Lean concrete leveling pads are typically 6 inches (150 mm) thick and extend in front of and behind the bottom PMB unit by 6 inches (150 mm). The concrete generally has a 28-day compressive strength of 2,500 psi (17.2 MPa) and is not reinforced with steel rebar, fibers, or other types of reinforcement. An example lean concrete leveling pad is shown in Figure 5.4.

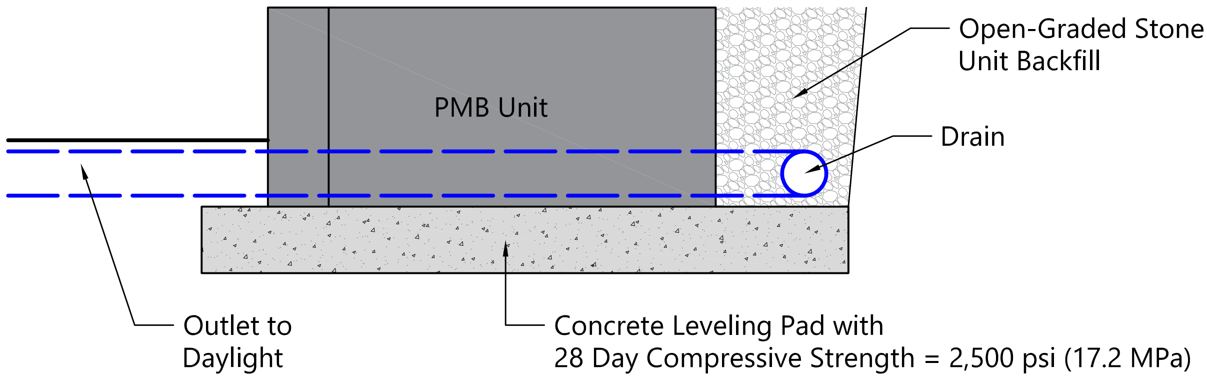

Fig. 5.4. Example lean concrete leveling pad.

If a structural footing is required, it should be designed separately following standard practice for reinforced concrete structures. An example of where this might be required is the case of very soft foundation soils where a reinforced concrete footing is designed to act as a pile-supported grade beam that in turn supports the wall.

5.4. DRAINS

Best practice in retaining wall design and construction is to provide plenty of drainage near the wall. Water exerts a hydrostatic force on the wall and it can produce buoyant forces in the supported and infill soils, both of which can have destabilizing effects on the wall.

PMB walls include a clean, open-graded stone backfill material around the PMB units. Although the earliest use of stone with segmental retaining wall units was intended as a compaction aid, it quickly was expanded to serve as a drainage medium as well. The stone material is placed in any hollow cores in the PMB units and between adjacent PMB units. For many PMB units, the stone is also placed at least 12 inches (300 mm) behind the PMB units, although this requirement is sometimes waived for very large hollow-core units (such as Redi-Rock XL units) that have a large area of stone between and throughout the units. A material meeting the requirements of No. 57 stone (ASTM C33 or AASHTO M43) with no material passing the number 200 (0.075 mm) sieve is preferred because it drains very quickly and does not allow pore pressures to build up on the wall.

A drain pipe is placed behind the PMB units at the lowest elevation where the pipe can adequately outlet to daylight. The drain pipe collects any water traveling through the stone backfill material and quickly and safely outlets the water away from the wall. The drain pipe should be at least 4 inches (100 mm) in diameter, perforated, and surrounded by the open-graded stone. Pipes made from PVC or HDPE are common. For some applications, the drain pipe and stone are wrapped with a non-woven geotextile fabric.

The drain pipe runs the entire length of the wall and needs to have proper outlets on the ends and at regularly spaced points along the wall. If the pipe is unable to outlet under the PMB blocks, provisions such for field modifications or weep hole outlets cast into select PMB units (as shown in Figure 5.5) must be made to facilitate drainage through the wall. If a flexible pipe, with or without a geotextile wrap, is used, an adaptor should be used to convert to a solid pipe for weep hole outlets through the face or under the retaining wall. It's also quite important that care be taken during installation to avoid crushing or damaging the drain pipe or outlets. An example drain is shown in Figure 5.5.

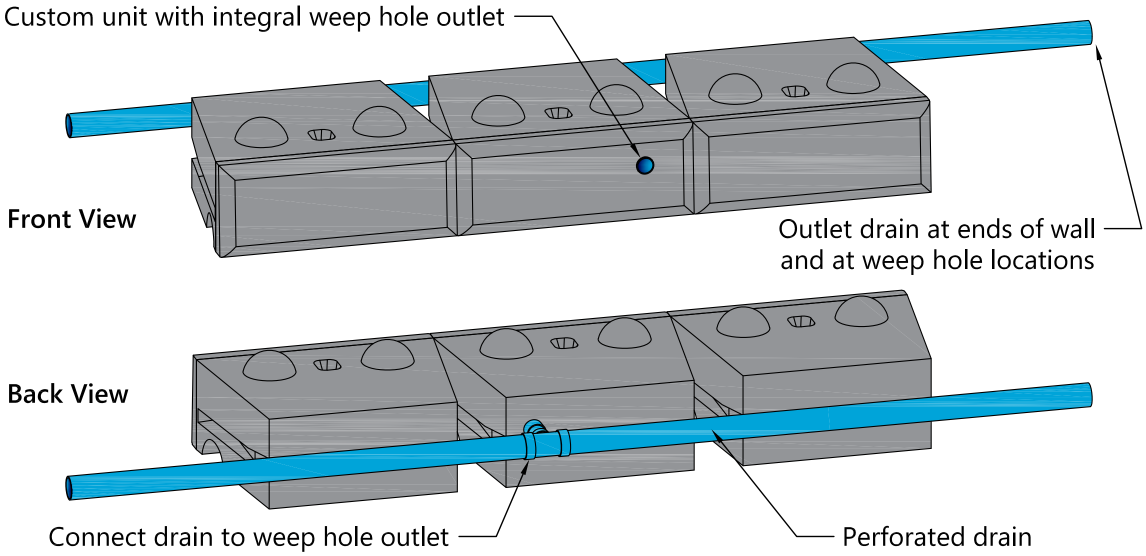

Fig. 5.5. Example wall drain outlet.

5.5. SLOPES

PMB gravity walls are used to create usable space, either at the top or bottom of the wall. They almost always need to account for slopes in the existing or proposed ground. The slopes can either be parallel to the wall, perpendicular to the wall, or at some skewed angle that incorporates sloping ground in both directions. Fortunately, walls can be designed to accommodate all these conditions.

5.5.1. Sloping Grade Parallel to Wall

When the ground elevations rise or fall along the length of the wall, the wall needs to adjust to the grade changes. If the grade changes are at the bottom of the wall, the design can include steps in the bottom of wall elevation. The step changes are made when the bury depth to the bottom of the wall is at least the minimum bury depth plus the height of a PMB unit or greater. The leveling pad is extended past the elevation change by at least 6 inches (150 mm) and then rises up to the new elevation at a slope of 1 horizontal to 1 vertical or flatter. An example step change in the bottom of the wall is shown in Figure 5.6.