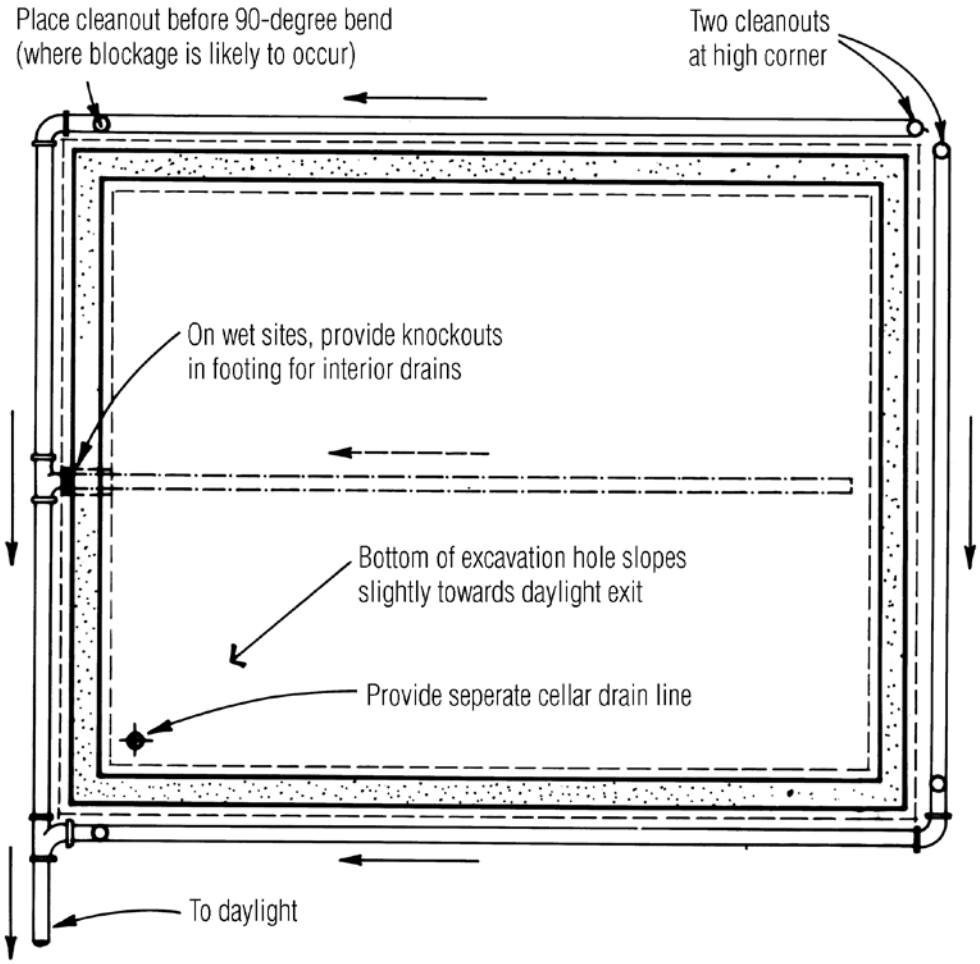
FOUNDATIONS
DRAINAGE

PERIMETER FOUNDATION DRAINS

Every foundation below grade should be equipped with an exterior perimeter drain. Always work out a drainage plan before digging to locate cleanout and daylight locations of perimeter footing drains (**Figure A**).

FIGURE A: PERIMETER DRAINAGE PLAN



Plan drainage, including cleanout and daylight locations, before digging. On wet sites, plan on knockouts through the footing to connect to a drain under the slab.

Perimeter foundation drainage must always be planned in conjunction with well-draining backfill (see Soil Drainage and Bracing before Backfill, Placing Backfill).

Placing Footing Drains

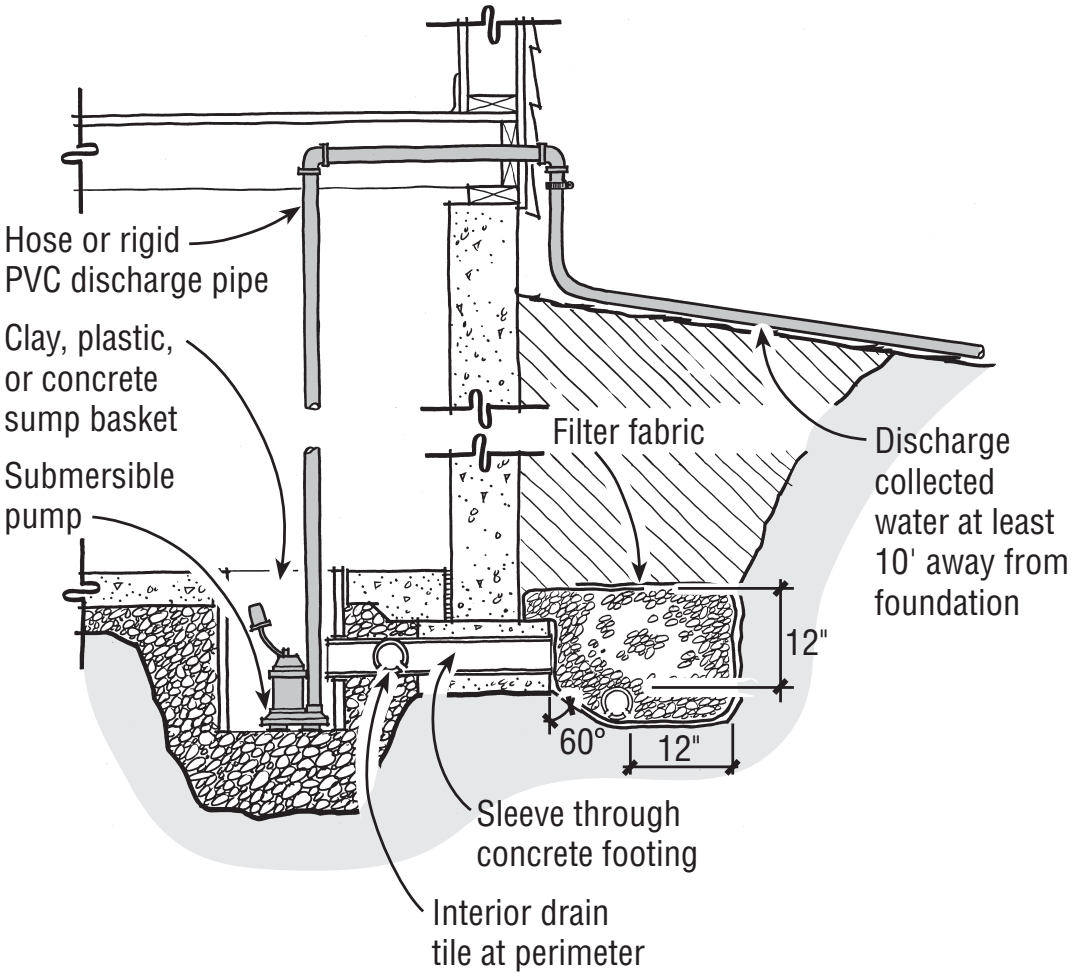
Place drain "tile" — typically 4-in. Schedule-C PVC or ABS pipe — with the holes down on a bed of gravel.

The gravel surrounding the drain should be wrapped with a geotextile, or filter fabric, to keep fine particles from clogging the drain tile.

Place drain tile straight and level, or with a slight pitch toward the exit. Do not attempt to create a pitch when using flexible drain tile, because undulations in the level can cause clogging. Flexible drain pipe should be placed on the footing shelf to prevent dips and sags (**Figure C**). In either case, perimeter drain pipe should never be above the surface of the slab.

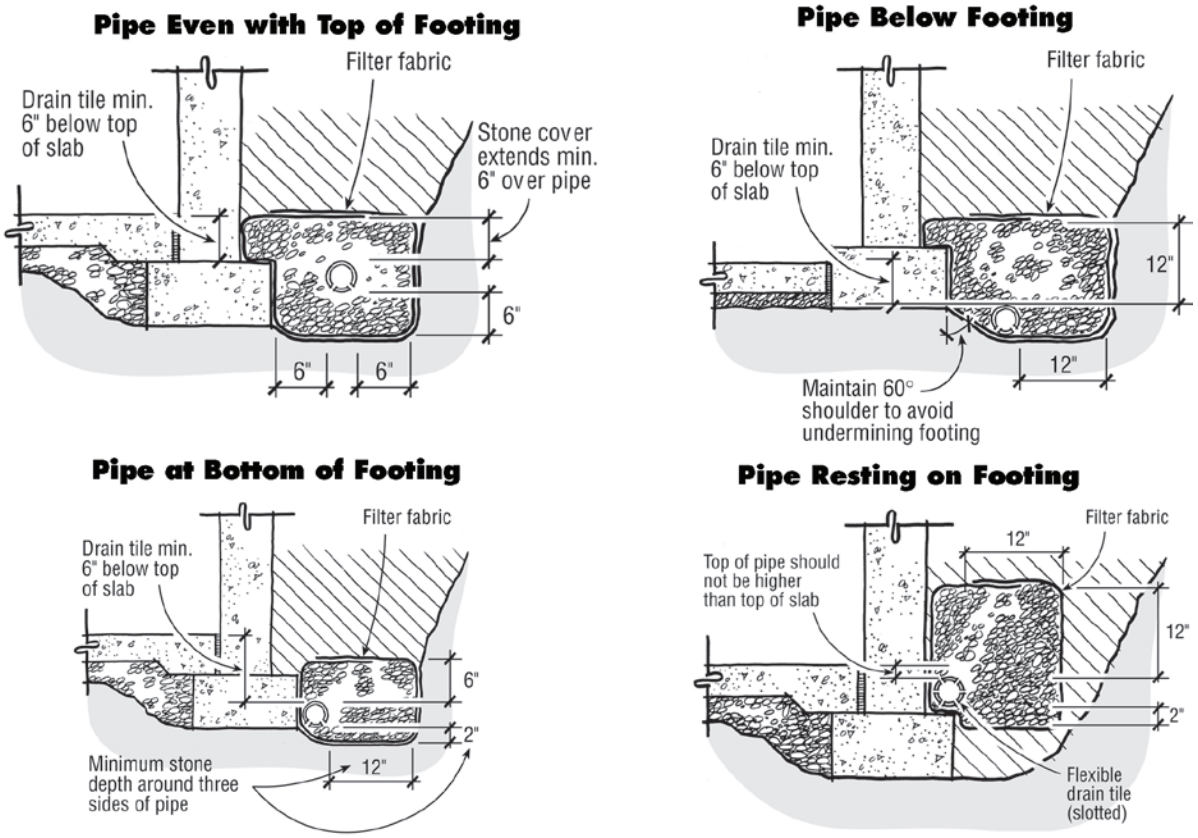
Tile should drain to daylight. If this is not possible, install a sump basket and a sump pump that discharges above ground away from the building (**Figure B**).

FIGURE B: INTERIOR SUMP BASKET



An interior sump basket picks up excess water flowing through sleeves in the footing. A submersible pump discharges the water at ground level away from the foundation.

FIGURE C: PLACING FOOTING DRAINS



The best location for rigid drain pipe is alongside the footing (**at left, top and bottom**). Ideally, the drain should be at least 6 in. below the top of the slab and always covered by at least 6 in. of stone. If tile is placed below the footing, do not place it too close to the footing or water may undermine the footing (**at right, top**). To keep flexible drain pipe from developing low spots, place it on top of the footings, making sure that the top of the pipe is not higher than the top of the interior slab and that it is covered by a 12-in.-deep bed of stone (**at right, bottom**).

Drainage Forms

Perimeter drainage can be provided with stay-in-place footing forms, such as Form-A-Drain® — to ensure a level perimeter drain. These systems usually provide a larger capacity than typical foundation pipe systems.

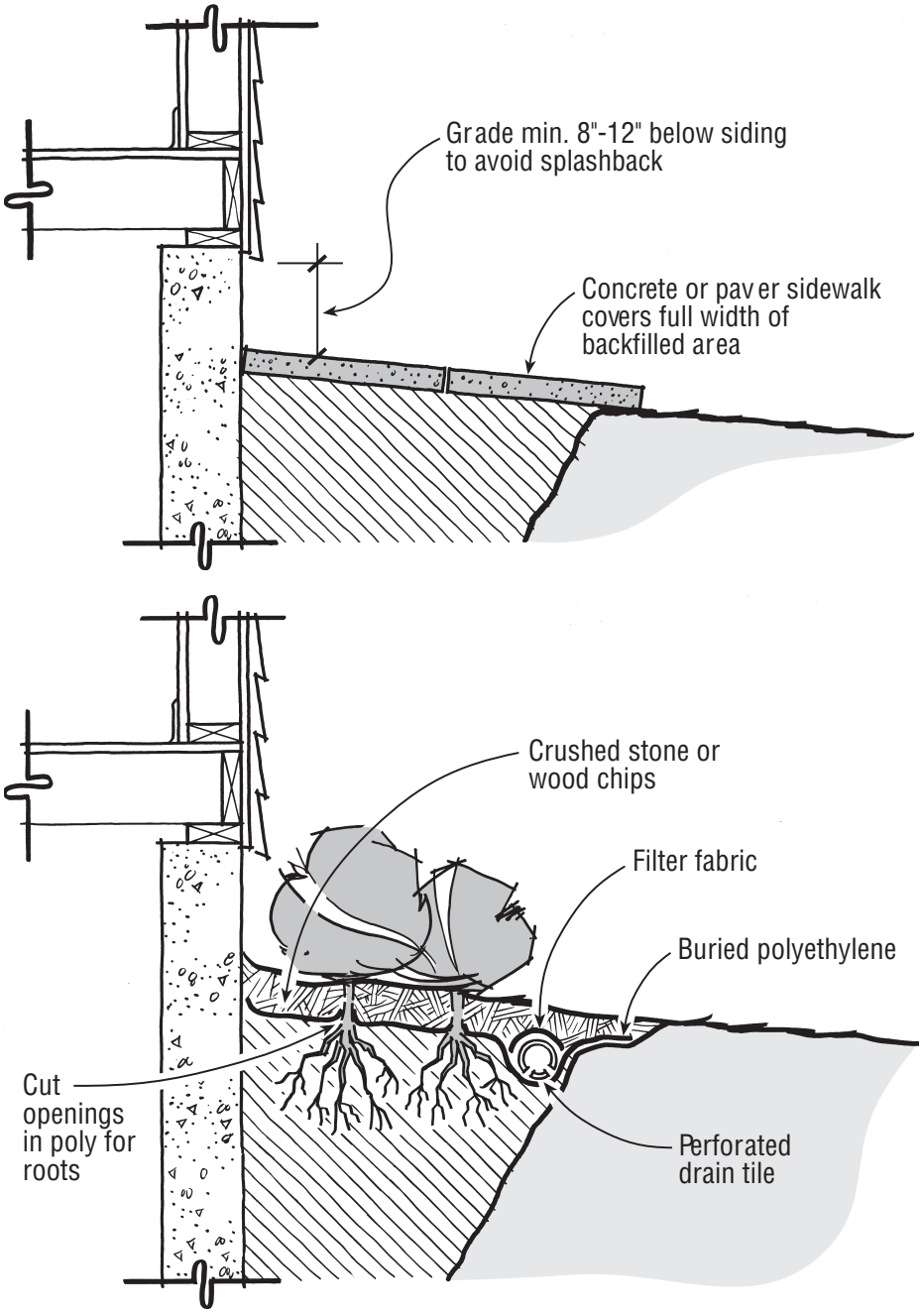
SURFACE DRAINAGE

While perimeter drainage can handle water migrating through the soil, it may not be enough to handle a heavy run-off of surface water. The first line of defense against basement water problems should be handled at the surface.

Sloped Grade

The finish grade around the house should slope away from the foundation at the rate of 1/2 to 1 in. per ft. for 6 to 10 ft. A 2- to 4-in. cap of silty-clay material — sometimes called a ground cap — will keep runoff from percolating down through the backfill. Better yet, use concrete or paver sidewalks sloped away from the house, or shallow subsurface drain pipes (**Figure D**).

FIGURE D: SURFACE DRAINAGE WITHOUT GUTTERS



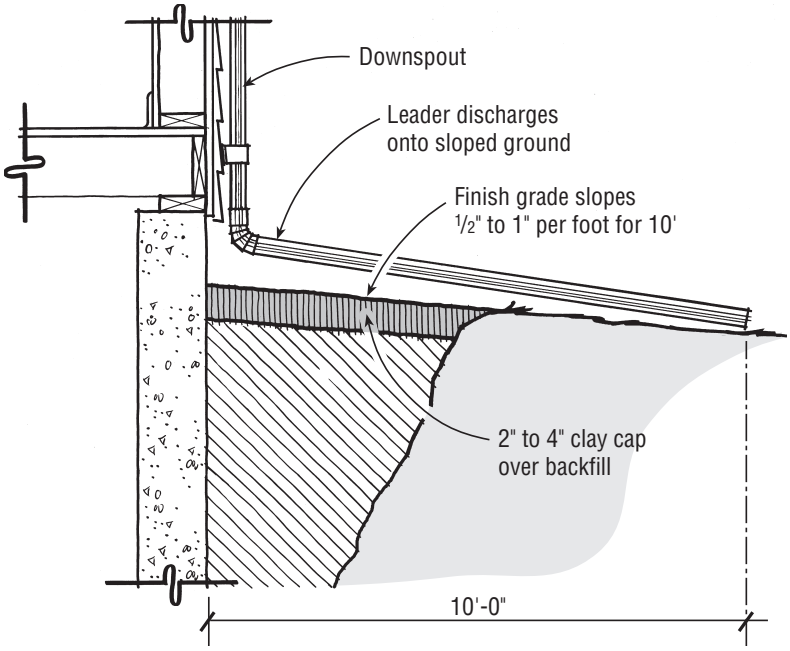
A properly sloped concrete or paver sidewalk will reduce the amount of runoff that percolates through the backfill (**at top**). Where perimeter plantings are used to landscape, improve drainage by burying a sheet of polyethylene below the plant bed, with openings cut out for roots (**at bottom**).

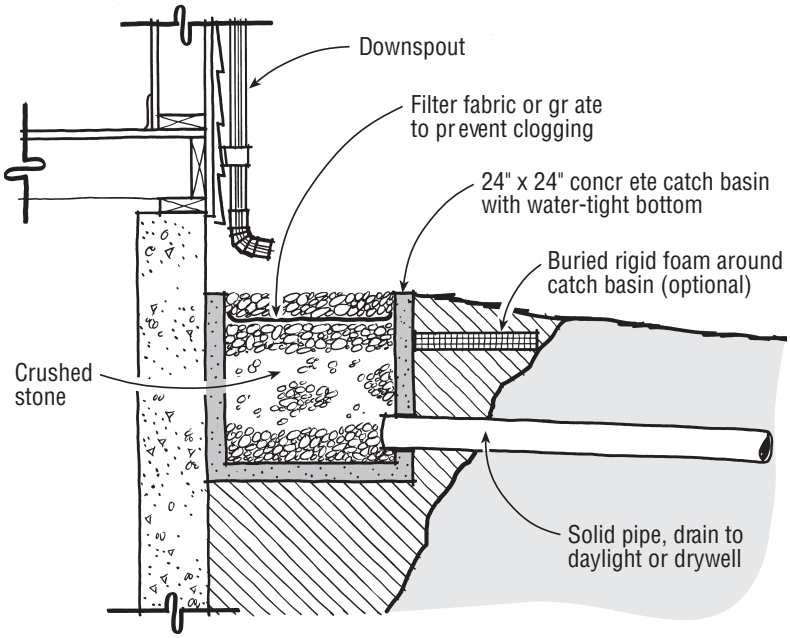
Make sure to properly compact backfill as you place it; otherwise, the soil will settle over time and create a slope draining toward the house (see Bracing Before Backfill, Placing Backfill).

Gutter Downspouts

Use gutters and downspouts to divert roof runoff away from the foundation perimeter. If leaders dump out right next to the house they will concentrate the problem in a smaller area. Extend downspout leaders 10 ft. away from foundation, or provide a sump basket and subsurface drain at the bottom of the downspout (**Figure E**).

FIGURE E: CHANNELING GUTTER DISCHARGE





Sloped downspout leaders should discharge at least 10 ft. away from the foundation wall (**at top**). Otherwise, downspouts should discharge into a catch basin (**at bottom**).