

Topsoiling (TSG)



Practice Description

Topsoiling is the removal of a desirable soil surface, referred to as topsoil, at a site prior to construction and using it on areas to be vegetated. Topsoiling a site usually improves the quality of the plant-growth medium at the site and increases the likelihood of successful plant establishment and performance. This practice applies to sites that are to be disturbed by excavation, compaction or filling, and to other areas where the subsoil is unsuitable for plant growth.

Planning Considerations

Topsoil is the surface layer of the soil profile, generally characterized as darker than the subsoil due to enrichment with organic matter. It is the major zone of root development and biological activity. Microorganisms that enhance plant growth thrive in this layer. Topsoil can usually be differentiated from subsoil by texture as well as color. Clay content usually increases in the subsoil.

The depth of topsoil may be quite variable. On severely eroded sites it may be non-existent.

Advantages of topsoil include its high organic-matter content, friable consistency (soil aggregates can be crushed with only moderate pressure), its available water-holding capacity, and nutrient content. Most often, it is superior to subsoil in the above characteristics. The texture and friability of topsoil are usually much more conducive to seedling emergence and root growth than subsoils.

In addition to being a better growth medium, topsoil is often less erodible than subsoils, and the coarse texture of topsoil increases infiltration capacity and reduces runoff.

Although topsoil provides an excellent growth medium, there are disadvantages to its use. Stripping, stockpiling, and reapplying topsoil, or importing topsoil, may not always be cost effective. Topsoiling can delay seeding or sodding operations, increasing the exposure time of denuded areas. Most topsoil contains weed seeds, and weeds may compete with desirable species.

In site planning, the option of topsoiling should be compared with that of preparing a seedbed in subsoil. The clay content of subsoils does provide high moisture availability and deter leaching of nutrients. When properly limed and fertilized, subsoils may provide a good growth medium, especially if there is adequate rainfall or irrigation water to allow root development in otherwise high-density material.

Topsoiling is strongly recommended where ornamental plants or high-maintenance turf will be grown. Topsoiling is a recommended procedure when establishing vegetation on shallow soils, soils containing potentially toxic materials, and soils of critically low-pH (high acid) levels.

If topsoiling is to be done, the following items should be considered:

- An adequate volume of topsoil should exist on the site. Topsoil will be spread at a compacted depth of 4" or greater.
- The topsoil stockpile should be located so that it meets specifications and does not interfere with work on the site, block drainage, or release appreciable amounts of sediment.
- Allow sufficient time in scheduling for topsoil to be spread and bonded to the subsoil prior to seeding, sodding, or planting.
- Care must be taken not to apply topsoil to subsoil if the two soils have contrasting textures. Clayey topsoil over sandy subsoil is a particularly poor combination because as water creeps along the junction between the soil layers, sloughing of the topsoil may occur.
- If topsoil and subsoil are not properly bonded, water will not infiltrate into the soil profile evenly and it will be difficult to establish vegetation.

Design Criteria and Construction

Materials

Field exploration of the site should be made to determine if there is sufficient surface soil of good quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy-clay loam, and clay loam). It shall be free of debris, trash, stumps, rocks, roots, and noxious weeds, and shall give evidence of being able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.

Potential topsoil should be tested by a recognized laboratory. It should meet the following criteria:

- Organic-matter content should be not less than 1.0% by weight.
- The pH range should be from 6.0-7.5. If pH is less than 6.0, lime should be added in accordance with soil-test results or in accordance with the recommendations of the vegetative-establishment practice being used.
- Soluble salts shall not exceed 500 ppm.
- If additional off-site topsoil is needed, it should meet the standards stated above.
- The depth of material meeting the above qualifications should be at least 4". Soil factors such as rock fragments, slope, depth to water table, and layer thickness affect the ease of excavation and spreading of topsoil.

Generally, the upper part of the soil, which is richest in organic matter, is most desirable; however, material excavated from deeper layers may be worth storing if it meets the other criteria listed above.

Stripping

Strip only those areas that will be affected by construction or development. A normal stripping depth is 4-6", but deeper depths may be satisfactory if the soil is suitable and undercutting is allowable in locations such as buildings, water-impoundment structures, roadways, etc. Appropriate sediment-control measures such as sediment barriers, sediment basins, inlet protection, etc., should be in place before the topsoil is stripped. Stripping should not be done on areas intended to support conventional, on-site effluent, disposal lines (field lines).

Stockpiling

The stockpile location should be out of drainageways and traffic routes. Stockpiles should not be placed on steep slopes where undue erosion will take place. Measures should be taken to prevent erosion of the stockpiles. These would include

- Mulching the stockpile when it is left inactive for 14 days or longer.
- Planting temporary vegetation when the stockpile is to be inactive over 30 days.
- Covering the stockpile with plastic whenever the piles are small or any soil loss would damage existing buildings or facilities.
- Planting permanent vegetation when the stockpile use will be inactive over 12 months.
- In cases where the stockpile is small and will be removed in fewer than 14 days, it may be more practical to use a sediment barrier than an erosion-control practice.

Site Preparation

Areas to be covered with topsoil shall be excavated, graded, filled, and shaped to the proper lines, grades, and elevations before topsoil placement is started.

The subgrades should be checked for pH and limed if the pH is less than 6.0. Liming shall be done in accordance with soil tests and in relation to the seeding mixture to be planted. Incorporate lime to a depth of at least 2" by discing.

Applying Topsoil

Immediately before placement of topsoil, the subsoil should be disced or scarified to a depth of 2" to enhance bonding of the subsoil and topsoil. Topsoil should be uniformly spread to a minimally compacted depth of 4". Required volumes of topsoil may be determined using Table TSG-1.

Table TSG-1 Volume of Soil Needed for Topsoiling

Depth to Spread (inches)	Cubic Yards Per 1,000 Sq. Ft.	Cubic Yards Per Acre
1	3.1	134
2	6.2	268
3	9.3	403
4	12.4	537
5	15.5	672
6	18.6	806

When applying topsoil, maintain needed erosion-control practices such as diversions, grass swales, lined swales, etc. Topsoil should not be spread when it or the subgrade is frozen or muddy.

Precautions should be taken to prevent layering of the topsoil over the subsoil. Mixing and bonding of the two soils should be enhanced by use of discing or cultivation tools.

Settling of the topsoil is necessary to bond the soils together, but undue compaction should be prevented. Light compaction is necessary to increase soil strength, reduce erosion, and enhance vegetation establishment. Excessive compaction should be prohibited as it increases runoff and inhibits seed germination and root development.

Surface irregularities that would impede drainage, increase erosion, or otherwise damage the site should be removed in final grading.

Common Problems

Consult with a qualified design professional if any of the following occur:

Depth of surface being stripped is significantly different than anticipated.

Topsoil appears to contain contaminants.

Topsoil appears too compacted during spreading; may need to loosen by discing or scarifying.

Maintenance

Inspect topsoiled areas frequently until vegetation is established.

Repair eroded or damaged areas and revegetate.

Repair sloughing on steep slopes—remove topsoil, roughen subgrade and respread topsoil.

Consult with a qualified design professional if drainage (wetness caused by seepage) or shallowness to bedrock (less than 24") is involved.

References

BMPs from Volume 1

Chapter 4

Land Grading (LG)

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Temporary Seeding (TS)

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