APPENDIX 3

LOW PRESSURE PIPE SYSTEMS

This Appendix shall be considered by the Department, as a comprehensive manual on the subject of Low Pressure Pipe (LPP) Systems. Additionally, this Appendix/Manual will specify how these systems are to be designed and installed in Williamson County.

Important Note: This manual was adapted from the UNC Sea Grant, College Publication UNC-SG-82-03, *Design and Installation of Low Pressure Pipe Waste Treatment Systems*, May 1982. The content was edited to conform to the specific geologic and physiographic characteristics of Williamson County, Tennessee. These standards promote reliability and longevity of waste treatment systems for environmental protection and public health.

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In cases where the depth to a blocking layer or restrictive horizon, within a soil profile, ranges from twenty-four (24) to thirty (30) inches, a *Modified* LPP (MLPP) may be installed using six (6) to eight (8) inches of compatible imported fill, as approved by the Department. MLPP lateral line trenches can be placed as shallow as twelve (12) inches deep, into the natural soil profile, giving a minimum natural soil-depth requirement of twenty-four (24) inches. Thus, the addition of the compatible soil fill material will result in a total soil profile depth of the required thirty (30) inches. The soil material covering a blocking layer or restrictive horizon shall have suitable textural, structural, absorption and drainage characteristics for such use as outlined in *Appendix 1*. It is essential that great care be used in installing these systems. Their design and construction are covered in *Chapter 7* of this Appendix/manual.

C. Topography and Landscape Positions

Low pressure disposal fields located on slopes require special design and installation procedures. The supply line delivering the effluent to the manifold, serving the lateral lines, shall always enter at the highest point of elevation in the distribution field. All LPP lateral line trenches shall be positioned and constructed parallel to the naturally existing contours of the ground surface in such a manner so as to ensure that the bottom of each lateral line trench remains level throughout its entire length.

Important Note: LPP systems may be installed on slopes ranging from zero to twenty-five percent (0-25%). LPP systems shall not be installed on sites where the slope exceeds twenty-five percent (25%). MLPP systems may be installed on slopes ranging from zero to fifteen percent (0-15%). MLPP systems may be considered for sites with slopes of sixteen to twenty-five percent (16-25%), however those sites shall be assessed in accordance with procedures outlined in *Appendix 1*, before any approval for such use is granted by the Department. MLPP systems shall not be placed on any slopes greater than twenty-five percent (>25%).

LPP and MLPP lateral line trenches may only be placed within the limits of a 100 year floodplain in accordance with *Appendix 1* of these regulations.

D. Slippage Soils

Where designated LPP or MLPP system septic field areas contain slippage soil (as outlined in the provisions of *Article 13* of the *Williamson County Zoning Ordinance*) on slopes of between 15-25%, the following requirements shall be met:

(1) A geotechnical engineer shall prepare a report identifying the location, character, and extent of the slippage soil areas. The report shall include design recommendations for proper drainage and construction of the septic system to ensure slope stability.

(2) The alternative system design plans required in accordance with *Section 19* (prepared by an engineer licensed in the State of Tennessee, with experience designing on-site wastewater systems) shall also be prepared in consultation with the geotechnical engineer and shall be in compliance with the geotechnical report.

(3) The Department shall require that both the LPP/MLPP system engineer of record and the geotechnical engineer provide on-site construction supervision and/or inspection of the system installation.

Said engineers shall also provide written documentation to the Department outlining their observations, findings and/or recommendations, along with stamped/sealed as-built drawings certifying the successful installation of the system in conformance with the approved design plans and geotechnical report.

E. Drainage Requirements

All existing drainage features on a lot shall be avoided by the minimum setback requirements, as stated in *Section 13*, to prevent hydraulic overloading of the disposal field. All surface waters (including runoff from all impervious surfaces on the property) and all subsurface waters shall be intercepted and/or diverted away from the disposal field trench components (or all system components where determined to be necessary by the Department) of the LPP system via the use of the soil drainage improvement practice specified by the Department.

A curtain drain installed, as a soil improvement practice, around a LPP or MLPP disposal field shall be kept a minimum of ~~ten (10)~~ fifteen (15) feet from any of the lateral line trenches. However, for MLPP systems, a site specific separation distance may be designated by a Department Soil Scientist depending upon the requirements for the limits of soil modification necessary for a particular site. See *Appendix 5*.

A bushing or reducer may be needed to adapt the pump outlet to the pump outlet pipe. The pump outlet pipe shall be connected to the supply line with a threaded PVC union to allow for quick removal or replacement. A brass or bronze globe, gate or ball valve shall be installed in the supply line (within the pump tank) to prevent effluent back-drainage during pump maintenance. Where a check valve is required (*Chapter 4* of this Appendix/manual), it shall also be installed with threaded PVC fittings inside the pump tank to provide easy access for maintenance. For systems where the absorption field is at a lower elevation than the pump, a 1/4-inch siphon-breaker hole must be drilled in the supply line inside the pump tank. This breaks any vacuum in the system and prevents the inadvertent siphoning of effluent out of the tank. The placement of this hole is critical to the functioning of the system. Similarly, when a check valve is used, a vent hole (in accordance with the manufacturers recommendations) must be drilled in the supply line inside the pump tank. The placement of this hole will ensure the purging of any air trapped within the pump.

LPP systems are considered by the Department to be *Electrically Assisted Systems (EAS)* ---- i.e., any type of subsurface sewage disposal system requiring the use of a sewage/effluent pump. As such, all the electrical components (and their installation) associated with LPP systems shall meet all the requirements and provisions of these regulations relating to *EAS.*

Important Note: Details regarding the set up and placement of the electrical components is outlined in Section 16 of these regulations

G. Pump and Alarm Check

After all required installation tasks have been completed, the system shall be checked for proper operation. With electrical power turned off, fill the pump tank with water to a level sufficient to activate the high water alarm float.

Turn on the electrical power. The alarm should activate, and the pump should start operating. The alarm should deactivate when the liquid level falls below the high water alarm float. The pump should turn off when the liquid level reaches the lowest float control. At the lowest float control level, the pump shall remain completely submerged.

H. Pressure Head Adjustment

The valves on each individual lateral line must be adjusted so as to provide ~~three (3)~~ five (5) feet of pressure head at the end of each and every lateral line. The pressure head is measured as the height liquid will rise above the turn-up elbow when the pump is running. The pressure head check is performed simultaneously on all lateral lines to ensure proper effluent distribution.

To adjust the pressure head:

(1) Glue a five-foot length of PVC pipe to a threaded fitting that will screw onto the lateral line turn-up fitting. The pressure head standpipes and all necessary fittings shall be of the same size and specifications as the lateral line pipes.

(2) Replace each individual lateral line turn-up cap with a pressure head standpipe and appropriate connectors.

(3) Turn the pump on to allow the liquid level to rise in the standpipes.

(4) Adjust each lateral line valve until the liquid level reaches the desired height in each standpipe. Proper pressure head adjustment of each individual lateral line shall be achieved when the liquid barely overflows the top of each standpipe.

(5) Once the proper pressure head is achieved on each individual lateral, the pump may be turned off, the standpipes removed, and turn-up caps replaced.

(6) Upon the completion of this task, and with the approval of the Department inspector, the pressure of the system will have been properly regulated.

I. Final Landscaping

After the LPP system is installed, the following shall be checked to ensure that the system will not be hydraulically overloaded due to excessive surface and/or subsurface water:

- The trenches are back-filled with the spoils from trench excavation. The lateral line trenches shall be back-filled as soon as possible after installation in order to protect the trenches from siltation.