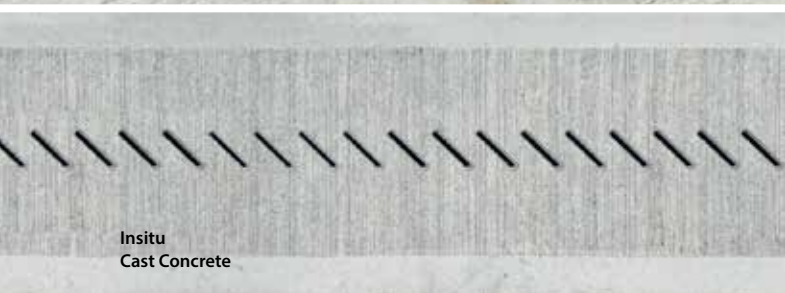


Drexus XL



In situ
Cast Concrete

Drexus XL Concrete Drainage System



Marshall's Drexus XL is a recycled polyethylene (PE) high capacity channel, ideally suited for high capacity heavy duty projects covering any load class from busy service yards and rail & docking ports, airports with severe dynamic transport loading to motorways and commercial outlets.

The high capacity system is designed to offer attenuation and storage facilities but also to achieve sufficient flow velocities at low gradient to ensure that the channels require minimal maintenance. Drexus XL's In-Situ surface finish is designed to integrate seamlessly into concrete surfaces.



Drexus XL PE
Former Unit

n55Plus
Q10 170

Drexus XL

Concrete Drainage System

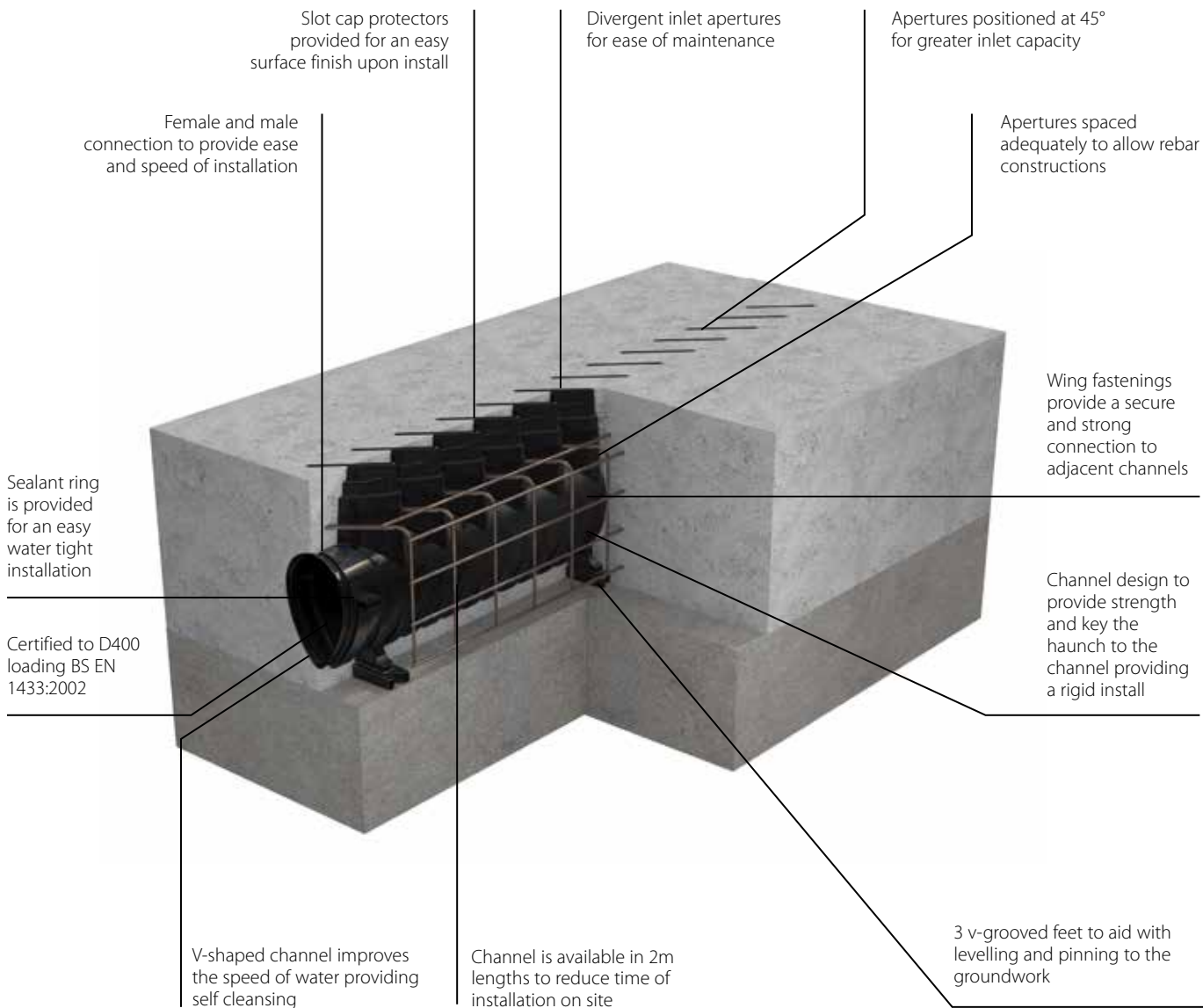
- One of the highest flow capacity system on the market
- Reduced post-installation maintenance
- Extensive applications
- Robust system
- Complies with BS EN 1433:2002
- Sufficient flow velocities can be achieved at low gradient to promote self cleansing
- Straightforward to install
- 5 different channel depths
- High attenuation capacity
- Simple detailing
- Channel and kerb applications
- One-piece channel design with quick and easy installation

Marshalls Drexus XL is a recycled polyethylene (PE) high capacity channel system. It's innovative inlet 'fin' design maximises strength at the surface enabling this one piece system to site at surface level without the need for a secondary rail system which helps reduce the cost of installation.

The Drexus XL have been designed with attenuation in mind and will assist with site wide storage becoming an integral part of any sustainable surface water management solution as part of either a SUDS or traditional drainage system.

It is ideally suited for high capacity heavy duty projects covering any load class from busy service yards and rail & docking ports, airports with severe dynamic transport loading to motorways and commercial outlets.

The high capacity system is designed to offer attenuation and storage facilities but also to achieve sufficient flow velocities at low gradient to ensure that the channels require minimal maintenance. Drexus XL's In-Situ surface finish is designed to integrate seamlessly into concrete surfaces.



Components

CHANNELS



325 Channel



425 Channel



525 Channel



675 Channel



825 Channel

ACCESSORIES

Access & Outlet Units

- The Access Chambers modular design provides rodding access or outfall and silt trap abilities.
- Each face of the Access Chamber features cutting guides for a series of channel depths allowing multiple connections of differing size channels acting as a junction or interim access point for maintenance.
- F900 rated Access Cover and Frames features a unique patented quick and easy locking and unlocking mechanism for ease of maintenance.



Access Cover & Frame

Access Chamber

Silt Box

Chamber Connector

- Provides a connection from the Channel to the Access Chamber
- Available in both Female and Male options to allow either end of Channel to connect into the Access Chamber.



Chamber Connector 425 Female



Chamber Connector 425 Male

Transition Units

- 4 different sizes transition units provides uninterrupted flow between the Channels minimizing impact on the hydraulic performance.
- Designed to provide the system with flow control and attenuation capabilities.



Transition Unit 425-525 Female to Male



Transition Unit 425-525 Male to Female

End Caps & Cap Outlets

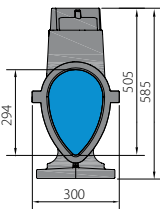
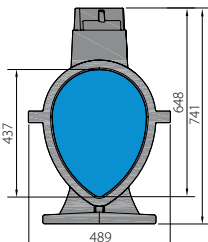
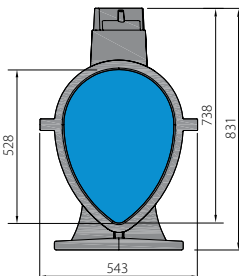
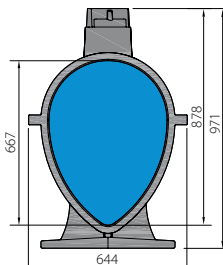
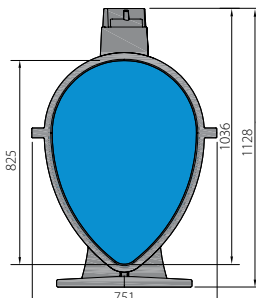





- End caps are designed to be universal to be used for both the Female or Male ends of the Channel.
- Cap Outlets enable the system to connect to standard underground pipes.

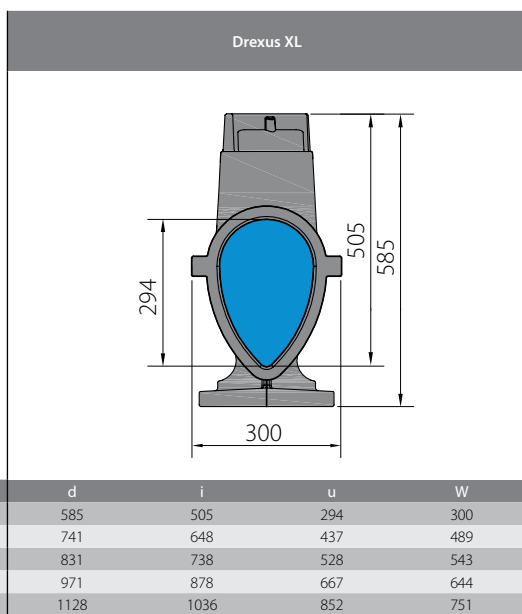


End Cap

Hydraulic Data

FLOW CAPACITY

Drexus XL 325	Drexus XL 425	Drexus XL 525	Drexus XL 675	Birco 150 with 825
				
 <p>Equivalent Pipe Diameter (mm) 225</p>	 <p>Equivalent Pipe Diameter (mm) 360</p>	 <p>Equivalent Pipe Diameter (mm) 435</p>	 <p>Equivalent Pipe Diameter (mm) 550</p>	 <p>Equivalent Pipe Diameter (mm) 675</p>



Hydraulic Data

The Drexus XL hydraulic data stated in the following tables comprises of flow capacity, in litres per second (l/s) and velocity in metres per second (m/s). This data has been calculated using spatially variable flow design principles.

Drexus XL										
Channel Type	325		425		525		675		825	
Gradient "1 in"	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s
10	232	5.72	807	7.78	1287	8.67	2383	10.01	4066	11.32
20	161	3.96	561	5.41	896	6.04	1662	6.98	2838	7.90
30	130	3.19	453	4.37	724	4.88	1344	5.64	2297	6.39
40	111	2.74	389	3.75	622	4.19	1155	4.85	1976	5.50
50	99	2.43	346	3.33	553	3.72	1027	4.31	1757	4.89
75	79	1.95	278	2.68	446	3.00	829	3.48	1419	3.95
100	68	1.67	239	2.30	382	2.57	711	2.99	1218	3.39
150	54	1.34	192	1.85	308	2.07	573	2.41	982	2.73
200	47	1.15	164	1.58	264	1.77	491	2.06	842	2.34
300	37	0.92	132	1.27	212	1.43	395	1.66	678	1.89
400	32	0.79	113	1.09	181	1.22	338	1.42	581	1.62
500	28	0.69	100	0.96	161	1.08	300	1.26	515	1.43
750	23	0.56	80	0.77	129	0.87	241	1.01	414	1.15
1000	19	0.47	68	0.66	110	0.74	206	0.86	354	0.98
1500	15	0.38	55	0.53	88	0.59	165	0.69	284	0.79
2000	13	0.32	47	0.45	75	0.51	141	0.59	243	0.68
Equivalent pipe diameter	225mm		360mm		435mm		550mm		675mm	

Drexus XL Channel Component Codes

A Constant Depth Channel

Constant Depth Channel	Loading	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	In-situ Top
325	B125 - F900	2000	300	188	585	505	13	DR537010
425	B125 - F900	2000	483	319	723	648	20	DR537020
525	B125 - F900	2000	543	379	813	738	23	DR537030
675	B125 - F900	2000	644	482	949	878	27	DR537040
825	B125 - F900	2000	707	586	1106	1036	32	DR537050

B Transition Channels

Transition Channels	Length (mm)	Width (mm)	Invert Width (mm)	Depth (mm)	Invert Depth (mm)	Unit Weight (kg)	In-situ Top
425-325 F-M	478	489/300	322/214	542/348	463/292	3.25	DR538110
525-425 F-M	478	543/489	379/322	592/542	527/463	4.5	DR538120
675-525 F-M	478	644/543	476/379	732/592	664/527	5.8	DR538130
825-675 F-M	478	706/644	582/476	890/732	821/664	7.5	DR538140
325-425 M-F	478	300/489	214/322	348/542	292/463	3.5	DR538010
425-525 M-F	478	543/489	322/379	542/592	463/527	4.6	DR538020
525-675 M-F	478	644/543	379/476	592/732	527/664	5.9	DR538030
675-825 M-F	478	706/644	476/582	732/890	664/821	7.6	DR538040

Drexus XL with reference numbers indicated in **bold black** are available ex-stock. Drexus XL with reference numbers indicated in light are manufactured to order. Contact our sales office to discuss your requirements.





C End Cap/Cap Outlets

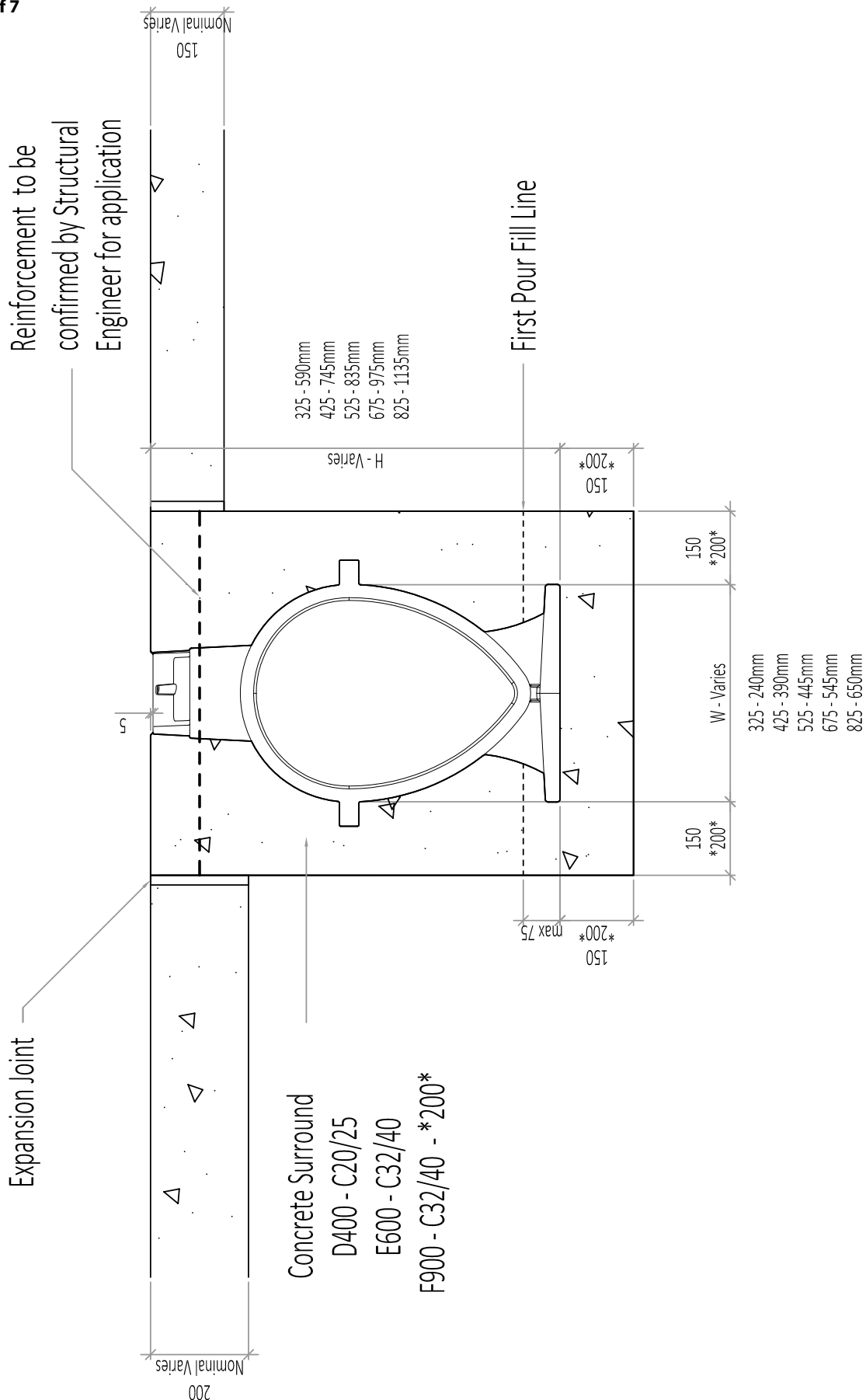
End Cap/Cap Outlets	Unit Weight (kg)	Item Code
325 End Cap	1	DR537910
425 End Cap	2.5	DR537920
525 End Cap	3	DR537930
675 End Cap	4.5	DR537940
825 End Cap	5.5	DR537950
325 Cap Outlet - M	1.9	DR537955
425 Cap Outlet - M	3.1	DR537956
525 Cap Outlet - M	4.2	DR537957
675 Cap Outlet - M	5.8	DR537958
825 Cap Outlet - M	9.4	DR537959
325 Cap Outlet - F	2.0	DR537960
425 Cap Outlet - F	3.3	DR537961
525 Cap Outlet - F	4.4	DR537962
675 Cap Outlet - F	6.0	DR537963
825 Cap Outlet - F	9.7	DR537964

D Outfalls Accessories

Outfall Accessories	Unit Weight (kg)	Item Code
325 AC Connector - M	2.6	DR538410
425 AC Connector - M	3.9	DR538420
525 AC Connector - M	5	DR538430
675 AC Connector - M	7	DR538440
825 AC Connector - M	9	DR538450
325 AC Connector - F	2.5	DR538510
425 AC Connector - F	3.9	DR538520
525 AC Connector - F	4.9	DR538530
675 AC Connector - F	6.9	DR538540
825 AC Connector - F	9	DR538550
325 - 525 Access Chamber	11.5	DR538905
675 - 825 Access Chamber	15	DR538920
Universal Access Cover F900	159	DR538930
Universal Silt Chamber	8.5	DR538915

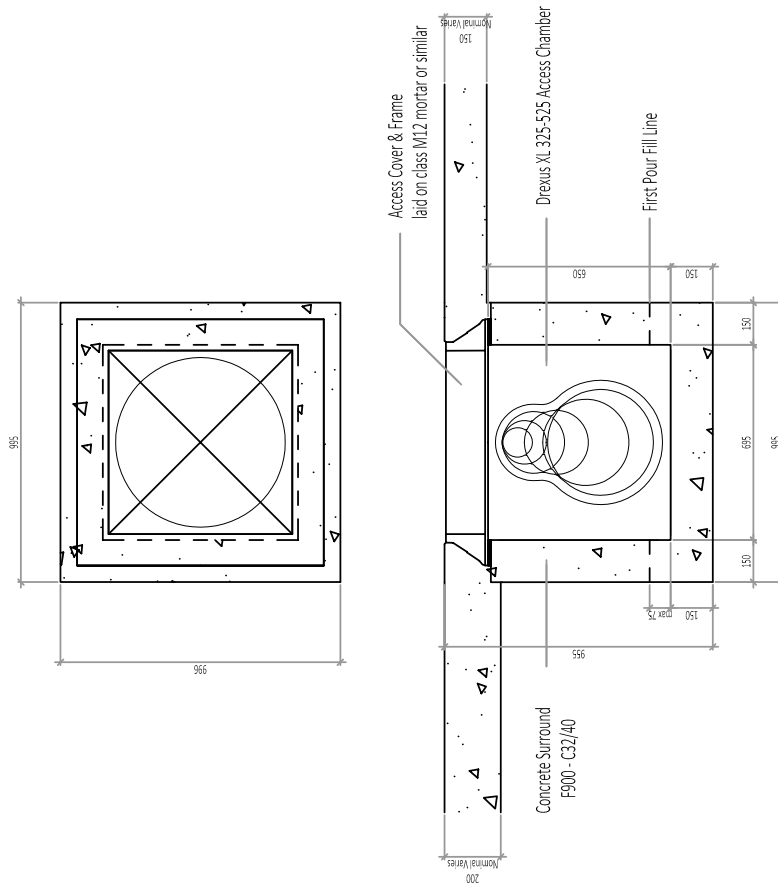
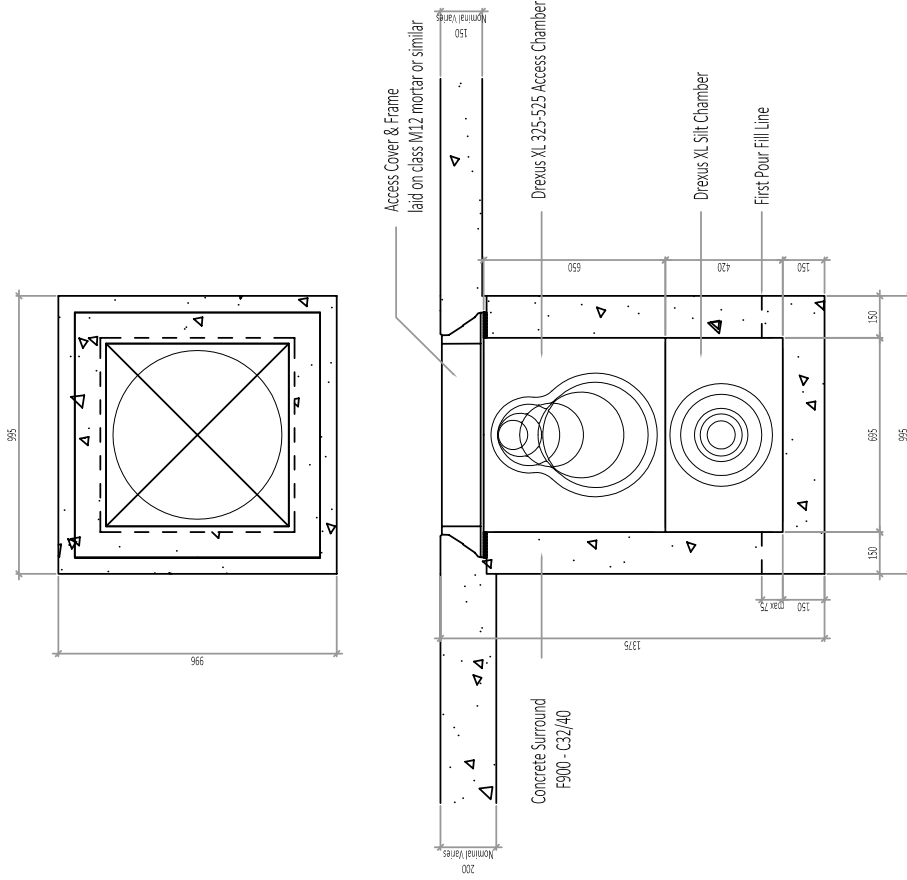
Standard Details

Drawing 1 of 7



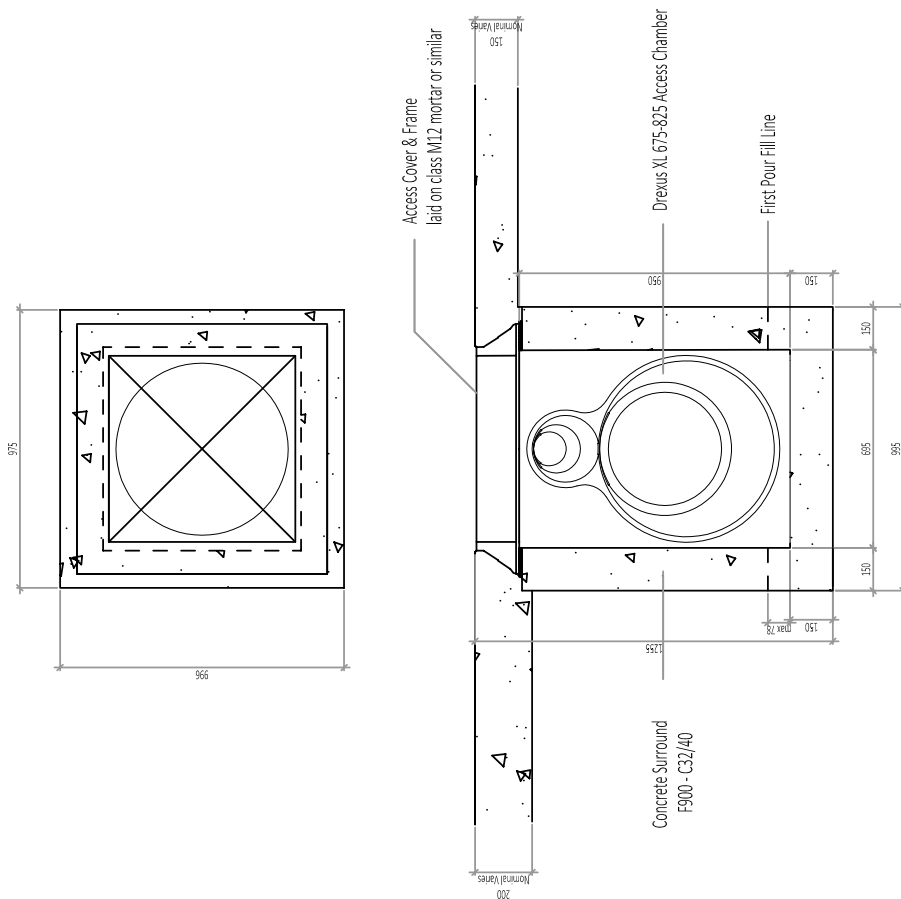
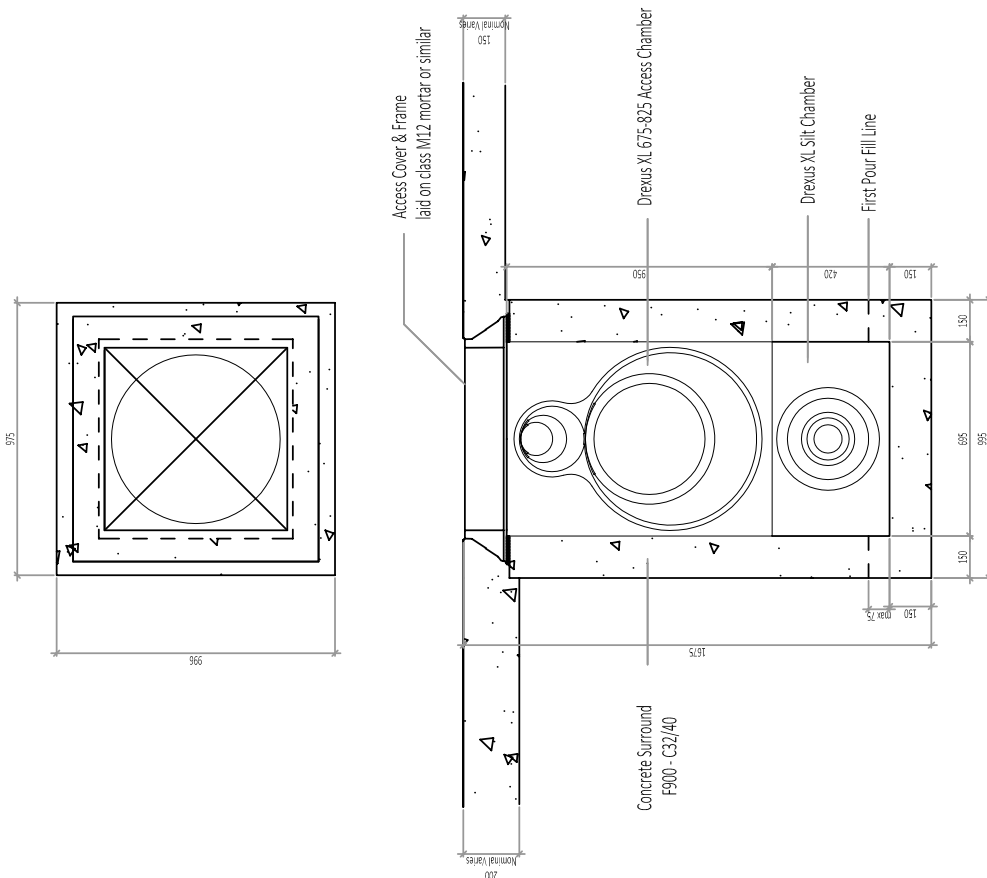
Standard Details

Drawing 2 of 7



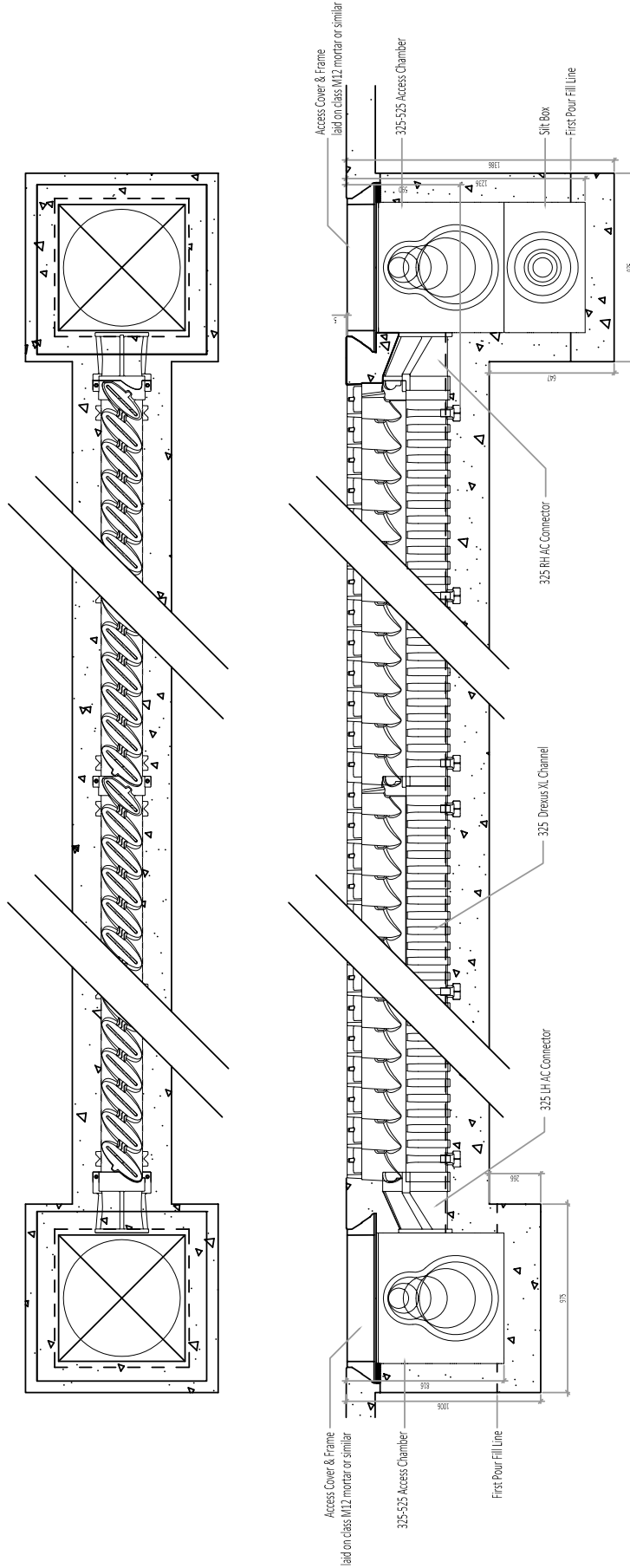
Standard Details

Drawing 3 of 7



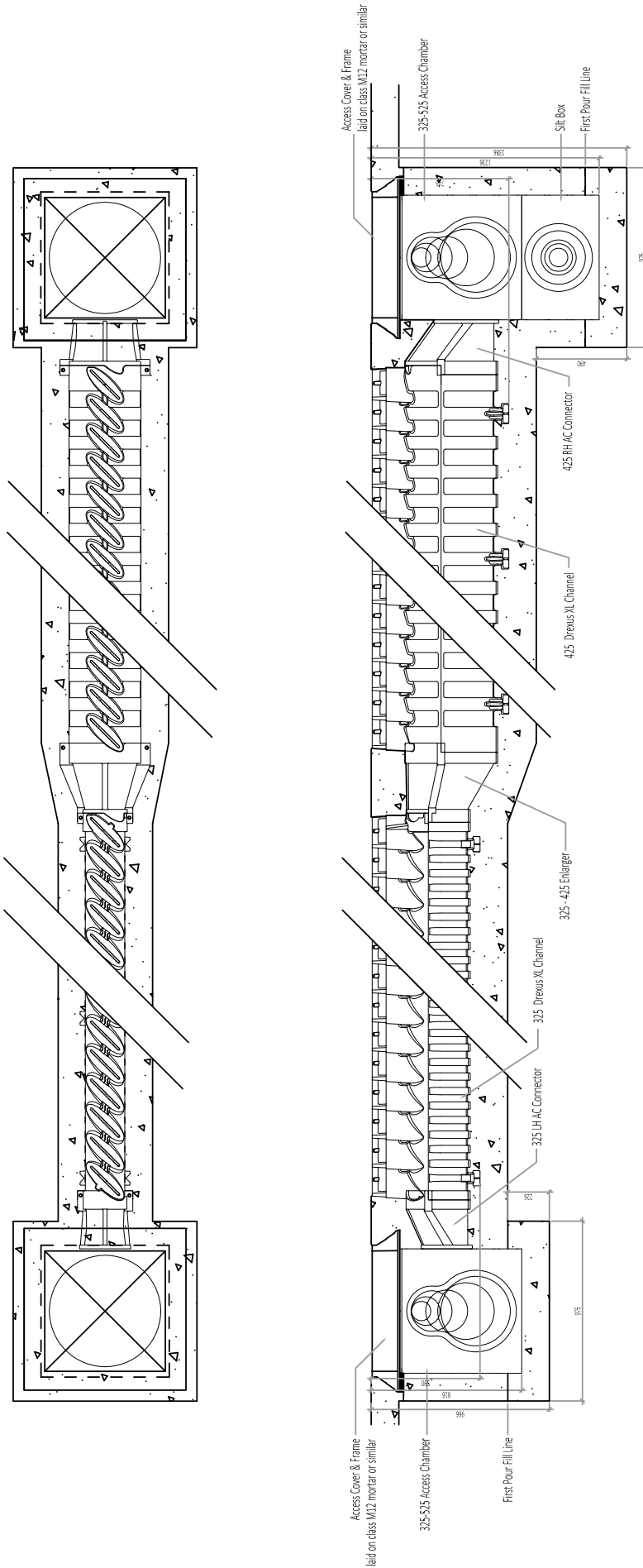
Standard Details

Drawing 4 of 7



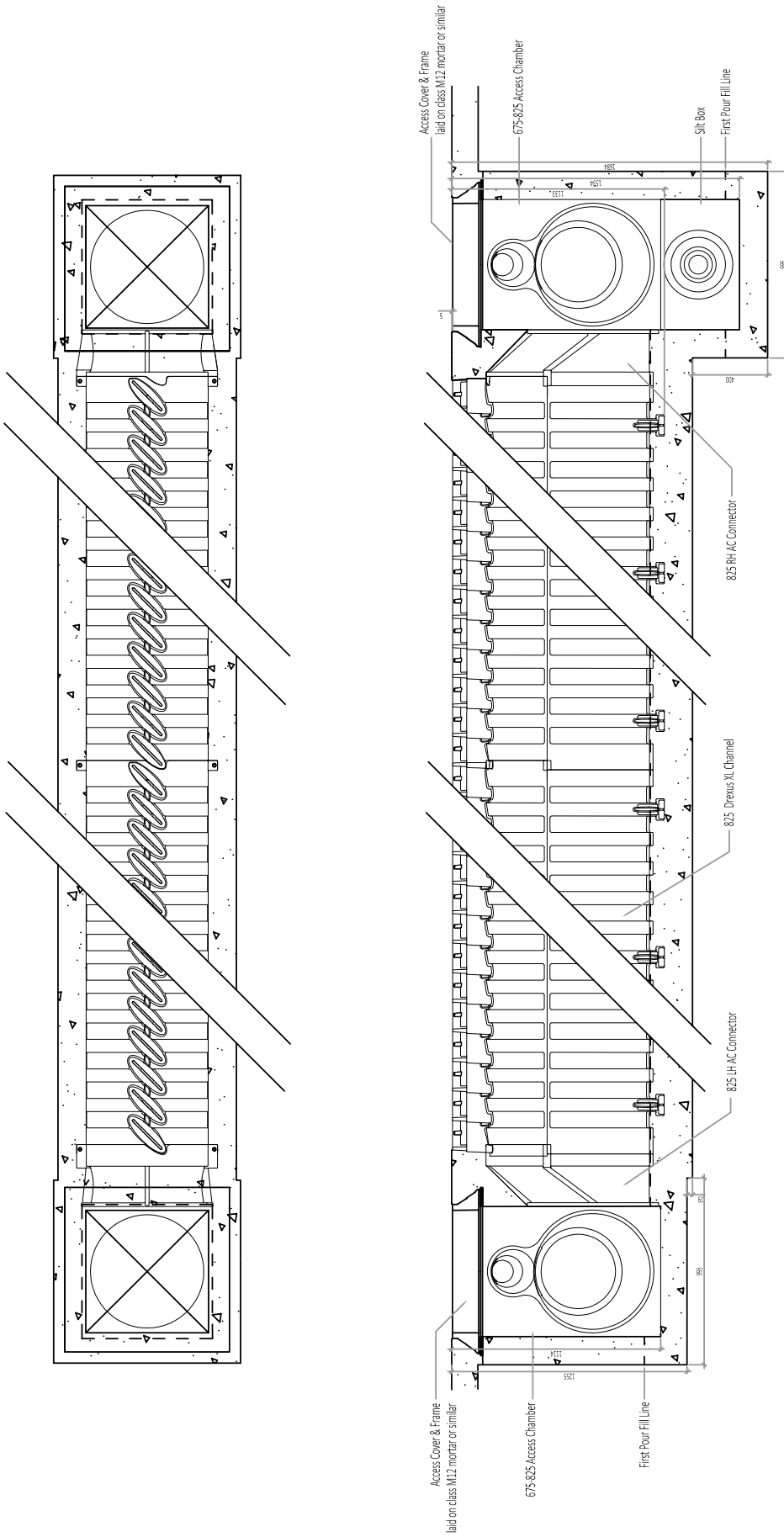
Standard Details

Drawing 5 of 7



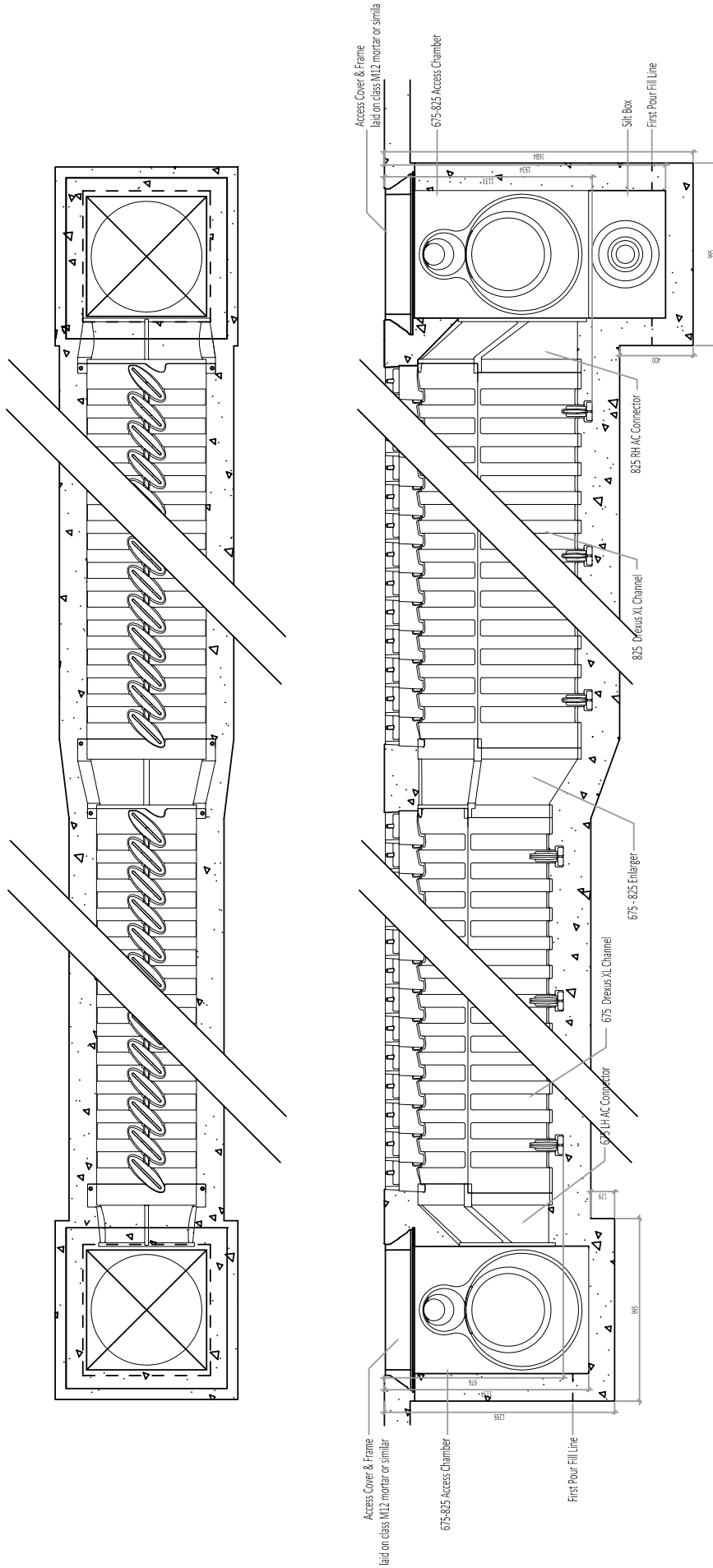
Standard Details

Drawing 6 of 7



Standard Details

Drawing 7 of 7



Standard Details

Notes for Drexus XL

Drawings 1 to 7

1. All dimensions are in millimetres
2. 5 mm Allowance made for pavement settlement
3. Mortar shall be Class 12 to BS EN 988-2:2003
4. Reinforcement shall have a minimum 60 mm cover unless otherwise stated by the Engineer
5. The standard details show the general arrangements used by Marshalls for product evaluation and load test classification purposes which may differ from customer requirements and site conditions. Reinforcement and concrete surrounds should be checked and accepted by the Engineer for project use

Specification

Introduction

The following specification covers the complete Drexus XL system including ancillary fittings and is compatible with the standard detail drawings.

Where the Manual of Contract Drawings for Highways Works is used, information for 'Appendix 5/6: Linear Channels'.

Drexus XL

Drexus XL has PE channel which is surrounded in concrete to form a high capacity linear drainage system. The system is a constant depth channel and is laid flush with the pavement surface. The system reference number relates to the channel depth.

1. The linear drainage system shall be Drexus XL manufactured and supplied by Marshalls plc. All channel materials and ancillary products detailed in this specification shall be supplied by Marshalls.
2. All components of the system shall be type tested and be fully compliant with the requirements of BS EN 1433:2002: Drainage channels for vehicular and pedestrian areas – Classification, design and testing requirements, marking and evaluation of conformity' when installed as per manufacturers recommendations.
3. The linear drainage system shall be a one-piece unit manufactured in a single material (Density Polyethylene PE) with the exception of certain ancillary products as supplied by the manufacturers in accordance with standard details.
4. The linear drainage channel:-
 - i. Shall be of a constant depth between transitions or access points
 - ii. Shall have a 3:2 ratio egg shape cross section as described in HR Wallingford: Tables for the hydraulic design of pipes, sewers and channels: 6th Edition: Vol 1
 - iii. Shall have multiple slot openings set at a transverse angle of 45° to the length of the channel and each slot shall be 150 mm in overall length, 10 mm wide and have an end radius of 5 mm
 - iv. Shall have a minimum inlet area of 13,800 mm²/m
 - v. When installed shall have slot openings set below the final pavement surface
 - vi. Shall fully comply with the requirements of 'BS EN 13501-1:2007+A1:2009: cl (8) & (9): Fire classification of construction products and building elements. Classification using test data from reaction to fire tests'.
5. The linear drainage shall be installed to line and level indicated in the contract and in accordance with manufacturer's instructions and standard details.
6. The drainage system shall be installed in accordance with manufacturers recommendations, industry best practice or as detailed in the contract / **WRc Sewers for Adoption; 7th Edition : 2012 / BS EN 752:2008 / BS 8000: Part 14:1989***

Note: * delete as required

Construction

Introduction

Installation of the Drexus XL linear drainage system should be carried out in accordance with Marshall's specification and standard detail.

The following method of installation is recommended by Marshalls and it is based on conventional UK best practice construction techniques and installation and testing trials and if applicable, installation shall comply with the recommendations in the Construction Phase Plan as defined by the 'Construction (Design and Management) Regulations 2015'.

Should your application differ from standard installation guidance you should consult with your Engineer or Marshalls Technical Advice Team.

Excavation

1. Sufficient material should be excavated to accommodate the channel unit, concrete bed and haunch and working areas.
2. Place excavation support as required depending on channel size, native ground conditions and method of working. Any 'soft spots' or poorly compacted formation should be made good.

Setting Out

1. Setting out pins should be accurately located in accordance with the contract drawings, with a string line level with the top and end of the channel slots. Pins should be located to avoid having to lift the channel units over the string line. The slots should be set so as to follow the longfall and crossfall of the final surface as required by the contract drawings.
2. Alternatively, a pipe laser placed at surface level may be used. It is not recommended that line and level is set using internal channel faces.
3. Line and level should be checked at regular intervals and channels adjusted as required. Marshalls recommend as a minimum that line and level are checked at the end of each concrete pour and before initial set has taken place.

Site Storage, Handling and Placing

1. Marshalls recommend that units are stored in their original packaging until required to help reduce the risk of damage and to help with movement around site.
2. It is the site contractor's responsibility to ensure that units are stored on solid level ground and in a clean and protected area away from potential site damage. Care should be taken when removing units from secure packaging and pallets and units should not be stacked more than one pallet high. Units shall not be stored close to sources of heat such as engine exhaust outlets or hot works areas such as welding and cutting.
3. Should the units be put in long term storage Marshalls recommend that the units are covered to protect mating surfaces and slot opening from dirt and debris until such time that they are required. Additional protection may be required to prevent accidental damage.
4. Marshalls advise that all drainage components should be installed by a safe method of working. The use of mechanical handling equipment such as lifting strops have proven to be of benefit and will eliminate manual handling. Whilst the smaller units are relatively light in weight, Marshall's do not recommend manual handling due to the size and shape of units.

Outfalls

1. Outfalls are formed using the Marshalls plastic outfall chamber and silt box units as required. The small access chamber is suitable for the channel unit up to size 525, the large access chamber is suitable for channel units 675 & 825.
2. The access chamber shall be cut to accept a chamber connector using the preformed template as a guide. The outfall chamber shall be bedded on semi-dry concrete (class S1) and concrete surround formed as per the standard details. The top surface of the surround shall finish flush with the top surface of the chamber. Provision should be made for the chamber connector to be cast monolithically in to the concrete surround or placed during installation of the channel units.

3. If a silt trap is required, it can be placed below the access chamber and the chamber base can be cut and removed using the preformed circular template as a guide. The silt box can be rotated to any orientation to receive the outlet pipe. For the best results and to maintain a watertight connection between the silt box and chamber, the concrete surround shall be cast monolithically. Depending on the method of installation the chamber may require bracing or support to avoid movement during the placement of concrete.
4. Access chambers shall have cast iron access covers and frames load rated to their intended application and shall be bedded and haunched on class 12 mortar (or as specified in the contract). When placed correctly, the frame will sit centrally over the chamber opening and directly on the concrete surround. The cover and frame can be placed after the concrete has

Channel Units

1. Drexus XL units are installed using the same principles of conventional pipe laying techniques.
2. Starting at the outfall chamber, i.e. working uphill, Marshalls recommend the following installation technique:-
3. Place the concrete bed to the correct line and level allowing the channel units to be placed on to the upper surface.
4. Place the chamber connector and first unit to the chamber. Minor adjustment to line and level can be made by placing non-compressible wedges beneath the feet. Subsequent channels are placed end to end in the same manner.
5. Units should be connected (or jointed) together using a mechanical pipe puller to form the joint and a propriety pipe lubricant may be used to aid jointing operations as required. Do not use soaps, grease or oils which are not designed for use with flexible pipe jointing gaskets.
6. Marshalls recommend the use of full channels and do not recommend cutting or alteration of channels and designs are produced to accommodate full lengths with ancillaries.
7. To maintain water tightness, channels shall be sealed at each joint using Marshall's flexible rubber pipe seal and adjacent channels shall be connected at each connection tab with cable ties, a peg, a nut and bolt or similar to maintain the integrity of each drainage run during installation runs.
8. Channels shall be regularly checked and adjusted for line and level and where channel units do not terminate in an access chamber, end caps shall be used to seal the drainage run.

Concrete bed and surround

1. Marshalls recommend a multi-layered pour sequence to avoid movement during placement of the concrete surround (see standard details). However, depending on the method of working, the size of the channel, the workability class of the concrete, the thickness of the surround and the size of the excavation, the channels may require additional support to avoid movement of the units or may require the use of temporary formwork to form the concrete surround to the correct size for each channel unit. The concrete thickness shall be as the minimum stated in the standard detail for each load class.
2. To help maintain channel alignment during the placement of the concrete bed and surround, channels can be secured in position with 'pins' or 'U' bars using the 'V' notch in the feet of each channel; retaining straps over the units fixed to the base concrete; kentilage or timber props.
3. Place and compact semi-dry concrete (class S1) to form base and to anchor the unit in position and avoid the risk of flotation. Check line and level and adjust to suit and ensure no voids are present to maintain load bearing strength. Refer to Marshalls Specification for concrete grades and depths. Allow a minimum 12 hrs to allow the concrete base to achieve an acceptable working strength before subsequent concrete is placed.
4. Place and compact the semi-dry concrete surround (class S1) in layers not exceed 150 mm on alternating sides of the channel to avoid movement and deformation. Check line and level, adjust to suit and ensure no voids are present to maintain load bearing capacity. The top surface shall be

Construction

no greater than the underside of the final surface pavement. Allow a minimum 12 hrs to allow the concrete surround to achieve an acceptable initial strength before subsequent concrete is placed.

5. If the channel is to be backfilled before placement of the final surface pavement, a minimum of 72 hrs shall pass before removal of formwork and backfilling commences. Care shall be taken during backfilling operations not to traffic or place loads on the channel surround.
6. The pipes may be used for the transportation of water when the concrete surround and backfill is up to the underside of the final pavement level and following a minimum of 72 hrs after installation.

Concrete pavement (final surface)

1. Place and compact final pavement concrete (class S2) to form final surface. Ensure plastic slot bungs are in place to prevent concrete ingress. If there are no specific Engineers specification, refer to Marshalls Specification for concrete grades, depths and reinforcement requirements.
2. The final surface shall be finished using float or beam to the required texture and the flat slot top shall provide a reference level for the final upper surface. The Customer may decide to change the shape and nature of the final pavement subject to their design and installation preferences. Specialist engineering advice may be required.

Reinforcement

1. Marshalls recommend the use of reinforcement for certain channel sizes and particular load classes.
2. If required, steel reinforcement shall be placed and spaced using non-compressible pcc setting blocks and tied using mild steel tie wire and shall be generally installed as conventional UK best practice. Refer to Marshalls standard specification for the typical arrangement for each application.
3. Final surface pavement only - Straight lacer bars shall be placed parallel over the channel body between the slot fins and spaced and tied to the main longitudinal steel or mesh to form a composite reinforcement mat.
4. Upper and side reinforcement – 'L' bars shall be placed parallel over the channel body between the slot fins. One leg shall be placed in the horizontal position and one leg shall be placed vertically down the side of the channel body. They shall be spaced and tied to the longitudinal main steel to form a composite steel cage.
5. Base reinforcement – for extreme load classes, base reinforcement is required which may be a structural mesh sheet placed and spaced using pcc setting blocks.
6. Concrete shall be placed so as not to damage the reinforcement. Dependant on the workability class concrete shall be vibrated or carefully placed so as to ensure full compaction and encasement of reinforcement to eliminate voids and maintain structural capacity. Consideration shall be given to the sequence of installation for reinforcement and placement of concrete.
7. The standard details show the general arrangements used by Marshalls for product evaluation and load test classification purposes which may differ from customer requirements and site conditions. The Customer may decide to change the reinforcement requirements subject to their installation preferences and ground conditions and specialist engineering advice may be required.

Expansion joints

1. Make provision for transverse expansion joints at the same frequency as adjacent concrete bays. If the drainage run is to be isolated from adjacent in-situ concrete slabs, then full depth contraction joints across the channel should be formed at between 5 and 8 metre centres. Movement joints parallel to the channel run should be formed either side of the channel surround to the full depth of the adjacent concrete slab and the joint should be designed to fully isolate the channel from any movement of the structural slab. Similarly, access chambers should also be isolated from the adjacent structural concrete slab by incorporating movement joints around the access chamber.
2. The design of the structural concrete slab and flexible joint with regard to the introduction of crack inducers, bay size and movement joint sealants is by others and specialist engineering advice may be required.

Commissioning

1. Do not load or traffic over the channel until the concrete has fully cured and reached full strength.
2. If the strength is unknown, then this should be a minimum 28 days. Loading or trafficking the channel before 28 days has lapsed, concrete strength should be confirmed by a concrete strength test. Particular care should be taken during the construction phase when load conditions may be more onerous due to construction plant and machinery movements and/or incomplete construction.
3. When the pavement has cured sufficiently to allow careful foot traffic (approx 48hrs), the slot bungs can be struck and removed or struck and left in place to avoid site debris entering the channel. The slots can be removed with a hooked or pointed tool (such as a bladed screwdriver or pry bar) by piercing the top surface. Move the tool from side to side before levering out in the direction of the slot length. The slot opening is designed such that on removal of the bung, the final pavement forms the lip of the slot opening. No plastic slot should be exposed at the upper surface level.

Notes

1. In order to obtain a good line and level, it is important to follow the installation guidance and check frequently as concrete is laid. The slot bungs provide a reference for the final surface level.
2. It is not recommended that channels are cut to length on site, drainage runs will be calculated and supplied to multiples of whole units with ancillaries.
3. Outfalls, access chambers and silt traps shall be constructed in accordance with the Standard Details. Silt traps and access chambers should be located at no more than 50m centres in long runs.
4. To help avoid the chamber and silt box units moving out of alignment during installation, screws can be fixed through the chamber base. To help avoid deformation of the chamber sides during placement of the concrete surround, internal cross bracing may be used.
5. Access chambers have been designed to be non-man entry.
6. Installation operations should be discontinued if weather conditions are such that the performance of the channel system may be compromised. Installation should not be undertaken when the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.
7. Concrete strengths, dimensions and reinforcement details indicated on typical arrangement drawings were determined to undertake product evaluation, installation and load testing trials to fully comply with BS EN 1433:2002 (Drainage channels for vehicular and pedestrian areas). These may vary to actual site conditions and specialist engineering advice may be required especially in unusual ground or load conditions.
8. Concrete base and surrounds have been designed to be semi-dry (class S1) to allow the units to be adjusted to maintain line and level and to avoid movement during installation.
9. Concrete chemical exposure class shall be determined by the Engineer.
10. All necessary Personal Protective Equipment (PPE) should be worn on site, as site rules stipulate. Goggles, ear defenders, dust masks and protective footwear must always be worn whenever cutting operations are undertaken.
11. COSHH - All relevant health and safety information, including COSHH data sheets, can be obtained from Marshalls Advisory Services, or the Marshalls Design Team on 0845 3020606.

