SUSTAINABLE LANDSCAPING PRACTICE FOR ENHANCING VEGETATION ESTABLISHMENT

Compacted soils within highway medians and roadsides result in limited capacity to support healthy vegetation, storm water infiltration, and afforestation efforts. The Maryland State Highway Administration (SHA) has begun to explore the use of alternative, sustainable practices to improve soil structure within existing medians and former project staging areas along the roadside.

This research supports the integration of new practices and procedures to improve soil structure that will help turf, meadow, forest and landscape plantings to thrive. The project established experimental test plots in Taneytown, Maryland, and field-scale soil decompaction and amendment practices were evaluated alongside standard SHA practices for turf establishment. The Taneytown site was heavily compacted in the old MD 853 roadbed, and has been identified for a future afforestation project. Replicate treatments with suburban subsoiling (the combination of deep soil ripping and compost amendment) were compared to standard SHA turf establishment. Replicate plots were also treated by planting forage radish to explore the feasibility of bio-drilling to loosen and improve compacted soils on the site. Plots were prepared and planted in Fall 2014 and reseeded in Summer 2015. Soil characteristics including texture, bulk density, organic matter, soil strength as measured with a cone penetrometer, and infiltration capacity, were evaluated both prior to and after treatment.

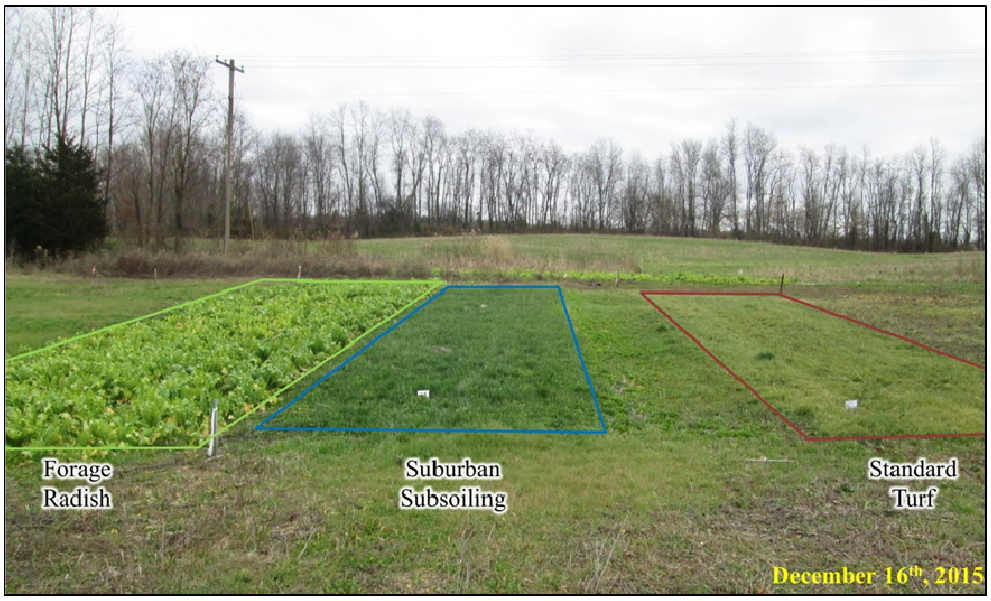


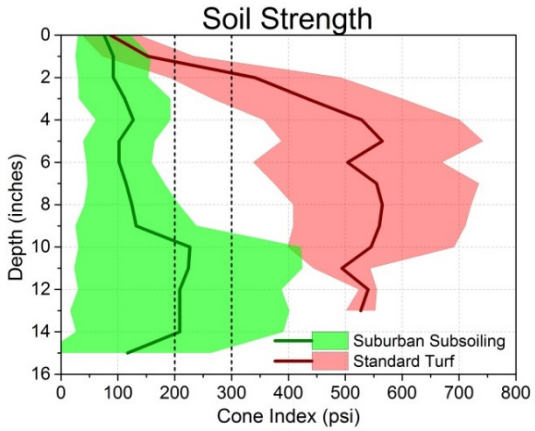
Figure 1 - Test Plot in Taneytown, Maryland

Results and Implementation

The results demonstrated significant improvements to the compacted soils on the project site, resulting in more successful turf establishment and dramatic increases in storm water infiltration.

(1) Suburban subsoiling resulted in a permeable soil profile with higher organic matter and infiltration compared to standard turf establishment practices. The median soil strength (a surrogate for compaction) with depth for the two treatments was shown in below figure. A soil strength above 200 PSI is generally considered to be limiting and above 300 PSI restrictive for vegetation growth. Suburban subsoiling improved stormwater infiltration and the success of vegetation and afforestation efforts.

	Standard Turf	**Suburban Subsoiling**
Bulk Density (g/cc)	1.56	1.11
Organic Matter (%)	3.50	6.40
Infiltration (in./hr)	0.04	8.43



(2) The mature deer compost used in this project provided stable soil carbon with nutrients and minimized the risk of nutrient losses or leaching when properly applied and soil-incorporated.

(3) The significant radish development on plots with successful germination demonstrated the potential for biodrilling as a multi-year strategy to mitigate compaction.

These findings are appropriate to apply to SHA projects as a low cost, low risk approach to revitalizing compacted soils. Abandoned roadbeds of sufficient size and scale will benefit from subsoiling and biodrilling techniques to ameliorate soil compaction prior to planting or revegetating the site. Application of forage radishes will be more suitable for existing meadows and other appropriate roadside landscape management areas.

Cultivating deep permeable organic soil profiles by adapting these land development practices will result in reduced life-cycle costs for green asset maintenance. SHA can include these techniques in the designer's toolbox for consideration on a site by site basis to promote long term landscape sustainability.