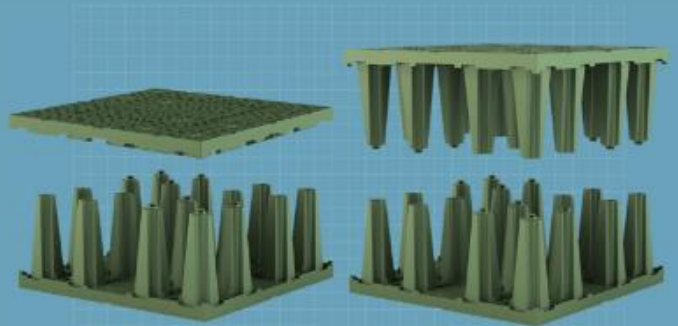




STORMCON



THE VAULT

OPERATION & MAINTENANCE
MANUAL

FEATURING GREENSTORM & STORMCRETE

www.stormcon.ca

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1. Introduction

The following Operation & Maintenance Manual has been generated for ownership use, in an effort to promote diligent operating practices of The Vault. The implementation of routine inspection and maintenance programs are recommended to ensure an effective and well-maintained system. The owner bears responsibility for ensuring compliance with this manual and is expected to maintain a detailed log of all preventative and corrective maintenance completed on The Vault. The owner is to evaluate the effectiveness of the maintenance and inspection program at least once per year and adjust the plan if necessary.

During active construction, it is imperative to ensure that all reasonable preventative measures are exercised to ensure little to no sediment and/or foreign particles enter the system. During and immediately after construction processes, increased sediment from the connected infrastructure is expected. To prevent this, additional measures, including increased inspection and cleaning frequency are required. Upstream sewers and quality control units must be inspected and maintained according to their manufacture's guidelines.

1.1 Definitions

Qualified Person(s) .. *In respect to a specified duty, a person who, because of his knowledge, training, and experience, is qualified to perform that duty.*

GreenStorm .. *A polypropylene geocellular stormwater retention & detention system.*

Access Shaft .. *A 450 mm diameter access, that can be integrated into the GreenStorm modules.*

StormCrete .. *A concrete stormwater detention system.*

Manhole Tee .. *Access to StormCrete.*

Access Points .. *Manhole tees and access shafts.*

2. Inspection

2.1 Inspection Interval

The Vault must be inspected by a qualified person(s). During active subdivision construction, The Vault must be inspected post-installation and every 2-3 months to ensure excess sediment and debris are not entering the system. Following significant storm events, additional inspections are required. During longer construction periods, the inspection log may be used to determine the required frequency of inspection. Inspection checklists and logs may be provided by Stormcon at the owner's request.

Following construction, The Vault must be inspected twice during the first year of operation. The inspection results should be recorded in a log and used to determine the interval at which future inspections are required for the lifecycle of the system. The Vault must be inspected at a minimum of once every 5 years, following the first year post-construction. All inspection tasks may be completed using CCTV inspection methodology.

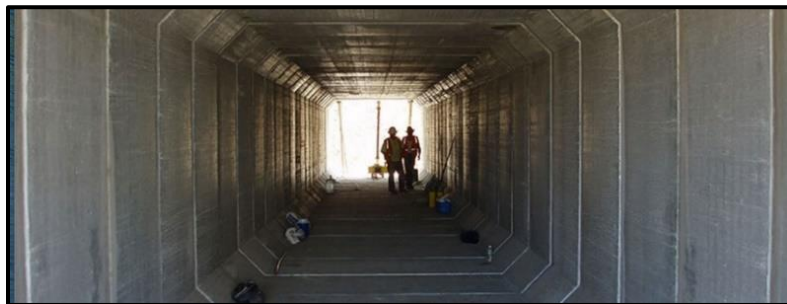


Image 1 – Manned StormCrete access

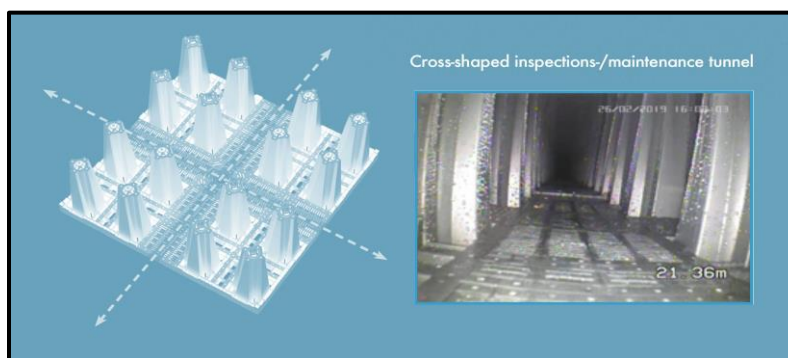


Image 2 - Full-range GreenStorm inspectability

2.2 Inspection Procedure

Access points are placed at suitable locations to allow for inspection.

GreenStorm is designed with cross shaped inspection channels that allow for two axes of CCTV inspection. The Perimeter StormCrete Channel and Access Shafts allow for ease of access to GreenStorm sections. The perimeter of GreenStorm is inspected to confirm all connections are operational.

All structural components must be inspected for cracking, wearing, and deterioration. All inlets and outlets must be inspected for clogging or blockages.

StormCrete is designed with manhole tees. StormCrete is human accessible and may be inspected through CCTV or visual inspection.

Steps to Inspect The Vault During Dry Conditions:

1. Visually inspect the system through the manhole tees to verify water is not flowing; if water is flowing, refer to “Steps to Inspect The Vault During Wet Conditions” below.
2. Vacuum out the permanent pool through the manhole tees and dispose of the contents in accordance with local laws and regulations.
3. Enter the stormcrete perimeter through the manhole and walk down to visually inspect the StormCrete joints, end wall, and cores.
4. Place a CCTV camera through the 600mm concrete core into the Greenstorm channels.
5. Use a CCTV camera to inspect the StormCrete perimeter.

Steps to Inspect The Vault During Wet Conditions:

1. Visually inspect the system through the manhole tees to determine the water level within the system to accurately size a required pump.
2. Bulkhead the upstream manhole and pump to remove any remaining water within the isolated system to the downstream manhole, through the manhole tees.
3. Lower a CCTV camera through the manhole tees and Access Shafts to each layer.
4. Inspect the perimeter and all connections of the system to identify clogging or blockages.

3. Cleaning

3.1 Cleaning Interval

The cleaning interval is determined at the inspection stage. During the building program it is expected that the StormCrete perimeter channel will require cleaning every 6 months. If the system is subject to oil spills, runoff from non-landscaped areas, such as stockpiles or unseeded slopes, cleaning frequency will increase. The GreenStorm section should be kept offline until after the building program is completed and the site has achieved 100% softscape completion, or as per municipal guidelines.

After subdivision construction, The Vault must be cleaned. All conveyance systems, including catch basins, manholes, pipes, water quality units, and inlets to the system, must be cleaned before final connection. Once 100% of the site has been soft scaped, the filter fabric covering the concrete cores can be removed. The bi-annual inspection results from the first year of operation will determine the cleaning frequency that must be carried out for the lifespan of the system.

The StormCrete perimeter will be the primary collection point for sediment and debris. Small amounts of sediment and debris will not impact the function of the system. It is recommended that the system be cleaned once a sediment depth of 300 mm is reached.

3.2 Cleaning Procedure

The Vault is designed with access points at critical locations for cleaning. All cleanings may be completed using a high-pressure nozzle on a flushing and vacuum truck. The StormCrete perimeter is the primary collection point for sediment within The Vault.

Steps to Clean The Vault:

1. Visually inspect the system through the manhole tees to verify water is not flowing; cleanings must only be conducted during dry conditions.
2. Vacuum out the permanent pool within the StormCrete perimeter through the manhole tees.
3. Use a high-pressure vacuum truck nozzle to clean the StormCrete perimeter channel, while vacuuming out sediment and debris.
4. Enter the manhole tees and walk down the perimeter channel to place a high-pressure vacuum truck nozzle through the 600mm concrete core into GreenStorm channels, while vacuuming out sediment and debris.
5. Dispose of contents in accordance with local laws and regulations.

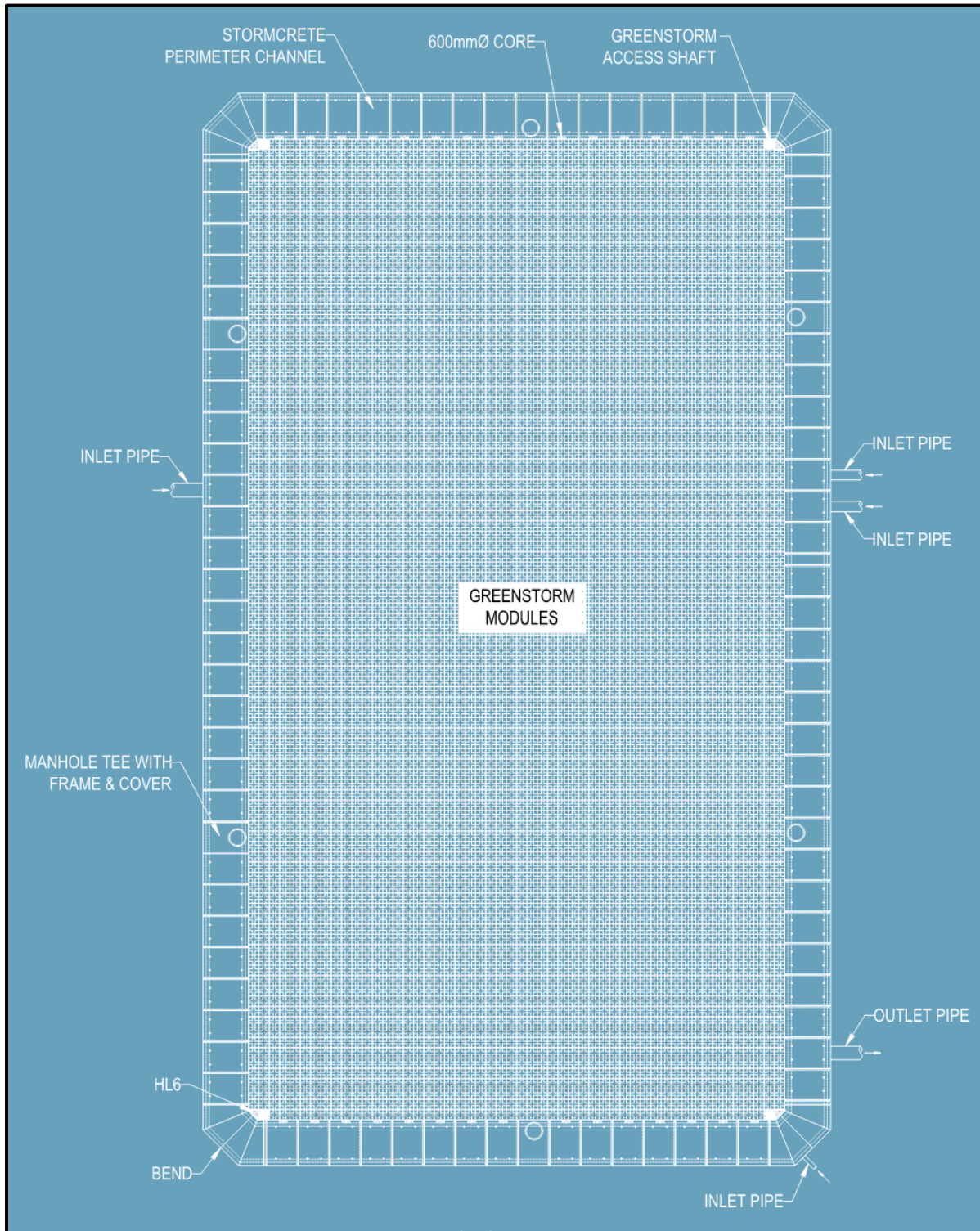
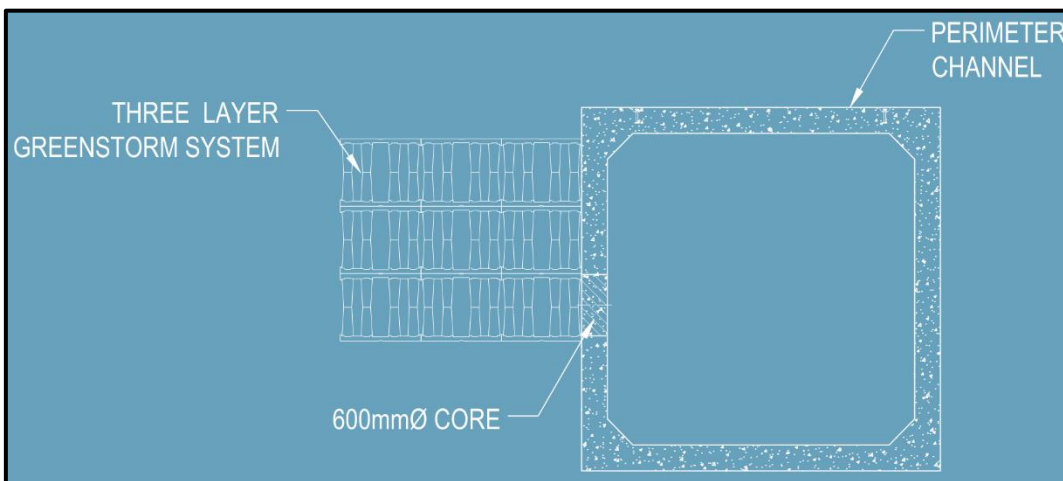
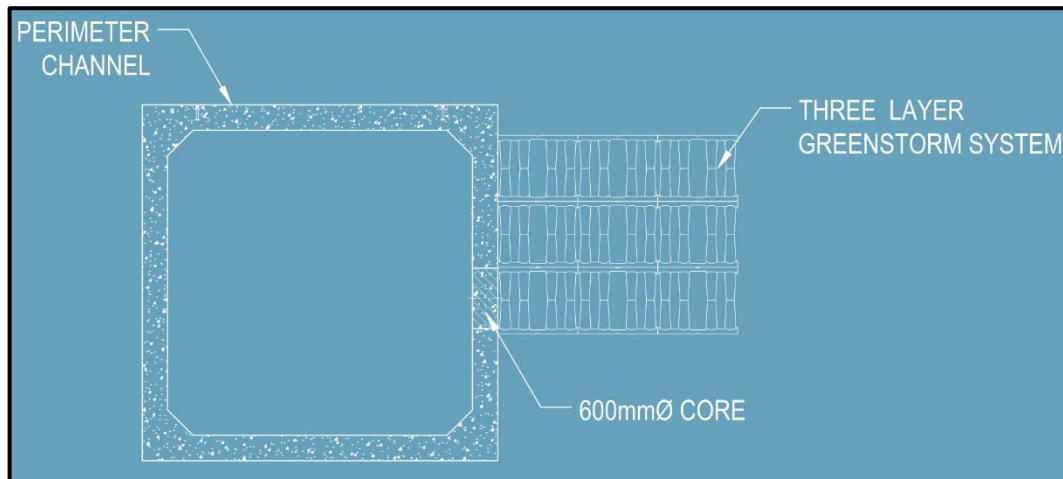
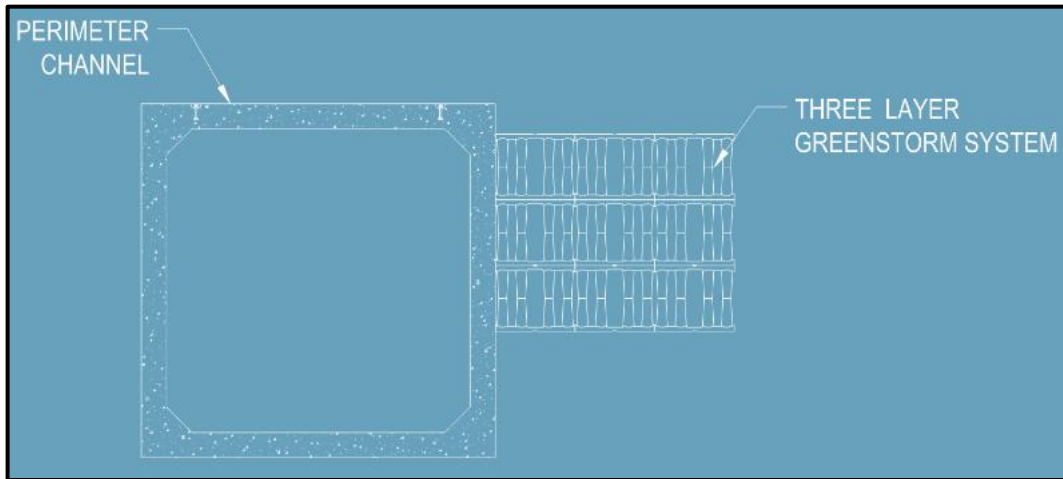


Image 3 – The Vault callout



Images 4, 5, & 6 – Perimeter channel detail.

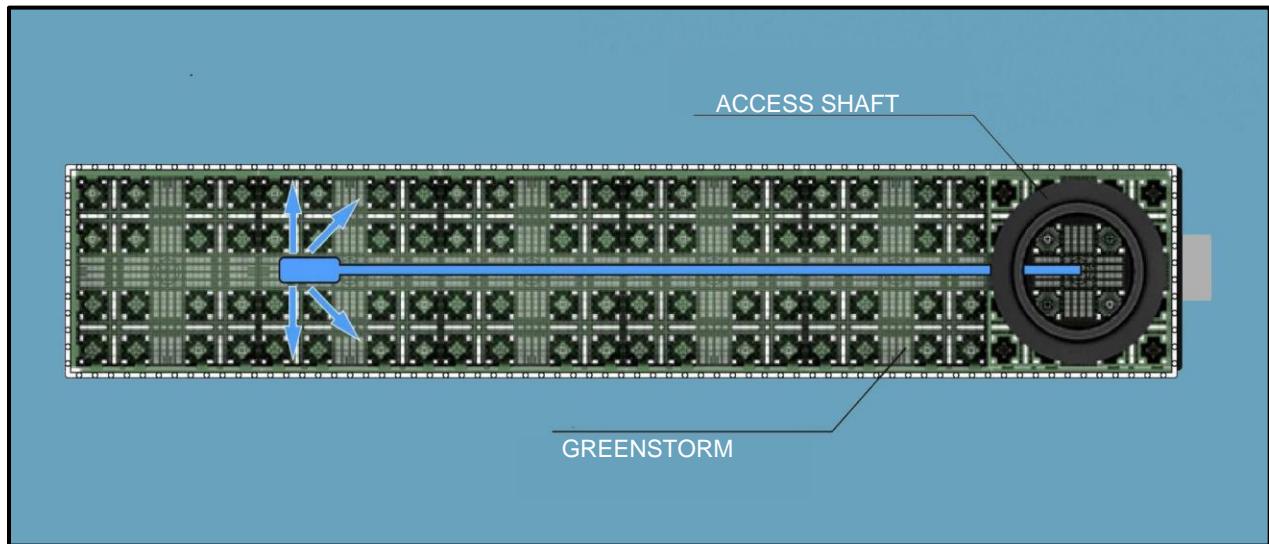
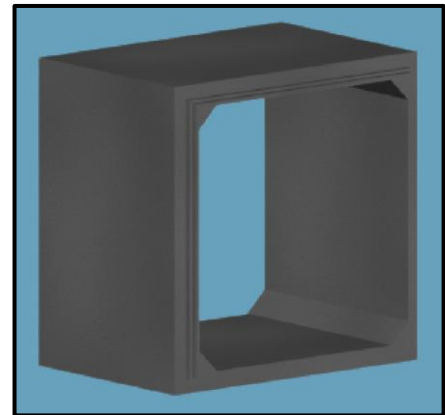
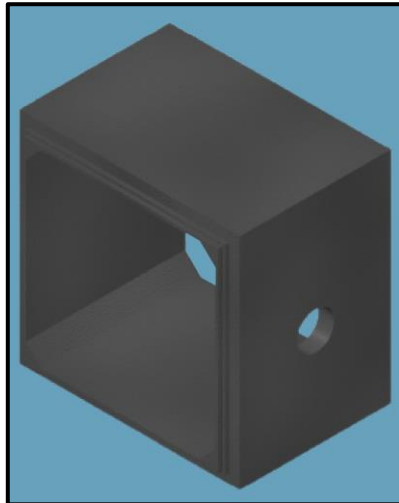
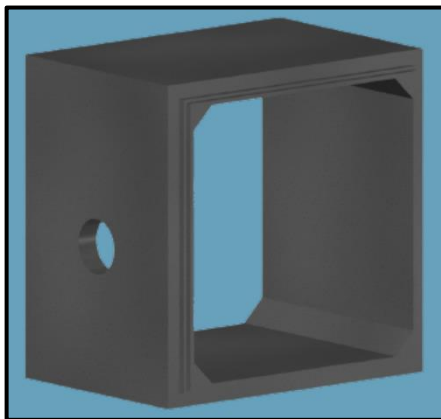
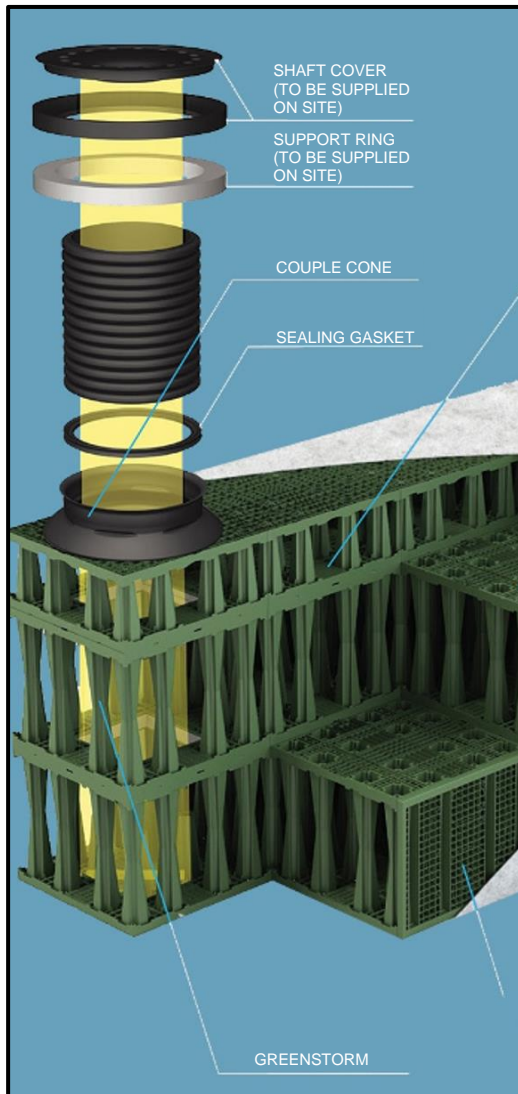


Image 7 – Access Shaft and GreenStorm



Images 8, 9, & 10 – StormCrete cored sections (Left, Middle); StormCrete solid walled section (Right)



Images 11, 12, & 13 – Access Shaft (Left); StormCrete Inspection (Top Right); GreenStorm Inspection Channel (Bottom Right)