

WET/DAMP BASEMENTS

PROBLEM. IS THIS BASEMENT LEAKING OR COULD WE HAVE ANOTHER PROBLEM?

Water line arching up on wall in corners of basement.

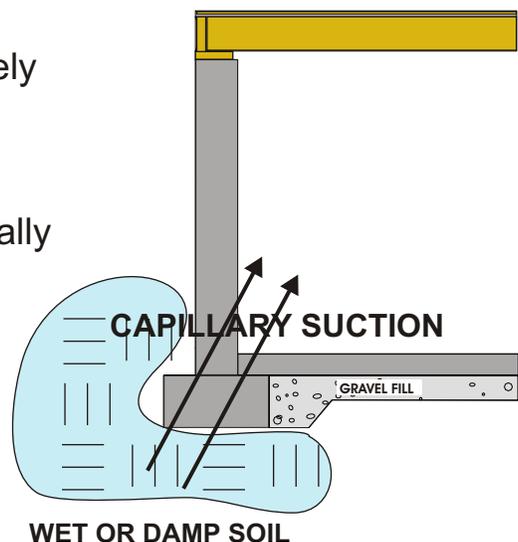
Water collecting on concrete floor starting in corners.



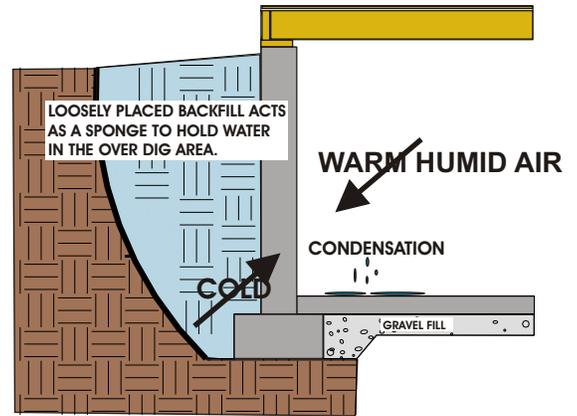
ANSWER: BASEMENT WALLS AND FLOORS CAN BECOME WET BY A LEAK, CAPILLARY SUCTION OR CONDENSATION.

1. LEAKS: Leaks can be of two different types. One is generated by a broken water or condensate line and the other is caused by rain or sprinkler water finding its way into the basement. When dealing with broken water lines the leaks tend to be of a consistent nature. Leaks from rain or sprinkler water tend to be influenced by rainfall or lawn irrigation. The latter type of leak can generally be traced to some exterior condition such as negative slope towards the foundation, poorly compacted backfill, or problems with gutters and down spouts.

2. CAPILLARY SUCTION: Capillary suction can occur when wet or damp soils come in contact with the footing and foundation wall. Concrete is an extremely porous media and large volumes of water can be transmitted by capillary suction when the concrete footing and foundation wall assembly comes in contact with wet or even damp soils. This is especially true of clay soils. This problem is compounded by placing poorly compacted backfill and allowing rainfall to run back against the foundation wall.



3. CONDENSATION: Condensation occurs when cold, wet or even damp soil against the outside of a foundation wall and footing assembly are significantly lower than the inside ambient temperature of the basement. The temperature differential will cause condensation to form on the inside of the basement walls and floor. This is especially true while the house is under construction in hot and humid climates. The problem is compounded by loosely compacted backfills which tend to hold water like a sponge and allow rainwater to run back against the foundation while under construction. Wet soils tend to be more conductive.



LEAKS IN BASEMENTS CAUSED BY RAINFALL OR IRRIGATION.

This type of leak is one that usually comes and goes with heavy rainfall. It appears to be very active with rainfall and somewhat passive with dry weather conditions. You would expect to find a condition that exists in the Photo No. 1 at right showing loosely compacted backfill with negative slope toward the foundation. Water from the down spout is allowed to flood against the foundation. This could be a contributing factor toward a leak or also promote capillary suction or condensation in the basement. The loosely compacted soil absorbs and holds water like a giant sponge. Another problem with loosely compacted soil appears at right in Photo No. 2 where settling has created negative slope back toward the house. The basement interior is shown in Photo No. 3. The interior was already showing signs of mold and mildew. This basement was a perfect example of having a leak, condensation and perhaps even capillary suction.

Leak detection requires very thorough investigation of both the interior and exterior of a basement. Tell tale signs on the inside lead you to solutions on the exterior.



Photo 1



Photo 2



Photo 3



Photo No. 4



Photo No. 5

What to look for in leak detection.

1. Examine all gutters and down spouts making certain they are working and are sized sufficiently to handle the rainfall intensity. Are splash blocks in place and is water finding its way away from the foundation. In Photo No. 4, the end of the gutter was crushed so that it would fit into the run off pipe forcing the gutter to overflow due to reduced volume. Photo No. 5 has one down spout on the entire right side of the house and cannot adequately handle the intensity and consistently over flows dumping water against the foundation.
2. Check the entire perimeter of the basement making certain that there is adequate slope away from the house. On the initial rough grade of a house, allow 2 inches of slope in 4 feet to accommodate settling. In the final grade allow at least 1 ½ inches of slope in 4 feet. Make certain that planting beds do not dam up water against the foundation.
3. Compact backfill. Almost all building codes require that backfill be placed in lifts and compacted. This single mistake probably contributes more to leaks, capillary suction, and condensation than any other single issue. Loose soil placed in the over dig cavities tends to hold water like a sponge. When soil is stored in a stockpile on a building site, the loader operator compacts the soil so that it does not wet out. The same thing should apply to backfilling.
4. Check the perimeter drainage system to see that it is in fact working. On perimeter drainage systems that run to daylight, at times the discharge pipe gets crushed due to construction traffic. On perimeter drains that drain into an interior sump, check to see that the sump is in fact working.

REMEDY: In the event that all of the above fails to correct the leaking condition, see section on J-DRain-it

CAPILLARY SUCTION: Capillary suction occurs when wet soils contact the footing and foundation walls of basements as seen in the detail on the right. Concrete is an extremely porous media and typically the concrete mass dries out on the interior of basement walls. The exterior of the concrete walls and footings are covered with backfill and consequently drying cannot take place to the exterior of the basement surfaces. Large volumes of water can be transmitted by capillary suction when the concrete mass of the footing and foundation wall come in contact with wet or even damp soils. This is especially true of clay soils. This problem is compounded by failure to compact the soil backfill. Excess rainfall is stored in loosely placed backfill similar to a sponge. Water is stored in this reservoir for long periods of time causing capillary suction until this soil dries. Photo No. 1 on the right tends to show the effects of capillary suction as water is visible on the lower portion of the wall and on the floor just adjacent to the wall. Capillary suction can easily be confused with condensation as they tend to appear quite similar. In order to distinguish between the two, conduct a test as shown in Photo No. 2. Tape a one to two foot square piece of plastic to the floor and wall sections and allow to stay in place for at least 24 hours. If water is trapped under the plastic, the condition is capillary suction. If water forms on the exterior of the plastic the condition is condensation. Also, it is possible to have both capillary suction and condensation in hot, humid climates. In this case, moisture would form under the plastic as well as on the outside surface of the plastic.

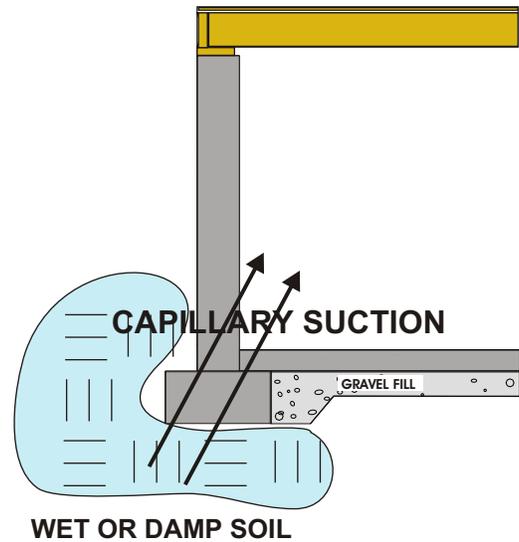


Photo No. 1



Photo No. 2

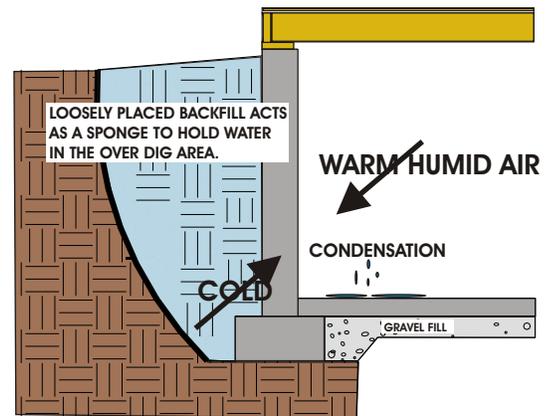
REMEDY: Once this condition exists and the walls have been backfilled, the only remedy is to allow sufficient time for the soil in contact with the footing and foundation wall to dry. The result of this drying forces water to the interior of the basement and it is best not to insulate and/or apply finishes to the walls until this condition dries. Install de-humidification as soon as possible to assist in drying.

The outside perimeter of the foundation should be checked for loosely placed soils and compacted. Provide sufficient slope away from foundation to promote drainage (2" of fall in 4 feet). Make certain gutters and down spouts are in place and adequately working. In hot, damp climates, provide de-humidification to interior of basement.

For new construction, provide a capillary break with a membrane on the foundation walls and footings and install a good drainage composite around the perimeter of the foundation.

Existing conditions may need to be remedied by installing an interior drain which acts as a capillary break. See **J-Drain-it** for remedy.

3. CONDENSATION: Condensation occurs when cold, wet or even damp soil against the outside of a foundation wall and footing assembly is sufficiently lower than the inside ambient temperature of the basement. (See figure on right). The temperature differential between the outside wall temperature and the inside ambient temperature could be as much as 35 degrees Fahrenheit. This is especially true while the house is under construction in hot, humid climates. The problem is compounded by loosely compacted backfills which tend to hold water like a sponge and allow rainwater to run back against the foundation while under construction. Wet soils tend to be more conductive. Condensation generally starts forming in the corners and a moisture mark is visible up the wall and water forms on the concrete slab as shown in Photo No. 1. Condensation can easily be confused with capillary suction. To identify condensation problems, tape a 1 to 2 foot piece of plastic to the floor and wall as shown in Photo No. 2. If water forms on the exterior of the plastic, the condition is condensation. If water forms under the plastic, the condition is capillary suction. It is possible to have both conditions at the same time. Wet loosely placed backfill contributes to both conditions.



REMEDY: Provide for de-humidification as soon as possible. Refrain from installing insulation and interior finishes until remedied to avoid mold and mildew. The outside perimeter of the foundation should be checked for loosely placed soils and compacted. Provide sufficient slope away from the foundation to promote drainage (2" in 4 feet). Make certain gutters and down spouts are in place and adequately working.

Existing conditions may need to be remedied by installing an interior drain. See **J-DRain-it** for remedy.