SURFACE MOISTURE MANAGEMENT, EXPANSIVE CLAY SOILS, AND FOUNDATION DEWATERING SYSTEMS

Surface moisture management refers multiple systems and components which are designed and intended to collect and/or contain water from rain, snow melt, and other sources of surface water and to direct and discharge it in a manner that reduces the potential for it to adversely affect homes or other components of construction. It is extremely important to create and maintain effective surface moisture management where it is necessary in order to reduce the potential for wetting soils adjacent to and beneath foundation components, basement floors, and enclosed under-building areas such as crawl spaces.

Wetting of these soils can result in damage to building components including, but not limited to: differential movement of both structural and non-structural components from compaction or liquefaction of soils, swelling and shrinking of expansive clay soils, deterioration of masonry materials, the propagation of organisms such as mold and those that cause wood rot, corrosion of metal components that are located in below grade areas such as basements and under-building crawl spaces, and the creation of environments which attract wood boring and wood damaging insects.

Soils in areas adjacent to foundation components are often disturbed (removed and replaced) in the course of construction of the foundation. This typically results in these soils being less densely compacted and, therefore, more capable of permitting surface water to percolate (trickle down) through them where it can collect around and under components of buildings and cause damage.

The information provided in this document pertains to both non-expansive and expansive soils. Most homes benefit from measures which reduce the potential for wetting soils adjacent to and beneath foundation components or other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them. However, in some areas of North America, maintaining soil moisture within a specific range can be beneficial and this is discussed in the **FOUNDATION WATERING SYSTEMS** section of this document.

SURFACE MOISTURE COLLECTION AND REMOVAL

The following are measures which have been demonstrated to be effective in reducing the potential for wetting the soils adjacent to and beneath foundations and other components of construction:

- The installation and maintenance of a roof eave gutter and downspout system (where applicable) to collect and convey roof runoff to points where it can be discharged without running back toward structures or other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them.

- The creation and maintenance of positive grading and drainage sufficient to direct surface water away from foundation and structural components and other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them.

- The elimination of conditions which can trap and retain surface water in areas adjacent to foundation components or other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them.

- The installation of sumps equipped with properly assembled and installed pumps, check valves, and discharge lines to collect both surface and subsurface water and to remove it to points where it can be discharged without running back toward structures or other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them.

- The proper installation of effective vapor retarders on exposed soil in under-building crawl spaces and the installation of an operable passive or active (mechanically assisted) ventilation system in under-building crawl-spaces. The purpose of such vapor retarders is to reduce the potential for any damp or wet soil in such areas to create or to contribute to moisture related adverse conditions.

- The design and creation of drainage swales, where applicable, to collect and convey surface moisture away from foundations and other components of construction.

- The design and construction of French drain or curtain/intercepting drain systems, where applicable, to receive and convey surface moisture away from foundations and other components of construction.

- Avoiding any yard or landscape watering and placement of yard and landscape irrigation systems piping or discharge components (other than the main supply piping) within six feet of structures or other components of construction which may be adversely affected by wetting of soils adjacent to and beneath them.

EXPANSIVE (SWELLING) SOILS

Expansive soils (also referred to as swelling soils) are soils or soft bedrock which increase in volume as they are wetted and shrink as they dry out. Bentonite, montmorillonite, and smectite, are among the most common expansive clay soils.

Expansive soils contain a high percentage of certain types of clay particles which are capable of absorbing large quantities of water. The volume of such soils may increase by as much as ten percent when they become wet. The expansion of these soils can exert pressures of as much as 20,000 pounds per square foot (psf) or more against foundations and other building components.

Expansive soils, where unmitigated, are one of the most prevalent causes of damage to buildings and other construction in the United States. This results in multiple billions of dollars in losses and costs to mitigate such damage. These losses include, but are not limited to: severe damage to structural components, concrete and asphalt flatwork, roads and highway structures, airport runways and taxiways, railroad roadbeds, and disruption of gas, water, sewer, and other pipelines.

FOUNDATION WATERING SYSTEMS

Reducing the potential for wetting of soils adjacent to and beneath foundations and other components of construction is typically viewed as beneficial. However, there are areas in North America where expansive soils adjacent to and beneath foundation components are intentionally kept wet in order to reduce the effects of seasonal moisture variations in expansive soils on foundations and other components. Expansive soils act like a sponge. They swell as they absorb moisture and shrink as they lose moisture. In most parts of North America soil moisture levels vary seasonally with soils tending to dry out and shrink during the summer and to absorb moisture and swell during the winter and spring.

As the soils adjacent to and beneath a house shrink and swell with variations in moisture levels, a house and its foundation may move either vertically or horizontally or both. As long as the foundation movement is not severe enough to damage the house and/or foundation, it is typically not a problem. If expansion and contraction of expansive soils tends to return the foundation or other components of construction to their original positions, then damage and other evidence of such movement of a house and foundation may appear and disappear on a regular basis as the seasons change.

In some areas of North America homes are designed and equipped with professionally designed and installed controlled foundation watering systems to reduce the potential for seasonal house and foundation movement and damage.

The goal of a foundation watering program is to maintain a relatively constant level of moisture in the soil adjacent to and beneath a house and its foundation. This typically requires the professional design and installation of either a buried foundation watering system or a less expensive soaker hose system which utilizes soaker hoses that are installed approximately three inches deep and approximately one foot from the edge of the foundation. This permits the water from the hoses to soak into the soil evenly.

If a foundation watering system is present, it is recommended that homeowners take appropriate measures to familiarize themselves with the layout and proper operation of the system.