



The Town of Leesburg in Virginia

DESIGN AND CONSTRUCTION STANDARD

Article # X-XXX.X

PART 1 - BACKGROUND

Tree Critical Root Zones (CRZ's) typically extend twice as far as the tree canopy and drip line. On a given site, the overlapping CRZ's of all the trees can cover a large portion of the ground within the Limits of Disturbance (LOD). Tree Protection Fence (TPF) is usually installed along the LOD on the perimeter of the site to protect the portion of the root zones that are outside the LOD. That still leaves a large portion of the CRZ's exposed to damage within the LOD. There are 3 options for dealing with tree roots within the LOD of a site.

Prune the roots at the LOD.

Protect the roots within the LOD from compaction and disturbance with Root Protection Matting (see TOL spec on RPM)

Preserve the roots within the LOD from grade fill and impervious surfaces by using vented Root Aeration Matting (vRAM)

It is common knowledge that tree leaves absorb carbon dioxide, but it is a little-known fact that tree roots also absorb an atmospheric gas. In the case of tree roots, they absorb oxygen from the surrounding soil. If this supply of oxygen is reduced or cut off, trees will decline and eventually die from suffocation. Several common practices cut off oxygen supplies to trees.

Paving impervious surfaces or building structures over tree Critical Root Zones (CRZ's).

Flooding the soil for extended periods of time with excess water which displaces available soil oxygen.

Raising the grade around a tree root zone by installing additional soil or fill.

The purpose of vented Root Aeration Matting (vRAM) systems is to provide a permanent solution to potential tree suffocation. vRAM provides a layer of ventilation for atmospheric gas exchange to roots of significant trees which are going to receive grade fill or impervious pavement over their CRZ. It does this by way of a breathable inner geocomposite grid kept open by a soil separator geotextile fabric on top and bottom. The breathable geocomposite matting is laid on-grade prior to permanent grade fill operations or construction over a critical root zone and it allows the topsoil and roots to remain intact. RAM systems of various kinds have been used successfully across the country for more than 30 years. Tree Preservation Experts in collaboration with noted geotechnical specialists are continually developing better versions of RAM using the latest materials and methods available. vRAM represents the 4th generation or Root Aeration Matting Systems. The difference in vRAM and all previous versions of RAM is the presence of multiple, purposefully redundant vertical vent pipes connected to a continuous horizontal vent pipe that is fixed to the edge of the vRAM geocomposite matting. This new vRAM system is the most robust yet and can provide maintenance-free operability for decades. vRAM can be used in both non-structural as well as structural scenarios. Exact locations of the vRAM are determined by the Project Forester and shown on the final Tree Preservation Plan in locations where grade fills and impervious surfaces will cover tree root zones within the LOD. It is important to protect the areas to receive vRAM from uncontrolled access prior to installation. Therefore, a temporary Tree Protection Fence should be installed around the area to receive vRAM to prevent unintended root damage by other trades. Situations for using vRAM include whenever fill, paving or structures are planned over a tree CRZ such as: Building slabs, Foundations, Sidewalks, Trails, Berms, Bike Share pads, Sport Courts, Patios, Courtyards, Parking lots, Driveways, Roadways, etc.

PART 2 – MATERIAL FABRICATION

vRAM shall consist of nominally ½" thick geocomposite biplanar or triplanar drainage geonet matting. The matting is made by various manufacturers and shall consist of a 3-dimensional inner extruded resin lattice covered on both sides by a non-woven, needle punched geotextile fabric. A sample of the material shall be submitted to TOL for approval prior to installation. A shop drawing shall also be produced by the installer and submitted to TOL for approval to illustrate the matting cut lines, joint plan, and proposed location for the vent pipes to be exposed at ground level once the installation is complete. Optimal locations for the vents are directly behind the proposed curb, pavement or building edge. Vents can also be located at the bottom of the toe of slope when needed. Vents should not be installed out in the open whenever possible, to avoid damage from lawn maintenance equipment. The matting should be cut to the specified lengths from the master rolls and numbered with spray paint before transporting to jobsite for ease of assembly. 1-foot of overlap should be allowed between precut matting strips.

vRAM Horizontal and vertical vent pipes shall consist of 2" SCH 40 PVC pipe. PVC caps for vent pipes shall be drilled with four ¼" vent holes spaced evenly around perimeter of the caps just below the closed end of cap. The horizontal pipes shall be drilled through both sides using a ½" drill bit at 2 feet o.c. to allow for the insertion of galvanized landscape nails. A drill press is a safe option and allows for consistency in making the holes. The horizontal vent pipes shall be cut into 5-foot lengths. Then the horizontal vent pipes shall be cut on one side lengthwise from end to end using a table saw with a 3/8" wide dado circular saw blade. This will open a slit along the entire pipe length to later receive the matting being inserted into the slit. The vertical vent pipes shall not be shortened, cut lengthwise, or drilled; they shall be rough cut above the anticipated fill levels in the field during installation. SCH 40 PVC tees shall be used unmodified to connect the horizontal and vertical vent pipes every 5 feet along one perimeter of the vRAM matting.

PART 3 – MATERIAL INSTALLATION

Onsite, the numbered strips of matting shall be laid out in order side by side on grade with 1-foot of overlap. Then the 5-foot-long horizontal pipes shall be slid over one edge of the matting, being careful to push the pipe all the way onto the matting so that the edge of the matting is abutting the opposite side of the slit pipe. Drive 12" galvanized landscape nails 2 feet o.c. through the pre-drilled holes to secure the matting inside the pipe and secure the pipes to the ground. At the end of each 5-foot pipe, using a utility knife cut a 6" x 12" section out of the edge of the matting to allow room for installation of the PVC tee. Insert the tee on the first section of horizontal pipe and secure it with at least 2 screws. Continue adding 5' section of pipe and additional tees until complete. Next, add the vertical vent pipes to the tees and extend the tops well beyond the proposed top of final elevation. Ensure that all pipes and connectors are secured with stainless steel, self-tapping screws. No glue shall be used to connect any PVC fittings. Pound temporary 6-foot-long fence posts into ground at each vent pipe and zip tie the vertical vent pipes to the fence posts. Remove the temporary tree protection fence and place the grade fill or stone on top of the vRAM system, being careful to not damage the vertical vent pipes. Once grade fill is complete, remove the fence posts and trim off excess lengths of vent pipes. Then affix the pre-drilled PVC caps on top of the vent pipes and secure with at least 2 stainless steel, self-tapping screws.

Not To Scale

REVISIONS		Vented ROOT AERATION MATTING (vRAM) SPECIFICATION	DRAWING XX-1
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