Cementitious Content (kg/m <sup>3</sup> )	
		Reinforced Units	Unreinforced Units
2	1	360	330
	2	360	300
	3	360	300
3	1	380	380
	2	360	340
	3	360	320
4a	2	360	360
	3	360	360
4b	2	360	360
	3	360	360
5	Seek the Advice from the Manufacturer		

Extract from Table 2 Cementitious Content I.S. 6:2004

Cement Group	Factory Produced or Combination (FP or COM)	Composition/ Specification
1	FP	Portland cement conforming to CEM 1 as specified in I.S. EN 197-1
		Portland blastfurnace cement conforming to BS 146
		Portland pfa cement conforming to CEM II/B-V as specified in I.S. EN 197-1
	COM	Combination of Portland cement conforming to CEM 1 as specified in I.S. EN 197-1 and ggbs conforming to BS 6600 containing no less than 36% and not more than 65% ggbs by mass of ggbs plus cement
Combination of Portland cement conforming to CEM 1 as specified in I.S. EN 197-1 and pfa conforming to BS 3892-1 containing no less than 21% and not more than 35% pfa by mass of pfa plus cement		
2	FP	Portland pfa cement conforming to CEM II/B-V as specified in I.S. EN 197-1 containing not less than 26% PFA by mass of nucleus
	COM	Combination of Portland cement conforming to CEM 1 as specified in I.S. EN 197-1 and ggbs conforming to BS 6699 containing no less than 70% and not more than 85% ggbs by mass of ggbs plus cement
		Combination of Portland cement conforming to CEM 1 as specified in I.S. EN 197-1 and pfa conforming to BS 3892-1 containing no less than 25% and not more than 40% pfa by mass of nucleus
3	FP	Sulphate resisting Portland cement conforming to BS 4027



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## PRECAST CONCRETE MANHOLES TO I.S.420

Condron Concrete Works produce a complete range of manhole components, all of which are certified to I.S. 420: 1989 and I.S. 420: 2004 in conjunction with ISEN 1917 and supersedes I.S. 420: 1989 in October 2004.

### Advantages of Precast Manholes:

The main advantages of precast concrete manhole units over insitu concrete construction are:

1. Units are factory produced to I.S. 420: 1989, I.S. 420: 2004 and I.S. EN 1917.
2. They are manufactured in wide range of sizes and depths.
3. They are simple to assemble requiring relatively unskilled labour on site.
4. Units are capable of being constructed as flexible watertight structures.
5. They are supplied fitted with non slip steps to EN 13101: 2002 Class C.
6. The structure is durable with its own inherent strength.

### Base Units:

The diameter of our Manhole Base is 1200mm and as can be seen from Table 11, an extensive range of channel sizes and floor plans are available which would cater for the vast majority of site requirements. The all socketed units are designed so that a seal can be provided on all connections, with double spigoted sections available for connecting the outlet to the socket of the first downstream pipe.

The 150mm, 225mm and 300mm channel sizes are also available with sockets and gaskets suitable for use with plastic pipes.

Heights and Weights of Manhole Bases are as shown on Tables 9 and 10.

### Chamber/ Inspection Units:

All chamber sections are fitted during manufacture with 350mm wide plastic coated aluminium rung steps, which are spaced 250mm apart, thereby providing a uniform step interval in all units. The black polyethylene covering

on the steps is resistant to nearly all media and also prevents sparking when walked on with iron-mounted boots. The steps comply to EN 13101: 2002 Class C Chamber Rings can be supplied reinforced if required. All sections are jointed using our CS 202 Butyl Sealant giving an immediate and flexible watertight joint.

Heights of chamber sections are as shown on Table 6.

**NOTE: All chamber sections are to be stored vertically on site to prevent rolling.**

### Cover Slabs:

The cover slabs, which are all reinforced, have a different thickness for different diameters. All are provided with a 600mm diameter opes and a socketed base which allows a butyl sealant joint to the top chamber section.

Table 8

Cover Slab Dia.	Overall Approx. Thickness	Effective Approx. Thickness	Approx. Weight (kg)
900mm	230mm	170mm	340
1050mm	230mm	160mm	480
1200mm	230mm	150 mm	580
1350mm	300mm	200mm	1020
1500mm	300mm	200mm	1260
1800mm	300mm	200mm	1780
2100mm	350mm	230mm	3200
2400mm	380mm	250mm	4140

### Quality Control and Testing

I.S. 420: 1989, I.S. 420: 2004 and ISEN 1917

incorporates routine water absorption tests, works proof load tests, maximum load tests, cube crushing tests, cover to reinforcement, complete manhole hydrostatic test and installed step tests. Our Quality Control Team carries these tests out daily to ensure compliance to the relevant standards.







## PRECAST CONCRETE MANHOLES TO I.S.420: 1989

Precast concrete cover slab showing the approx. location of the access ope in the cover slab over the access steps to EN 13101: 2002 Class C.



Manhole Cover Slab Showing Access Ope

Precast concrete cover slabs should always be stored horizontally on site.

Precast concrete manhole ring on base with access steps to EN 13101: 2002 Class C.



Precast concrete manholes and bases should always be stored vertically on site.

### 1200mm ø, 1 Meter high Manhole Ring positioned on Base

#### Heights and weights of Chamber Rings

Table 9

Internal Diameter of Chamber Rings	Wall Thickness (Approx.)	Height (Approx Weight in kgs)			
		1.00m	0.75m	0.50m	0.25m
900mm	95mm	630	-	325	205-
1050mm	100mm	820	-	420	215
1200mm	110mm	1120	-	570	290
1350mm	140mm	1660	1250	850	-
1500mm	155mm	2080	1565	1050	-
1800mm	160mm	2420	-	1120	-
2100mm	155mm	3000	-	1520	-
2400mm	230mm	4700	-	2380	-

#### Heights and weights of Manhole Bases

Table 10

Channel Size	Overall height (Approx.)	Effective Height (Invert to top of Base)	Approx Weight in kgs for Base Types			
			Type 1	Type 2	Type 3	Type 4
150mm	750mm	600mm	1960	-	-	1800
225mm	750mm	600mm	2120	-	-	1850
300mm	750mm	600mm	2120	2000	2050	-
375mm	750mm	600mm	2120	2000	2050	-



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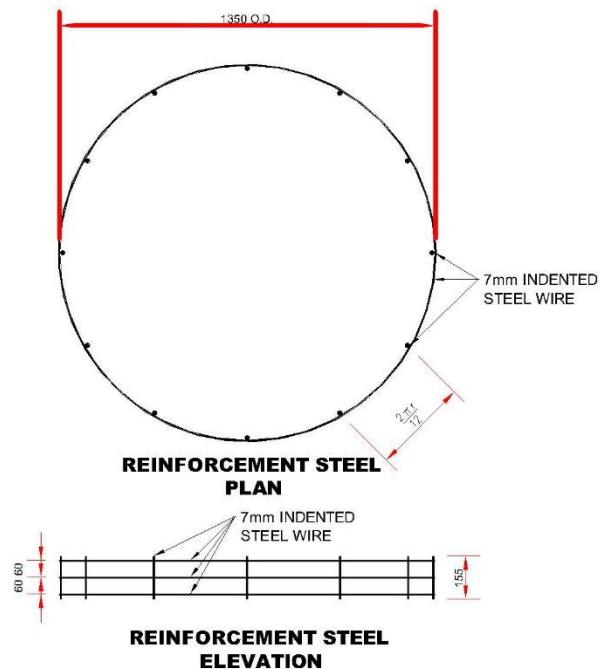
## AVAILABLE MANHOLE BASE PLANS IN 1200MM Ø BASES

Table 11

Plan Type	1	2	3	4
150mm Diameter Channel				
225mm Diameter Channel				
300mm Diameter Channel				
375mm Diameter Channel				



### REINFORCEMENT STEEL DETAILS FOR 1200mm Ø BASES



**Manhole Base with 300mm ø channel (Type 1) showing correct position of Butyl Sealant**



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## MANHOLES



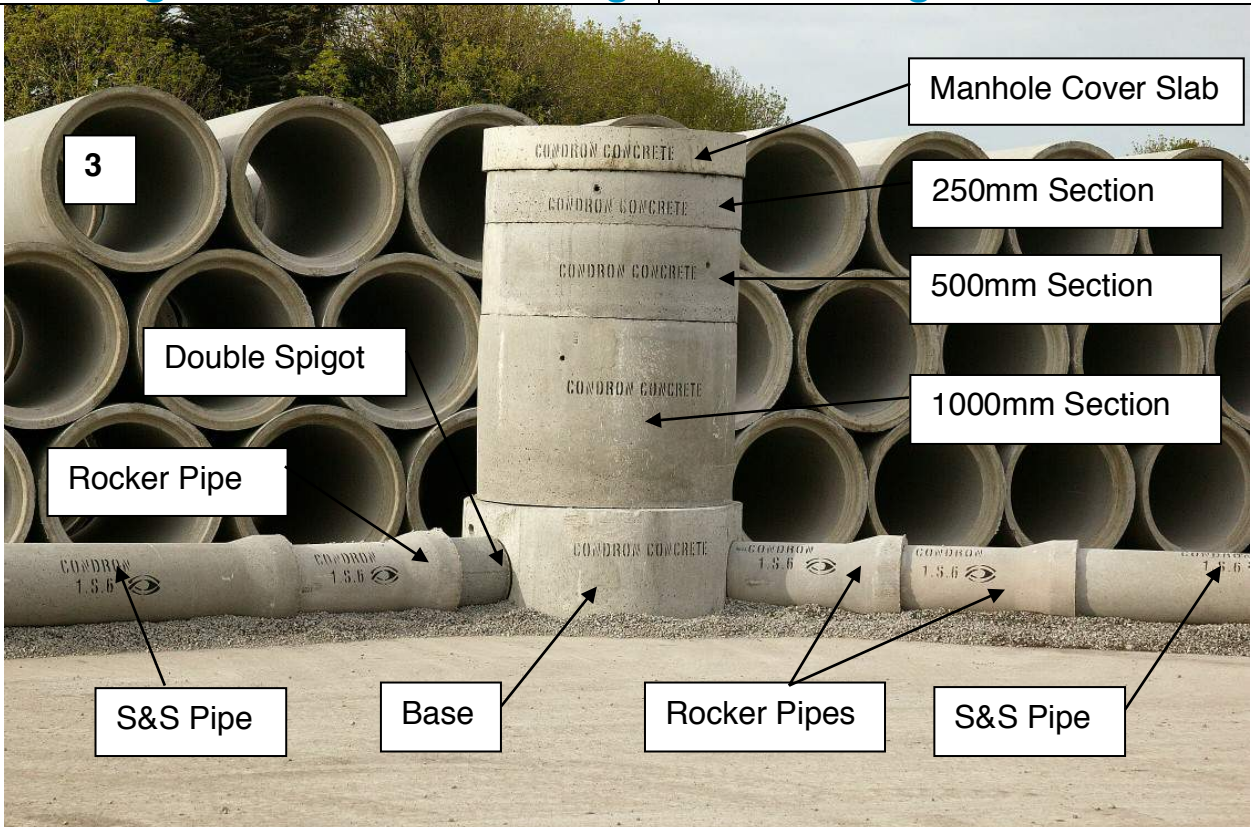
1



2

Positioning of 0.5M Chamber Ring

Positioning of Manhole Cover



3

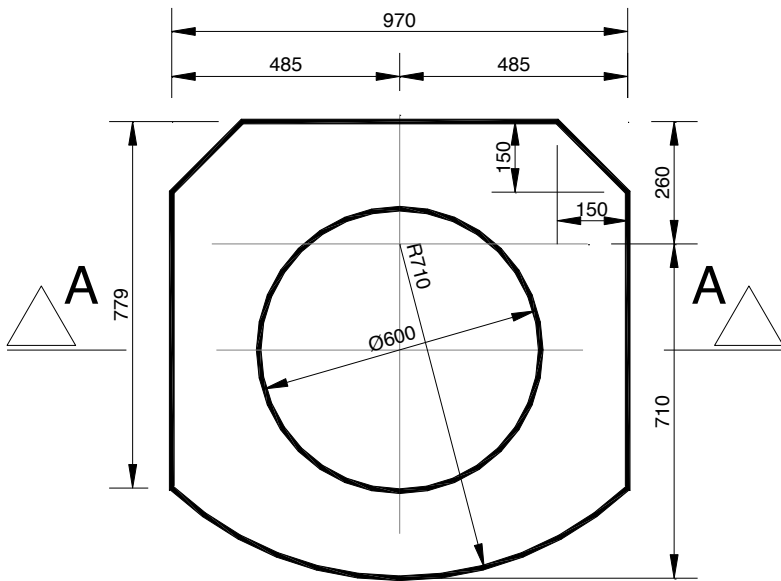
Typical Manhole Construction



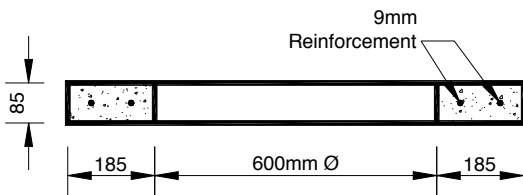
## CONDRON CORBEL SLABS/ADJUSTING UNITS

Seating Ring Depth (mm)	Manhole Diameter (mm)	Weight (Approx.) (kg)
85	600	100

- National Roads Authority (NRA) approved.
- Condrion Cover Frame Corbel Slabs/ Adjusting Unit are manufactured using 85mm thick reinforced concrete to suit Condrion Concrete manhole covers with 600mm access aperture.
- They are quick and simple to install.
- They can be used as risers in place of engineering bricks to achieve the required level for the manhole cover and frame.
- All Corbel Slabs/ Adjusting Units manufactured by Condrion Concrete Works are tested in accordance with I.S. 420 and I.S. EN 1917:2004 Specifications.



PLAN



SECTION A-A





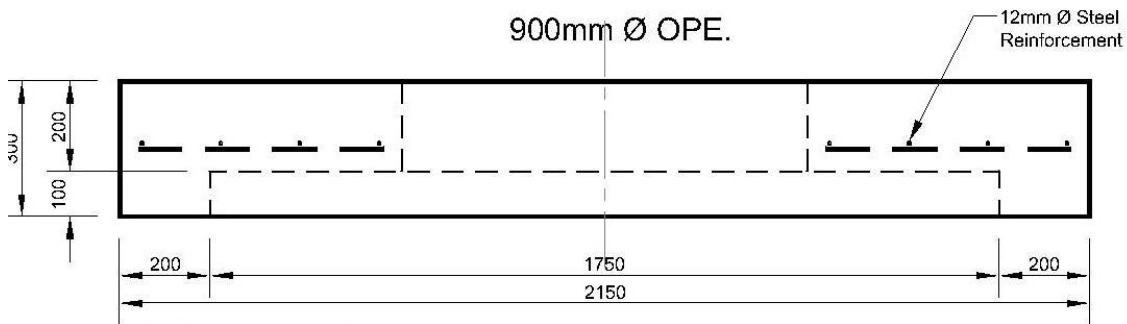
# Condron Concrete Works

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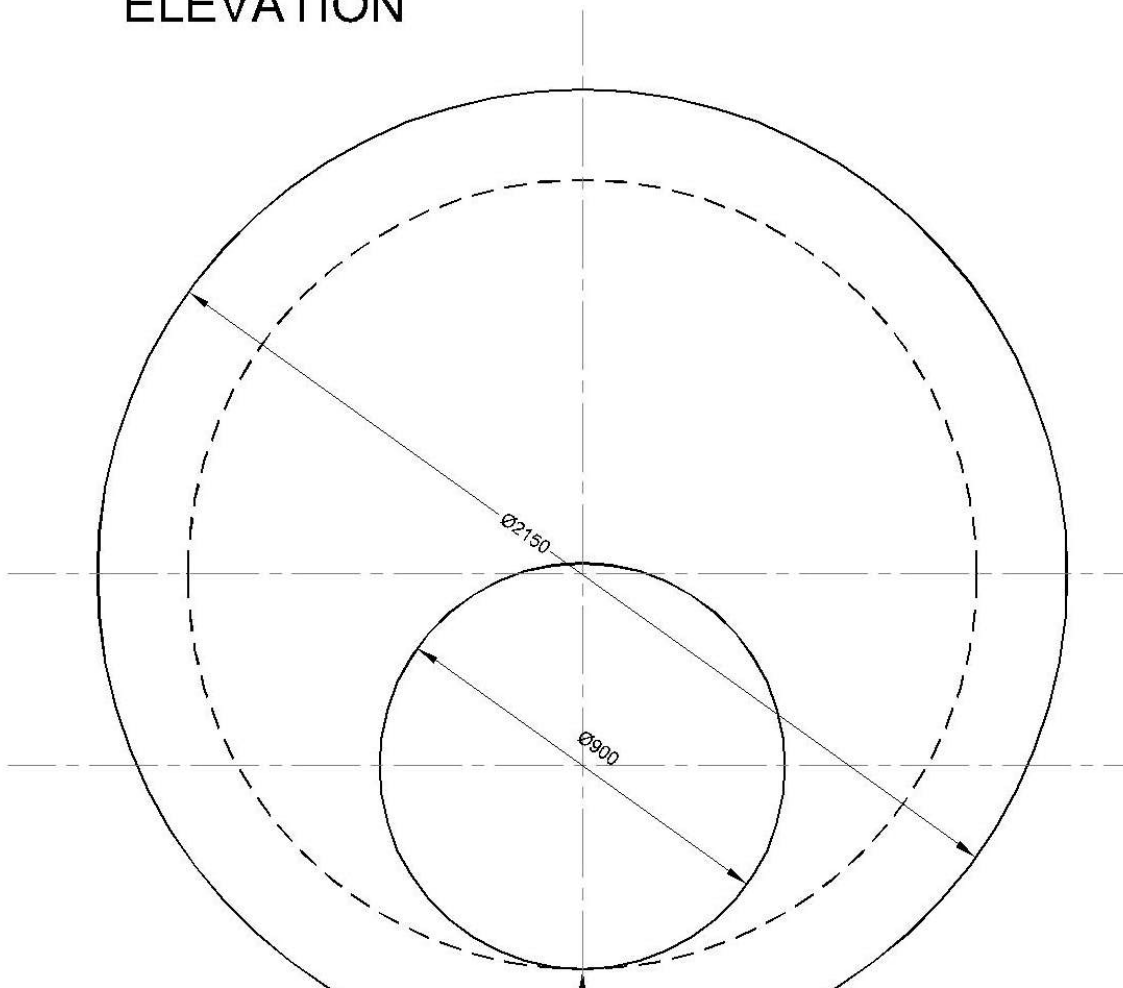
ARDEN ROAD, TULLAMORE, CO. OFFALY, IRELAND.

## CONDRON MANHOLE COVER

CONDRON CONCRETE 1800mm Ø H.D.C.  
to I.S.EN 1917 and I.S. 420:2004



ELEVATION



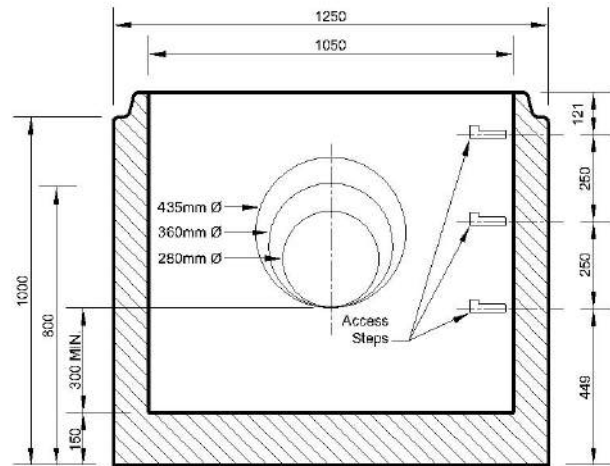


## CATCH PITS

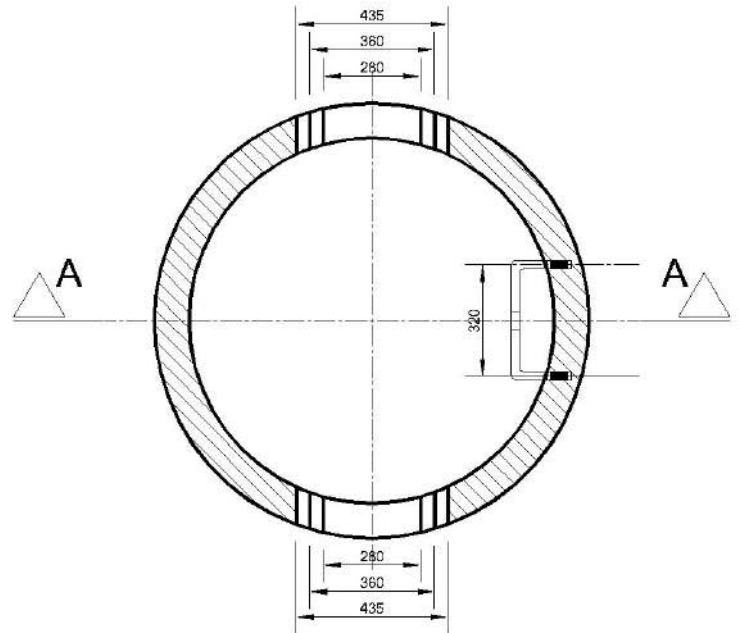
### Available Configurations

Inlet / outlet size	225mm Ø	300mm Ø	375mm Ø
90° base	✓	✓	✓
180° base	✓	✓	✓
270° base	✓	✓	✓

- Inlet/outlet opes can vary to suit 225mm, 300mm and 375mm Condron Concrete S&S Pipes, Ogee Pipes or (proprietary) Twin Wall and P.V.C pipes.
- Base Configurations can incorporate a third inlet/outlet ope and are available left or right handed.
- Reinforced concrete base.
- Extendable depths and standard manhole covers available.
- Chamber Catch-pits can be supplied in 900mm or 1200mm Ø upon request.
- Quick installation.
- Catch-pit sections are manufactured and tested in accordance with I.S. 420 and I.S. EN 1917:2004.
- Steps available if required.
- National Roads Authority (NRA) approved.
- Catch Pits must be lifted using a specialist grab and never lifted using slings through pipe opes or step rings.



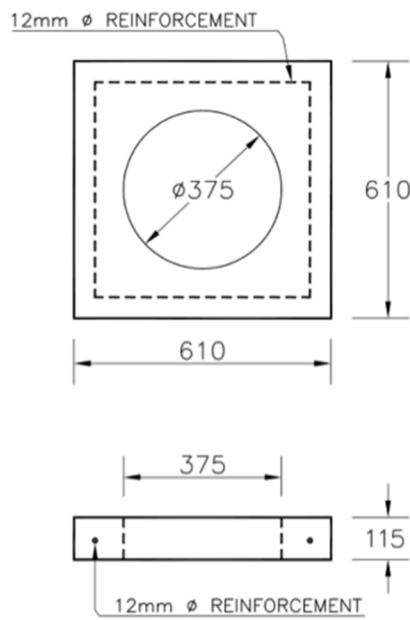
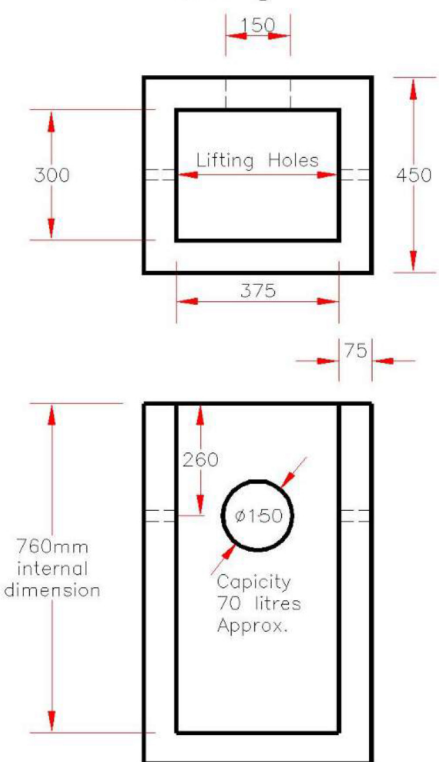
SECTION A-A



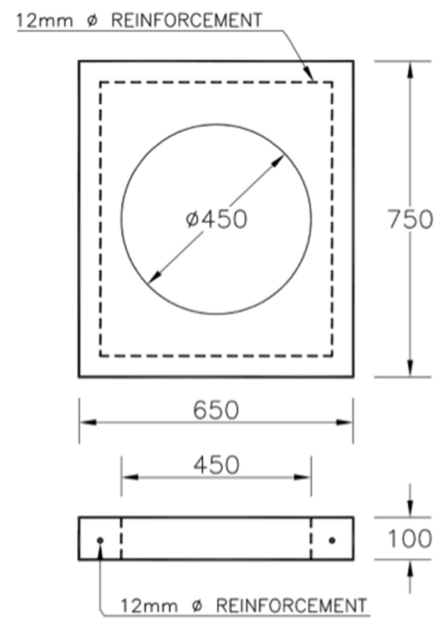
PLAN

## RECTANGULAR GULLIES TO BS 5911 – 6:2004

### Rectangular Untrapped Gully



**Small**



**Large**

National Roads Authority (NRA) approved.



Rubber insert to be installed into gully traps for use with PVC pipes.



PVC pipe with rubber insert in Circular Gully with Concrete Cover Slab.  
Cover Slabs are universally designed to receive most types of Gully Grids.



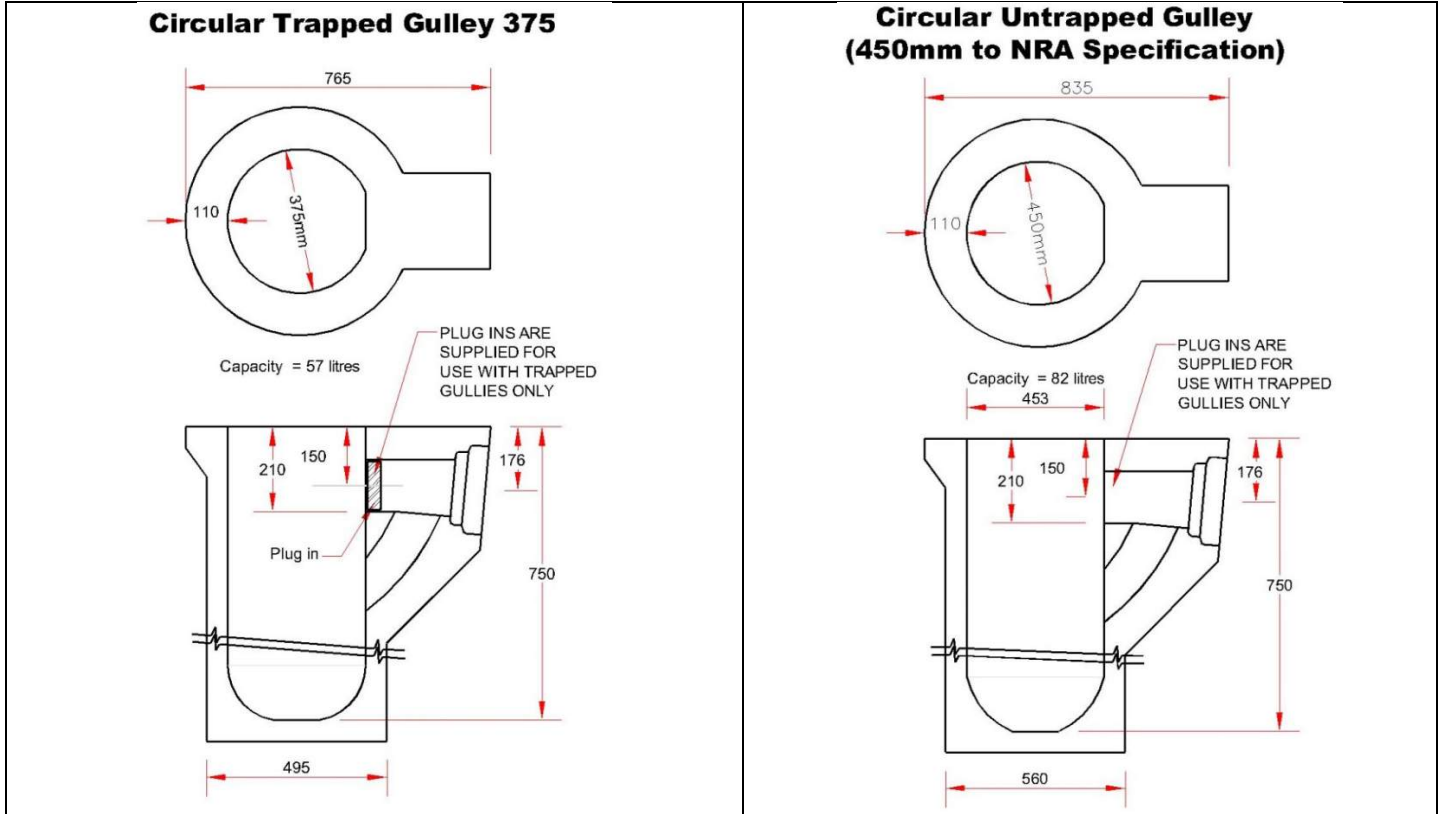
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## CIRCULAR GULLIES TO BS 5911 – 6: 2004

Circular Gullies are available with 375mm Ø, 450mm Ø trapped or un-trapped. Gully Cover Slabs available on request 610x610x115mm, 375mm ope.



The above Diagrams Shows Approximate Capacity only



Rectangular and Circular Gullies



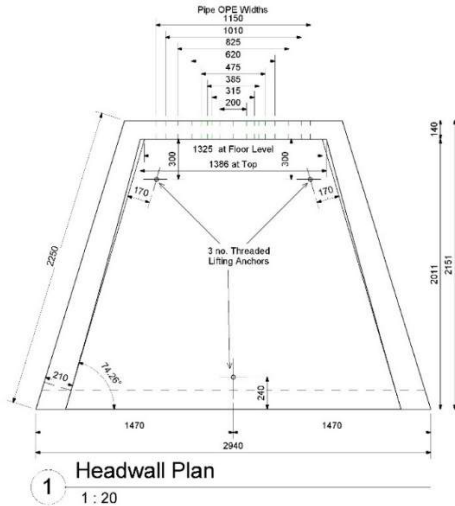


# Condron Concrete Works

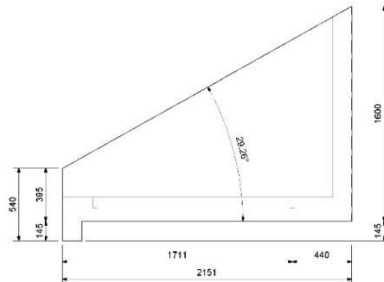
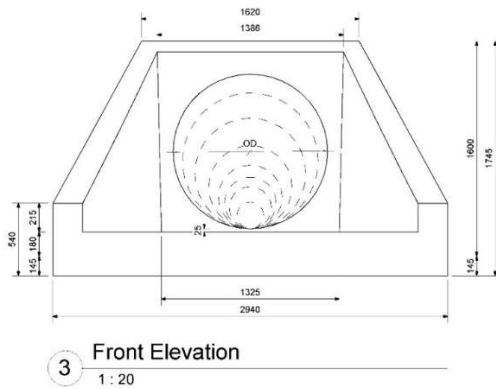
CONDRON CONCRETE WORKS IS A TRADENAME FOR CONDron CONCRETE LTD.

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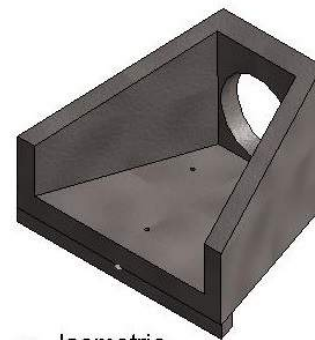
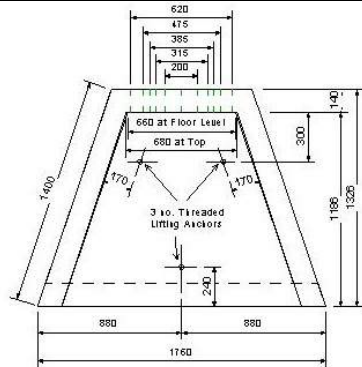
## CONDron HEADWALL



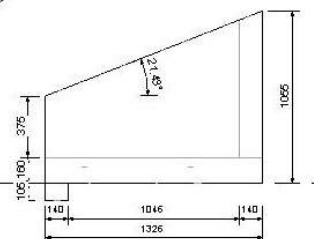
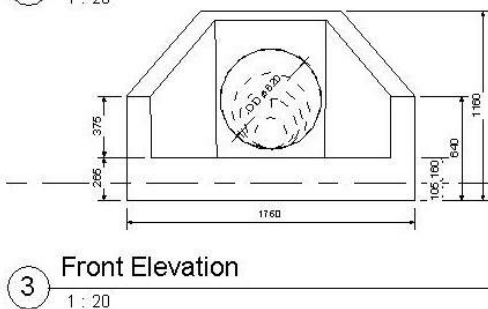
4 Isometric



### Large Condron Headwall



4 Isometric



2 Side Elevation  
1 : 20

### Medium Condron Headwall



# Condron Concrete Works

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## CONDRON HEADWALL

Condron Headwalls are available in the following sizes:

Op mm	Diameter (OD)	Medium headwall opes: 1185x1760x1055 high	Large headwall opes: 2151x2940x1600 high
200		✓	✓
315		✓	✓
385		✓	✓
475		✓	✓
620		✓	✓
825			✓
1010			✓
1150			✓

Headwall with Concrete Pipe



Headwall with optional Rubber Gasket





## HANDLING / PIPE JOINTING

**All pipes and fittings should be carefully inspected on delivery and before being used. No broken or defective pipe should be used (Ref to Pipe testing page 27).** Cleanliness is essential to ensure a watertight joint. The spigot and the socket of all joints must be cleaned. The rubber gasket should be placed in the correct position (see pages 8 & 9). **Under no circumstances should a lubricant be used with Lamell rings. A check must be made that the rubbers are evenly tensioned and not twisted. The vertical and horizontal alignment of the pipe must be correct before the joint is made. Piping should start at the downstream end, the pipes being normally laid with the sockets upstream. The spigot must be first entered into the socket of the preceding pipe; a suitable jointing harness should then be attached to the two pipes, which are drawn together until the pipe locks home. Prior to the pipe being fitted into its final position all gaskets should be checked to ensure twisting has not occurred. If the alignment of the pipe has been altered the pipes may need to be pushed together again.**

### HANDLING

Adherence to the basic principles of pipe handling will do much to ensure a sound and efficient pipeline. For the larger size pipes (1050mm Ø and over), the contractor must provide all off-loading equipment.

### RECOMMENDATIONS FOR HANDLING CONCRETE PIPES

1. Avoid damage when handling, especially to the ends of concrete pipes, and **NEVER** drag or roll pipes over rough ground.
2. Use correct craneage for offloading utilising properly constructed 'C' hooks with spreader bar or canvass/fabric slings with central lift.
3. Stack pipes on even ground on timbers to protect sockets and spigots, making sure the bottom row is securely chocked.
4. Never exceed recommended heights for stacking pipes on site, as shown in Table 8.
5. Joint rings **MUST** be stored away from sunlight, heat or possible contact with any oils.
6. Under NO circumstances should pipes be lifted by passing ropes or chains through the bores.
7. Ensure compliance with the Health & Safety at Work Act 1989, subsequent amendments and the Health & Safety Product Data Sheet issued by Condron Concrete Works in compliance with of the above act.
8. See Product Data Sheet at back of brochure.

Table 12

PIPE STACKING LAYERS	
Pipe Ø (DN)	Number Of Layers
150 – 225	6
300 – 375	4
450 – 600	3
600 – 900	2
1050 and above	1

**Note:** Chamber Rings and manhole Rings should never be stored on their side (“on the roll”) but should always be stored Vertically. This is particularly important with shallow depth sections, which are easily toppled even if stacked on firm, level ground.

### Further Information

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Fax: + 353 (0) 506 41565

E-mail: [condronconcrete@eircom.net](mailto:condronconcrete@eircom.net)

Web: [www.condronconcrete.com](http://www.condronconcrete.com)

THIS DATA SHEET IS IN COMPLIANCE WITH THE HEALTH AND SAFETY AT WORK ACT 1989



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## LAYING PIPES





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## LAYING PIPES





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## LAYING PIPES





# Condron Concrete Works

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## LAYING PIPES





## SITE TESTING AND INSPECTION OF PIPELINE

All pipelines must be tested **before** and **after** backfilling. (Ref to table 13 page 28)

### AIR TEST

This test is not covered by, I.S. 6: 2004 and ISEN 1916, but a pipe which complies with the Standard will usually comply with the air test provided it is laid correctly and the test equipment is in good condition. Failure to pass the air test should not preclude the acceptance of the pipeline if a successful water test can be achieved.

Air testing, whilst being convenient for the contractor, is subject to many variants and special care must be taken to ensure that any indicated failure is not due to the test equipment as opposed to the pipeline. It is always more satisfactory to test a string of pipes correctly jointed rather than single pipes, because this will minimise the effect of any shortcomings in the equipment and will give an average for the line rather than an individual result, which may vary.

A typical specification states that air should be pumped into the pipeline by a suitable means until a stable pressure of 100mm head of water is indicated on the U-tube and if, after allowing a suitable period for the pressure to stabilise, the air pressure has not fallen below 75mm during a period of 5 minutes, without further pumping, the pipeline should be accepted.

### Test Procedure and Acceptance Criteria

The following test procedure is consistent with that described in BS 8301 / the Water Authorities Association publication "Sewers for Adoption".

- (a) Seal the ends of the pipeline by means of expanding or inflatable drain stoppers. We recommend the use of Mill test or A.T.O. type inflatable stoppers, which are light and reliable.
- (b) Connect a 'U' gauge (manometer) to the test nipple of the drain stopper by means of rubber tubing.
- (c) Raise the internal pressure of the system until the 'U' gauge indicates slightly more than 100mm of water (50mm where gullies are connected). Purpose made drain testing equipment is so calibrated that the scale indicates the actual pressure in mm water gauge.
- (d) Allow about 5 minutes for stabilisation of the air temperature (a 1° change in temperature is reflected in a change in pressure of about 38mm on the gauge).
- (e) Adjust the pressure to 100mm (or 50mm if appropriate) by either introducing further air or by bleeding off any excess pressure.
- (f) Observe the fall in indicated pressure over a 5-minute test period. The residual pressure should not be less than 75mm (or 38mm for a 50mm test).

### Comment

- (a) If a test fails, identify the cause. Leaks may readily be detected by applying a soap solution to **all** parts of the system while the air test is in progress.
- (b) Stoppers, which are not well seated, can allow air to escape. Reseating or retightening the stopper may be necessary. Mill Test or A.T.O. type inflatable stoppers are recommended for pipes > 375mm  $\varnothing$ .
- (c) Temperature change can lead to an apparent failure of the air test (particularly if a cold wind is blowing across the pipes). If this is the case a longer stabilisation period may be necessary.
- (d) Check gaskets are positioned correctly (see pipe jointing).

### Water Test

I.S. 6: 2004 and ISEN 1916 specifies that each batch of pipes is sampled and tested hydrostatically to 50KPa (5 metre head) for 15 minutes. Tests are also carried out at this pressure on joints whilst under shear load and during angular deflection. This provides a rapid indication of the impermeability of the pipes and joints and how they will perform when laid on site. It is normal for a site test to be of much longer duration and at a lower pressure. The following test is typically specified: The pipe shall be filled with water and provided with a





## SITE TESTING AND INSPECTION OF PIPELINE

standpipe so that the head is not less than 1.2m above the crown of the pipe at the highest point and no more than 6.0 metres at the lowest point. It may be necessary to test pipelines laid at a steep gradient in sections to remain within these limits.

It is normal to allow the filled pipeline to stand full of water for a period of not less than 2 hours to allow for absorption prior to commencement of the test.

If the loss of water over a 30 minute period, when topped up every 10 minutes, is less than 0.5 litres per metre diameter per linear metre of pipe run the test is considered acceptable.

### Close Circuit Television (CCTV)

The use of CCTV is now quite widely used for the inspection of mature sewers to assess their serviceability, and also for newly laid sewers to identify any major defects at the end of the maintenance period prior to adoption by the appropriate authority.

Close circuit television (CCTV) is used by many authorities for pipeline inspections.

This is a visual check only and requires personnel who are not only experienced in the operation of the equipment but also in interpreting the results.

### General

The air and water tests summarised above are consistent with those specified in the following publications: - B.S. 8301 and I.S. E.N.1610: 1998

Table 13

Pipe -	Pipe Length (m)	Maximum No. of pipes to be laid prior to testing
150mm	1.25	3/4
225mm	1.25	3/4
300mm	2.0	3/4
375mm	2.5	3/4
450mm	2.5	3/4
525mm	2.5	3/4
600mm	2.5	3/4
675mm	2.5	3/4
750mm	2.5	3/4
900mm	2.5	3/4
1050mm	2.5	3/4
1200mm	2.5	3/4
1350mm	2.5	3/4
1500mm	2.5	3/4
1650mm	2.5	3/4
1800mm	2.5	3/4
2100mm	2.5	3/4
2400mm	2.5	2/3

Table 13 Shows the maximum number of pipe lengths to be tested before and after backfilling under normal site conditions.

### NOTE:

We strongly recommend that testing be carried out periodically during the pipe laying process for every three to four pipes as set out in B.S. 8010 Section 2.7 ie. British Standard Code of Practice for Precast Concrete Pipelines. Where backfilling is required as work progresses three to four pipes must be tested before and after backfilling. This practice is recommended to facilitate rectification of defects prior to backfilling. All concrete pipe work should be laid in accordance with the Manufacturer's Instructions and the Supervising Engineers Specifications.



## STRUCTURAL DESIGN

The forces acting on a cross section of pipeline arise from four main sources.

1. Weight of overlying fill.
2. Soil pressures transmitted to the pipe from surface loads i.e. traffic and other transient loads.
3. Supporting reaction below the pipe.
4. Water within the pipe (only significant for larger diameter pipes).

The four main conditions in which pipes are installed are:

1. In a 'narrow' trench.
2. In a 'wide' trench.
3. On the surface of ground over which an embankment is built.
4. In a narrow trench over which an embankment is built.

Design tables for condition 1 are supplied in the bedding Class / depth of cover tables. For conditions as stated in 2, 3 & 4 special design considerations apply and consultation may be required.

It is structurally critical if trench width on site exceeds the designed trench width. Trench width should be inspected and recorded regularly. A trench adjacent to a manhole may need to be wider but this should be taken into account at design stage.

### TESTING

The Irish Standard Specification for Concrete Sewer Pipes, I.S.6: 2004 gives minimum crushing test loads for each diameter of pipe. Loads are applied in a three edge-bearing test described in the standard. Hydraulic tests are also carried out, by applying an internal hydraulic pressure of 0.5 bar to test for porosity. We also employ a 100% gauging system of our Spigots and Sockets to ensure watertight joints to 10m head of water.

(See Quality Control Page 5 and 6 and Testing and Inspection Page 27 and 28).

### BEDDING FACTORS AND MATERIAL

In the three edge-bearing test, the vertical loading and supporting reactions are line loads. The strength of the pipes determined in the crushing test is multiplied by a bedding factor (Fm), which represents the amount by which the stresses in the pipe are reduced because of the spreading properties of the bedding for load and reaction.

The value of bedding factor (Fm) for a particular method of construction is not a precise figure but is affected by the quality of workmanship. The figures given are assuring a good standard of workmanship. Pipe settlement will be kept to a minimum by the proper selection and compaction of the bedding material. The bedding should be compacted to a density not less than that of the natural soil in the sides and bottom of the trench. The bedding material should be of a similar particle size to that in the trench sides. Where the ground is clay or silt, bedding material must consist of all-in gravels to prevent the trench from becoming a drainage channel and thus carrying away fines from the trench walls and bedding and causing settlement of the pipes. Rounded single size material is not recommended. The bedding directly beneath or above the pipeline must not be over compacted; otherwise line loading of the pipes will result.

Research and long experience has shown the following rule of thumb to be acceptable with a maximum of 40mm and limit on fine sands.

Table 14

↓ (mm) Pipe	Bedding Material Size
225 – 600	5 – 14mm
675 – 1500	15 – 20mm
1650 – 2400	25 – 40mm

### COMPACTION

The degree of compaction shall be as specified in the structural design of the pipeline. Specified degrees of compaction shall be controlled by a method specification related to the particular equipment used (compaction means) or, where required, verified by testing.

The initial backfill directly above the pipe should be compacted by hand where required. Mechanical compaction of the main backfill directly above the pipe should not be commenced until there is a total depth of cover of least 300mm above the top of the pipe. The total depth of the cover directly above the pipe before mechanical compaction is commenced depends on the type of compaction device. The choice of compaction equipment, the number of passes and the thickness of layer to be compacted shall take account of the material to be compacted and the pipe to be installed.

Compaction by saturating the backfill or side fill is permissible only in exceptional cases and then only in suitable, non-cohesive soils.

### MINIMUM DEPTH OF COVER

It is advisable that pipes laid under roads should have cover over the pipe of not less than 1.2m. Pipes laid with less than 1.2m cover require special consideration.

For pipes laid in fields a minimum cover of 0.6m should be provided. At shallower depths there is a risk of damage from agricultural operations.

### DESIGN CALCULATIONS

The required crushing strength of a concrete pipe can be calculated using the following equation.

$$Wt > (We \times Fs) / Fm$$

Where: Wt = required I.S.6 crushing load (kn/m), (Fn=Wt)

We = Total applied load on the pipe (kn/m)

Fs = Factor of safety (1.25 MINIMUM)

Fm = the bedding factor

Crushing load (Wt) as stated in I.S. 6: 2004 Table 5

#### NOTE:

The minimum crushing load (Wt) is the load which the pipe will sustain without collapse. The proof load (Wp) is the load which reinforced pipes sustain without developing a crack exceeding 0.3mm in width over a length of 300mm.. The Design Loads used in Tables 16, 17 and 18 are calculated from the Marston's Formula to collapse. (Fn=Wt)



## STRUCTURAL DESIGN

### Minimum Crush Test Loads I.S. 6: 2004 and ISEN 1916

Table 15

Nominal Pipe - (DN)	Minimum Crushing Load $F_n$ kN/m ( $F_n=Wt$ )
225mm	27
300mm	36
375mm	45
450mm	54
525mm	63
600mm	72
675mm	81
750mm	90
900mm	108
1050mm	126
1200mm	144
1350mm	162
1500mm	180
1650mm	198
1800mm	216
2100mm	252
2400mm	288

Note 1,  
Note 2,  
Note 3,

Sizes DN 225 to DN675 inclusive are manufactured unreinforced.

Sizes DN 750 and above are manufactured reinforced.

When using Condron Concrete I.S. 6: 2004 reinforced pipes the proof load is 80% of the minimum crushing load and the normal factor of safety of 1.25 is sufficient.



1200mm  $\varnothing$  I.S. 6 Pipe undergoing Crush Test



## STRUCTURAL DESIGN

### DEPTH OF COVER TABLES

Depth of cover tables are provided for I.S. 6: 2004 Minimum Crush Strength and give a simple guide to maximum depth of cover for different bedding classes for single pipelines laid in a narrow trench. The density of fill is taken as 19.6kn/m<sup>3</sup>. This value is suitable for general design purposes and is unlikely to be exceeded in normal practice.

### GENERAL

The general requirements of I.S. EN 1295 – 1: 1998 'Structural Design of Buried Pipelines' must be followed. Under no circumstances should blocks or bricks be placed beneath pipes and special care should be taken with material immediately surrounding the pipeline to minimise the possibility of large size lumps of rock, hardcore etc. coming into direct contact with the pipe and thus causing point loading. With a Socketed pipe care must be taken to ensure that adequate clearance is given beneath the Socket. Uniform support along the pipeline is essential. Where pipes are installed in soft ground the thickness of the lower bedding may need to be increased to prevent excessive settlement of the pipeline.

In assessing the loading category, regard should be paid to the possible future upgrading of a road. Pipes under verges should normally be treated as though under the road, and should take account of any planned road improvements.

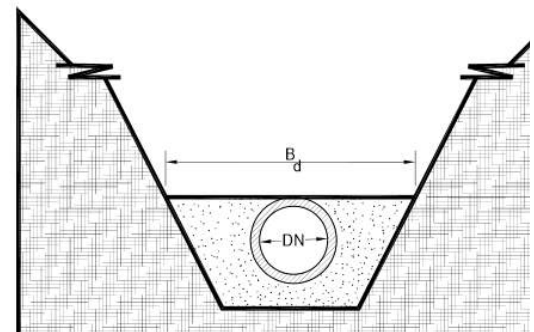
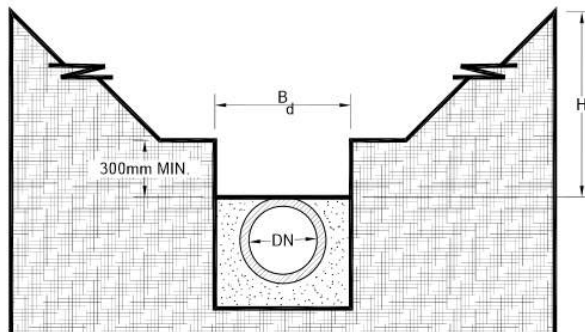
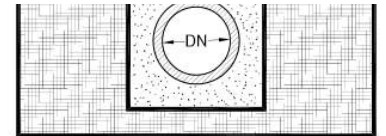
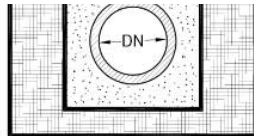
The water table must be kept below all trenches while pipe laying is in progress. Trench width should be kept as narrow as possible and within its designed dimensions. See recommended trench width, on Bedding Class depth of Cover tables. **Acceptance tests (water or air) must be applied prior to commencement of backfilling and should comply with BS8301: 1985 or ISEN 1610. Adequate trench support should be used where necessary to ensure stability and safety.**

### FACTOR OF SAFETY

To allow for unexpected site conditions a minimum factor of safety of 1.25 should be allowed on the calculated external loads.

### TRENCH WIDTHS

Narrow trench conditions – the assumed widths are given in the depth of cover charts. The effective trench width ( $B_d$ )



## Strength Classes Required For Depth of Cover

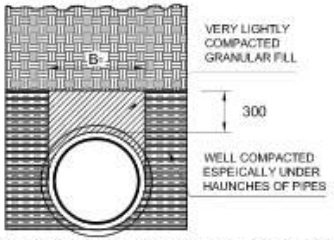
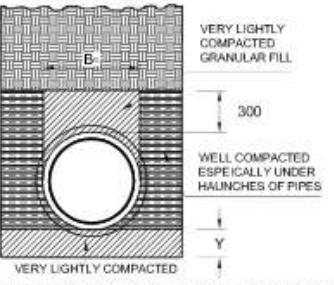
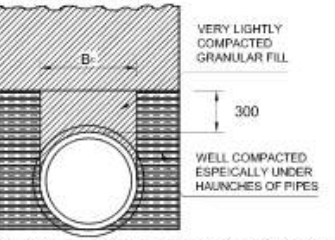
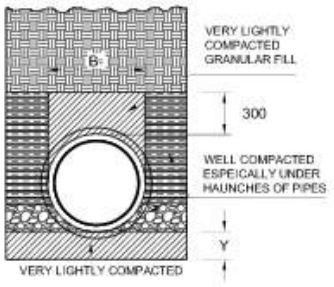
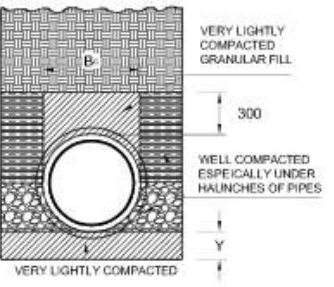
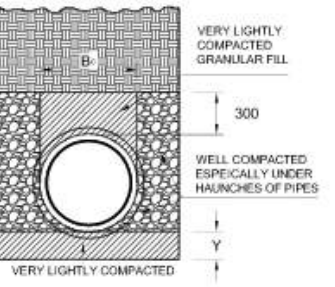
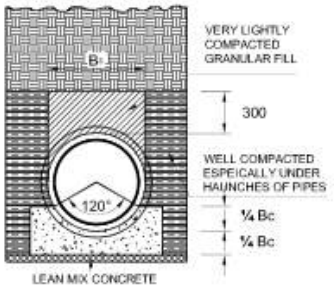
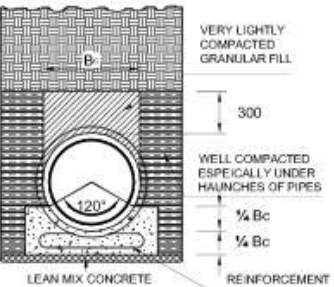


# Condron Concrete Works

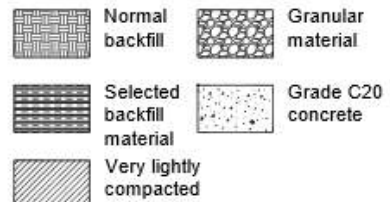
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## STRUCTURAL DESIGN / BEDDING CLASSES

<p><b>CLASS D</b> Hand Trimmed Flat Bottom. <b>BEDDING FACTOR = 1.1</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Suitable in fine grained soils and relatively dry conditions. Hand trim formation filling in any hollows. Form socket hollows as required with 50mm minimum clearance of sufficient length to permit jointing. Pipes are laid directly onto excavated trench base.</p>	<p><b>CLASS N</b> Flat Granular Type <b>BEDDING FACTOR = 1.1</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Lay pipes in a flat layer of selected material. Form socket hollows as required with 50mm minimum clearance of sufficient length to permit jointing.</p>	<p><b>CLASS C</b> Hand Shaped Bottom. <b>BEDDING FACTOR = 1.5</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Suitable in uniform soils and relatively dry conditions. The bottom of the trench / formation shall be profiled to fit the pipes over a width of <math>\frac{1}{2} B_c</math> with socket hollows as required with 50mm minimum clearance of sufficient length to permit jointing. Scarifying the formation level of the trench is generally adequate in practice.</p>
<p><b>CLASS F</b> Granular Bedding <b>BEDDING FACTOR = 1.5</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Lay pipes in a flat layer of granular bedding material on the formation level of the trench. Form socket hollows as required with 50mm minimum clearance of sufficient length to permit jointing. Pipes will settle slightly in to the bedding. Place side fill and compact well.</p>	<p><b>CLASS B</b> 180° Granular Bedding <b>BEDDING FACTOR = 1.9</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Lay pipes in a flat layer of granular bedding material on the formation level of the trench. Form socket hollows as required with 50mm minimum clearance of sufficient length to permit jointing. Compact the layers each side of the pipe up to the springing level taking care not to displace them.</p>	<p><b>CLASS S</b> 360° Granular Bedding <b>BEDDING FACTOR = 2.2</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Lay, joint and bed pipes as per Class B then place and well compact layers of the same bedding material at each side up to the crown level taking care not to displace the pipes. This is followed by a 300mm layer of the same granular bedding material but slightly compacted directly over the pipe, after which ordinary backfilling is commenced.</p>
<p><b>CLASS A</b> Plain Concrete Cradle <b>BEDDING FACTOR = 2.6</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>Class A concrete bedding, either plain or reinforced each with 120° cradle. Screenshot the formation level with lean mix concrete, place blocks on the screed to support pipes behind</p>	<p>Reinforced Concrete Cradle <b>BEDDING FACTOR = 3.4</b></p> <p>NORMAL BACKFILL DEGREE OF COMPACTION DEPENDENT UPON SURFACE DESIGN REQUIREMENTS</p>  <p>each socket. Lay pipes using packers on blocks to achieve the correct line and level. At pipe joints, form construction joints through the concrete bed to ensure flexibility of pipeline.</p>	<p>The minimum width of cradle is to be <math>1\frac{1}{4} B_c</math> or <math>B_c + 200\text{mm}</math>. The minimum thickness is to be <math>\frac{1}{4} B_c</math>. Pour the cradle carefully from one side to prevent voids in the concrete. Backfill when the concrete has cured to the required strength.</p>

### KEY





## STRUCTURAL DESIGN

Table 16: FOOTING DESIGN AND CLASSIFICATION: 6: 2004, CLASS 120 PIPES

MAIN ROADS																				
Nominal Diameter (mm)	Socket O.D. (mm)	Recommended Trench Width (m)	Load Included kN/m	Depth of Cover (m)																
				1	2	3	4	5	6	7	8									
225	392	0.70	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
300	505	0.75	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
375	606	1.05	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
450	707	1.15	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
525	808	1.20	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
600	909	1.35	2.1	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
675	1008	1.45	2.6	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
750	976	1.50	3.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
900	1148	1.90	4.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1050	1420	2.05	6.4	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1200	1605	2.30	8.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1350	1805	2.45	10.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1500	2012	2.60	13.0	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1650	2155	2.80	15.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1800	2310	2.95	18.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
2100	2525	3.25	25.5	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
2400	2866	3.55	33.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

**Table 16**

The above Table assumes recommended trench width and proper pipe laying procedures, with adequate backfill material and compaction.

Minimum pipe crushing loads have been obtained from Table 5 of I.S. 6:2004.

The loadings have been calculated using the Minimum Crush Load (W<sub>c</sub>) with a factor of safety of 1.25 minimum.

The recommended minimum depth of cover for pipelines under roads is 1.2m.

NOTE: Refer to the Design Calculations in this document.

The above table is to be used as a guide only.



## STRUCTURAL DESIGN

Table 17: FOR ISEN 1916 AND I.S. 6: 2004, CLASS 120 PIPES

LIGHT ROADS																				
Nominal Diameter (mm)	Socket O.D. (mm)	Recommended Trench Width (m)	Load Included kN/m	Depth of Cover (m)																
				1	2	3	4	5	6	7	8									
225	392	0.70	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
300	505	0.75	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
375	606	1.05	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
450	707	1.15	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
525	808	1.20	-	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
600	909	1.35	2.1	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
675	1008	1.45	2.6	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
750	976	1.50	3.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
900	1148	1.90	4.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1050	1420	2.05	6.4	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1200	1605	2.30	8.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1350	1805	2.45	10.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1500	2012	2.60	13.0	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1650	2155	2.80	15.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
1800	2310	2.95	18.7	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
2100	2525	3.25	25.5	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
2400	2866	3.55	33.3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Table 17

The above Table assumes recommended trench width and proper pipe laying procedures, with adequate backfill material and compaction. Minimum pipe crushing loads have been obtained from Table 5 of I.S. 6:2004.

The loadings have been calculated using the Minimum Crush Load (W=) with a factor of safety of 1.25 minimum.

The recommended minimum depth of cover for pipelines under roads is 1.2m.

NOTE: Refer to the Design Calculations in this document.

The above table is to be used as a guide only.



## STRUCTURAL DESIGN

**Table 18: FOR ISEN 1916 AND I.S. 6: 2004, CLASS 120 PIPES**

Nominal Diameter (mm)	Socket O.D. (mm)	Recommended Trench Width (m)	Load Included kN/m	FIELDS																
				Depth of Cover (m)																
				1	2	3	4	5	6	7	8									
225	392	0.70	-	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
300	505	0.75	-	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
375	606	1.05	-	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
450	707	1.15	-	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
525	808	1.20	-	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
600	909	1.35	2.1	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
675	1008	1.45	2.6	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
750	976	1.50	3.3	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
900	1148	1.90	4.7	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1050	1420	2.05	6.4	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1200	1605	2.30	8.3	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1350	1805	2.45	10.3	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1500	2012	2.60	13.0	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1650	2155	2.80	15.7	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
1800	2310	2.95	18.7	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
2100	2525	3.25	25.5	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B
2400	2866	3.55	33.3	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B

**Table 18**

The above Table assumes recommended trench width and proper pipe laying procedures, with adequate backfill material and compaction. Minimum pipe crushing loads have been obtained from Table 5 of I.S. 6:2004.

The loadings have been calculated using the Minimum Crush Load (W=) with a factor of safety of 1.25 minimum.

The recommended minimum depth of cover for pipelines under roads is 1.2m.

NOTE: Refer to the Design Calculations in this document.

The above table is to be used as a guide only.





# Condron Concrete Works

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## HYDRAULIC DESIGN

Pipelines should be designed to accommodate expected discharge, while also ensuring self-cleansing is achieved. A velocity between 0.75m / sec and 4.0m / sec, is considered satisfactory for self-cleaning when flowing half full.

### COLEBROOK – WHITE EQUATION

A number of formulas have been developed to assist in hydraulic calculations to determine flow rates in pipelines. The Colebrook – White equation is considered most accurate for commercial pipes as effective roughness is applied. The equation expressed in Engineering terms is as follow:

$$V = -2 \sqrt{2g Di} \text{ Log} \left( \frac{ks}{3.7D} + \frac{2.51v}{D\sqrt{2g Di}} \right)$$

Where  
 V = Velocity  
 G = Gravitational acceleration (9.81 m/s)  
 i = Hydraulic gradient (m/m)  
 D = Pipe internal diameter (m)

ks = Hydraulic

v = Kinematic viscosity of fluid ( $1.31 \times 10^{-6}$  m<sup>2</sup>/s)

Now Q can be calculated using

$$Q = VR \text{ (m}^3\text{/s)}$$

Where  
 Q = Discharge (m<sup>3</sup>/s)  
 V = Velocity (m/s)  
 R = Hydraulic Radius =  $\frac{D(m)}{4}$   
 D = Internal Diameter of pipe

### DESIGN CHARTS

BS 8005:Part 1 1987, contains hydraulic flow charts based on the Colebrook – White equation for calculating transitional flow.

Two such charts have been included to simplify calculations. Each has a different roughness factor (ks) and should be used as follows:-

Foul and combined sewers ks = 1.5mm  
 Surface water sewers ks = 0.6mm

The velocities and discharges given in the hydraulic flow charts are for circular concrete pipes flowing full. If the pipes are partially full the proportional discharge and velocity values, can be taken off the partial flow chart provided.

### Example

Design of Surface Water Sewer

Pipeline length	=300m
Difference in level between inlet and outlet	=2m
Design discharge	=500L/S

### To determine:

- Adequate pipe size when flowing full
- Discharge and Velocity when flowing 70% full
- Determine if the velocity is satisfactory for self-cleansing

### Solution

Hydraulic Gradient	1 in 150 (or 0.0066)
Ks for surface water sewer	0.6mm

#### a) Flowing Full

Refer to hydraulic flow chart ks = 0.6mm  
 The intersection of the horizontal discharge line of 500 L/S (0.5m<sup>3</sup>/sec) with the vertical hydraulic gradient line of 1 in 150 gives:

Pipe Diameter	600mm
Average Velocity	1.95 m/sec
Discharge	550 L/S

#### b) Discharge and Velocity when flowing 70% full

Refer to the graph showing Relative Velocity and flow in circular pipes for any depth of flow. The intersection of the horizontal proportional depth line of 0.7 with the proportional discharge and velocity curves gives:

Proportional Discharge	0.84
Proportional Velocity	1.12

### Therefore:

Actual Discharge	0.84 x 550 = 462 L/sec
Actual Velocity	1.12 x 1.95 = 2.18 m/sec

#### c) Check if self-cleansing is achieved when flowing half full

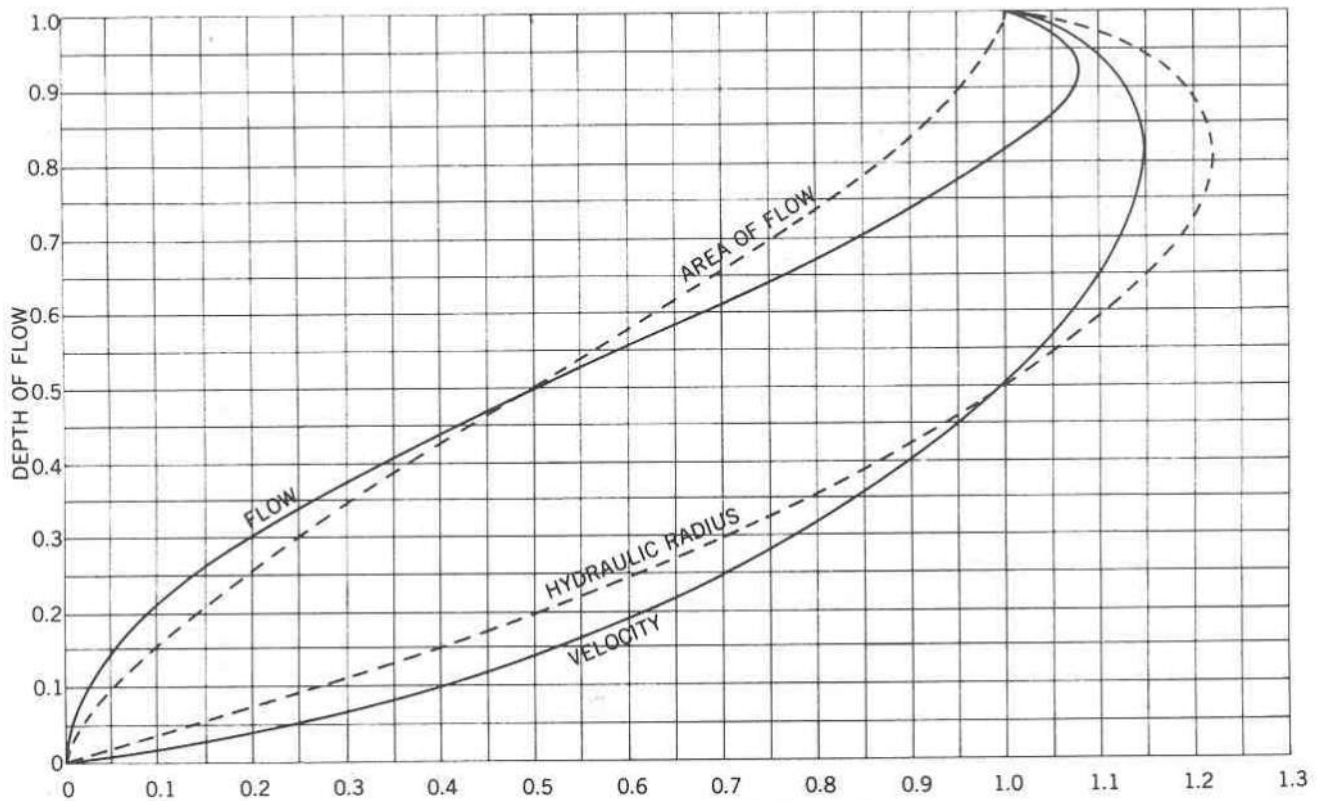
Refer again to Relative Velocity and flow chart. When the discharge is 0.5 the proportional velocity is 1.0,

=> 1.0 x 1.95 = 1.95m/sec, 0.75 < 1.95 < 4.0 therefore satisfactory



## HYDRAULIC DESIGN

### Relative Velocity and Flow in Circular Pipe for any Depth of Flow



**NOTE:** This graph complies with B.S. 8005: part 1 1987 and will comply to any new Irish, British or European Standards in the future.



# Condron Concrete Works

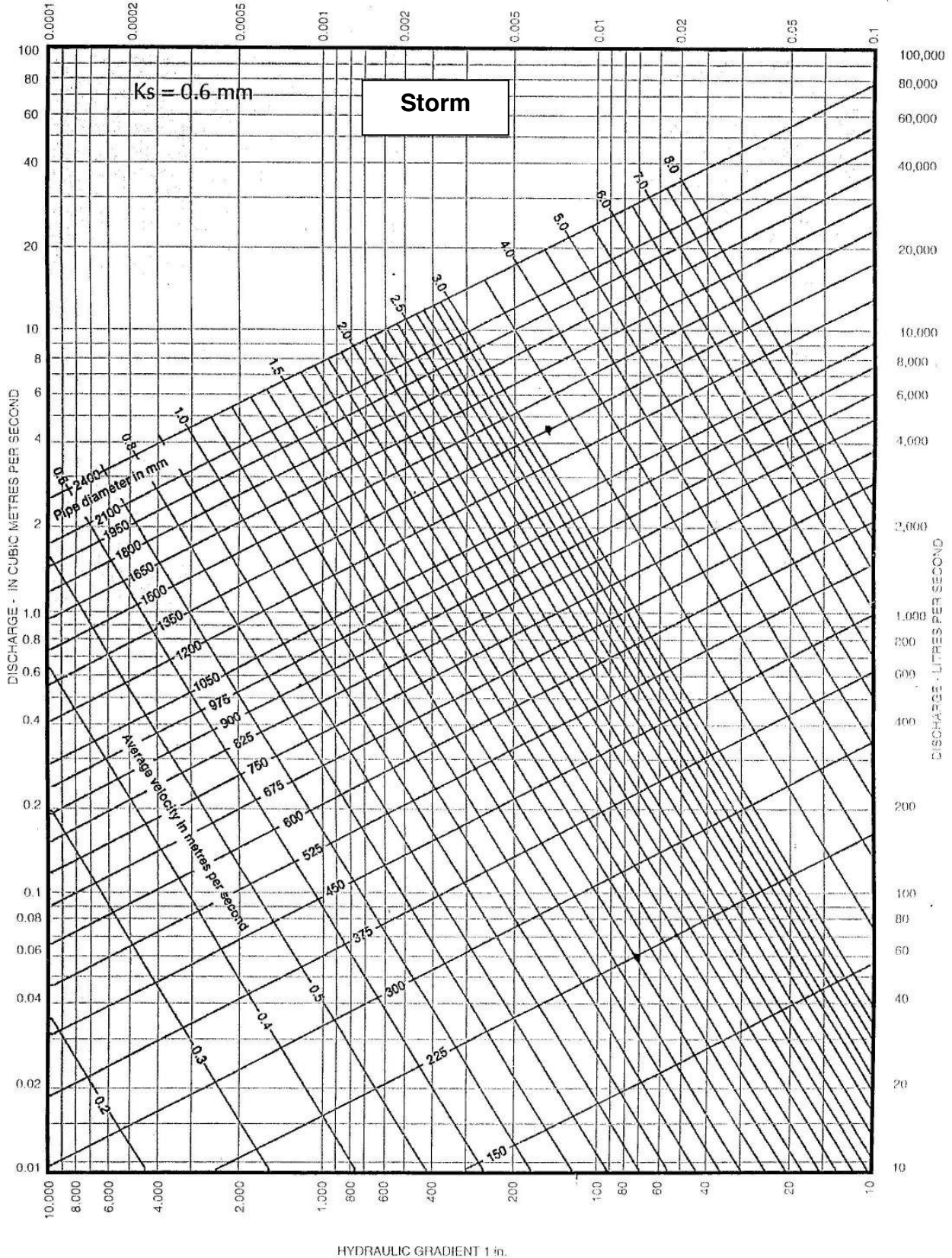
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## HYDRAULIC DESIGN

Colebrook – White) Water at 15°C

### Flow Chart No.1





# Condron Concrete Works

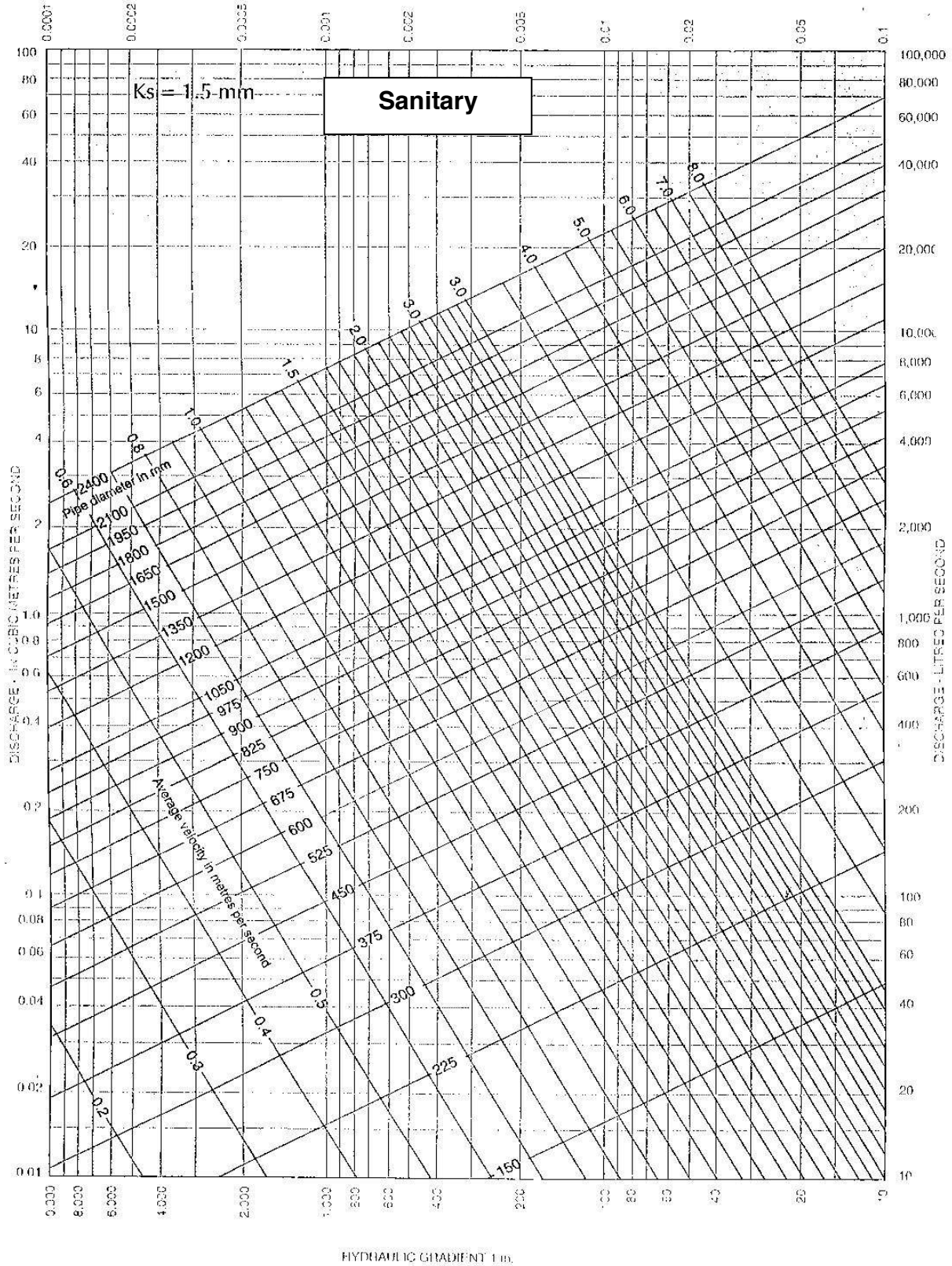
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## HYDRAULIC DESIGN

(Colebrook – White) Water at 15°C

### Flow Chart No.2





# Condron Concrete Works

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## PRODUCT DATA SHEET

### CONCRETE PIPES, MANHOLE COMPONENTS AND ANCILLARY PRECAST PRODUCTS MANUFACTURED BY CONDRON CONCRETE WORKS

#### Composition

The products are composed of cementitious materials and aggregates and possibly admixtures. Certain products may be reinforced with steel.

#### Hazards

The finished products as supplied are of an inert nature and inherently non-hazardous to health. The individual items are generally heavy and many are so shaped that they can roll easily. Correct handling and stacking procedures as given below must be employed.

#### Handling/Use Precautions

The weight and surface nature of the products requires the use of protective gloves and footwear to avoid injuries.

- The manual handling of such loads may cause an injury should be avoided. Good slinging and lifting practices should always be used and the following points observed:
- Products must not be rolled off vehicles or around sites.
- Chamber Rings and manhole Rings should never be stored on their side ("on the roll") but should always be stored vertically. This is particularly important with shallow depth sections, which are easily toppled even if stacked on firm, level ground.
- Chamber rings, Bases and Catch Pits must not be lifted by slinging through the step/rung irons and pipe junctions must not be lifted by slinging around the branch.
- Use correct craneage for offloading vehicles. Properly constructed 'C' hooks with spreader bar or canvas/fabric slings with a central lift are recommended.
- Where lifting points are provided, all the lifting points must be used.
- Where lifting points are not provided, then suitable slings (canvas/fabric) should be used around the product and never through it. Correct craneage must always be utilised.
- Care should be taken when breaking down product stacks either on the delivery vehicle or on site.
- Pipe jointing tackle is only to be used for the purpose for which it is supplied.
- When cutting or surface treating products by hand or machine, dust and flying fragments may be created. The dust created may be of respirable size and may contain quartz. Extended periods of exposure to high concentrations of such dust, particularly in enclosed spaces, can constitute a health hazard. In such circumstances, respiratory protective equipment should be worn. Suitable eye protection should be worn to protect against dust and/or flying fragments.
- Provide Trench Supports where necessary.
- Ensure compliance with the Health Safety and Welfare at Work Act 2005. See Safety Page 47

#### Ogee Pipe Loading per 12 Metre Vehicle

Table 23

Pipe -	Approx. Number of Ogee pipes per 12 Metre Vehicle
150mm	450
225mm	330
300mm	220
375mm	160
450mm	120
600mm	86
750mm	40
900mm	35
1050mm	18
1200mm	16

#### S & S Pipe Loading per 12 Metre Vehicle

Table 24

Pipe -	Approx. Number of S & S pipes per 12 Metre Vehicle
150mm	400
225mm	200
300mm	60
375mm	45
450mm	30
525mm	24
600mm	18
675mm	16
750mm	12
900mm	10
1050mm	8
1200mm	7
1350mm	5
1500mm	4
1650mm	4
1800mm	3
2100mm	3
2400mm	3

## SAFETY



# Condron Concrete Works

CONDRON CONCRETE WORKS IS A TRADENAME FOR CONDRON CONCRETE LTD.

**ARDEN ROAD, TULLAMORE, CO. OFFALY, IRELAND.**

Attention is drawn to Regulations 76 and 77 of the Safety, Health and Welfare at Work (Construction) Regulations 1995. These notes are a brief summary of safety precautions based on the 1995 Regulations made under the Safety, Health and Welfare at Work Act 1989. It is the responsibility of employers, employees, and the self-employed, to ensure that legal requirements are complied with. Particular attention is drawn to the Safety, Health and Welfare at Work (Construction) Regulations 1995 and other legislation setting out the duties of owners, employers and employees in relation to the construction and maintenance of buildings.

Above notes are given for general information guidance only, and are not to be taken as comprehensive. All Condron Concrete Works Drivers have Hard Hats, Steel - Toe Boots, Safety Jackets and current FAS Safety Passes.

#### Identification Of Product - Concrete Pipes

##### *Application:*

Use of concrete pipes should be in accordance with the relevant National and European Union Codes of Practice.

##### *Composition of Ingredients:*

Concrete pipes are a mixture of natural aggregates, cement, water and steel. Admixtures may be added to modify the properties of the finished product.

##### *Hazard Identification:*

Concrete pipes are abrasive and can weigh 50kg to over 8 tonnes depending on the dimensions and should be handled accordingly

Concrete pipes should be stored correctly to prevent rolling and overturning.

Cutting, drilling or hammering of concrete pipes can create dust. If inhaled in excessive quantities over extended periods, respirable dust can constitute a long term hazard

Cutting, drilling or hammering of concrete pipes, unless adequately controlled, can project particles at high velocity with consequent risk of impact damage and/or injury particularly to the exposed areas of the body and eyes.

When cutting, use equipment suitable for concrete and steel in accordance with manufacturer's instructions.

##### *First Aid Measures and First Aid Treatment as follows:*

Eye Contact: Immediately rinse under running water and seek medical advice

Cuts and Abrasions: Cuts / Abrasions from concrete pipes should be cleaned and treated using the normal first aid method. Wounds must receive prompt medical attention. In all cases of doubt or where symptoms persist, medical advice must be obtained.

##### *Accidental Release Measures:*

Avoid contact with skin.

Tidy up debris from broken pipes.

##### *Handling and Storage:*

Protect skin when handling concrete pipes.

Use suitable handling and transport equipment when using concrete pipes.

Before lifting always size up the load.

Always follow safe lifting and manual handling procedures.

Ensure adequate load bearing capacity of the ground when placing or storing concrete pipes.

Recommended stacking heights depending on diameter.

Pipes in storage should be chocked.

Do not roll / drag pipes.

Webbed fabric slings or 'C' hooks should be used.

Trench preparation and pipe support should be in accordance with Health and Safety regulations.

Store / Stack well back from edge of any excavation.

##### *Exposure Controls / Personal Protection:*

Hand Protection: Wear suitable protective gloves.

Skin Protection: Avoid contact with skin.

Eye Protection: Wear goggles to prevent eye contact from flying particles when cutting, drilling or hammering concrete pipes.

Masks: Wear appropriate respiratory protection when cutting, drilling or hammering concrete pipes.

Footwear: Wear footwear with protective toecaps when working with concrete pipes.

##### *Physical and Chemical Properties:*

Concrete pipes are grey in colour.

The product is abrasive.

##### *Stability and Reactivity:*

Ensure the integrity and stability of pipes whilst stored on site.

##### *Toxicological Information:*

Not applicable.

##### *Ecological Information:*

Concrete pipes have no ecological effects.

##### *Disposal Considerations:*

Concrete pipes may be recycled or placed in approved landfill sites.

##### *Transport Information:*

Ensure security and safety of load at all times

#### **Note:**

**The information given in this manual is, to the best of our knowledge, correct, but customers, including consultant engineers, site engineers, architects and specifiers, must satisfy themselves that any particular product is suitable for their specific requirements. Condron Concrete Works, or their employees, or agents, do not accept any liability whatsoever arising from anything contained in this manual.**



# Condron Concrete Works

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## CONCRETE ROOF TILES



M Profile Tile



3 in 1 Tile

Concrete Pantiles, Concrete Slate Tiles, Concrete Bullnose Slate Tiles, 3 in 1 Tile /Cladding Tiles, Concrete Plain Tiles /Cladding Tiles, M Profile and Condron Slate. and Accessories including Ridge Tiles, Ornamental Ridge Tiles, Cloak Tiles, Baby Ridge Tiles are available from:

Condron Concrete Works  
Arden Road, Tullamore,  
Co. Offaly.

Telephone: +353 (057) 9349000-9

Fax: +353 (057) 9341565

Email: [condronconcrete@eircom.net](mailto:condronconcrete@eircom.net) or

Web: [www.condronconcrete.com](http://www.condronconcrete.com)

