

# GEM Engineering, Inc.

GEOTECHNICAL ENVIRONMENTAL & MATERIALS SERVICES

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## What is uncontrolled fill?

Engineers understand that fill will provide suitable support for many structures if it is properly controlled at the time of placement. Control measures include: subgrade preparation (e.g. stripping all topsoil and soft inorganic soil); fill material selection (e.g. soil without significant organic matter); placement/compaction techniques (e.g. compaction achieves the required density); testing to confirm that the required properties are achieved; and full documentation of the materials, methods and results.



Proper documentation includes: subgrade preparation; a description of the material(s) used; methodology used for placement (e.g., layer thickness and compaction equipment), and most importantly the percent compaction and moisture content at the time of placement. Controlled fill essentially has documentation that confirms the fill is comprised of suitable materials, was placed in accordance with acceptable industry standards, and was compacted to appropriate levels.

Uncontrolled fill fails to meet one or more of these requirements. Any fill for which proper documentation is not available must be considered uncontrolled fill. Uncontrolled fill may contain unsuitable materials such as wood or debris. It may be underlain by compressible topsoil that was not stripped. The density of the fill may be low, making it compressible.

## Where is it found?

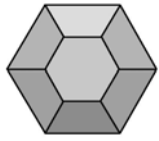
Uncontrolled fill can be found anywhere, but commonly is found in areas where the grade was raised to achieve a level surface, such as low areas, along creeks, old basements, etc. Uncontrolled fill may be found on sites adjacent to past construction where excess material was dumped without subgrade preparation or compaction. Uncontrolled fill may be encountered on sites that previously were filled without a strong, enforced specification for embankment construction.

## Why is it a problem?

Uncontrolled fill will not provide adequate support for overlying foundations, slabs, pavements or other structures. The most common problems associated with uncontrolled fill are poor compaction, raveling (migration of smaller particles into larger voids), inclusion of unsuitable materials (e.g., tree stumps or organics), and collapse of unstable or buried objects (e.g. large pipes).

The unknown quality, consistency, and behavior characteristics of uncontrolled fill create significant concerns for overlying construction, including: large total and differential settlements, collapse of unstable buried objects, poor bearing support, attraction of termites, corrosion of pipes, and contamination from toxic or hazardous materials. The manifestation of these problems can cause poor foundation, slab, and pavement performance.





## How does uncontrolled fill impact design and construction?

The presence of uncontrolled fill increases the level of risk associated with construction because of the issues previously discussed. To address these increased risks, changes in the design commonly are required. For example, foundations may have to be extended through the fill, a different foundation system may be warranted, or the fill may have to be removed and replaced. The actual measures required are dependent on many factors, including the composition of the uncontrolled fill, its apparent quality, the nature of the overlying construction, the willingness of the owner to accept risk, and the cost/benefit of various alternatives. In general, the presence of uncontrolled fill will increase constructions costs and delays in the construction schedule. If not discovered and properly addressed, uncontrolled fill often causes future structural damage.



Raveling into open voids.



Collapse & poor compaction.



Unsuitable materials.

## Is after the fact testing a substitute for proper documentation?

Existing fill can be evaluated using a number of techniques including drilling, excavation of test pits, density testing, etc. If suitable conditions are disclosed at a significant number of locations, the risk for unsuitable conditions may be reduced. However, no amount of exploration can replace proper documentation and eliminate the risk for poor performance. Without documentation, good material quality and density results at one location explored after the fact do not mean that unsuitable conditions are not present in other areas. For example, uncontrolled fill may have been placed by illegal dumping of individual loads of material over a period of years. In this case there is no basis for assuming that the conditions at one location and depth have any bearing on the remaining materials.

