

## D3 Quay and Deepwater Berth

### Construction Methodology – Outfall 1

BHD3-GCL-ZZ-ZZ-MS-R-0002



|              |                  |                                   |
|--------------|------------------|-----------------------------------|
| Completed By |                  |                                   |
| Signature    |                  |                                   |
| Position     | Section Engineer |                                   |
| Date         | 21/08/25         |                                   |
| Revisions    |                  |                                   |
| Revision No. | Date             | Summary of Changes                |
| P01          | 21/08/2025       | Initial Draft for Internal Review |
|              |                  |                                   |
| Comments     |                  |                                   |
|              |                  |                                   |

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## 1.0 Project Overview

The purpose of this document is to give a high-level methodology for the construction 'Outfall 1' that will discharge into Belfast Lough, along the Northern Boundary of the D3 Quay and Deepwater Berth project, along the access road.

## 2.0 Outfall Construction

The location of 'Outfall 1' can be seen from drawing BHD3-DCL-DR-QL-D-C-0003 C04 in Appendix A, a cross-section of the headwall to be constructed at this location can see below in Figure 1, and the specification of the headwall can be seen in Appendix B.

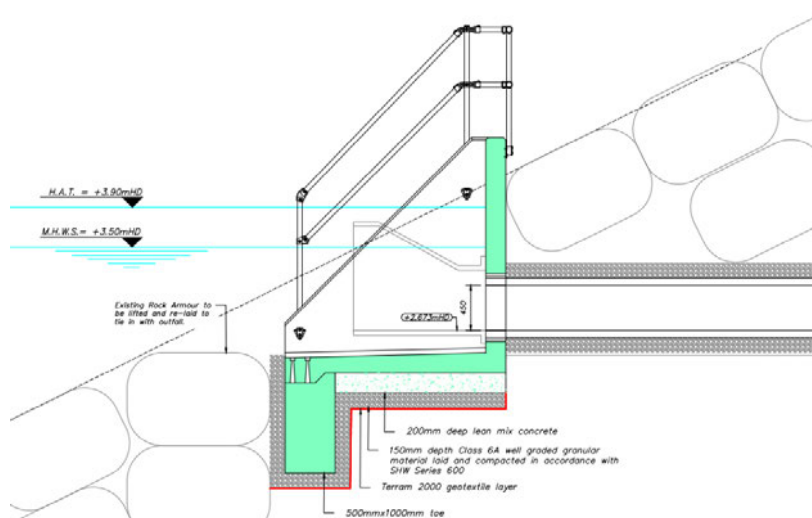


Figure 1: Cross-Section at Outfall 1

Outfall 1 will discharge the surface water run-off from the access road along the Northern boundary of the D3 Quay and Deepwater Berth project. Prior to discharge, the surface water will pass through a full retention separator (Klargester NSFA150), to remove any contaminants.

### 2.1 Construction Sequence

See below construction sequence for the installation of Outfall 1.

- Remove rock armour.
- Reduce level to formation and install the geotextile.
- Place and compact aggregate.
- Pour in-situ concrete base (Note: This will be completed on a falling tide to ensure concrete has time to set, prior to being submerged by the tide).
- Lift precast concrete headwall into position and backfill around the toe.
- Install concrete pipes from the headwall back to the newly constructed chamber and backfill.
- Fix duckbill valve to the headwall.
- Re-lay rock armour around the headwall.

## **2.2 Materials**

See below materials required for the construction of Outfall 1.

- Headwall: Althon Precast Concrete SFA15 D (with 1000mm toe).
- Duckbill valve: Tideflex Check Valve Series TF-1 (flanged duckbill valve to suit 450mm internal diameter).
- Terram 2000 geotextile.
- Class 6A well graded granular material.
- Concrete.

## **2.3 Plant**

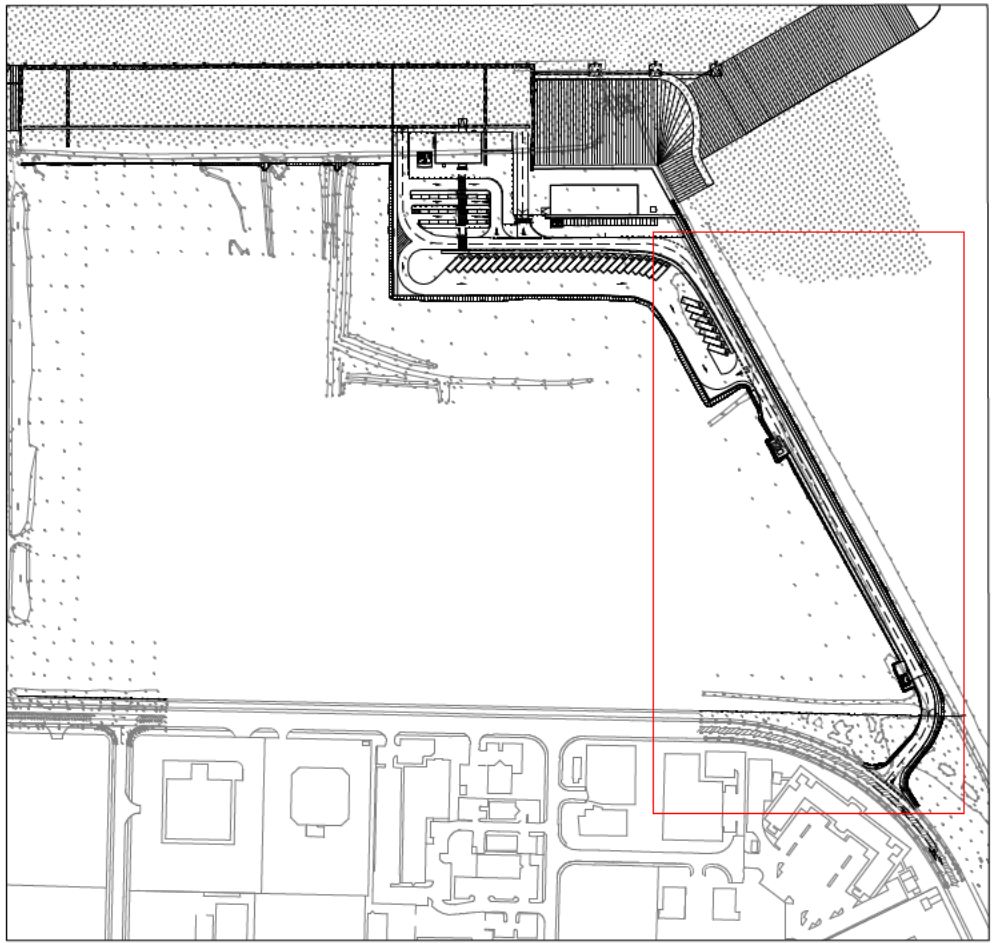
See below plant required for the construction of Outfall 1.

- 13T excavator.
- 9T forward tipping dumper.

## 3.0 Appendices

### 3.1 Appendix A – Drawings

| Rev | Date     | By  | Check | Details             | Appr. |
|-----|----------|-----|-------|---------------------|-------|
| C01 | 26/09/24 | CB  | PMM   | Tender Issue        | CD    |
| C02 | 10/12/24 | KMC | PMM   | Title Block Updated | CD    |
| C03 | 18/04/25 | KMC | PMM   | Construction Issue  | CD    |
| C04 | 17/07/25 | KMC | PMM   | Layout amended      | CD    |



Location Plan  
Scale 1:5000

Legend – Drainage

- Storm Pipe
- Filter Drain
- ACQ QMAX 350 Channel
- ACQ QMAX 350 Access/Outlet Box
- ACQ QMAX 700 Channel
- ACQ QMAX 700 Access/Outlet Box
- ACQ Multidrain MD Channel (MD100 10.0)
- ACQ Multidrain MD100 Sump
- Storm Connection Pipe
- Storm Gully
- Storm Manhole
- Storm Manhole Fitted with Flow Control Device
- Klargester Full Retention Separator
- Klargester Bypass Separator
- Foul Manhole
- Foul Pumping Station
- Foul Decompression Chamber
- Foul Pipe (Gravity)
- Foul Pipe (Pumped)

Drainage Notes

- All dimensions in mm unless noted otherwise.
- Full retention separators to be Klargester NSFA150, NSFA225 as noted, or approved equal
- Bypass Separators to be Klargester NSBE125 as noted, or approved equal.
- Penstock to be Alton HDPE Penstock or approved equal. Penstocks shall be provided with non-rising stem spindles. Spindles shall be adequately supported over their length to ensure efficient operation when opening and closing the door. Penstocks shall be manually operated by means of removable tee bars to be supplied with each Penstock
- All gullies to be trapped. All kerb side gullies to be Class D400 cast iron gratings to BS EN 124.
- All manhole covers to be Class D400 cast iron to BS EN 124. All other gullies to be Class D400 cast iron gratings to BS EN 124. 100mm wide C35/40 concrete surround to gully frame
- For details of filter drains refer to standard details drawing BHD3-DCL-DR-QL-D-C-0006
- Outfalls 1 & 2 to be Althon SFA Precast Concrete Headwalls or equal approved.

General Notes

- All levels in metres to Harbour Datum (HD).
- All dimensions in mm unless noted otherwise.
- Harbour datum at Belfast Harbour is 2.01m below Ordnance Datum (OD).

|                 |             |
|-----------------|-------------|
| Tide Levels CD: | +0.00m OD   |
| HAT             | = +3.90m HD |
| MHWS            | = +3.50m HD |
| MLWS            | = +0.40m HD |
| LAT             | = +0.00m HD |

CONSTRUCTION  
DRAWING

Project Title:  
D3 Quay and Deep Water Berth

Drawing Title:  
Drainage Layout  
Sheet 3

|                                            |                    |                                            |
|--------------------------------------------|--------------------|--------------------------------------------|
| Client:<br>Belfast Harbour Commissioners   | Drawn by:<br>CB    | Date:<br>July 2023                         |
| Project Number:<br>BHD3                    | Checked by:<br>PMM | Scales:<br>1:500                           |
| Doran Project Number:<br>221096            | Approved by:<br>CD | Sheet Size:<br>A1<br>Uniclass:<br>PM_40_40 |
| Drawing Number:<br>BHD3-DCL-DR-QL-D-C-0003 | Revision:<br>C04   | STATUS:<br>A5                              |

## **3.2 Appendix B – Headwall Specification**

## SFA15 Headwall Range

Up to 1200mm Pipework  
1300mm - 2350mm Backwall Height

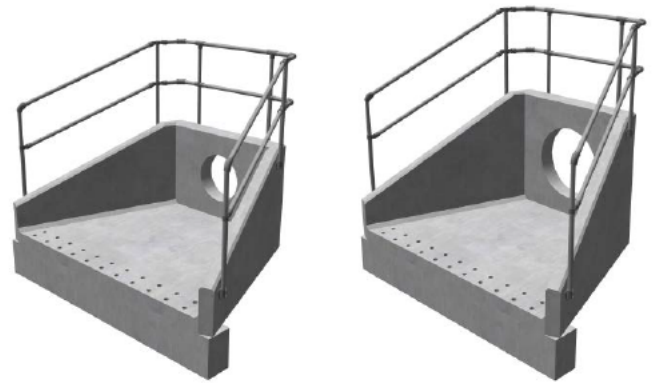
300 and 500mm Thick Toe

Althon Sewers for Adoption precast headwalls should be used when a concrete headwall is part of a Section 104 Agreement and the sewers are to be adopted once completed by the local Water Company. The materials used and installation must comply with the 'Sewers for Adoption' guidelines. Althon SFA precast concrete headwalls offer a cost effective alternative to in-situ structures for connecting pipework discharging into open watercourses.

There are four sizes of Sewers for Adoption concrete headwalls available catering for pipe sizes up to and including 1500mm. Each size of SFA precast concrete headwall comes with three depths of toe and four back wall heights offering wing wall profiles to suit most applications.

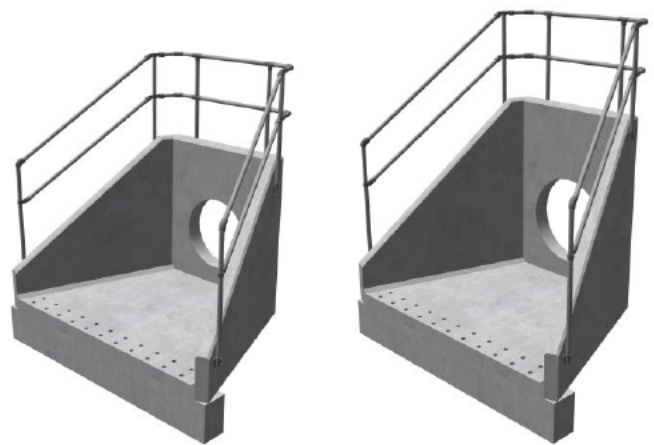
Althon Sewers for Adoption precast concrete headwalls are cast to suit the diameter and type of pipe being used and can be provided with fixings cast in at the time of manufacture to accommodate gratings, trash screens, flap valves, penstocks, ladders, Kee Klamp® handrails and flow and depth monitoring equipment.

Our Sewers for Adoption compliant precast headwalls are available with toe extensions either 300 or 500mm thick with depths ranging from 450 to 1000mm. We also manufacture Sewers for Adoption compliant outfall safety grilles to suit our concrete headwalls.



SFA15 A  
1300mm Backwall

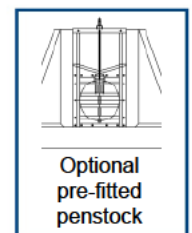
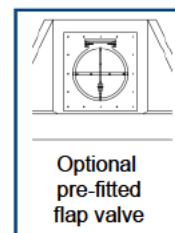
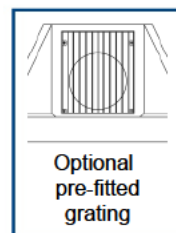
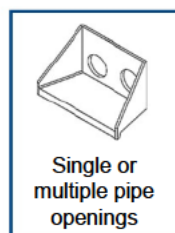
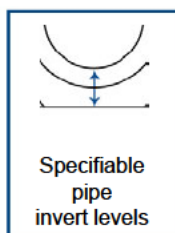
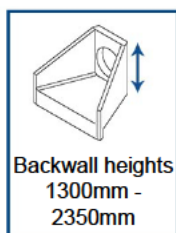
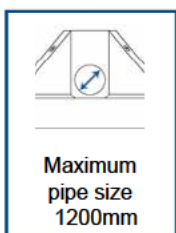
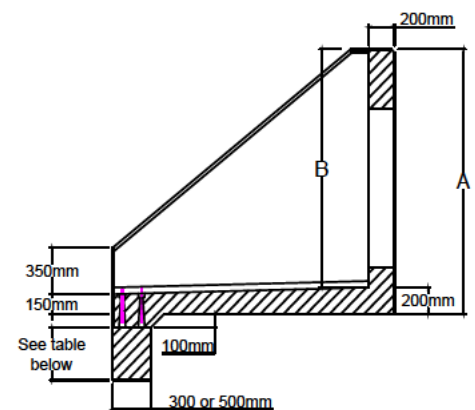
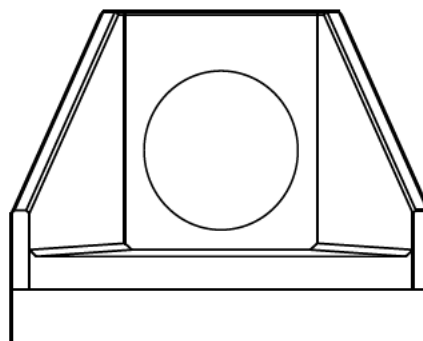
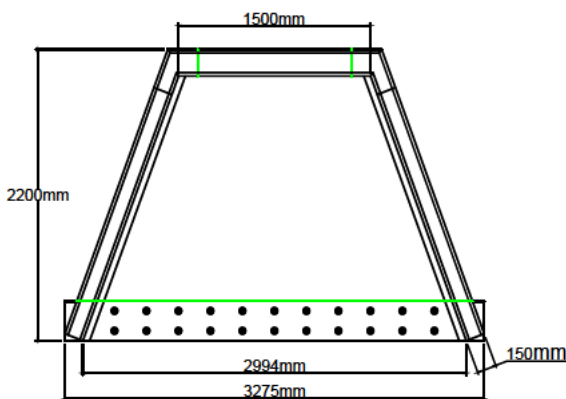
SFA15 B  
1650mm Backwall



SFA15 C  
2000mm Backwall

SFA15 D  
2350mm Backwall

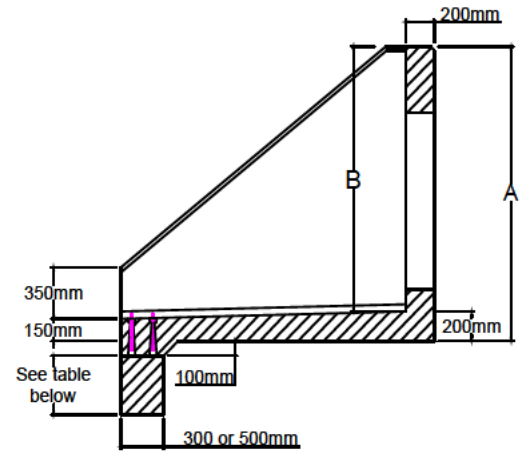
Optional Kee Klamp handrail



## SFA15 Headwall Range

Up to 1200mm Pipework  
1300mm - 2350mm Backwall Height

300mm Thick Toe



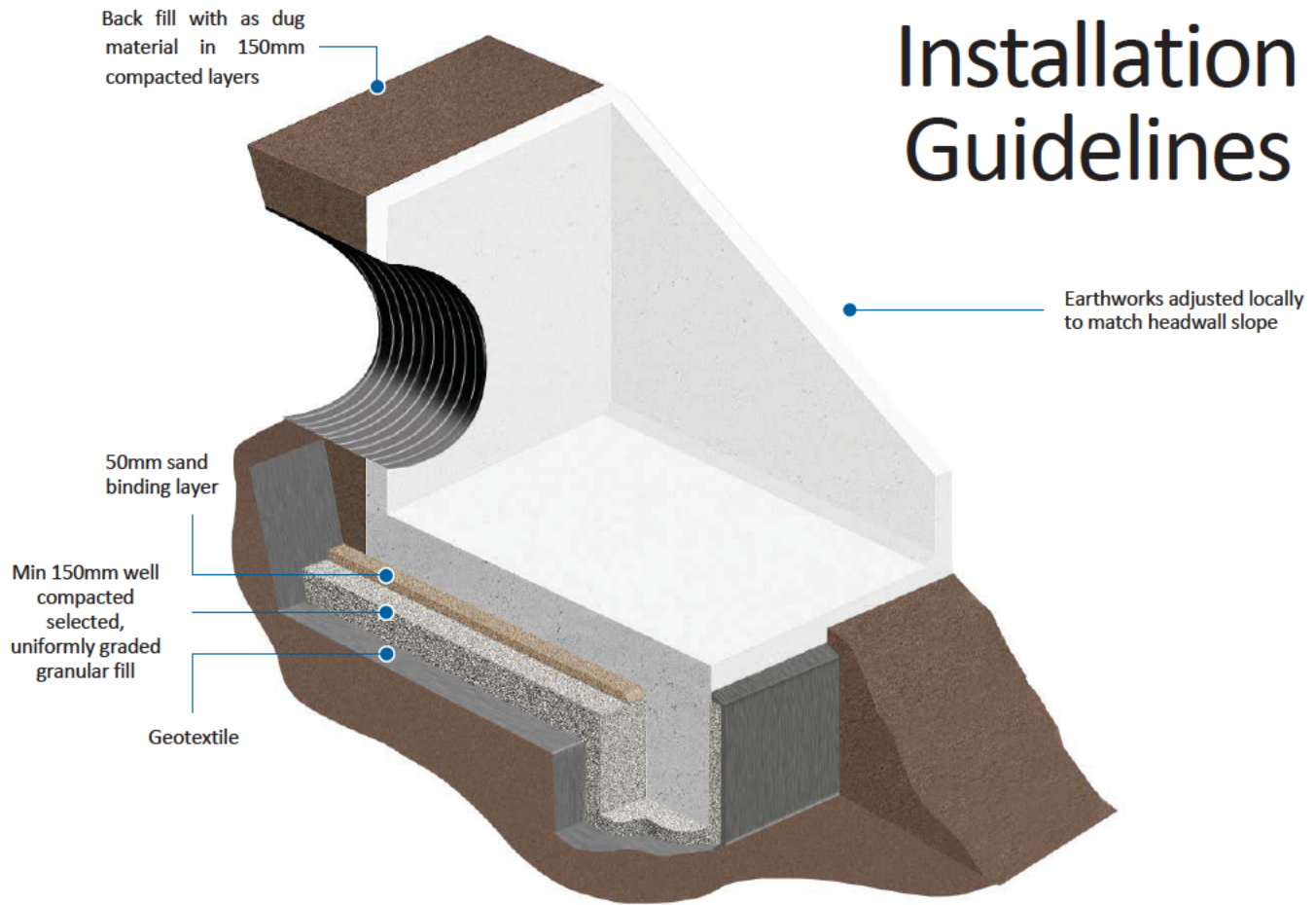
| Headwall Ref | Back Wall Height A | Back Wall Height B | Wing Wall Profile | Weight | Weight with Toe |       |       | Max Pipe Opening        | Max Pipe Opening | Max Pipe Opening   | Max Pipe Opening | Max Pipe Opening   | Max Pipe Opening |
|--------------|--------------------|--------------------|-------------------|--------|-----------------|-------|-------|-------------------------|------------------|--------------------|------------------|--------------------|------------------|
|              |                    |                    |                   |        | 400mm           | 650mm | 950mm | Invert Level with Apron |                  | 100mm Invert Level |                  | 225mm Invert Level |                  |
|              |                    |                    |                   |        |                 |       |       | TW / Clay               | Concrete         | TW / Clay          | Concrete         | TW / Clay          | Concrete         |
|              | mm                 | mm                 |                   | kg     | kg              | kg    | kg    | mm                      | mm               | mm                 | mm               | mm                 | mm               |
| SFA15A       | 1300               | 1100               | 1:2.3             | 4610   | 5560            | 6155  | 6870  | 750                     | 825              | 750                | 675              | 600                | 600              |
| SFA15B       | 1650               | 1450               | 1:1.6             | 5198   | 6148            | 6743  | 7458  | 1200                    | 1050             | 1050               | 1050             | 900                | 900              |
| SFA15C       | 2000               | 1800               | 1:1.24            | 5768   | 6718            | 7313  | 8028  | 1200                    | 1050             | 1200               | 1050             | 1200               | 1050             |
| SFA15D       | 2350               | 2150               | 1:1               | 6345   | 7295            | 7890  | 8605  | 1200                    | 1050             | 1200               | 1050             | 1200               | 1050             |

500mm Thick Toe

| Headwall Ref | Back Wall Height A | Back Wall Height B | Wing Wall Profile | Weight | Weight with Toe |       |        | Max Pipe Opening        | Max Pipe Opening | Max Pipe Opening   | Max Pipe Opening | Max Pipe Opening   | Max Pipe Opening |
|--------------|--------------------|--------------------|-------------------|--------|-----------------|-------|--------|-------------------------|------------------|--------------------|------------------|--------------------|------------------|
|              |                    |                    |                   |        | 500mm           | 750mm | 1000mm | Invert Level with Apron |                  | 100mm Invert Level |                  | 225mm Invert Level |                  |
|              |                    |                    |                   |        |                 |       |        | TW / Clay               | Concrete         | TW / Clay          | Concrete         | TW / Clay          | Concrete         |
|              | mm                 | mm                 |                   | kg     | kg              | kg    | kg     | mm                      | mm               | mm                 | mm               | mm                 | mm               |
| SFA15A       | 1300               | 1100               | 1:2.3             | 4610   | 6315            | 6315  | 8295   | 750                     | 825              | 750                | 675              | 600                | 600              |
| SFA15B       | 1650               | 1450               | 1:1.6             | 5198   | 6903            | 7898  | 8883   | 1200                    | 1050             | 1050               | 1050             | 900                | 900              |
| SFA15C       | 2000               | 1800               | 1:1.24            | 5768   | 7473            | 8468  | 9453   | 1200                    | 1050             | 1200               | 1050             | 1200               | 1050             |
| SFA15D       | 2350               | 2150               | 1:1               | 6345   | 8050            | 9045  | 10030  | 1200                    | 1050             | 1200               | 1050             | 1200               | 1050             |

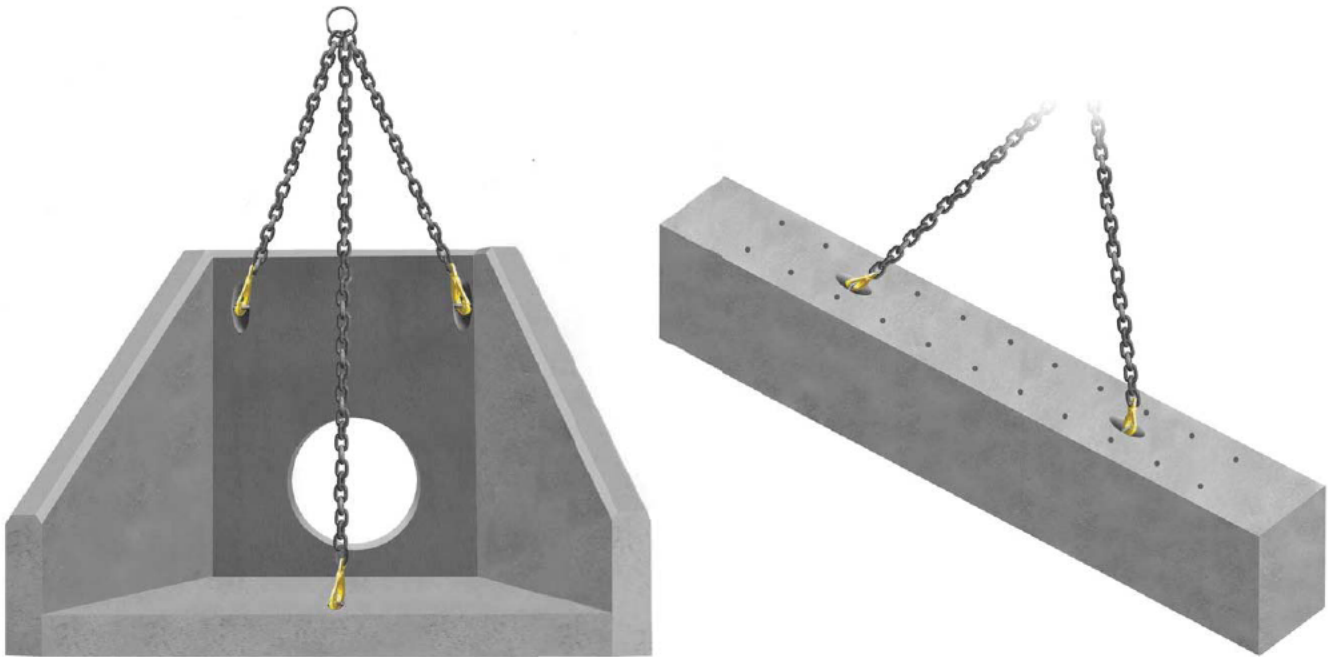
Note - Approximate headwall weights are based on a headwall with no hole cast in

# Installation Guidelines



- 1 Ensure that first or last spigot/butt or socket/butt pipe that is to be fitted to the Headwall is in position and free from backfill.
- 2 Dig out the bank of the watercourse to take the size of the headwall making sure that the Headwall will not protrude into the path of the water flow. The angle of the excavation to the rear of the Headwall should be roughly the same as the existing bank profile.
- 3 Dig out sufficient size trench to take the toe along the front of the foundation.
- 4 Line toe foundation with Geotextile then place selected, uniformly graded granular fill in the base and compact well. Lift Toe into position and level then fill around the toe with selected, uniformly graded granular fill and compact well. Insert supplied threaded rod into the sockets cast into the top of the toe.
- 5 Line the base of the rest of excavation with Geotextile then place a minimum bed of 150mm Class 6A or 6K\* Selected Well Graded Granular Material on the base & compact well, especially around the back of the toe, then a 50mm topping of fine material (Class 6L\*) to ensure units are level and stable. Lift Headwall into position, over the end of the pipe & locate over threaded rod protruding from the toe and level. Place washer over threaded rod (SFA10 8 No) in recess in Headwall apron and tighten nut. Fill recess with high strength non-shrink grout.
- 6 The pipe should be flush with the front of the back wall if fitting grating or flap valve, or protruding by 50mm if not.
- 7 Shim the pipe until it is central within the opening then fill void with sand cement mortar or high strength non-shrink grout.
- 8 If flap valve or grating is supplied, this will need to be removed before the pipe is inserted and sealed into place. Then reinstall using stainless steel fixing bolts into cast in sockets. (When bolting flap valves against headwall, use a good quality sealant but do not over tighten bolts or distortion may occur resulting in the valve not seating correctly.
- 9 Backfill pipe section first then backfill all around Headwall with as dug material. Make good at front of toe with as dug material ensuring river bank is returned to its original profile. It may be necessary to provide protection in front of the toe, please refer to engineers' recommendation.

\*Manual of Contract Documents for Highway Works: Volume 1 (MCHW1), Specification for Highway Works, Series 600 (Nov 09)



## Rapid-Lift Lifting Anchors

All Althon SFA Headwalls and Toes are fitted with Rapid-Lift lifting anchors. The Althon Rapid-Lift system allows the SFA Headwalls & Toes to be offloaded, transported and located in their final position without the need for any specialised lifting equipment. Standard lifting hooks and chains can be used with the three lifting points (two lifting points on Toes). The minimum chain leg length for all units is 1500mm.

## Althon Precast Concrete SFA Headwall Safety Sheet

Althon Limited manufacture pre-cast concrete SFA Headwalls using :-

**6 - 14mm aggregate • 0/4mm Sharp sand • Portland cement BS EN 197-1- Cem 1 52.5 • Cryso Fluid Premia 205 Varit Superplasticiser**

When units have been manufactured and cured they are in a chemically inert state. But the following information should be considered.

- It is advisable to wear toe cap safety footwear when handling any concrete products. Please refer to your company Safety Policy for specific details on manual handling.
- When cutting with masonry grinding discs or drilling with masonry drill bits it is necessary to wear eye protection and a dust mask. It is also recommended to wear ear protection during either of these two processes.
- Due to some units having sharp edges it is advisable to wear protective gloves when handling Althon products.
- When fitting or removing some of the larger accessories it is necessary to use a mechanical system to prevent risk of back injury.

## Maintenance of SFA Headwalls

With respect to the maintenance of any exposed surfaces of concrete components, only routine (Annual) cleaning may be necessary with a Power Washer and possibly some mild detergent to any exposed surfaces to maintain appearance; however all sites are unique and environmental impact of cleaning should be taken into account. Where cleaning is required and environmental conditions prevent mild detergent, using clean water and a power washer/stiff brush should suffice. Concrete units are often expected to “weather” and some coverage will help them to blend into their environment.

If damage to the structure of any pre-cast concrete components occurs we recommend their replacement not repair. If there is minor damage to corners during their normal life by grass cutting equipment etc. then repair with an epoxy compound such as ‘Mason Mate 0868PR380 Polyester Resin’.

To dispose of any Pre-Cast concrete components the preferred method is to recycle the material by crushing and grading, but if the quantity is too small to be cost effective then disposal in conventional landfill is acceptable as all the concrete components are inert with regard to having any environmental impact.

### Maintenance of Galvanised Grates & Handrails.

Annual/bi-annual visual checks are basic recommendations. If gratings are in a water course subject to a higher level of debris/weed, then more regular checks may be required. Clearing of debris/weeds from the grate will ensure no disruption to the flow, or backing up of the water course. Handrails should also only require a visual inspection – annually or at the same time as the headwall & grates.