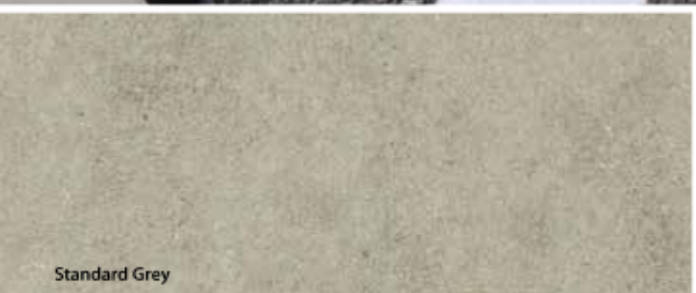




Mono Beany, A21, East Sussex



Standard Grey

Mono Beany®



One Piece Combined Kerb
and Drainage System

An innovative, concrete single piece combined kerb and drainage solution. Mono Beany is a low to medium capacity system which combines strength and aesthetics through Marshalls' high strength M-Tech concrete. Available in two depths and in both Half Battered and 45° Splayed profiles with a range of accessories to provide a comprehensive drainage system which carries the BSI Kitemark.

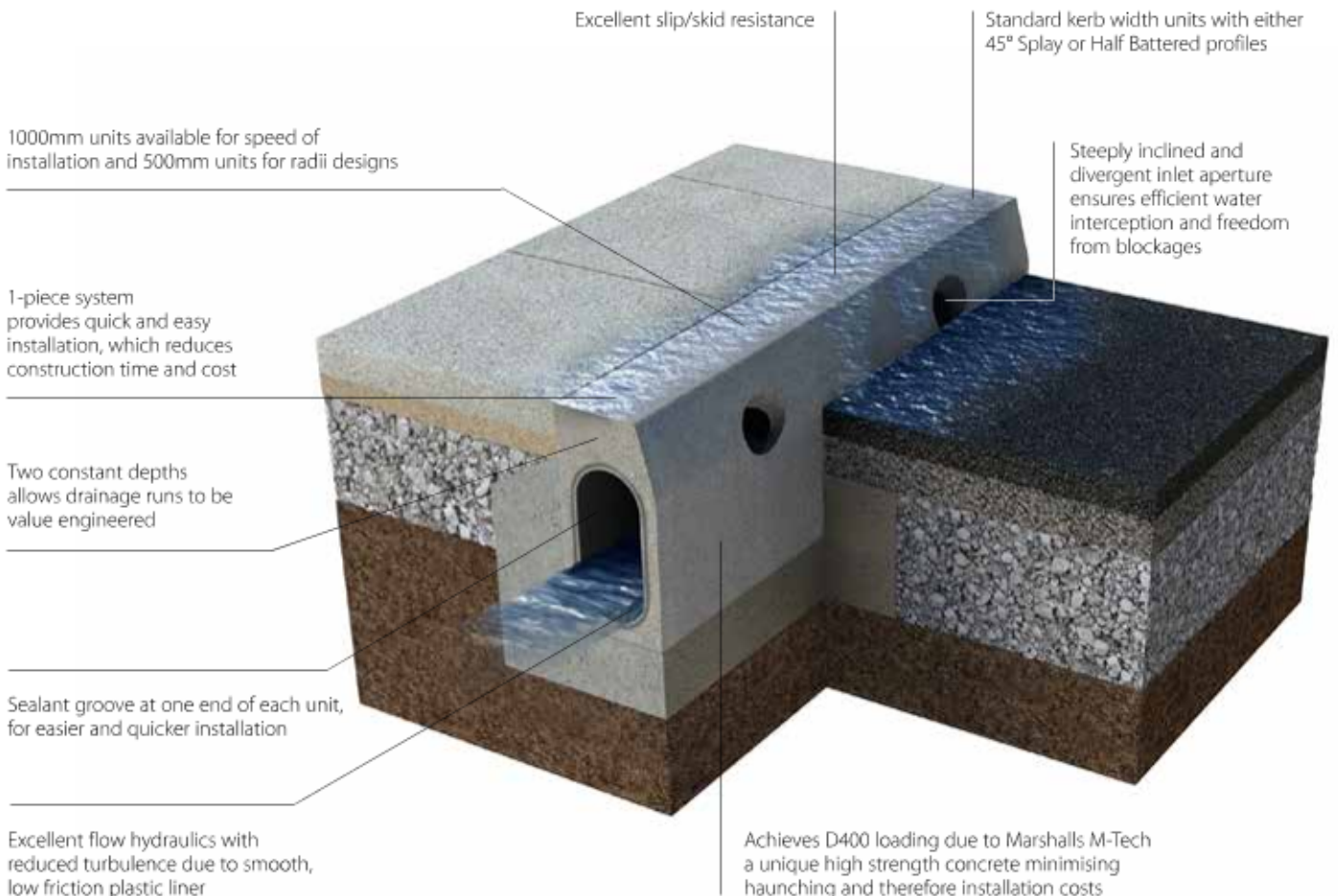
nbsPlus
Q10 190

Mono Beany®

One Piece Combined kerb and Drainage System

Mono Beany®

- The growing demand for more cost-effective and less complicated drainage systems has led to modern linear drainage becoming the preferred choice amongst specifiers and contractors.
- Marshalls Mono Beany demonstrates our commitment to this growing market.
- Mono Beany is an extension of our original Beany Block, and alongside Mini Beany this new addition not only complements but completes our comprehensive Beany range of water management solutions.
- Manufactured from Marshalls M-Tec concrete, Mono Beany provides increased strength with less material.
- Mono Beany offers versatility, available in both Half Battered and Splayed profiles, in 500mm and 1000mm lengths with two invert depths and a full suite of problem solving accessories.
- Mono Beany achieves a load classification of D400 making it suitable for a number of trafficking applications including major and minor carriageways, car parks and commercial and urban scapes.
- Installation costs are further reduced and speeds increased due to only a single mechanical lift being required per meter.
- This one piece system is simple and straight forward to design and easy to set out and install. Cost effective and flexible with excellent surface drainage efficiency specifically designed for low to medium flow capacity. Inlet apertures are 500mm apart, reducing running or fast flowing water on the carriageway and eliminating ponding.
- Mono Beany carries the British Standard Kitemark, is certified to BS EN:1433 and is CE approved.



Cost Advantages

Mono Beany is ideal where specific problems would arise with conventional drainage methods for example:

- Where there is insufficient fall to the outfall point.
- Where, in flat areas, either numerous, closely spaced gullies or false falls would be required in the carriageway.
- Where long gully connections would be needed.
- Where surface water drainage pipes would conflict with service mains and cables.
- Where ponding would occur at low points.
- Where traffic safety and control measures would be required when widening existing carriageway.

Mono Beany is likely to be more economical than conventional kerb/point drainage where carriageways have crossfall, few vehicular crossings or where a surface water drain would be required for highway drainage purposes. Cost savings have been significant on highway and non-highway schemes incorporating lengths of the Beany Block system. For comparison purposes, conventional methods should include the following as appropriate:

- Surface water drain (including reinstatement).
- Gullies.
- Gully connections.
- Manholes.
- Kerbs.
- Channel Blocks.
- Extra 200mm width of footway plus a small amount of carriageway.
- Service diversions.
- Traffic safety and control (existing carriageways).

Construction Savings

- Mono Beany System combines water interception and transportation in one system. This minimises or eliminates the need for carrier drains, gullies and manholes, reducing construction costs and saving time.
- Simple one-piece system – straightforward to design and detail, reducing design times and cost. Easy to set out and straightforward to install.
- The overall construction period can be reduced as carriageway materials may be laid in a continuous sequence. Unlike laying conventional drainage, excavations are kept to a minimum without exposing the formation and sub-base surfaces to possible periods of adverse weather.
- Underground cables and services can be avoided so contractual/ insurance claims are likely to be much less than when laying conventional drainage.

Low Maintenance

- Mono Beany will require periodic inspection and emptying of Silt Traps, Outfalls and Catchpits. The number of Silt Traps and Outfalls are likely to be fewer than in a conventional drainage systems*. If a blockage does occur, it can easily be located and rectified by rodding or jetting from an access point or through a top block aperture adjacent to the blockage.

**It is recommended to have an access point at the head of the run and every 50m and a Silt Trap every 100m*

Components

HALF BATTERED



Half Battered 321 1000mm



Half Battered 321 500mm



Half Battered 502 1000mm



Half Battered 502 500mm

45° SPLAYED



45° Splayed 321 1000mm



45° Splayed 321 500mm



45° Splayed 502 1000mm



45° Splayed 502 500mm

ACCESSORIES



Centre Stone 321 1000mm



Centre Stone 502 1000mm



Dropper 321



Dropper 502



*Half Battered Access Cover with Rodding Box for 321 System



*45° Splayed Access Cover with Rodding Box for 321 System



*Half Battered Access Cover with Rodding Box for 502 System

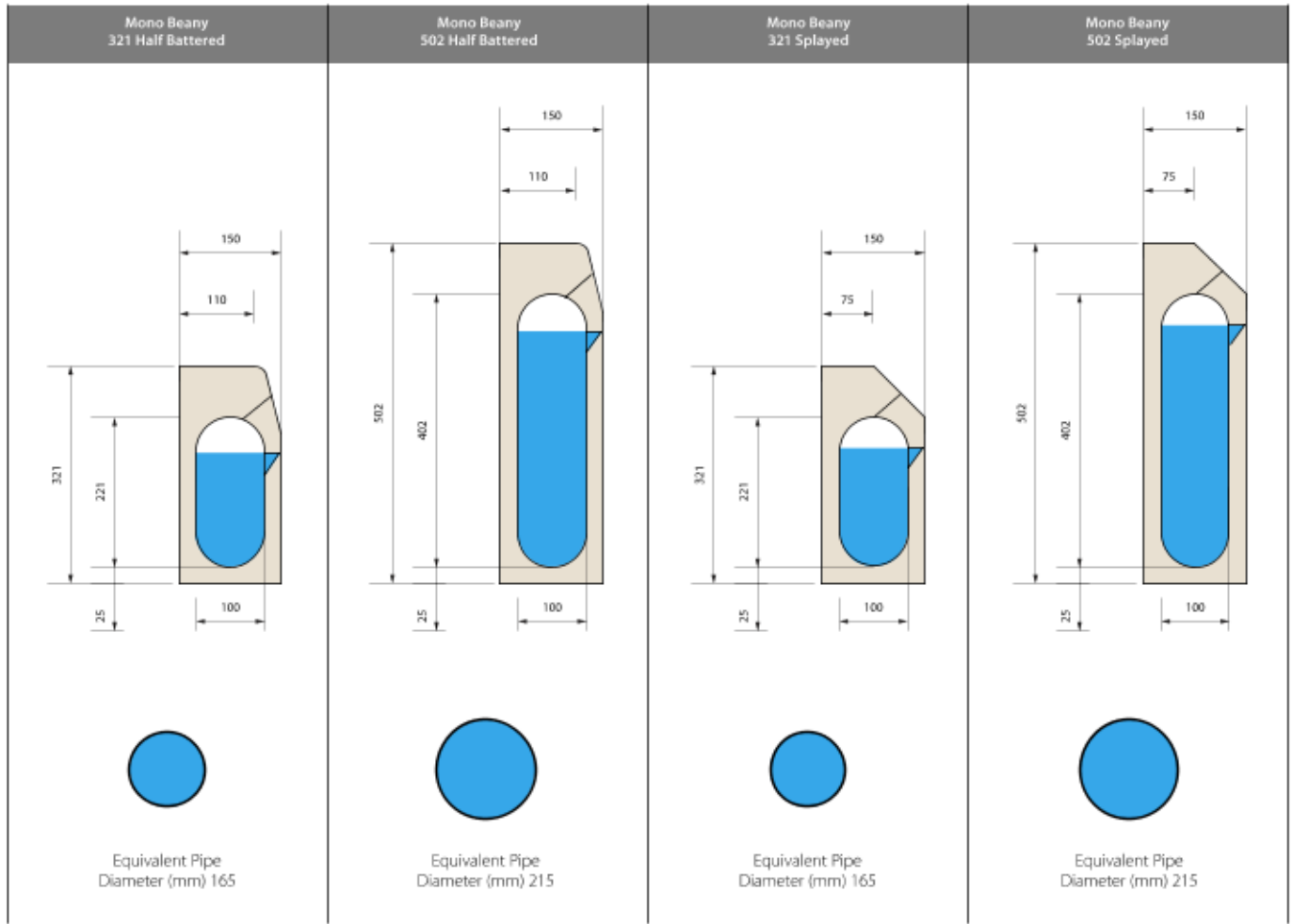


*45° Splayed Access Cover with Rodding Box for 502 System

*Access Cover with Rodding Box. Comprising a two section concrete and cast iron Rodding Box and Access Cover. Cut-out panels to allow Mono Beany runs from both sides

Hydraulic Data

FLOW CAPACITY



	Mono Beany Half Battered		Mono Beany Splayed	
ref.	d	l	d	l
321 Unit	196	171	221	196
502 Unit	377	352	402	377

Hydraulic Data

The Mono Beany 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 Colebrook White design principles.

Mono Beany									
Channel Type	321		321 Centre Stone		502		502 Centre Stone		
Gradient '1 in'	l/s	m/s	l/s	m/s	l/s	m/s	l/s	m/s	
10	79	4.29	32	3.61	169	4.75	116	4.52	
20	54	2.96	22	2.49	117	3.29	80	3.13	
30	44	2.38	18	2.00	94	2.65	64	2.52	
40	37	2.04	15	1.71	81	2.27	55	2.16	
50	33	1.81	13	1.52	71	2.01	49	1.91	
75	26	1.45	10	1.22	57	1.62	39	1.53	
100	22	1.24	9	1.04	49	1.38	33	1.31	
150	18	0.99	7	0.83	39	1.11	27	1.05	
200	15	0.85	6	0.71	33	0.95	23	0.90	
300	12	0.68	5	0.57	27	0.76	18	0.72	
400	10	0.58	4	0.48	23	0.65	15	0.61	
500	9	0.51	3	0.43	20	0.57	13	0.54	
750	7	0.41	3	0.34	16	0.46	11	0.43	
1000	6	0.35	2	0.29	13	0.39	9	0.37	
1500	5	0.28	2	0.23	11	0.31	7	0.29	
2000	4	0.24	1	0.19	9	0.26	6	0.25	

Outfall Capacities			
Outfall Type	Outlet Pipe Diameter (mm)	l/s	m/s
Mono Beany inline Side Outfall	150	29	2.6

RADIUS BLOCKS

Radius	Unit Reference
≤4.99	Cut on site or extended radius
5m - 9.99m	9/5 Radius Unit
10m - 20m	20/10 Radius Unit
20.01 - 40m	0.5m Unit

Mono Beany Component Codes

A Constant Depth System

Constant Depth Channels	Length (mm)	Width (mm)	Height (mm)	Invert Depth (mm)	Unit Weight (kg)	Item Code Standard Grey
Half Battered	1000	150	321	171	69	DR663030
	500	150	321	171	34.5	DR663035
	1000	150	502	352	91	DR663040
	500	150	502	352	45.5	DR663045
45° Splayed	1000	150	321	196	64	DR663120
	500	150	321	196	32	DR663125
	1000	150	502	377	86	DR663130
	500	150	502	377	43	DR663135

B Transition Channels

Transition Channels		Length (mm)	Width (mm)	Height (mm)	Invert Depth (mm) Upstream/Downstream	Unit Weight (kg)	Item Code
Half Battered	502 - 321 Transition RH	1000	150	502	352/171	107	DR663320
	502 - 321 Transition LH	1000	150	502	352/171	107	DR663321
45° Splayed	502 - 321 Transition RH	1000	150	502	377/196	107	DR663325
	502 - 321 Transition LH	1000	150	502	377/196	107	DR663326

E End Cap/Cap Outlets

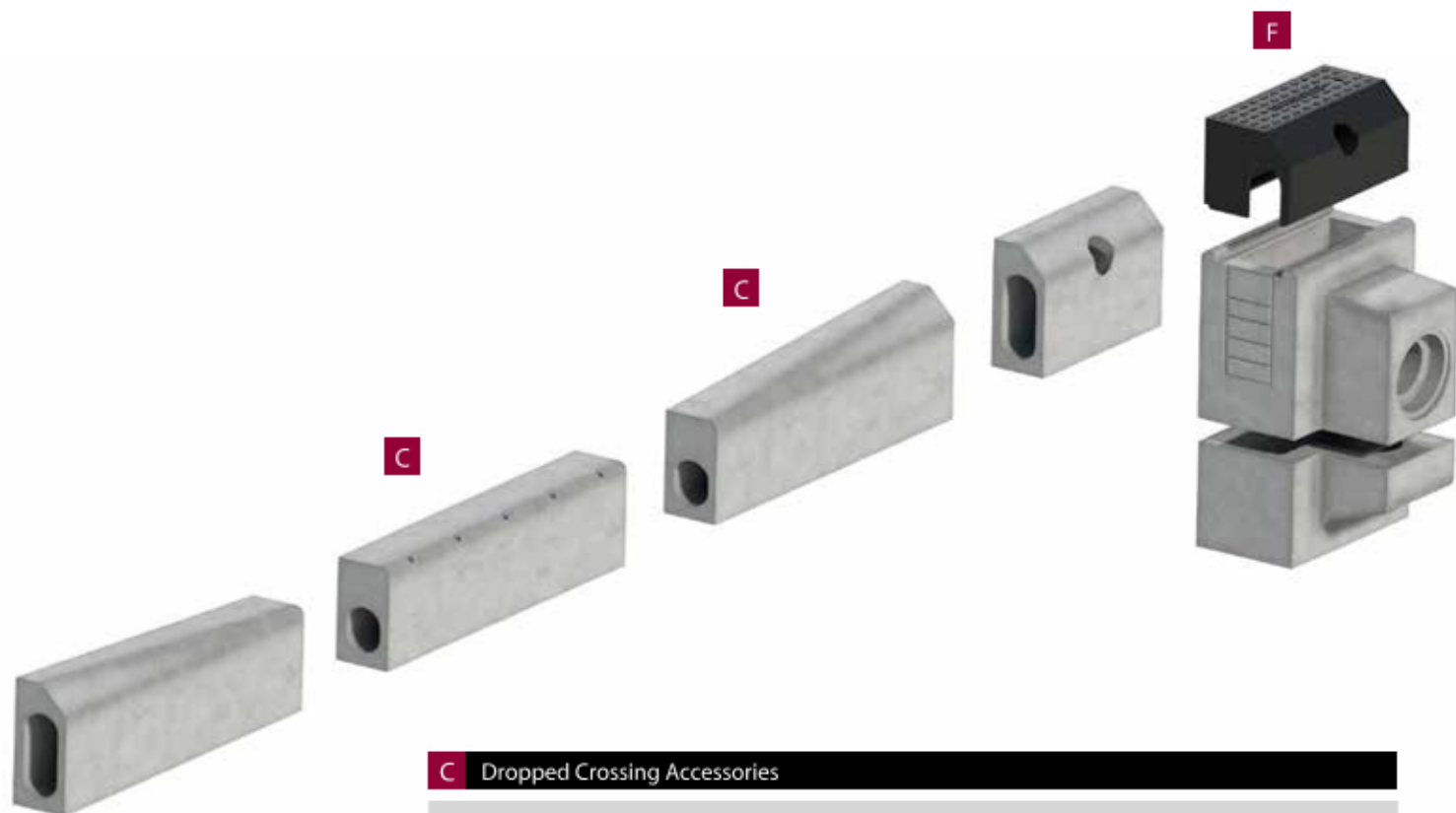
End Cap/Cap Outlets	Unit Weight (kg)	Item Code
End Cap for 321 System	1	DR664235
End Cap for 502 System	1	DR664240
Cap Outlet for 321 System	1	DR664225
Cap Outlet for 502 System	1	DR664230

F Outfalls & Accessories

Outfalls & Accessories	Unit Weight (kg)	Item Code
In-line Slide Outfall	80	DR664180
Half Battered Access Cover	40	DR664010
45° Splayed Access Cover	40	DR664020
Rodding Box for 321 System	20	DR664185
Rodding Box for 502 System	30	DR664190

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




C Dropped Crossing Accessories

Road Crossing Accessories		Length (mm)	Width (mm)	Height (mm)	Unit Weight (kg)	Item Code Standard Grey
Half Battered	Centre Stone 321	1000	150	202	40	DR663110
	Centre Stone 502	1000	150	383	50	DR663115
	Right Hand 321	1000	150	202/321	50	DR663090
	Right Hand 502	1000	150	383/502	60	DR663095
	Left Hand 321	1000	150	202/321	50	DR663100
	Left Hand 502	1000	150	383/502	60	DR663105
45° Splayed	Centre Stone 321	1000	150	252	40	DR663310
	Centre Stone 502	1000	150	433	50	DR663315
	Right Hand 321	1000	150	252/321	50	DR663290
	Right Hand 502	1000	150	433/502	60	DR663295
	Left Hand 321	1000	150	252/321	50	DR663300
	Left Hand 502	1000	150	433/502	60	DR663305

G Cable Ducts

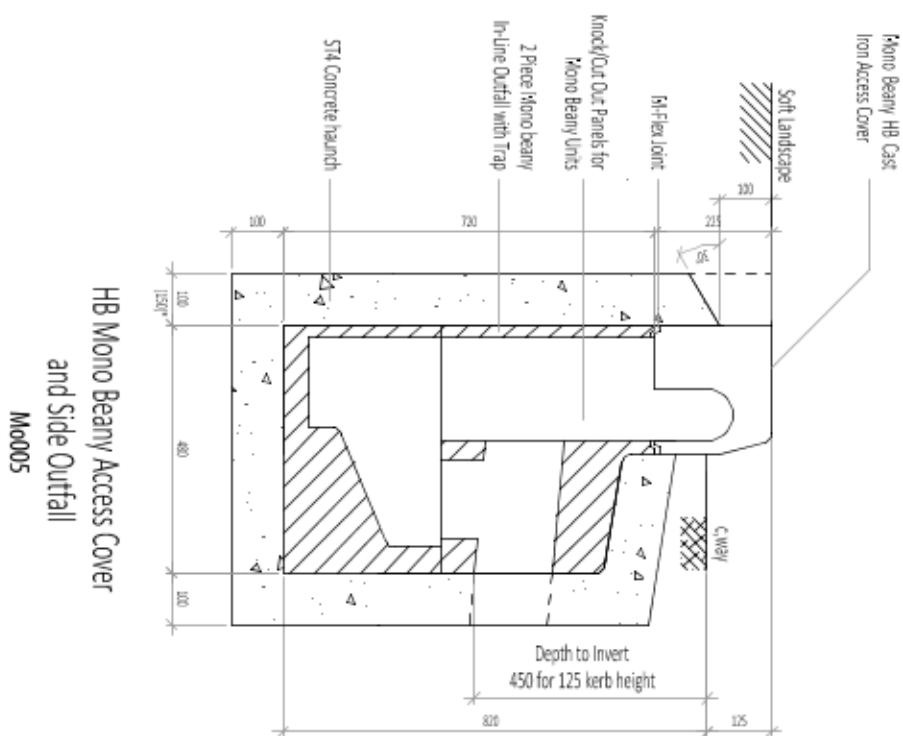
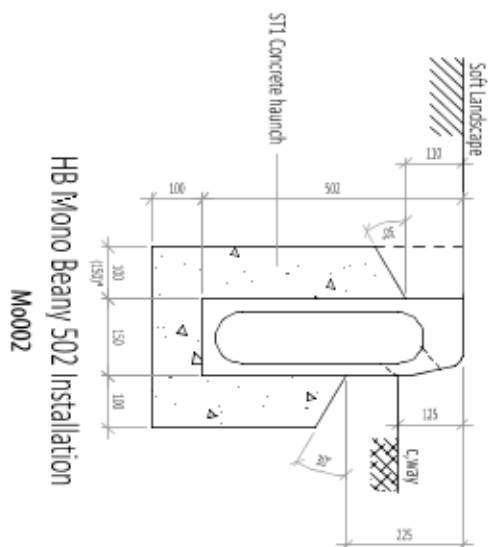
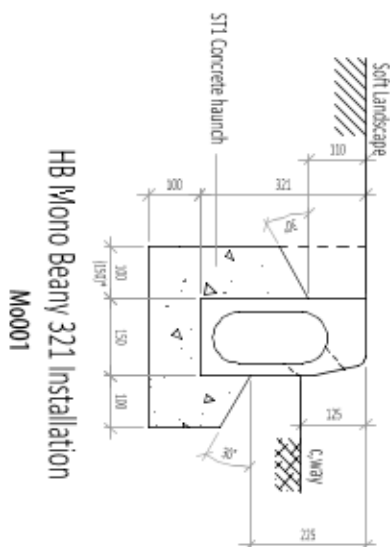
Cable Ducts		Unit Weight (kg)	Item Code
Half Battered	321 Cable Duct		DR664250
	502 Cable Duct		DR664255
45° Splayed	321 Cable Duct		DR664260
	502 Cable Duct		DR664265

D Radial Channels

Radial Channels		Length (mm)	Width (mm)	Height (mm)	Unit Weight (kg)	Item Code	
Half Battered	5/9 Internal Radius 321	490	150	321	20	DR663050	
	5/9 Internal Radius 502	490	150	502	30	DR663060	
	5/9 External Radius 321	490	150	321	20	DR663070	
	5/9 External Radius 502	490	150	502	30	DR663080	
	20/10 Internal Radius 321	490	150	321	20	DR663055	
	20/10 Internal Radius 502	490	150	502	30	DR663065	
	20/10 External Radius 321	490	150	321	20	DR663075	
	20/10 External Radius 502	490	150	502	30	DR663085	
	45° Splayed	5/9 Internal Radius 321	490	150	321	20	DR663140
		5/9 Internal Radius 502	490	150	502	30	DR663150
5/9 External Radius 321		490	150	321	20	DR663160	
5/9 External Radius 502		490	150	502	30	DR663170	
20/10 Internal Radius 321		490	150	321	20	DR663145	
20/10 Internal Radius 502		490	150	502	30	DR663155	
20/10 External Radius 321		490	150	321	20	DR663165	
20/10 External Radius 502		490	150	502	30	DR663175	

Standard Details

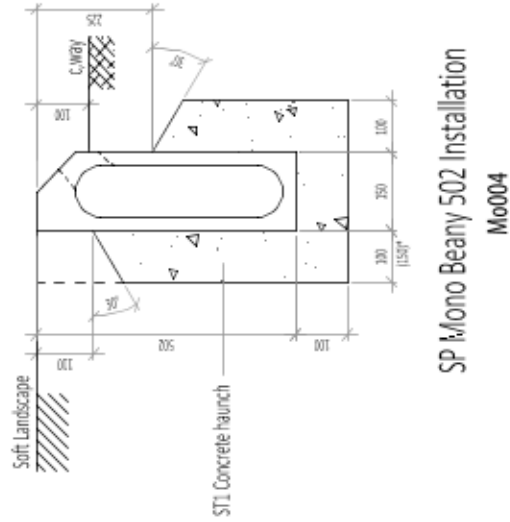
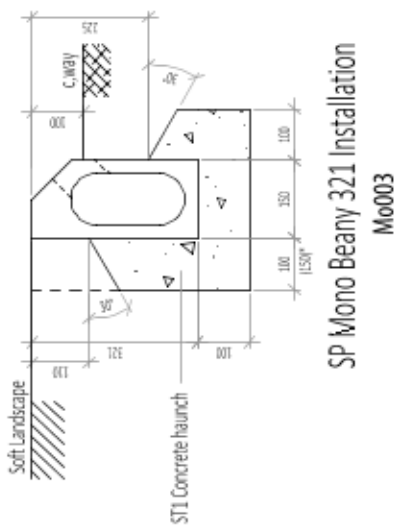
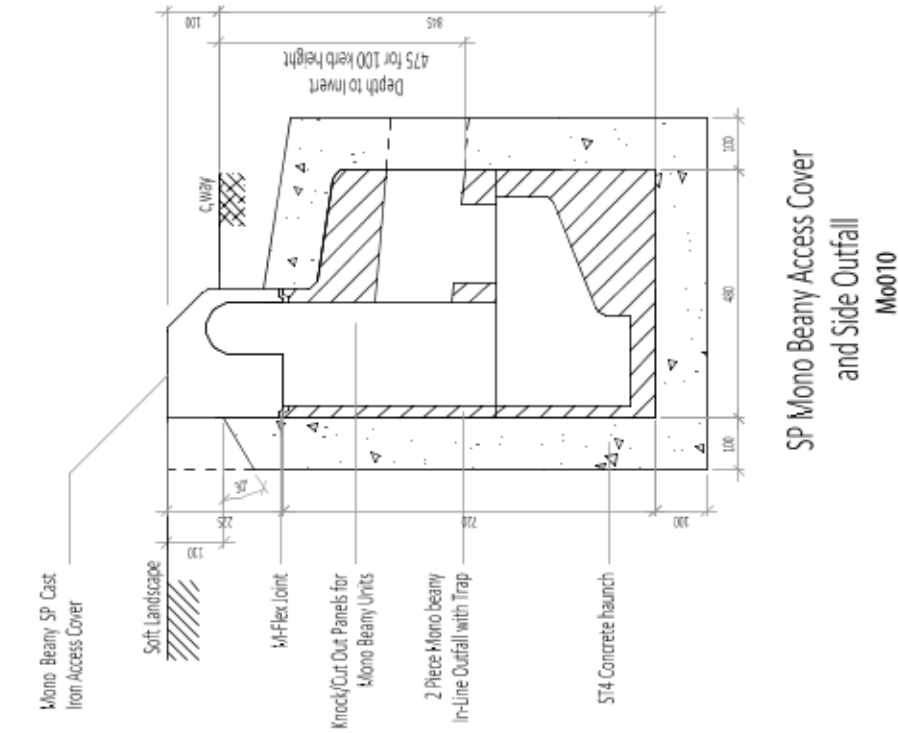
Drawing 1 of 9*



*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Standard Details

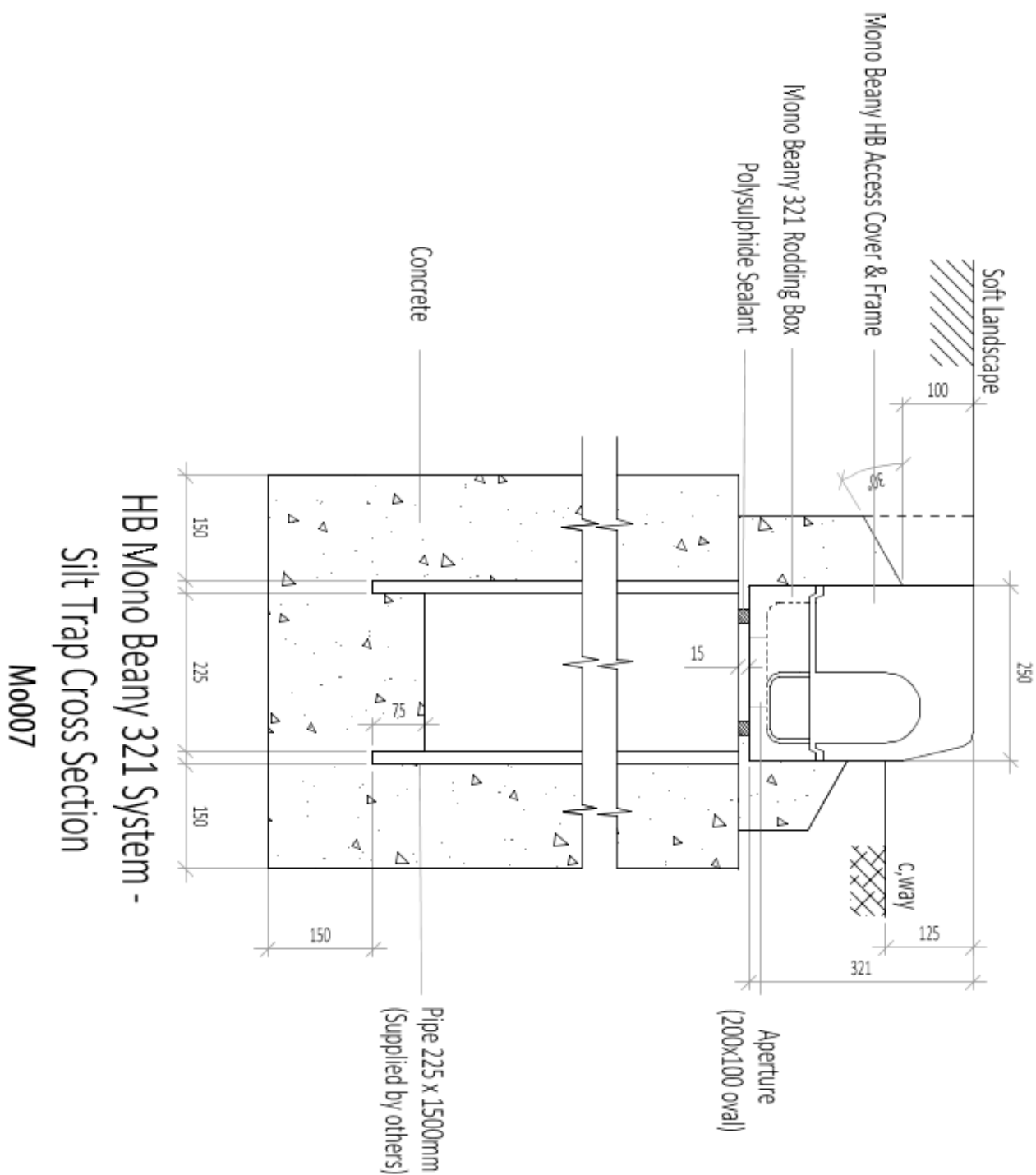
Drawing 2 of 9*



*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bys) shall have a full height rear launch

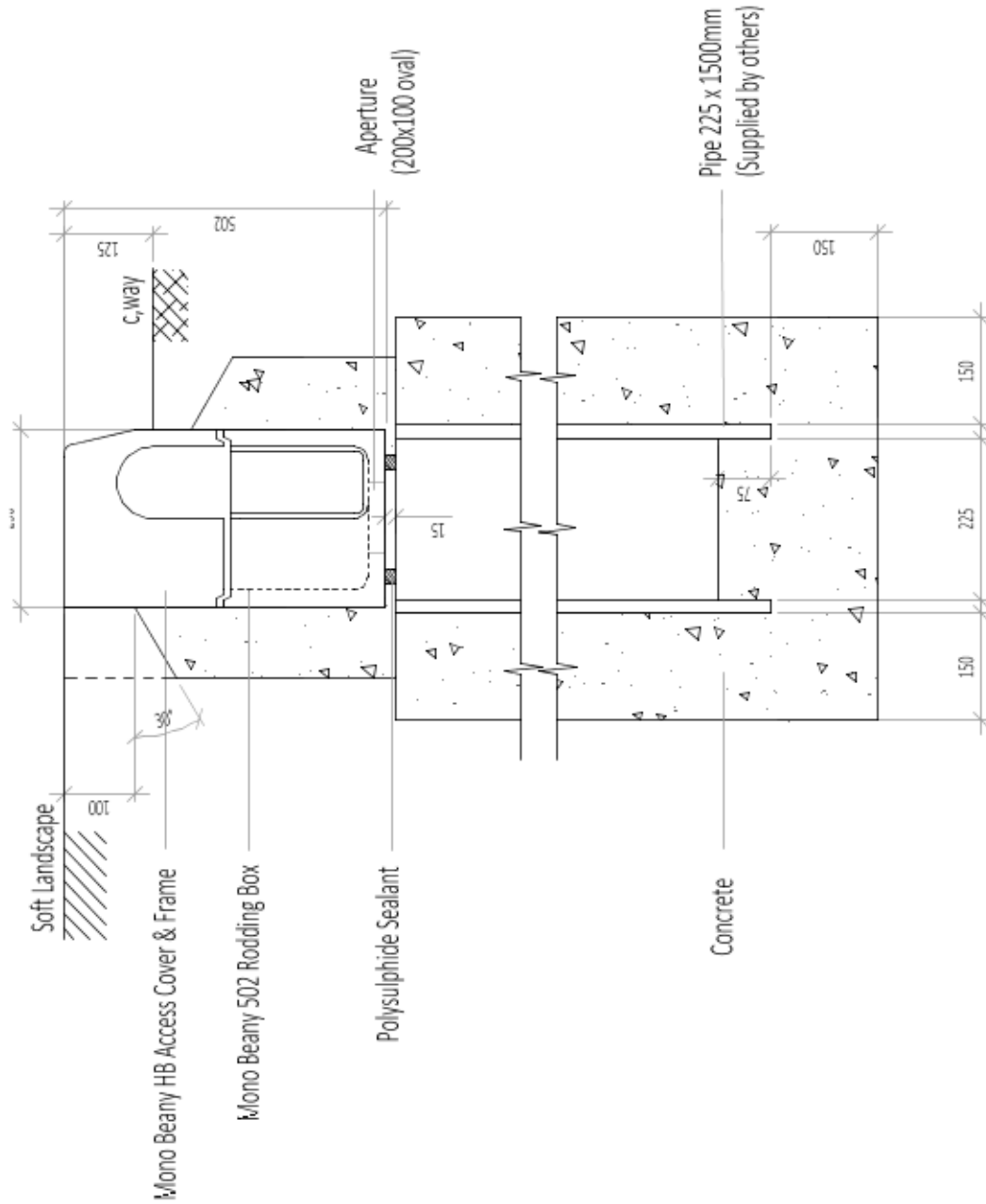
Standard Details

Drawing 3 of 9*



*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Drawing 4 of 9*

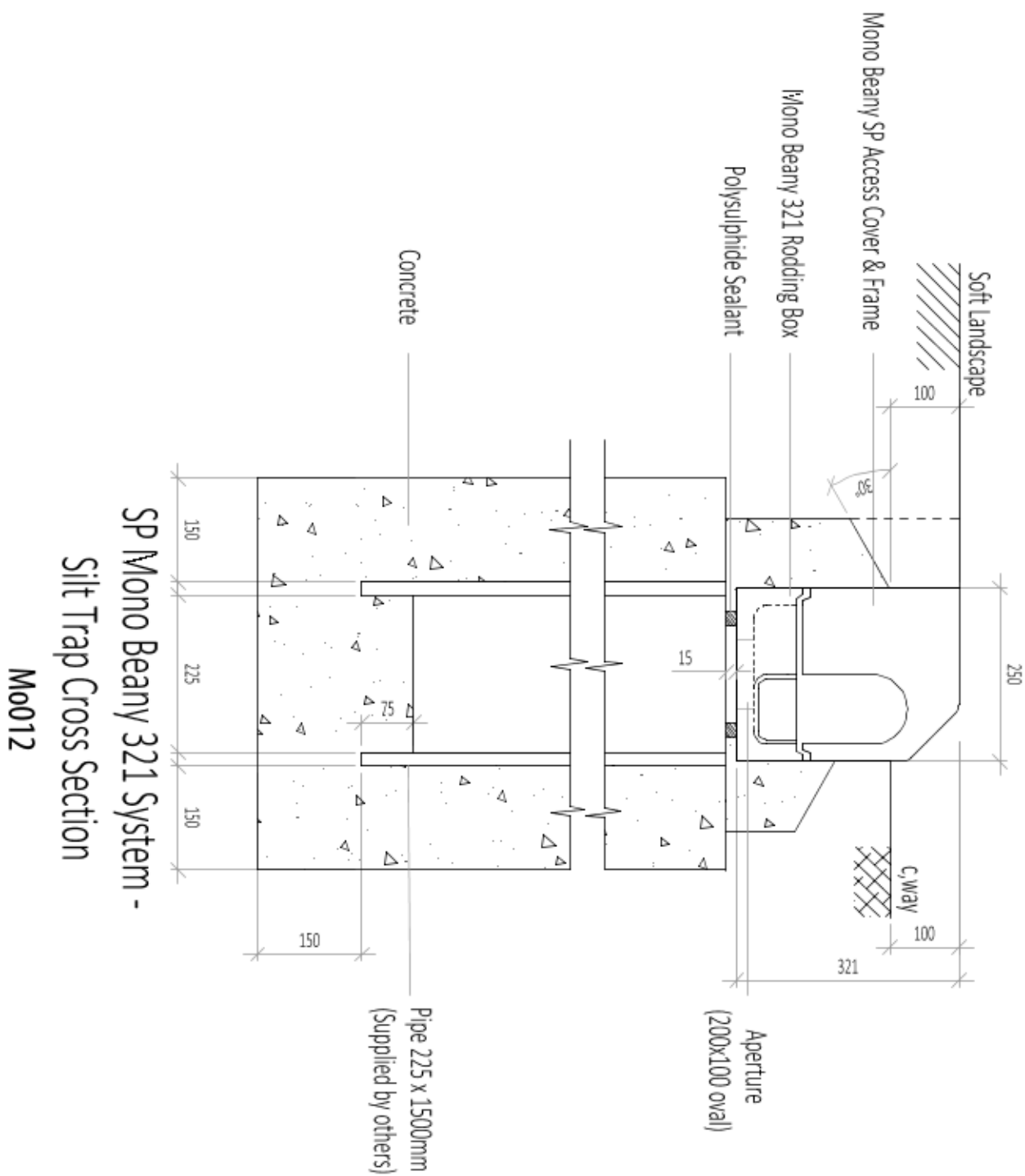


HB Mono Beany 502 System -
Silt Trap Cross Section
Mo009

*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Standard Details

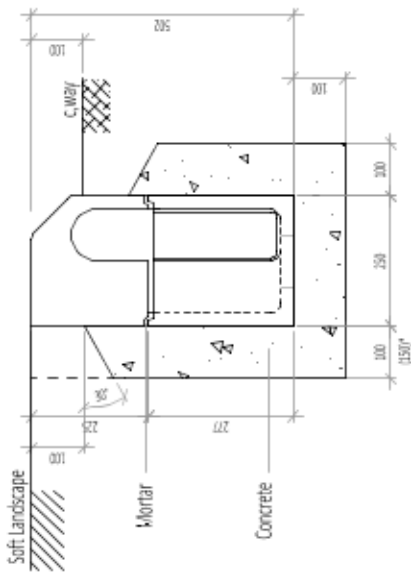
Drawing 5 of 9*



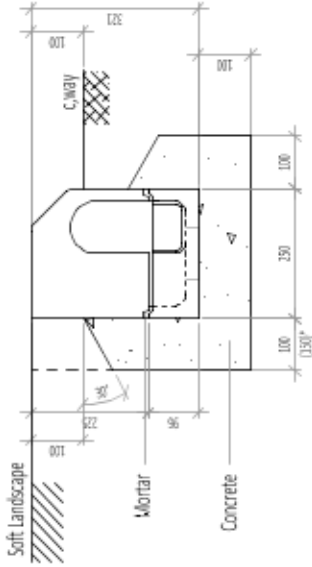
*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Standard Details

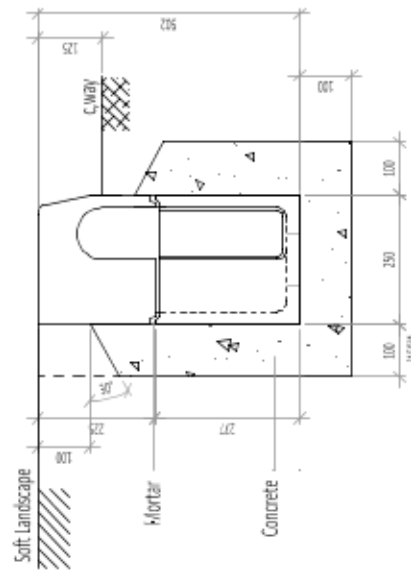
Drawing 6 of 9*



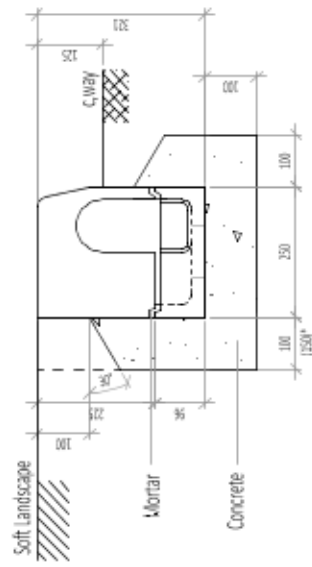
**SP Mono Beany 502 Rodding Box
& Access Cover Installation**
Mo013



**SP Mono Beany 321 Rodding Box
& Access Cover Installation**
Mo011



**HB Mono Beany 502 Rodding Box
& Access Cover Installation**
Mo008

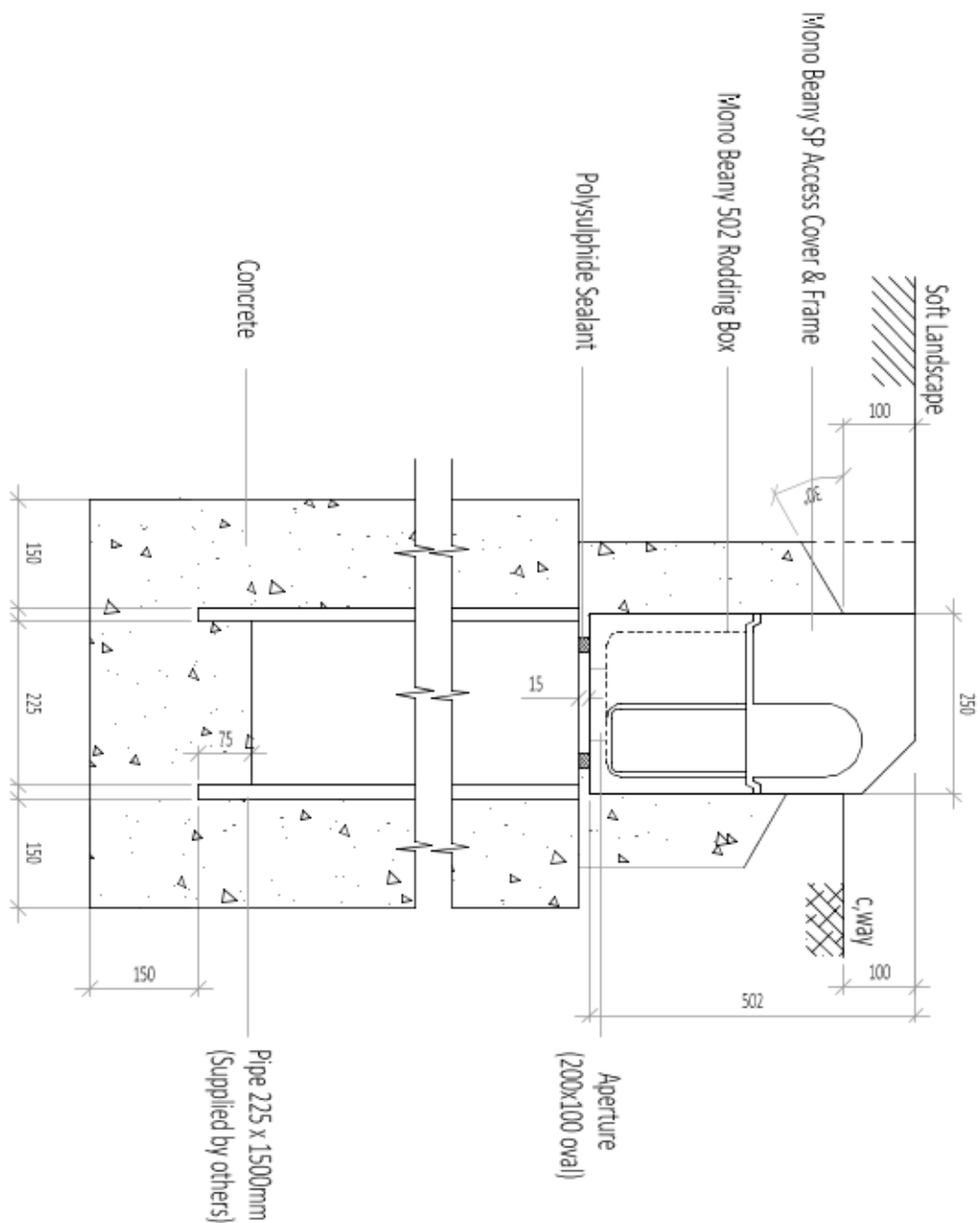


**HB Mono Beany 321 Rodding Box
& Access Cover Installation**
Mo006

*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Standard Details

Drawing 7 of 9*



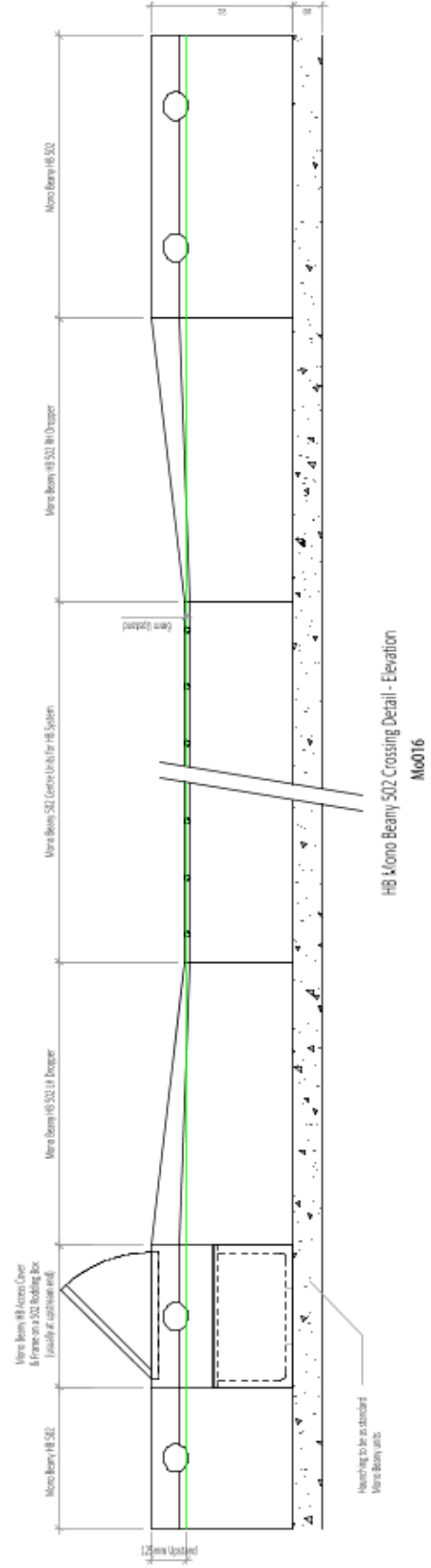
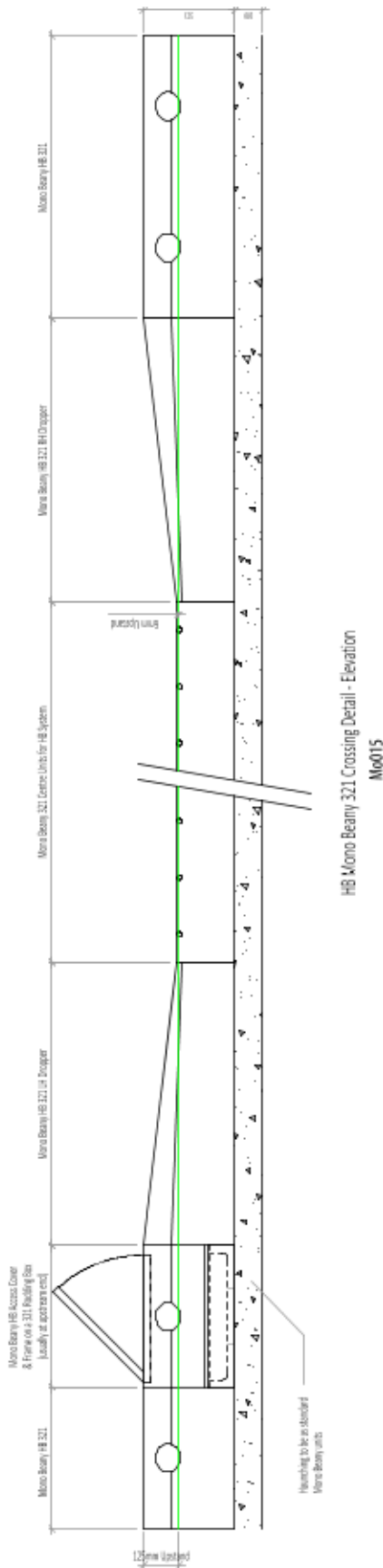
SP Mono Beanny 502 System -
Silt Trap Cross Section

M0014

*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and laybys) shall have a full height rear launch

Standard Details

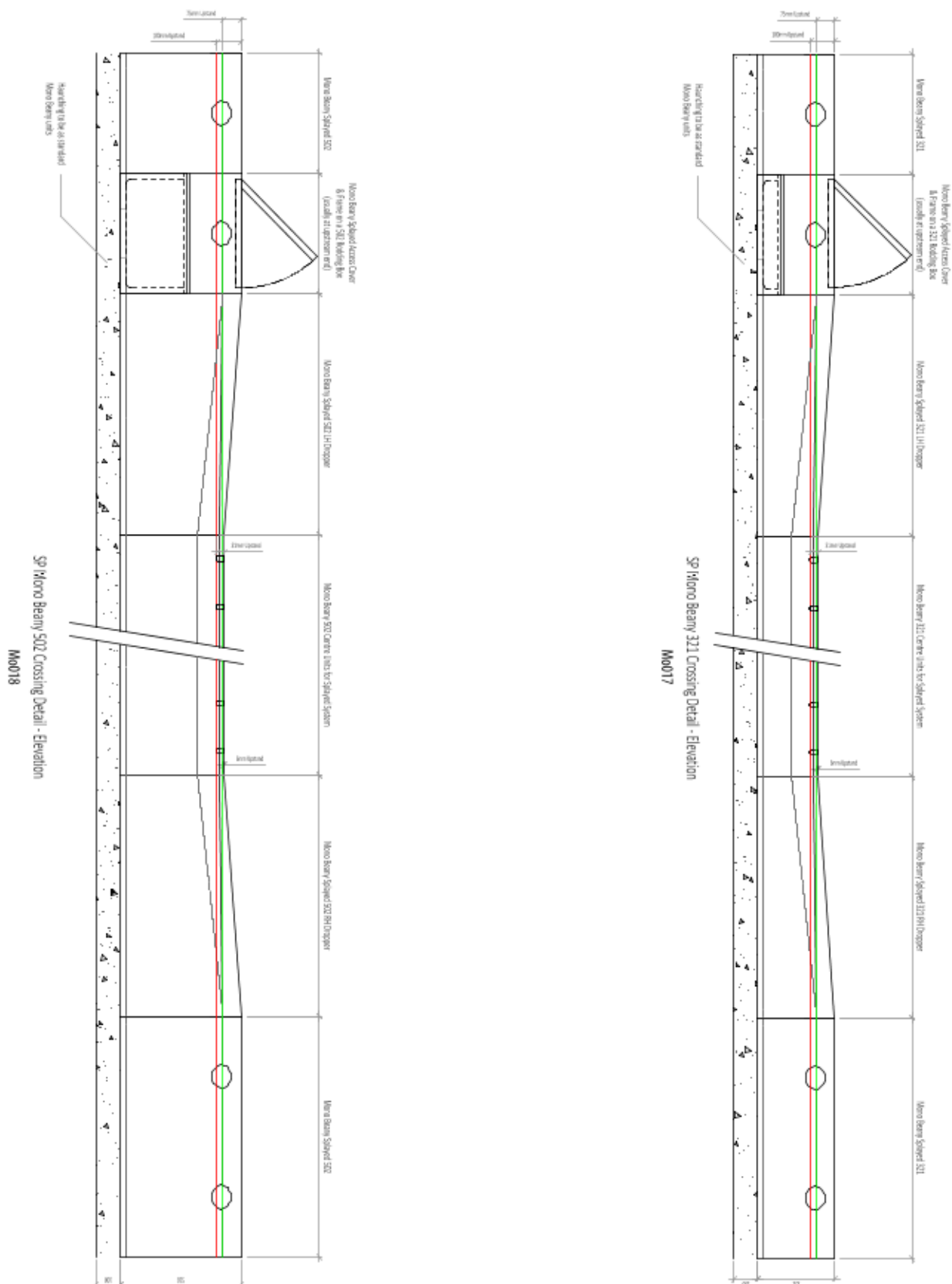
Drawing 8 of 9*



*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and lay bays) shall have a full height rear launch

Standard Details

Drawing 9 of 9*



*Units located in areas subject to a frequent number of high speed and/or heavy good vehicle impacts, (i.e. junctions, roundabouts and laybys) shall have a full height rear launch

Standard Details

Notes For Mono Beany

Drawings 1 to 9

1. Mortars shall be;
 - i. A Mortar class 12 cement mortar to BS EN 998-2 for general bedding and levelling
 - ii. Marshalls' M-Flex for bedding Mono Beany access covers onto silt boxes
 - iii. Marshalls' M-Flex for bedding the sections of the Marshalls' Trapped Gully Unit sections
2. Concrete bed, haunch and surround shall be;
 - i. A concrete mix ST1 to BS 8500-1&2 and BS EN 206-1 for Base Units used in the normal kerb application
 - ii. A concrete mix ST1 to BS 8500-1&2 and BS EN 206-1 for Beany Trapped Gully, Silt Traps, Catch Pits, end cap and outfall details
 - iii. Rear haunch shall be full height when used in areas subject to frequent high impact and/or heavy goods vehicular impact (i.e., junctions, roundabouts or layby's) or in areas of soft landscaping to the rear.
3. Marshalls' vertical joint sealant, M-Seal, shall be applied to all vertical faces to achieve a watertight seal.
4. Mono Beany Access Covers and Frames are hinged and handed to the direction of the traffic, specified "nearside" and "offside".
5. Movement joint details that fully isolate the Mono Beany whilst maintaining restraint shall be provided adjacent to all concrete slabs, even when the slab is covered by other materials.
6. All dimensions are in millimetres

Specification

Introduction

The following specification covers the complete Mono Beany system including ancillary fittings and is compatible with the Standard Detail Sheets. Where the Manual of Contract Documents for Highway Works is used, information for 'Appendix 5/5: Combined Drainage and Kerb systems' is available on request.

Mono Beany Combined Kerb and Drain Linear Drainage system

1. The combined kerb and drainage system shall be Marshalls Mono Beany®, manufactured in pre-cast concrete, with the exception of certain ancillary items which are manufactured in cast iron as supplied by Marshalls, Halifax HX5 9HT in accordance with Standard Detail Sheets.
2. The combined kerb and drainage shall consist of a one part system of constant depth blocks
 - a. Units shall be a maximum of 321/502*mm deep, 150mm wide and 1000mm long.
 - b. Units laid to radii of less than 40m shall utilise 500mm units and for radii of less than 30m purpose made radial blocks as appropriate
 - c. Kerb upstand shall be 125/75*mm (HB/SP*)
 - d. Kerb profile to be Half Battered / 45° Splay*
 - e. The unit shall be formed in pre-cast concrete with an integral plastic internal lining.
3. All components of the Mono Beany system shall comply with the British Standard BS EN1433:2002, load classification D400 and the following:
 - a. All units shall be 3rd party accredited with the Kite Mark.
 - b. The water inlet aperture shall increase in size towards the inside of the unit with a minimum divergence angle of 5°
 - c. The angle of incline of the water inlet aperture shall be at least 30° to the horizontal
 - d. Water inlet apertures shall be wholly within individual units and not within 100mm of the end of each unit
 - e. When installed, the depth of construction from the top of the base channels to the drained area surface shall be not less than 125mm
 - f. The system shall have a minimum of 12,850mm²/m water inlet aperture area
4. The combined kerb linear drainage shall be installed to line and level indicated in the contract and in accordance with manufacturer's instructions and standard details.
5. 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

Excavation

1. Sufficient material should be excavated to accommodate the Units, concrete bedding and haunching.
2. Any 'soft spots' or poorly compacted formation should be made good.

Setting Out

1. Setting out pins should be accurately located to the correct line and level with a string line level placed to the rear of the kerb.
2. Sufficient setting out pins should be inserted where Mono Beany Units are laid on horizontal curves

Outfalls

1. Mono Beany Outfalls should be installed first.
2. Sufficient material should be excavated to accommodate the Trapped Mono Beany Gully
3. 125mm of ST4 mix (BS 8500-1&2) concrete of the appropriate mix is placed in the bottom of the excavation
4. The bottom section of the two part Mono Beany Outfall is lowered into position
5. Sufficient M-Flex sealant is gunned onto the top horizontal surface of the bottom section of the two part Beany Outfall so as to provide a seal between the top and bottom sections
6. The bedding concrete should be laid and brought up flush to the top of the Mono Beany Outfall.
7. The Cast iron Access Cover & Frame Units should be set directly onto a liberal quantity of stiff, cement mortar to completely fill the whole of the joint.

Mono Beany Unit Installation

1. Bedding concrete (ST1 to BS 8500-1&2) of the appropriate thickness and depth shall be laid
2. Mono Beany Units shall be laid onto the freshly mixed bedding concrete, starting at the outfall, i.e. working uphill
3. Alternatively, the Mono Beany Units may be bedded on to a layer of 10 to 40mm cement mortar (M12 mortar to BS EN 998-2) on a previously prepared concrete foundation.
4. Where cutting is necessary, one or two Units shall be cut so that no single Unit is less than 200mm in length and no cuts shall be within 50mm of the inlet aperture. No cutting shall impair the stability of the Unit.
5. All cutting and trimming of the Units shall be carried out with an appropriate cutting tool.



Mono Beany Joint Sealant

1. Sufficient Marshalls' M-Flex sealant should be gunned into the sealant groove at either end of the unit.

Mono Beany End Caps

1. Where the Mono Beany run does not terminate at an outfall, the base unit shall be sealed using the Mono Beany End Cap.
2. The End Cap shall be securely placed against the vertical end of the base unit and haunched with fresh concrete (ST1 mix to BS 8500-1&2).

Pavement Installation

1. Where Mono Beany is laid on or adjacent to existing or proposed concrete slabs, transverse joints shall be formed within the units and haunching adjacent to the slab joints and also longitudinal movement joints between the haunching and the slabs.
2. Where necessary, the Unit drainage openings shall be protected against the ingress of material during concreting operations by covering with Waterproof Cloth Tape.
3. Where Mono Beany is installed in areas of soft landscaping or areas subject to frequent high impact and/or heavy goods vehicular impact (i.e., junctions, roundabouts or layby's) Marshalls recommend a full height rear haunch

Health & Safety

4. 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.
5. 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.



Client:
Highways England

Contractor:
Costain

Engineer:
Mouchel (Manchester)

Marshall's products used:

- 15,000 linear metres of Mono Beany
- Bespoke transition unit



Marshall's supplied 15,000 linear metres of Mono Beany one-piece combined kerb and drainage to the new M1 smart motorway scheme.

Challenge

The road network is a crucial part of our national transport system and failures to improve these networks increases cost, hinders employment opportunities and makes it harder to do business.

Congestion is already a serious problem on the M1 between junctions 28 and 31 which carries around 95,000 vehicles per day.

The challenge was to install new infrastructure, including drainage attenuation, with minimal disruption and to select a suitable product engineered to help contractors meet deadlines. This would ensure the M1 was open and running to its full capacity within the project timescales. The client also needed to keep within budget and didn't want to pay for a costly over-engineered system.

Solution

Marshall's was chosen to supply linear drainage to the project. Mono Beany is Marshall's first one-piece combined kerb and drainage system made with ultra-tough M-Tech concrete which has been proven to significantly reduce installation time.

This innovative product is available in two depths which both have a recycled inner plastic core to provide hydraulic flow benefits at low and medium capacities. Each one metre unit can carry up to 40 tonnes (Class D400) when trafficked. The inlet apertures are divergent and angled at 45° to prevent blockages and maximise drainage efficiency. These features ensure surface water is cleared rapidly and internal flow is smooth and efficient.

The hydraulic capacity requirements varied along the run and therefore a mix of Mono Beany 321 and 502 units were required as this was deemed more cost-effective. Marshall's also used its expertise to develop a new transition unit to complete the M1 scheme as part of the Highways Agency's focus on innovation. This was developed in order to create a smooth hydraulic transition from a 502 to a 321 Mono Beany unit, which reduced the hydraulic capacity, while coming within budget.



Mono Beany
Case Study - M1



Benefit

Costain initially anticipated it would lay 240 metres of Mono Beany per day, however using the revolutionary, easy-to-install Mono Beany system the installation time was considerably reduced, with 340 metres installed per day to the scheme.

Malcolm Bell, Construction Manager from Costain said: *"Due to how quickly we were able to install the innovative Mono Beany system there was an increased demand on deliveries to site. Marshalls offered a reliable and guaranteed supply throughout the project, delivering three to four loads per week direct-to-site, often delivering two loads per day. This helped to ensure we met our completion deadlines and kept works disruption to a minimum.*

"Working with Marshalls also offered Costain a dedicated and knowledgeable design team to meet our requirements for this scheme.

"These are all important factors when tasked with installing over nine miles of drainage to a major strategic route connecting people, communities and businesses."

In the longer term this scheme will help relieve congestion and smooth traffic flow along this stretch of the M1, improving safety and journey times for commuters. These benefits will also support economic development in the region.

Responding to the recent announcement by Highways England that there will be a £1.5bn investment in smart motorway schemes Marshalls Drainage Trading Director said: "Marshalls is already engaged in a number of smart motorway schemes as part of this investment, offering design expertise on a wide range of suitable products.

"As the UK's leading supplier of hard landscaping materials, we are committed to developing effective water management and linear drainage solutions to meet the needs of contractors.

"Having already supplied Junctions 28-31 of the M1, we are poised for further involvement to improve the road network and have the capacity and capability to deal with further orders."

