Engineering Design and Specifications
for
OnSite Septic System

Designed for: MODOT
Location: 27800 County Road 6150
Edgar Springs, MO

Prepared by

Dickman Professional Engineering Services, LLC

P. O. Box 617
Osage Beach, MO 65065

MODOC Maintenance Property

07/16/07

Design Analysis

General: This system will serve an existing one bathroom maintenance building located off Highway 63 at 27800 County Road 6150, in Edgar Springs, MO, in Section 1, Township 34N, Range 19W, Phelps County, Missouri, designed for MODOT.

Treatment: The Soil Morphology report by Richard Dickman, #543, indicates 14 inches of group III clay loam soil in the Ap horizon, over 6 inches of group III clay loam soil in the Bt1 horizon, and over 28 inches of group IVa clay soil in the 2Bt2 horizon. The overall Site Suitability determination indicates that the site is "unsuitable for a conventional system" based on soil drainage. The following alternative system is proposed: Primary treatment shall be provided by a new 1000 gallon septic tank with a Zabel 1801 effluent filter (or equal) installed in the tank outlet according to manufacture's instructions. The filtered effluent shall be gravity fed to the new 1000 gallon (minimum) dose tank equipped with pump, screened pump basket, float controls and high water alarm (refer to Design Analysis for pump requirements). MODOT shall furnish both the septic and dose tanks. The soil absorption field shall be dosed by means of a Low-Pressure Pipe (LPP) system, which will uniformly distribute effluent over the area. Certain setback variances are necessary for this property platted prior to 1996.

Pumps: A dose pump shall be used which will deliver 30 gallons per minute at 12 feet of total head. Float controls shall be set to deliver 60 gallons per dose for a net dose of 60 gallons. Use Zoeller Pump Model #151.

Absorption Field: The Soil Morphology report indicates a loading rate of 0.40 gal./day/sq. ft. for the group III soil lying in the Ap horizon, based on a conventional system. From 19 CRS 20-3.060 (7)(M) 2 and Table 13 and 14 the corresponding loading rate for a shallow placed LPP system in this group III soil, would be 0.20 gal./day/sq. ft. The required absorption field area is:

240 g.p.d./0.20 = 1200 sq. ft.

A total of 240 feet of LPP trench has been fitted into the available area, as shown on the plan. The supply line, manifold and laterals shall be schedule 40 PVC pipe. The supply line, manifold and laterals shall be configured to allow the effluent remaining in the pipes to drain to the absorption field between doses. The 1-1/2 -inch supply line and manifold will feed four1-inch laterals. Laterals shall follow the contours and be spaced no closer than 5 feet on center with orifices 5/32-in diameter spaced 5 feet on center. The first orifice shall be 3 feet from the manifold and oriented up to reduce siphoning between trenches at the end of a dose. The trench bottom for lateral lines shall be approximately 12 inches below the ground surface. Control and divert surface/subsurface runoff with a curtain drain and final grading/landscaping to prevent overloading the absorption area.

On Site System

- An LPP (Low Pressure Pipe) was selected for its uniform distribution using the total absorption area, thereby limiting the distance the leachate contaminates will travel from the disposal area, over a conventional system.

- The dose tank shall be equipped with high water alarms.

- Install Curtain Drain as shown on detail and design drawing to divert surface/subsurface water away from the field to prevent overloading the absorption area.

With these design considerations, all setback requirements are met in *accordance with 19 CRS 20-3-060 (1)(D) and Table1.*

Construction Notes:

- All products, materials, and construction methods shall comply with Missouri and Phelps County Laws for onsite sewage disposal systems and applicable building codes.

- Primary treatment shall be a new 1000 gallon septic tank with a Zabel 1801 effluent filter installed in tank outlet in accordance with manufacture's instructions, placed to allow service connections be made with 4 inch SCH 40 PVC at a minimum 1% slope between tanks. Tank shall be provided by MODOT.

- The effluent from the septic tank shall be filtered and gravity fed to a new 1000 gallon (minimum) dose tank with pump, screened pump basket, float controls, and a high water alarm (refer to Design Analysis for pump requirements). Dose tank shall be provided by MODOT.

- Tanks shall be watertight.

- Layout all lateral trenches prior to excavation to insure they fit in the available area. If an obstruction prevents layout of total field, contact the engineer.

- The trench bottoms must be level (installed to contours) and approximately 12 inches below the soil surface. (See LPP detail drawing).

- Compact clay soil between manifold trench and lateral trenches to form a barrier to seepage.

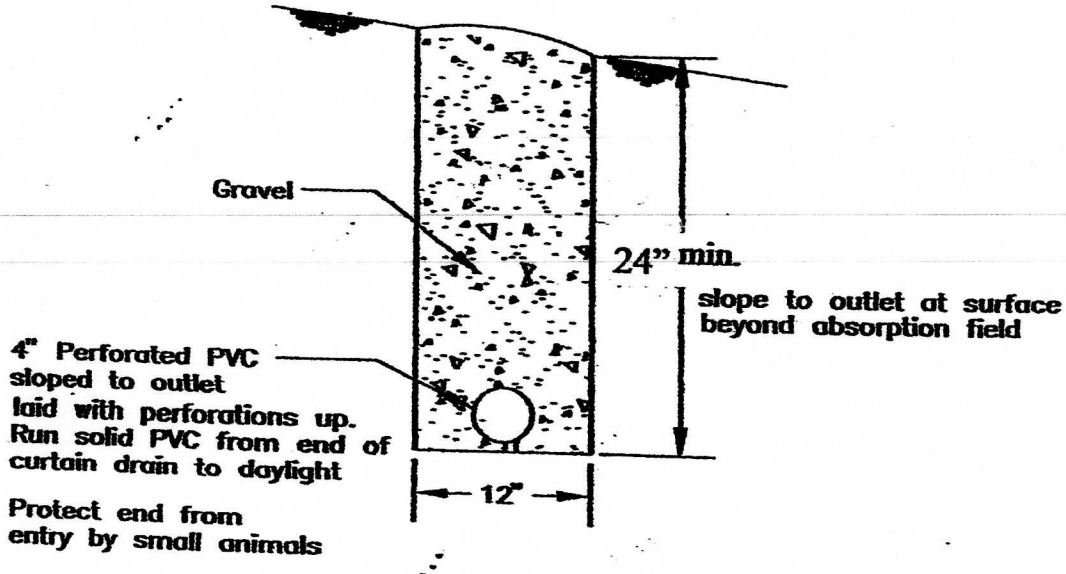
- Use ball valves to adjust water pressure to 3 feet of head at the end of the lateral lines.

- 1-inch PVC lateral lines pipe may be placed inside E-Z Flow 10-inch pipes to substitute for the gravel in the LPP trenches.

- Set pump controls to dose 60 gallons for a net dose of 60 gallons. If a shop drawing with pump tank dimensions is provided, the engineer will calculate float settings.

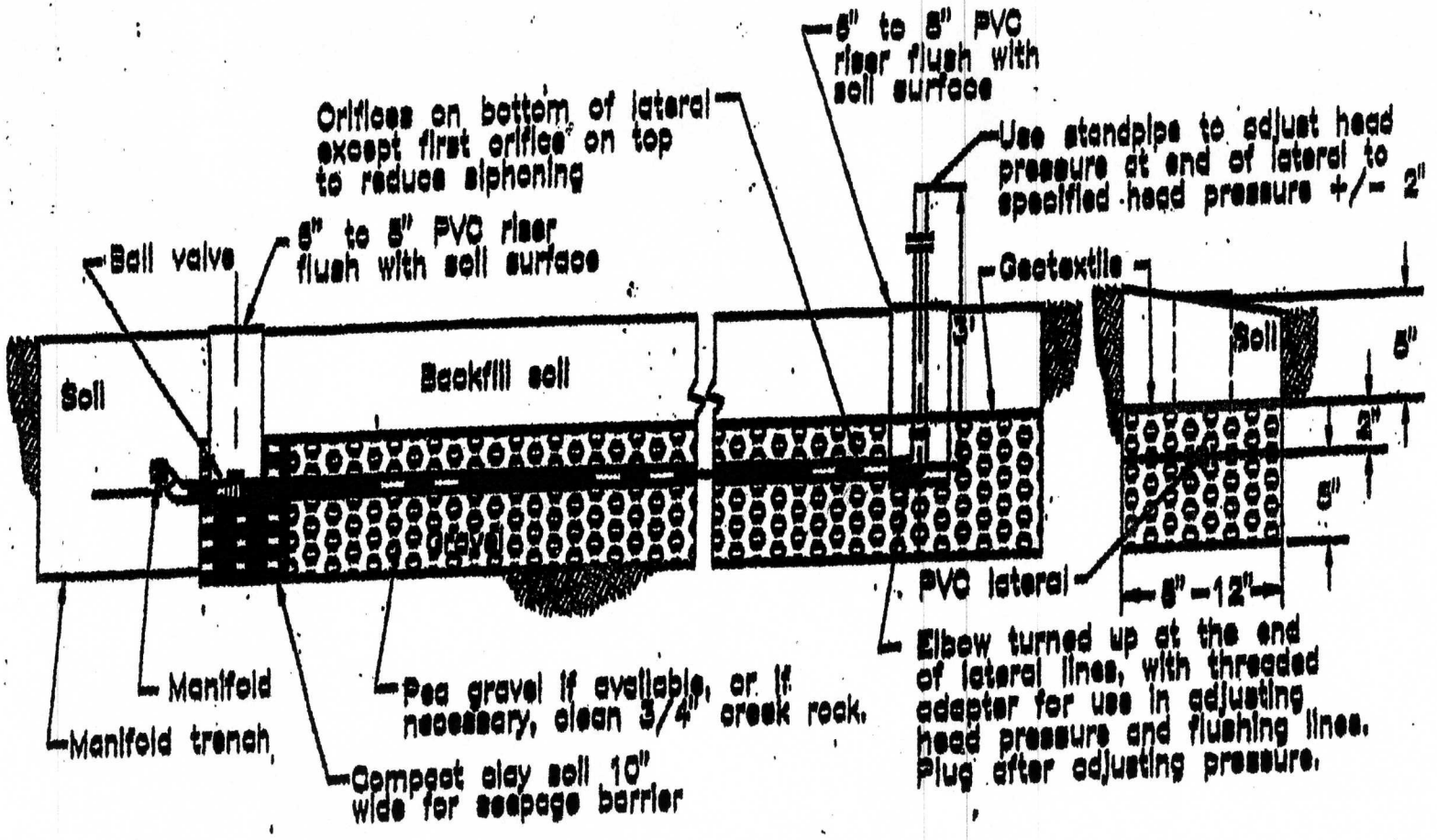
- The layout of lines should be done so as to avoid removing any trees in the absorption area. If it is necessary to remove any trees, do so only with the owner's permission. If a large tree is removed at the time of installation, the preferred method to reduce soil disturbance is to cut the tree at the ground surface leaving the roots and soil intact. A portion of any root which interferes with installation may be cut out. Any over-excavation shall be backfilled with a sandy textured soil prior to continuing with installation. If a tree is removed after the system is installed, it must be cut at the surface and the roots left to decay in place, to avoid damage to the underground system, which might be caused by removing the roots.

- The absorption area shall be protected from damage or compaction before and after installation.

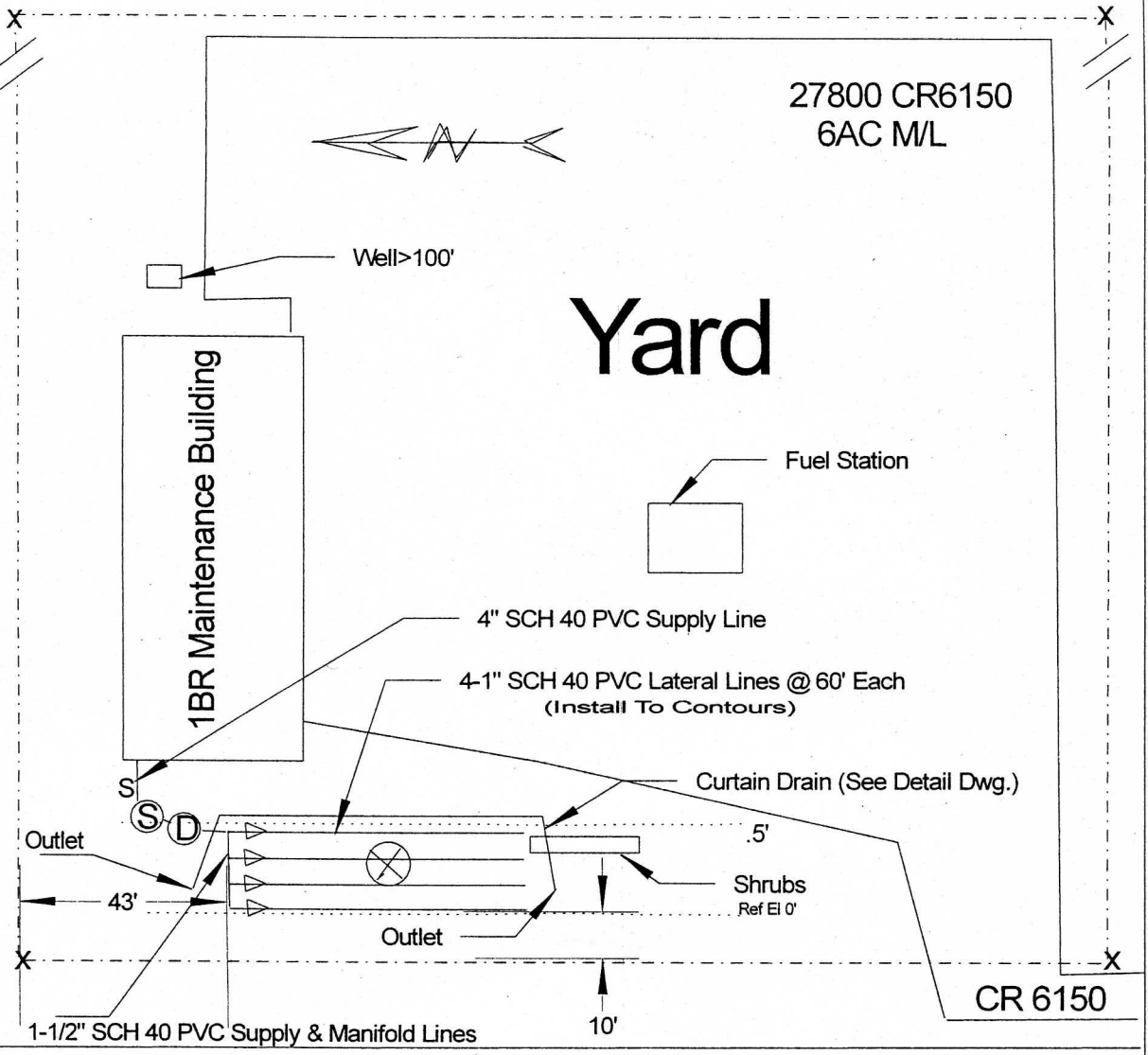


Curtain Drain Detail

Section
No Scale



LPP Trench Detail
(manifold and laterals drain to trench)
No Scale



SCALE 1"=30'

Ⓢ New 1000 gallon septic tank septic tank with a Zabel A1801 effluent filter in the tank outlet or equal.

Ⓓ New 1000 Gal. (min) dose tank with screened pump basket, float controls and highwater alarm.

S Old septic tank-pump out/crush in place/back fill.

Legend

⊗ Soil Pit

\- - - - - Edge of Property

X Property Pin

Notes:
1. Contractor shall be responsible for locating all utilities, whether shown or not prior to construction.
2. Owner is responsible for protection of field before and after construction.
3. MODOT will provide new septic & dose tanks.

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7/24/17

SEWER PLAN FOR:
MODOT

Section 1, TN 34N, RG 9W
Phelps County, MO