## Low Pressure Pipe System Design and Construction

Tall Guy Waste Water Solutions & Soils, LLC Chris Nothstine, PE

The materials being presented today represent MY opinions, based on MY experiences and do NOT necessarily reflect the opinions of NOWRA.

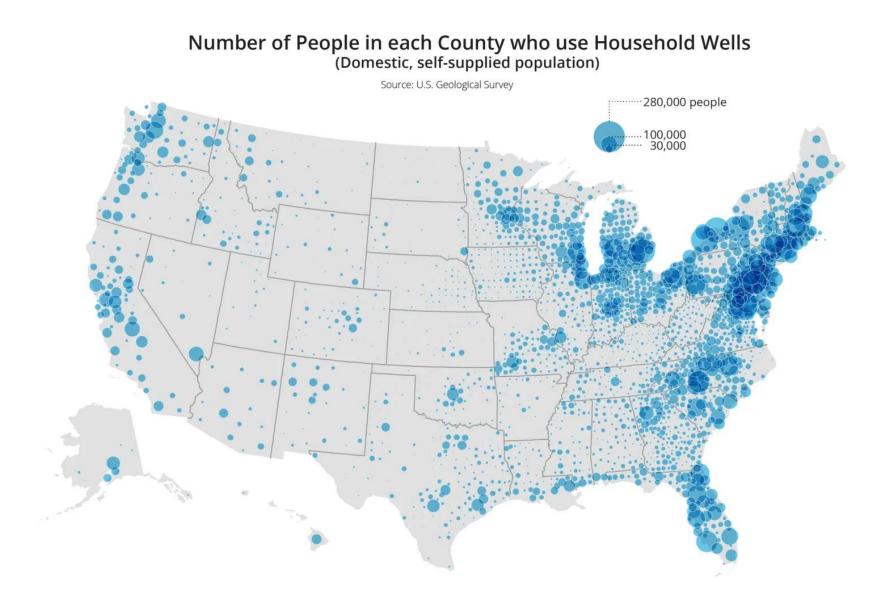
### Loose and party decayed organic matter A horizon Mineral matter mixed with some humus E horizon Light colored mineral particles. Zone of eluviation and leaching B horizon Accumulation of clay transported from above C horizon Partially altered parent material Unweathered parent material

## Soil morphology

Soil morphology is the field of observable attributes of the soil within the various soil horizons and the description of the kind and arrangement of the horizons. The observable attributes ordinarily described in the field include the composition (texture), soil structure and organization of the soil, color of the base soil and features such as mottling, distribution of roots and pores, evidence of translocated materials such as carbonates, iron, manganese, carbon and clay, and the consistence of the soil.

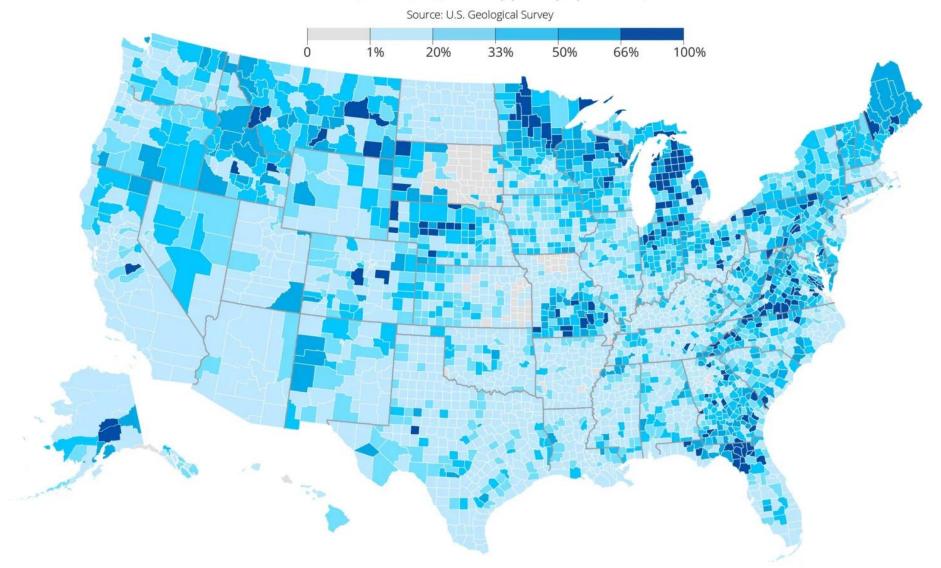
| Dusite Wastewater Treatment         DHSS Home * Healthy Living * Environmental Factors * onsite         Onsite Wastewater Treatment Systems         Negistration & Licensure Forms         Onsite Wastewater Treatment Systems         Information for Professionals         Calendar of Events         Onsite Wastewater Complaints         Cell Tracking Information * NEW*         Departion and Maintenance Guidelines ?         Mestimated 25 percent of homes in Missouri rely on an onsite wastewater reatment system (OWTS) in areas where public severs are not available). Construction Permit Process and and prevent contamination of surface and groundwater. Factors that affect the proper functioning property, onsite systems prevent human contact with severage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning or onsites systems include the site and soil conditions, designing and prevent on the Hand Senior Services (DHSS) has set minimum state standards for OWTS. These standards cover new systems and major changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding   | Missouri Depar<br>DHSS<br>Breakter & Health<br>are leady service | ************************************** | vices                     | Governor Parson       | Find an Agency | Online Services Se      | earch<br>G Select Langua |
|--|--|--|---------------------------|-----------------------|----------------|-------------------------|--------------------------|
| DHSS Home » Healthy Living » Environmental Factors » onsite       Environmental Factors         • Onsite Wastewater Treatment Systems       • Related Links         • Information for Professionals       • Aleated Links         • Calendar of Events       • DHSS Construction Permit Process and Application         • Organtion and Maintenance Guidelines Image Systems request professionals or professionals or sets wastewater and disperse it on the property where it is generated. When functioning properly, onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation, and maintenance.       OHSS has set minimum state standards for OWTS. These standards cover new systems and major changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding       Maintenance or expanding  | Healthy Living   | Senior & Disability Service            | es Licensing &            | Regulations           | Disaster &     | Emergency Planning      | Data & Statisti          |
| <ul> <li>Onsite Wastewater Treatment Systems</li> <li>Registration &amp; Licensure Forms</li> <li>Information for Professionals</li> <li>Calendar of Events</li> <li>Consite Wastewater Complaints</li> <li>CeU Tracking Information *NEW*</li> <li>Operation and Maintenance Guidelines </li> <li>An estimated 25 percent of homes in Missouri rely on an onsite wastewater treatment system (OWTS) in areas where public severs are not available. Onsite Wastewater and disperse it on the property where it is generated. When functioning properly, onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation, and maintenance.</li> <li>The Missouri Department of Health and Senior Services (DHSS) has set minimum state standards for OWTs. These standards cover new systems and major changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding</li> </ul>   | Onsite Waster  | water Treatment                        |                           |                       |                | Healthy Living          |                          |
| <ul> <li>Registration &amp; Licensure Forms         <ul> <li>Related Links</li> <li>Laws, Regulations &amp; Manuals</li> <li>Calendar of Events</li> <li>Laws, Regulations &amp; Manuals</li> <li>Frequently Asked Questions</li> <li>DHSS Construction Permit Process and Application</li> </ul> </li> <li>Corration and Maintenance Guidelines IM Issouri rely on an onsite wastewater treatment system (OWTS) in areas where public sewers are not available. Onsite systems treat wastewater and disperse it on the property where it is generated. When functioning properly, onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation, and maintenance.</li> <li>The Missouri Department of Health and Senior Services (DHSS) has set minimum state standards for OWTS. These standards cover new systems and major changes are replacing a sewage tank, and replacing or expanding</li> <li>Chronic Diseases</li> <li>Cheat Public Diseases</li> <li>Cheat Pu</li></ul>   | DHSS Home » Healthy L  | iving » Environmental Factors          | » onsite                  |                       |                | Environmental Factors   |                          |
| <ul> <li>Reduct at the Related Links</li> <li>Information for Professionals</li> <li>Laws, Regulations &amp; Manuals</li> <li>Calendar of Events</li> <li>Insteaded Links</li> <li>Laws, Regulations &amp; Manuals</li> <li>Crequently Asked Questions</li> <li>DHSS Construction Permit Process and<br/>Application</li> <li>Operation and Maintenance Guidelines Application</li> <li>CEU Tracking Information *NEW*</li> <li>DHSS Construction Permit Process and<br/>Application</li> <li>Operation and Maintenance Guidelines Application</li> <li>An estimated 25 percent of homes in Missouri rely on an onsite wastewater<br/>treatment system (OWTS) in areas where public sewers are not available. Onsite<br/>systems treat wastewater and disperse it on the property where it is generated.</li> <li>When functioning properly, onsite systems prevent human contact with sewage,<br/>and prevent contamination of surface and groundwater. Factors that affect the<br/>proper functioning of onsite systems include the site and soil conditions, design,<br/>installation, operation, and maintenance.</li> <li>The Missouri Department of Health and Senior Services (DHSS) has set minimum<br/>state standards for OWTS. These standards cover new systems and major<br/>changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding</li> </ul>   |  |  |                           | ourses                |                | Chronic Diseases        |                          |
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| Operation and Maintenance Guidelines       Image: Construction of the property of the property where it is generated.         An estimated 25 percent of homes in Missouri rely on an onsite wastewater treatment system (OWTS) in areas where public sewers are not available. Onsite systems treat wastewater and disperse it on the property where it is generated.       Image: Construction of the property where it is generated.         When functioning properly, onsite systems prevent human contact with sewage, and prevent contamination of surface and groundwater. Factors that affect the proper functioning of onsite systems include the site and soil conditions, design, installation, operation, and maintenance.       Image: Construction of the property of the propery | • Onsite Wastewater Co   | • mplaints                             | DHSS Construction Pe      |                       |                | Healthy Families        |                          |
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| when functioning property, onsite systems prevent human contact with sewage,       Food Programs         and prevent contamination of surface and groundwater. Factors that affect the       weight for the site and soil conditions, design,         installation, operation, and maintenance.       weight for owners, state standards for OWTS. These standards cover new systems and major         changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding       Local Public Health Agencies  | ·  |  | ere it is generated.      | TOTA M                |                | Genetic Disease & Early | y Childhood              |
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| state standards for OWTS. These standards cover new systems and major<br>changes to existing systems. Some examples of major changes are replacing a sewage tank, and replacing or expanding Immunizations   | The Missouri Department o  | f Health and Senior Services (DHS      | S) has set minimum        | .epa.gov/se           | price          | Local Public Health Age | encies                   |
|  |  | -                                      | -                         |                       |                | 5                       |                          |
| an absorption field. These standards became effective in January 1996.   |  |  |                           | ank, and replacing o  | r expanding    | Immunizations           |                          |

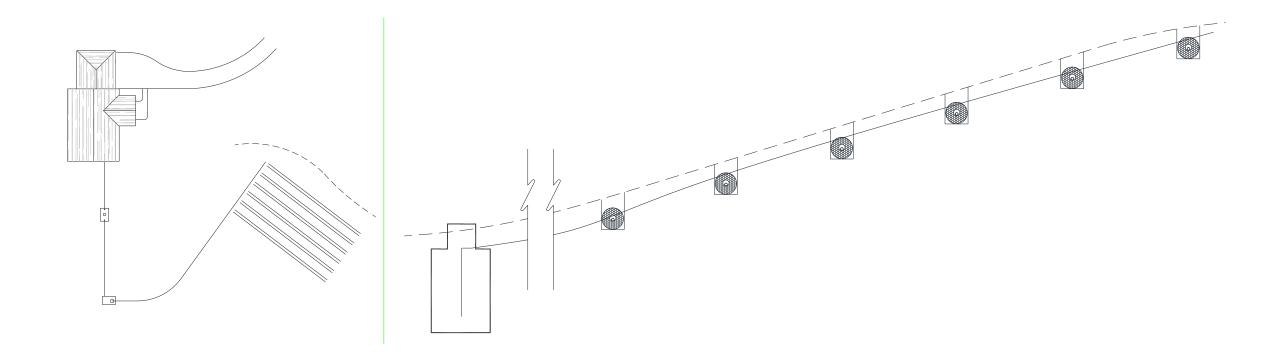
## from circle of blue WaterNews, October 1, 2018



## from circle of blue WaterNews, October 1, 2018

### Percentage of People in each County who use Household Wells (Domestic, self-supplied population)



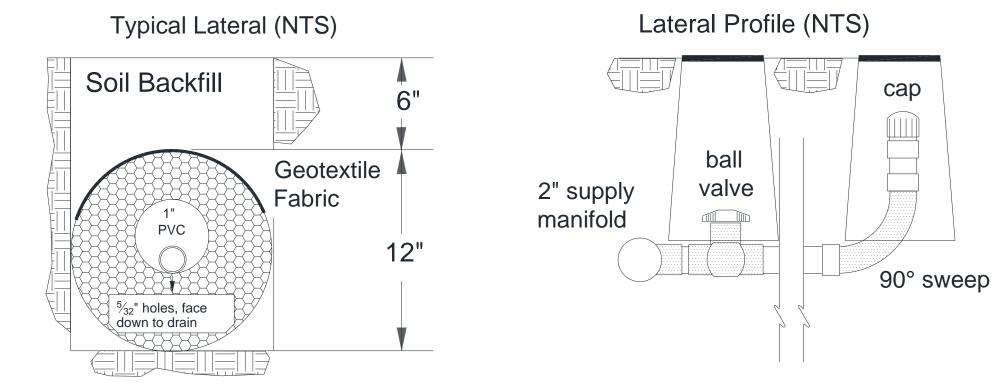


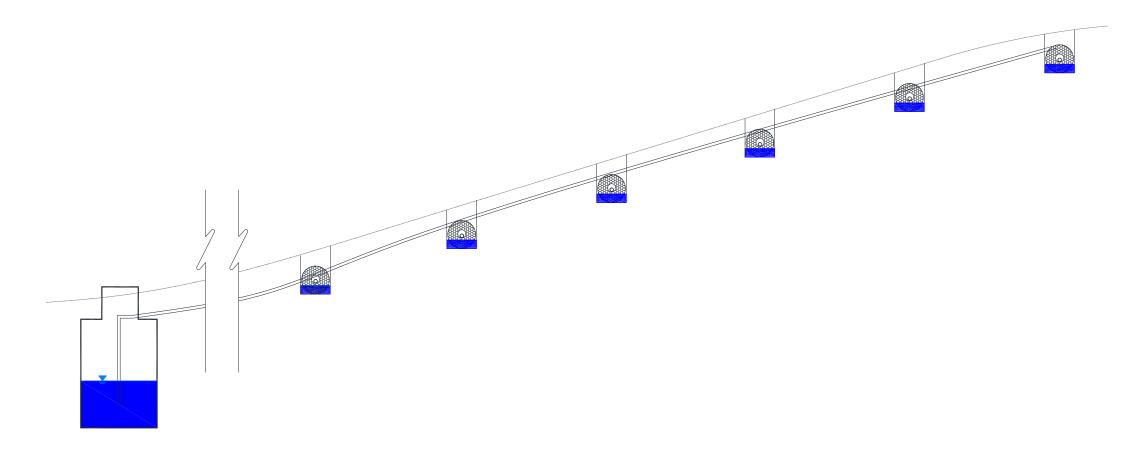
**Plan View** 

Profile of tank and laterals

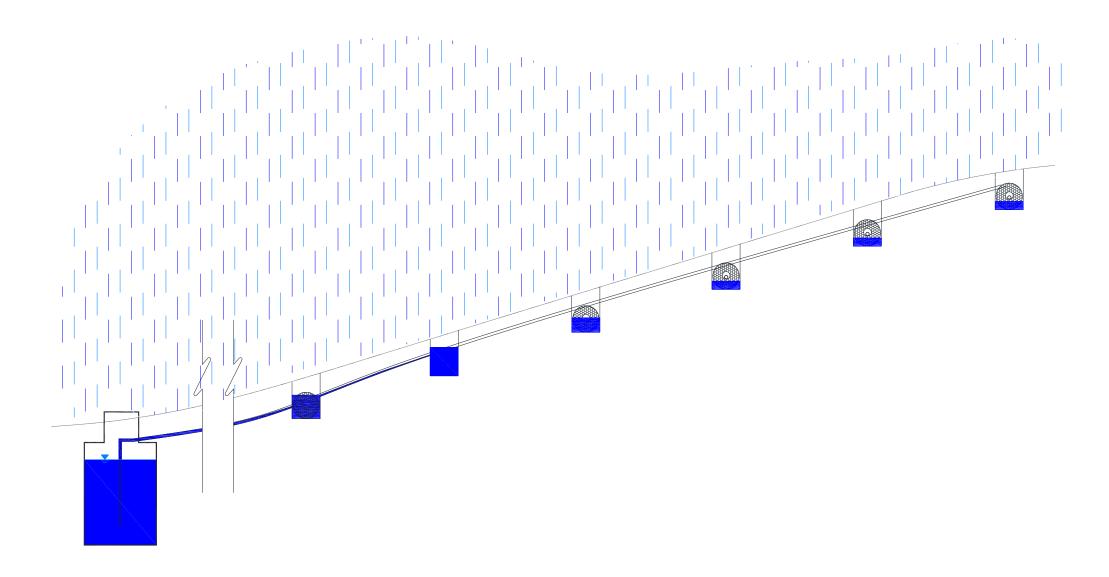


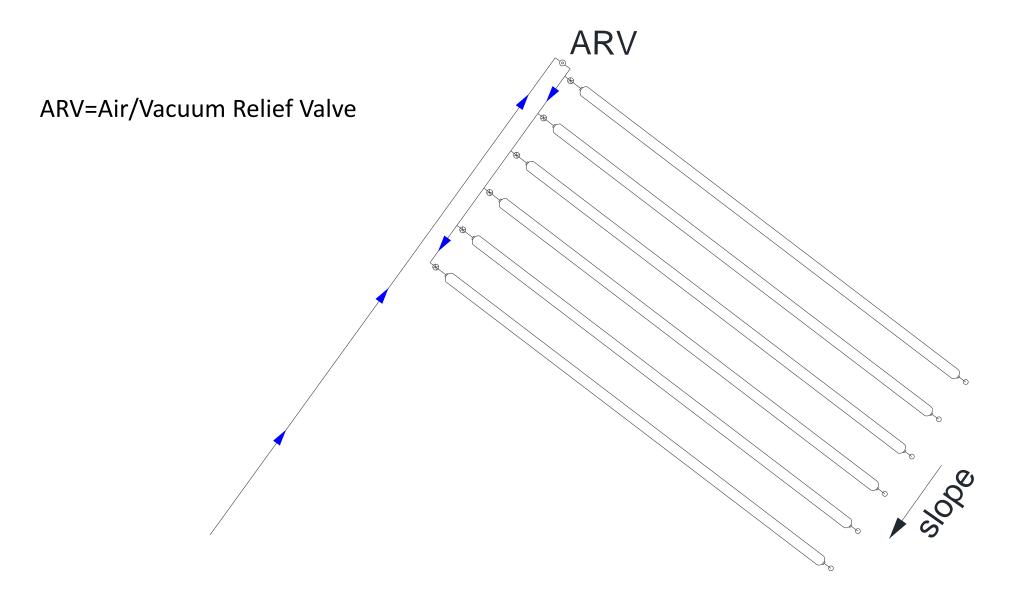
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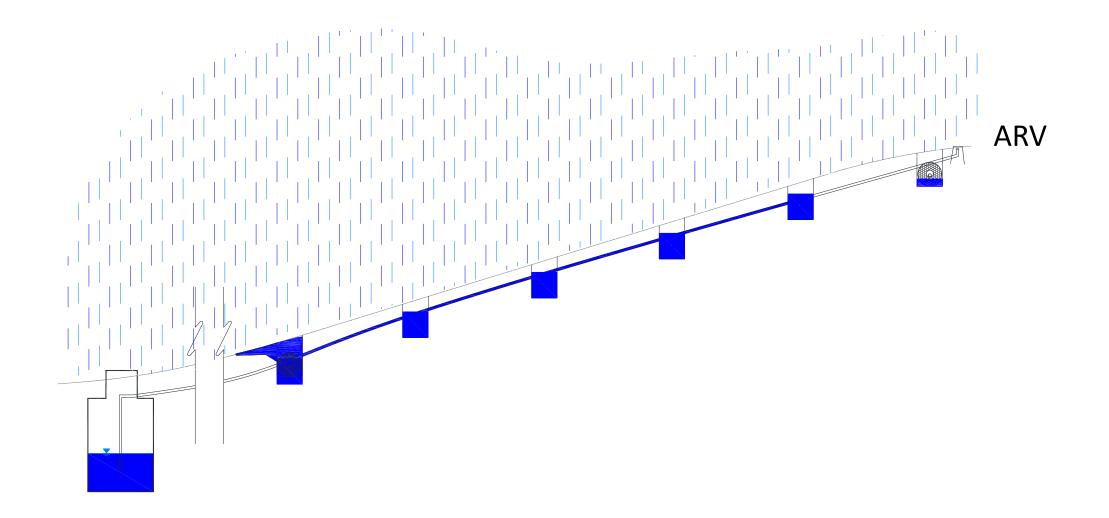




Traditional Layout



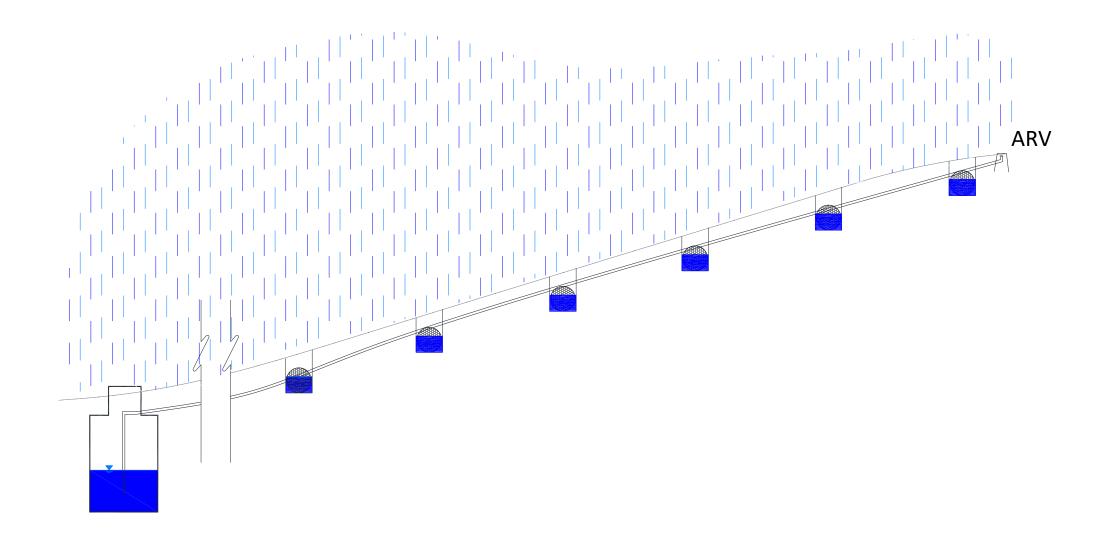




ARV

2000

ARV=Air/Vacuum Relief Valve



#### SIZING INFORMATION

| Pressure (ft) | Orifice Diameter (in) |      |      |      |  |  |  |  |
|---------------|-----------------------|------|------|------|--|--|--|--|
|               | 1/8                   | 5/32 | 3/16 | 1/4  |  |  |  |  |
| 2.5           | NP                    | NP   | 0.66 | 1.17 |  |  |  |  |
| 3             | NP                    | NP   | 0.72 | 1.28 |  |  |  |  |
| 3.5           | NP                    | 0.54 | 0.78 | 1.38 |  |  |  |  |
| 4             | NP                    | 0.58 | 0.83 | 1.47 |  |  |  |  |
| 4.5           | NP                    | 0.61 | 0.88 | 1.56 |  |  |  |  |
| 5             | 0.41                  | 0.64 | 0.93 | 1.65 |  |  |  |  |
| 5.5           | 0.43                  | 0.68 | 0.97 | 1.73 |  |  |  |  |
| 6             | 0.45                  | 0.71 | 1.02 | 1.80 |  |  |  |  |
| 6.5           | 0.47                  | 0.73 | 1.06 | 1.88 |  |  |  |  |
| 7             | 0.49                  | 0.76 | 1.10 | 1.95 |  |  |  |  |
| 7.5           | 0.50                  | 0.79 | 1.14 | 2.02 |  |  |  |  |
| 8             | 0.52                  | 0.81 | 1.17 | 2.08 |  |  |  |  |
| 8.5           | 0.54                  | 0.84 | 1.21 | 2.15 |  |  |  |  |
| 9             | 0.55                  | 0.86 | 1.24 | 2.21 |  |  |  |  |
| 9.5           | 0.57                  | 0.89 | 1.28 | 2.27 |  |  |  |  |

Inches x (Pressure in Feet)<sup>1/2</sup>. NP means Not Permitted.

Source: Pressure Distribution Network Design by James C. Converse, January 2000.

## Prepared for you by10/19/2022Pump Selection for Pressurized System

| Orifice Size                          | 0.156 | inches |           |
|---------------------------------------|-------|--------|-----------|
| Residual Head at Last Orifice         | 4.00  | feet   |           |
| Lateral Length                        | 60    | feet   |           |
| Total Number of Laterals per Cell     | 6     |        |           |
| Orifice Spacing                       | 5.00  | feet   |           |
| Distributing Valve Model (# of Zones) | 1     |        | None used |
| Lift to Manifold                      | 13    | feet   |           |
| Discharge Assembly Size               | 1.50  | inches |           |
| Transport Line Size                   | 1.50  | inches |           |
| Pipe Class/Schedule                   | 40    |        |           |
| Transport Length                      | 130   | feet   |           |
| Manifold Size                         | 2.00  | inches |           |
| Pipe Class/Schedule                   | 40    |        |           |
| Length of Distribution Header         | 5.00  | feet   |           |
| Lateral Size                          | 1.25  | inches |           |
| Pipe Class/Schedule                   | 40    |        |           |
| Flow Meter                            | none  |        | None used |
| 'Add-on' Friction Losses              | 5.00  | feet   |           |

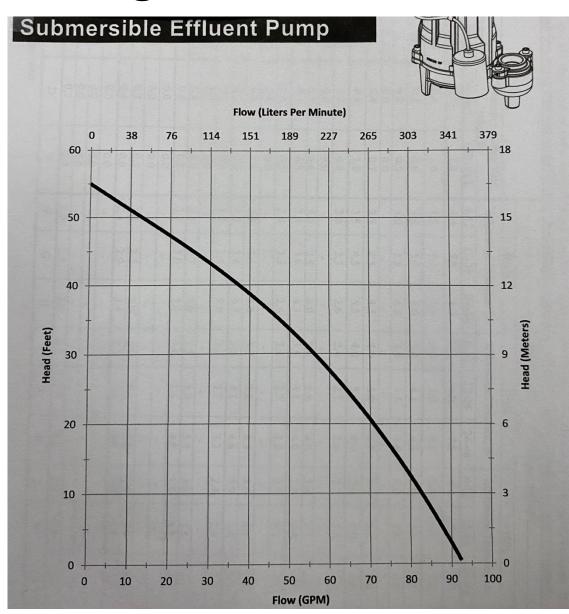
### Calculation

| Minimum Flow Rate per Orifice<br>Number of Orifices per Zone | 0.60 gpm<br>72     |
|--|--------------------|
| Total Actual Flow Rate                                       | 43.6 gpm           |
| Number of Laterals per Zone                                  | 6                  |
| Total Dynamic Head:  |                    |
| Lift to Manifold   | 13.0 feet          |
| Residual Head at Last Orifice                                | 4.0 feet           |
| Frictional Head Losses:                                      |                    |
| Head Loss in Transport Pipe                                  | 13.7 feet          |
| ad Loss through Discharge Assembly                           | 5.7 feet           |
| Head Loss in Distribution Header                             | 0.0 feet           |
| Head Loss in Laterals  | 0.2 feet           |
| 'Add-on' Friction Losses                                     | 5.0 feet           |
| Head Loss through Distributing Valve                         | 0.0 feet None Used |
| Head Loss through Flow Meter                                 | 0.0 feet None Used |
| Size Pump for:   |                    |
| TOTAL FLOW RATE  | 43.6 gpm           |

TOTAL FLOW RATE 43.6 gpm @ TOTAL DYNAMIC HEAD 41.7 feet

Output

Input



## Prepared for you by10/19/2022Pump Selection for Pressurized System

| Orifice Size                          | 0.156 | inches |      |
|---------------------------------------|-------|--------|------|
| Residual Head at Last Orifice         | 4.00  | feet   |      |
| Lateral Length                        | 60    | feet   |      |
| Total Number of Laterals per Cell     | 6     |        |      |
| Orifice Spacing                       | 5.00  | feet   |      |
| Distributing Valve Model (# of Zones) | 1     |        | None |
| Lift to Manifold                      | 13    | feet   |      |
| Discharge Assembly Size               | 1.50  | inches |      |
| Transport Line Size                   | 2.00  | inches |      |
| Pipe Class/Schedule                   | 40    |        |      |
| Transport Length                      | 130   | feet   |      |
| Manifold Size                         | 2.00  | inches |      |
| Pipe Class/Schedule                   | 40    |        |      |
| Length of Distribution Header         | 5.00  | feet   |      |
| Lateral Size                          | 1.25  | inches |      |
| Pipe Class/Schedule                   | 40    |        |      |
| Flow Meter                            | none  |        | None |
| 'Add-on' Friction Losses              | 5.00  | feet   |      |

used

used

### Calculation

| Minimum Flow Rate per Orifice        | 0.60 gpm  |           |
|--------------------------------------|-----------|-----------|
| Number of Orifices per Zone          | 72        |           |
| Total Actual Flow Rate               | 43.6 gpm  |           |
| Number of Laterals per Zone          | 6         |           |
| Total Dynamic Head:                  |           |           |
| Lift to Manifold                     | 13.0 feet |           |
| Residual Head at Last Orifice        | 4.0 feet  |           |
| Frictional Head Losses:              |           |           |
| Head Loss in Transport Pipe          | 4.1 feet  |           |
| ad Loss through Discharge Assembly   | 5.7 feet  |           |
| Head Loss in Distribution Header     | 0.0 feet  |           |
| Head Loss in Laterals                | 0.2 feet  |           |
| 'Add-on' Friction Losses             | 5.0 feet  |           |
| Head Loss through Distributing Valve | 0.0 feet  | None Used |
| Head Loss through Flow Meter         | 0.0 feet  | None Used |
| Size Pump for:                       |           |           |
| TOTAL FLOW RATE                      | 43.6 gpm  |           |
| TOTAL DYNAMIC HEAD                   | 32.0 feet |           |

When designing low-pressure pipe systems, we need to consider Linear Loading Rate.

LLR – Amount of wastewater applied daily along the landscape contour. It is expressed in gallons per day per lineal foot along the contour.

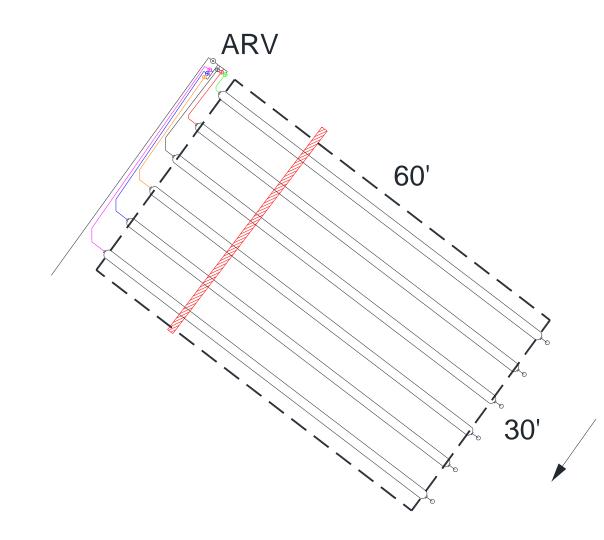
J.C. Converse, 1998

| Depth of Class III soil | Maximum recommended |
|-------------------------|---------------------|
| (inches)                | LLR                 |
| 18-24                   | 4 gpd/LF            |
| 12-18                   | 3 gpd/LF            |
| 6-12                    | 1 gpd/LF            |
|                         |                     |

J.C. Converse

|                              |       |        |                |              | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | San Star                   | H                                       | Ivdraulic |                            | pading Rat | te. gal/da                 | a/ft                                    |                |     |
|------------------------------|-------|--------|----------------|--------------|--|----------------------------|---|-----------|----------------------------|------------|----------------------------|---|----------------|-----|
|                              |       |        |                |              |  | 0.40/                      |   |           | 5-9%                       | ope        |                            | >10%                                    |                |     |
| Ge'l Charge                  |       |        | Infiltration I | oading Rate, | Sector Sector                            | 0-4%                       |   |           | Succession of the second   |            |                            |   |                |     |
| Soil Charac                  | Strue | eture  | gal/c          | $h_{a/ft^2}$ | Infiltra                                 | Infiltration Distance, in. |   | Infiltr   | Infiltration Distance, in. |            | Infiltration Distance, in. |   |                |     |
| Texture                      | Shape | Grade  | >30 mg/L       | <30 mg/L     | 8-12                                     | 12-24                      | 24-48                                   | 8-12      | 12-24                      | 24-48      | 8-12                       | 12-24                                   | 24-48          | Row |
| COS, S, LCOS, LS             |       | 0SG    | 0.8            | 1.6          | 4.0                                      | 5.0                        | 6.0                                     | 5.0       | 6.0                        | 7.0        | 6.0                        | 7.0                                     | 8.0            | 1   |
| FS, VFS, LFS, LVFS           |       | 0SG    | 0.4            | 1.0          | 3.5                                      | 4.5                        | 5.5                                     | 4.0       | 5.0                        | 6.0        | 5.0                        | 6.0                                     | 7.0            | 2   |
| And the second second second |       | 0M     | 0.2            | 0.6          | 3.0                                      | 3.5                        | 4.0                                     | 3.6       | 4.1                        | 4.6        | 5.0                        | 6.0                                     | 7.0            | 3   |
|                              | DI    | 1      | 0.2            | 0.5          | 3.0                                      | 3.5                        | 4.0                                     | 3.6       | 4.1                        | 4.6        | 4.0                        | 5.0                                     | 6.0            | 4   |
| CSL, SL                      | PL    | 2.3    | 0.0            | 0.0          | -  | -                          |   | -         | -                          |            |                            | -                                       | -              | 5   |
|                              | PR/BK | 1      | 0.4            | 0.7          | 3.5                                      | 4.5                        | 5.5                                     | 4.0       | 5.0                        | 6.0        | 5.0                        | 6.0                                     | 7.0            | 6   |
|                              | /GR   | 2,3    | 0.6            | 1.0          | 3.5                                      | 4.5                        | 5.5                                     | 4.0       | 5.0                        | 6.0        | 5.0                        | 6.0                                     | 7.0            | 7   |
|                              | 29    | 0M     | 0.2            | 0.5          | 2.0                                      | 2.3                        | 2.6                                     | 2.4       | 2.7                        | 3.0        | 2.7                        | 3.2                                     | 3.7            | 8   |
| FSL, VFSL PL<br>PR/BK<br>/GR | PL    | 1,2,3  | 0.0            | 0.0          | -  |                            | - 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19 |           |                            |            | -                          |   | and the second | 9   |
|                              |       | 1      | 0.2            | 0.6          | 3.0                                      | 3.5                        | 4.0                                     | 3.3       | 3.8                        | 4.3        | 3.6                        | 4.1                                     | 4.6            | 10  |
|                              |       | 2,3    | 0.4            | 0.8          | 3.3                                      | 3.8                        | 4.3                                     | 3.6       | 4.1                        | 4.6        | 3.9                        | 4.4                                     | 4.9            | 11  |
| L PL                         |       | 0M     | 0.2            | 0.5          | 2.0                                      | 2.3                        | 2.6                                     | 2.4       | 2.7                        | 3.0        | 2.7                        | 3.2                                     | 3.7            | 12  |
|                              | PL    | 1,2, 3 | 0.0            | 0.0          |  | -                          |   |           |                            | -          | -                          | and a state                             | - 47 C         | 13  |
| -                            | PR/BK | 1      | 0.4            | 0.6          | 3.0                                      | 3.5                        | 4.0                                     | 3.3       | 3.8                        | 4.3        | 3.6                        | 4.1                                     | 4.6            | 14  |
|                              | /GR   | 2,3    | 0.6            | 0.8          | 3.3                                      | 3.8                        | 4.3                                     | 3.6       | 4.1                        | 4.6        | 3.9                        | 4.4                                     | 4.9            | 15  |
|                              |       | 0M     | 0.0            | 0.2          | 2.0                                      | 2.5                        | 3.0                                     | 2.2       | 2.7                        | 3.2        | 2.4                        | 2.9                                     | 3.4            | 16  |
| SIL                          | PL    | 1,2,3  | 0.0            | 0.0          | -  | 1999 - <sup>19</sup> 18,   | -                                       | -         | -                          | -          | -                          | 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | -              | 17  |
|                              | PR/BK | 1      | 0.4            | 0.6          | 2.4                                      | 2.7                        | 3.0                                     | 2.7       | 3.0                        | 3.3        | 3.0                        | 3.5                                     | 4.0            | 18  |
|                              | /GR   | 2,3    | 0.6            | 0.8          | 2.7                                      | 3.0                        | 3.3                                     | 3.0       | 3.5                        | 4.0        | 3.3                        | 3.8                                     | 4.3            | 19  |
|                              |       | 0M     | 0.0            | 0.0          | -  | -                          | -                                       | -         | -                          | - 10       | -                          |   | -              | 20  |
| SCL,CL SICL                  | PL    | 1,2,3  | 0.0            | 0.0          | -  | -                          | 1997 <b>-</b> 1997                      | -         | -                          | -          | -                          | -                                       | 100 million    | 21  |
|                              | PR/BK | 1      | 0.2            | 0.3          | 2.0                                      | 2.5                        | 3.0                                     | 2.2       | 2.7                        | 3.2        | 2.4                        | 2.9                                     | 3.4            | 22  |
|                              | /GR   | 2,3    | 0.4            | 0.6          | 2.4                                      | 2.9                        | 3.4                                     | 2.7       | 3.0                        | 3.3        | 3.0                        | 3.5                                     | 4.0            | 23  |
|                              | 0M    | 0.0    | 0.0            | -            | -  | -                          | -                                       | -         | _                          | - Te       | -                          | -                                       | 24             |     |
| SC, C, SIC                   | PL    | 1,2,3  | 0.0            | 0.0          | State Sarah                              |                            | -                                       | -         | -                          | the state  | -                          | _                                       |                | 25  |
|                              | PR/BK | 1      | 0.0            | 0.0          |  | - 2.2                      |   | -         | -                          |            | -                          |   | -              | 26  |
|                              | /GR   | 2,3    | 0.2            | 0.3          | 2.0                                      | 2.5                        | 3.0                                     | 2.2       | 2.7                        | 3.2        | 2.4                        | 2.9                                     | 3.4            | 27  |
| A<br>2000 by E. Jerry Tyler  | В     | C      | D              | E            | F  | G                          | Н                                       | Ι         | J                          | K          | L                          | M                                       | N              | 0   |

Table 1. Infiltration rates in gal/da/ft<sup>2</sup> for wastewater of >30 mg L<sup>-1</sup> or wastewater of <30 mg L<sup>-1</sup> and hydraulic linear loading rates in gal/da/ft for soil characteristics of texture and structure and site conditions of slope and infiltration distance. Values assume wastewater volume of >150 gal/da/bedroom. If horizon consistence is stronger than firm or any cemented class or the clay mineralogy is smectitic, the horizon is limiting regardless of other soil characteristics

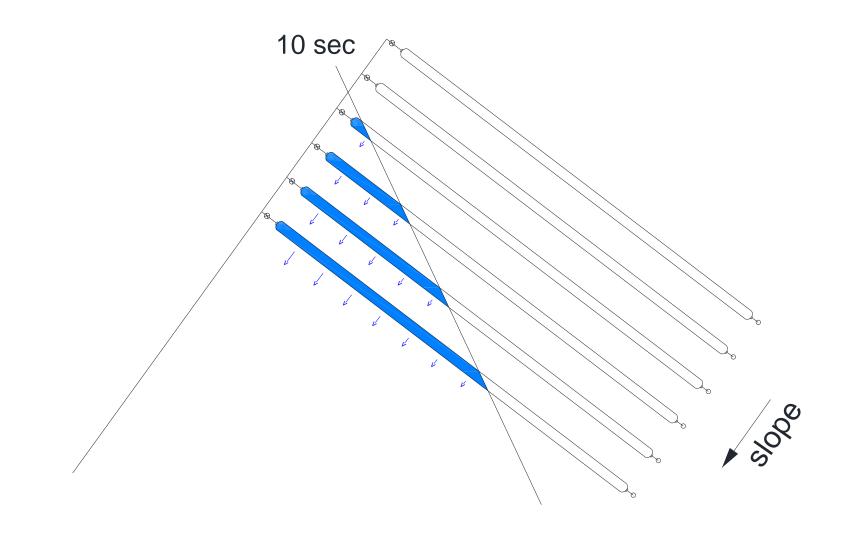


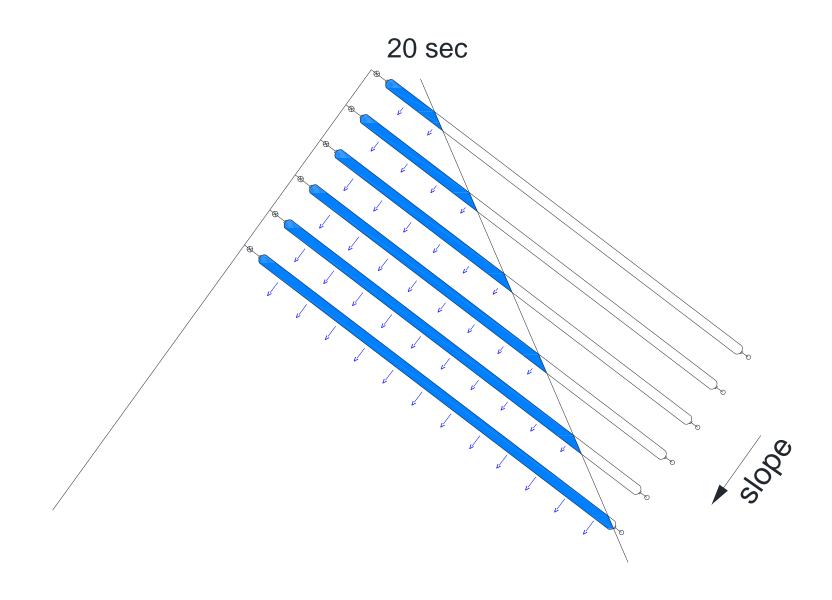
Area Requirement 1,800 SF x 0.2 gpd/SF = 360 gpd

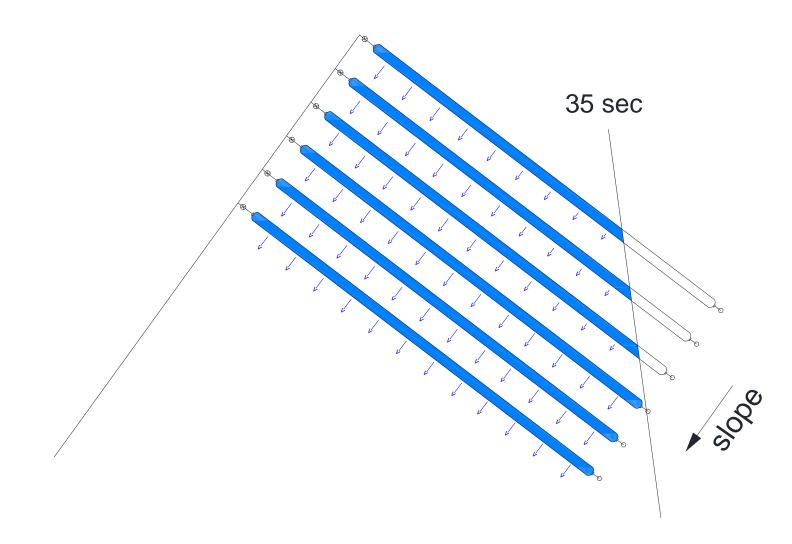
Linear Loading Rate (LLR) 60 gpd / 60LF = 1.0 gpd/LF

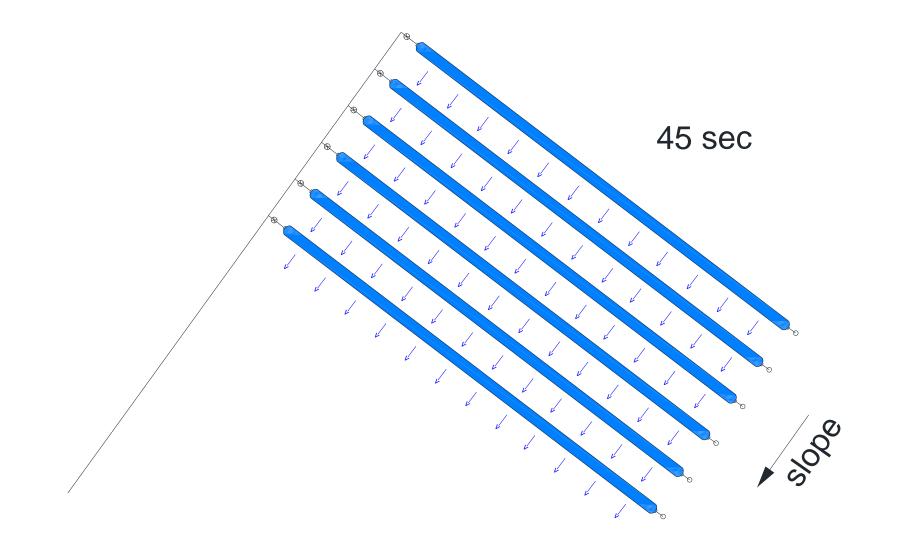
<u>(LLR)</u> 1 apd/L F

1 gpd/LF x 6 = 6 gpd/LF 6 gpd/LF > 4 gpd/LF (not adviseable)

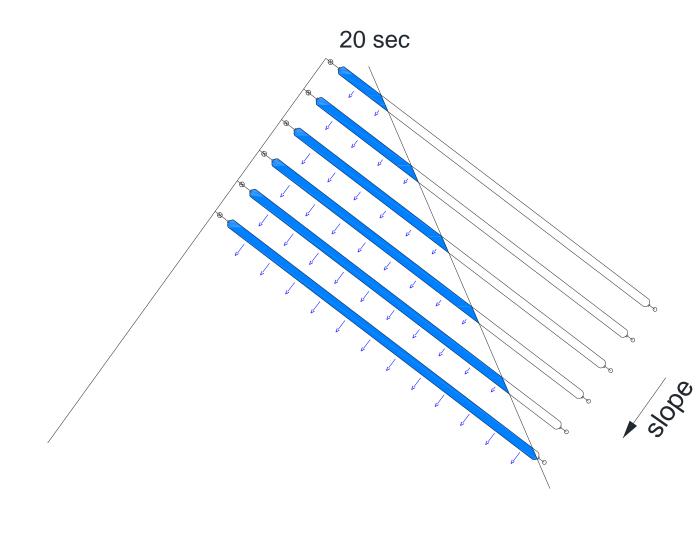








Q(gallons) @ time(minutes)



| Line                        | 1.0 min | 2.0 min | 3.0 min |
|-----------------------------|---------|---------|---------|
| 1                           | 2.0     | 8.7     | 15.4    |
| 2                           | 2.3     | 9.0     | 15.7    |
| 3                           | 2.8     | 9.5     | 16.2    |
| 4                           | 3.6     | 10.3    | 17.0    |
| 5                           | 4.6     | 11.3    | 18.0    |
| 6                           | 5.8     | 12.5    | 19.2    |
| Total                       | 21.1    | 61.3    | 101.5   |
| $\frac{Q_{6}-Q_{1}}{Q_{1}}$ | 190%    | 44%     | 25%     |

to the SHWT or to impervious layer.

4. Cover: The cover from the top of the LPP to the proposed gradient inches (6") to eighteen inches (18") (see § 6.84 and 6.85 of this Part, Fig.

5. All LPPs shall be timed-dosed, either by the timed-dosed technology precedin. Category 1 technology) or by incorporating a timed-dosed component as specified in 6.36(B) of this Part.

6. Flow differential between first  $(1^{st})$  and last orifice in the laterals: The maximum head differential between the first  $(1^{st})$  and last orifice on each lateral shall be no greater than fifteen percent (15%).

7. Pump events per day and maximum dose per LPP orifice: The number of dose events per day shall be between twelve (12) and twenty-four (24). The maximum dose per LPP orifice shall be one half (0.50) gallons.

Components of the LPP: LPPs shall also conform to other components in § 6.36(B) of "t: "Common components for all pressurized drainfields." 40 PVC or equivalent sweep elbows (also called "turnups") shall be attsch lateral to facilitate maintenance and inspection. A st

ARV

2000

ARV=Air/Vacuum Relief Valve