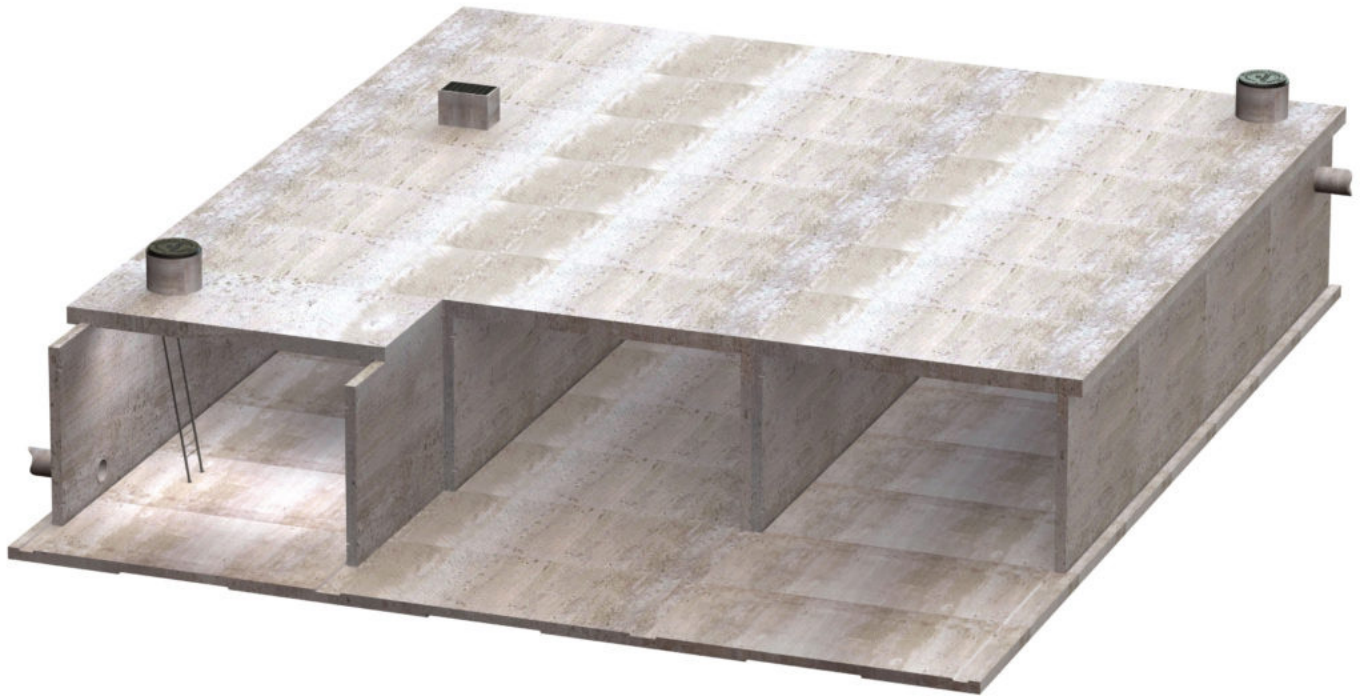


Panel Vaults

Operations and Maintenance Guide



1. Safety Notes

- Use caution when working with underground installations, gases and other hazardous substances could be present in the vault.
- Seek the advice of a health and safety expert regarding safe practices for inspecting or entering underground structures.
- Ensure compliance with local, state and federal safety regulations.

2. Role and Function

The Panel Vault system is primarily used to manage water quantity by temporarily storing stormwater runoff from impervious surfaces to prevent flooding, slow down the rate at which stormwater leaves the site and reduce receiving stream erosion. In addition, the Panel Vault system can be used to capture stormwater runoff for water quality treatment. Regardless of how the Panel Vault system is used, some sedimentation may occur in the modules during the time water is stored.

3. Inspection/Maintenance

3.1. Inspection and Maintenance Overview

- a. State and local regulations typically require all stormwater management systems to be inspected on a regular basis and maintained as necessary to ensure performance and protect downstream receiving waters. Inspections should be used to evaluate the conditions of the system. Based on these inspections, maintenance needs can be determined. Maintenance needs vary by site and system. Using this guide, qualified maintenance personnel should be able to provide a recommendation for maintenance needs. Requirements may range from minor activities such as removing trash, debris or pipe blockages to more substantial activities such as vacuuming and removal of sediment and/or non-draining water. Long-term maintenance is important to the operation of the system since it prevents excessive pollutant buildup that may limit system performance by reducing the operating capacity and increasing the potential for scouring of pollutants during periods of high flow.
- b. Only authorized personnel shall inspect and/or enter a Panel Vault system. Personnel must be properly trained and equipped before entering any underground or confined space structure. Training includes familiarity with and adherence to any and all local, state and federal regulations governing confined space access and the operation, inspection and maintenance of underground structures.

3.2. Accumulation of Solids

- a. Should be checked yearly by using a long pole to measure the sludge buildup on the bottom of the vault. If there are more than 6 inches of sludge, cleaning is recommended.
- b. Removal of accumulation of sludge:
Using the services of a professional tank cleaning services is recommended. Excessive sludge buildup may be due to problems with catch basins and grit-chambers upstream of the detention vault.

3.3. Inspection and Maintenance Frequency

a. The Panel Vault system should be inspected on a regular basis, typically twice per year, and maintained as required. The maintenance frequency will be driven by the amount of runoff and pollutant loading encountered by a given system. Local jurisdictions may also dictate inspection and maintenance frequencies.

3.4. Inspection Equipment

a. The following equipment is helpful when conducting Panel Vault inspections:

- Recording device (pen and paper form, voice recorder, iPad, etc.)
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Confined space entry equipment, if needed
- Flashlight
- Tape measure
- Measuring stick or sludge sampler
- Long-handled net (optional)

3.5. Inspection Procedures

a. A typical Panel Vault system provides strategically placed access points that may be used for inspection. Panel Vault inspections are usually conducted visually from the ground surface, without entering the unit. This typically limits inspection to the assessment of sediment depth, water drain down and general condition of the modules and components, but a more detailed assessment of structural condition may be conducted during a maintenance event.

b. To complete an inspection, safety measures including traffic control should be deployed before the access covers are removed. Once the covers have been removed, the following items should be inspected and recorded (see form provided at the end of this document) to determine whether maintenance is required:

c. Observe inlet and outlet pipe penetrations for blockage and obstruction.

d. If possible, observe internal components like baffles, flow control weirs or orifices, and steps or ladders to determine whether they are broken, missing or possibly obstructed.

e. Observe, quantify and record the sediment depths within the modules.

f. Retrieve as much floating trash as possible with a long-handled net. If a significant amount of trash remains, make a note in the inspection and maintenance log.

g. For infiltration systems, local regulations may require monitoring of the system to ensure drain down is occurring within the required permit time period (typically 24 to 72 hours). If this is the case, refer to the local regulations for proper inspection procedure.

3.6. Maintenance Indicators

- a. Maintenance should be scheduled if any of the following conditions are identified during the inspection:
- Inlet or outlet piping is blocked or obstructed.
 - Internal components are broken, missing or obstructed.
 - Accumulation of more than six inches of sediment on the system floor or in the sump, if applicable.
 - Significant accumulation of floating trash and debris that cannot be retrieved with a net.
 - The system has not drained completely after it hasn't rained for one to three days, or the drain down does not meet permit requirements.
 - Any hazardous material is observed or reported.

3.7. Maintenance Equipment

- a. The following equipment is helpful when conducting Panel Vault maintenance:
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
 - Traffic control equipment (cones, barricades, signage, flagging, etc.)
 - Manhole hook or pry bar
 - Confined space entry equipment, if needed
 - Flashlight
 - Tape measure
 - Vacuum truck

3.8. Maintenance Procedures

- a. Maintenance should be conducted during the dry weather when no flow is entering the system. Confined space entry is required to maintain the Panel Vault system. Only personnel that are OSHA Confined Space Entry trained and certified may enter underground structures. Once safety measures such as traffic control have been deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:
- b. Remove trash and debris using an extension on the end of the boom hose of the vacuum truck. Continue using the vacuum truck to completely remove accumulated sediment. Some jetting may be necessary to fully evacuate sediment from the system floor or sump. Jetting is acceptable in systems with solid concrete floors or base slabs (referred to as closed-bottom systems). However, jetting is not recommended for open-bottomed systems with gravel foundation since it may cause bedding displacement, undermining of the foundation or internal disturbance.
- c. All material removed from the system during maintenance must be disposed of in accordance with local regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.

- d. Inspect inlet and outlet pipe penetrations for cracking and other signs of movement that may cause leakage.
- e. Inspect the system for movement of modules. There should be less than 3/4-inch spacing between modules.
- f. Inspect the general interior condition of modules for concrete cracking or deterioration. If the system consists of horizontal joints as part of the modules, inspect those joints for leakage, displacement or deterioration.

Be sure to securely replace all access covers, as appropriate, following inspection and/or maintenance. If the Panel Vault modules or any of the system components show significant signs of cracking, spalling or deterioration or, if there is evidence of excessive differential settlement between modules, contact Oldcastle Infrastructure.

Inspection and Maintenance Log

Refer to as-built records for details about system size and location on site.

Location _____	
System Configuration:	Inspection Date _____
<input type="checkbox"/> Detention <input type="checkbox"/> Infiltration <input type="checkbox"/> Retention/Harvesting	
<i>Inlet or Outlet Blockage or Obstruction</i>	Notes:
<input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>Condition of Internal Components</i>	Notes:
<input type="checkbox"/> Good <input type="checkbox"/> Damaged <input type="checkbox"/> Missing	
<i>Sediment Depth Observed</i>	Notes:
<input type="checkbox"/> Inches of Sediment: _____	
<i>Trash and Debris Accumulation</i>	Notes:
<input type="checkbox"/> Significant <input type="checkbox"/> Not Significant	
<i>Drain Down Observations</i>	Notes:
<input type="checkbox"/> Appropriate Time Frame <input type="checkbox"/> Inappropriate Time Frame	
<i>Maintenance Requirements</i>	
<input type="checkbox"/> Yes - Schedule Maintenance <input type="checkbox"/> No - Inspect Again in _____ Months	



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