



BPU PRODUCT SPECIFICATIONS



Environmental Conservation Solutions, LLC.



Rethinking Water Management Systems

BPU Product Specifications

- **BPU** refers to a bundle pipe unit of 5-pipe HDPE plastics that form a trapezoidal-shaped subsurface reservoir with dimensions of top width, bottom width, and height per linear foot of BPU.
- The standard lengths of a single pipe or BPU are 42 in. (1067 mm) and 88 in. (2235 mm), referred to as **BPU-42** and **BPU-88**, respectively.
- Figure 1 (a) and (b) show a typical schematic of the two standard lengths of PIPE-R™ BPU system referred to as **BPU-42** and **BPU-88**, respectively.

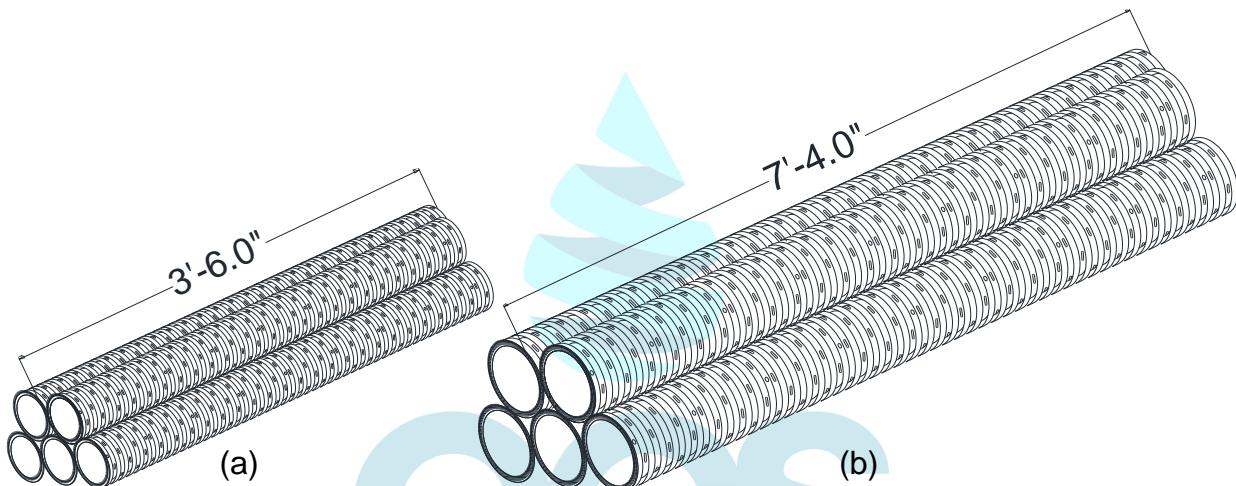


FIGURE 1 BPU SECTIONS OF TWO STANDARD LENGTHS NAMELY (A) BPU-42 AND (B) BPU-88

Multiple BPU Configurations

- Figure 2 shows a longitudinal section of a typical BPU lengths that is 8.625 inches (219mm) high. This is the typical depth of a single layer of a BPU.
- The heights are standard for all, but if there is the need to increase the depth of the system, then another unit of similar width can be placed on top of the previous one aligned 90° from the lower layer.
- The increase in height can be continued for a maximum of seven units for load bearing systems and 10 units for non-load bearing systems. Each addition in height and/or width increases the voids in the system and allows for more storage volume, if needed.
- There are six different combinations of BPUs that can be interlocked in the horizontal alignment to achieve wider spread. This capability can be achieved with either BPUs of **BPU-44** and **BPU-88**.

- These are: **BPU-0001**, **BPU-0003**, **BPU-0005**, **BPU-0007**, **BPU-0009**, and **BPU-0011**. The different configurations of BPUs are currently supported in the manufacturing process and are readily available.

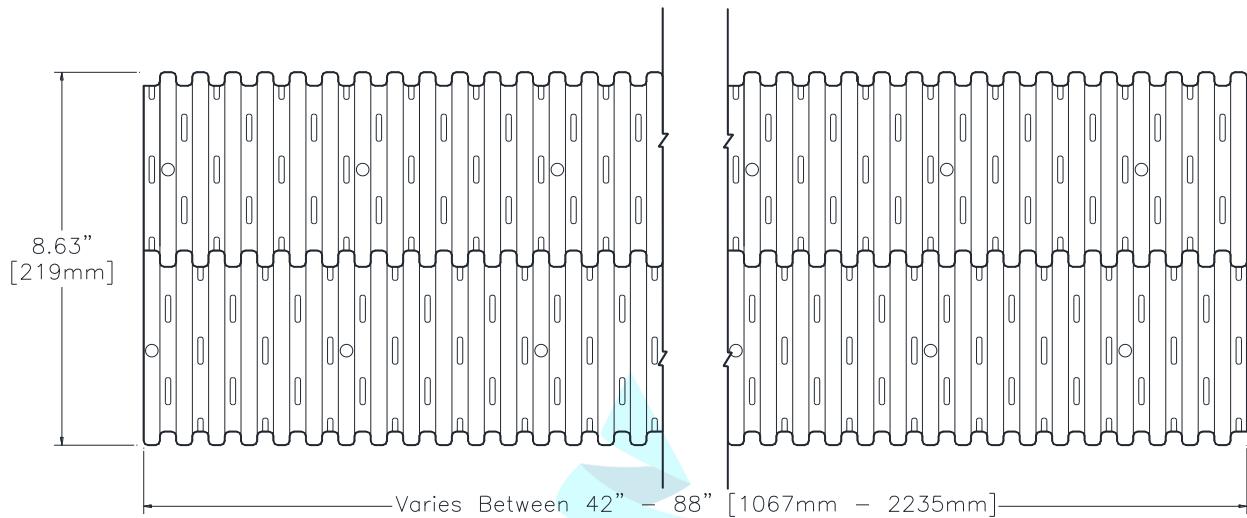


FIGURE 2 LONGITUDINAL SECTION OF A SINGLE LAYER BPU

- The cross sections of BPUs of a single layer with standard variations in the width of the PIPE-R™ reservoir system are shown in subsequent figures.
- The different configurations are the creation of a single 5-pipe BPU as **BPU-0001**. Each section is differentiated from the previous one by the addition of two interlocking 5-BPUs.

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BPU-0001 Reservoir System

- Figure 3 shows the cross section of **BPU-0001** reservoir unit with top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

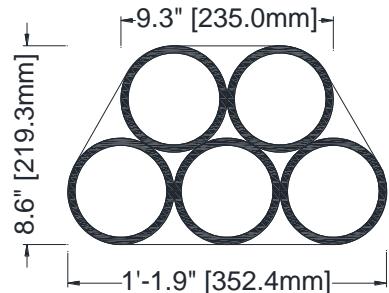


FIGURE 3 CROSS SECTION AND DIMENSIONS OF BPU-0001

- The volume occupied by a linear foot of **BPU-0001** reservoir unit is approximately 0.65 ft³/ft. (0.02 m³/m) with 96 percent void space available for storage (shown in Table 1).
- Also presented are the approximate weight of **BPU-0001** reservoir unit when empty and full with water.

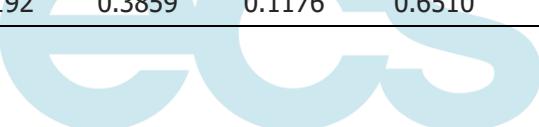
TABLE 1 PROPERTIES OF BPU-0001 RESERVOIR SYSTEM

Description	Geometry and Hydraulic Property
Size ($W_1 \times W_2 \times H$)	9.3" × 13.88" × 8.63" (235 × 352 × 219 mm)
Weight of Reservoir (empty)	1.7 lb. (0.77 kg)
Weight of Reservoir (full)	40.6 lb. (18.42 kg)
Reservoir Storage	0.65 ft ³ (0.02 m ³)

- The notations W_1 and W_2 are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 2 are the storage capacity at the corresponding stage heights and width of a **BPU-0001** reservoir unit reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4201** and **BPU-8801** reservoir units are 2.28 ft³ (0.065 m³) and 4.77 ft³ (0.14 m³), respectively.

TABLE 2 STORAGE CAPACITY OF BPU-0001 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft ³ /ft.	m ³ /m
1	0.0000	0.0000	0.7723	0.2354	0.0000	0.0000
2	0.0417	0.0127	1.0118	0.3084	0.0357	0.0010
3	0.0833	0.0254	1.0899	0.3322	0.0777	0.0022
4	0.1250	0.0381	1.1334	0.3455	0.1222	0.0035
5	0.1667	0.0508	1.1546	0.3519	0.1679	0.0048
6	0.2083	0.0635	1.1551	0.3521	0.2141	0.0061
7	0.2500	0.0762	1.1390	0.3472	0.2600	0.0074
8	0.2917	0.0889	1.1002	0.3353	0.3048	0.0086
9	0.3333	0.1016	1.0538	0.3212	0.3479	0.0099
10	0.3750	0.1143	1.0057	0.3065	0.3891	0.0110
11	0.4167	0.1270	0.9576	0.2919	0.4283	0.0121
12	0.4583	0.1397	0.9095	0.2772	0.4657	0.0132
13	0.5000	0.1524	0.8614	0.2626	0.5011	0.0142
14	0.5417	0.1651	0.8134	0.2479	0.5346	0.0151
15	0.5833	0.1778	0.7653	0.2333	0.5662	0.0160
16	0.6250	0.1905	0.7172	0.2186	0.5958	0.0169
17	0.6667	0.2032	0.6502	0.1982	0.6232	0.0176
18	0.7083	0.2159	0.5126	0.1563	0.6464	0.0183
19	0.7190	0.2192	0.3859	0.1176	0.6510	0.0184



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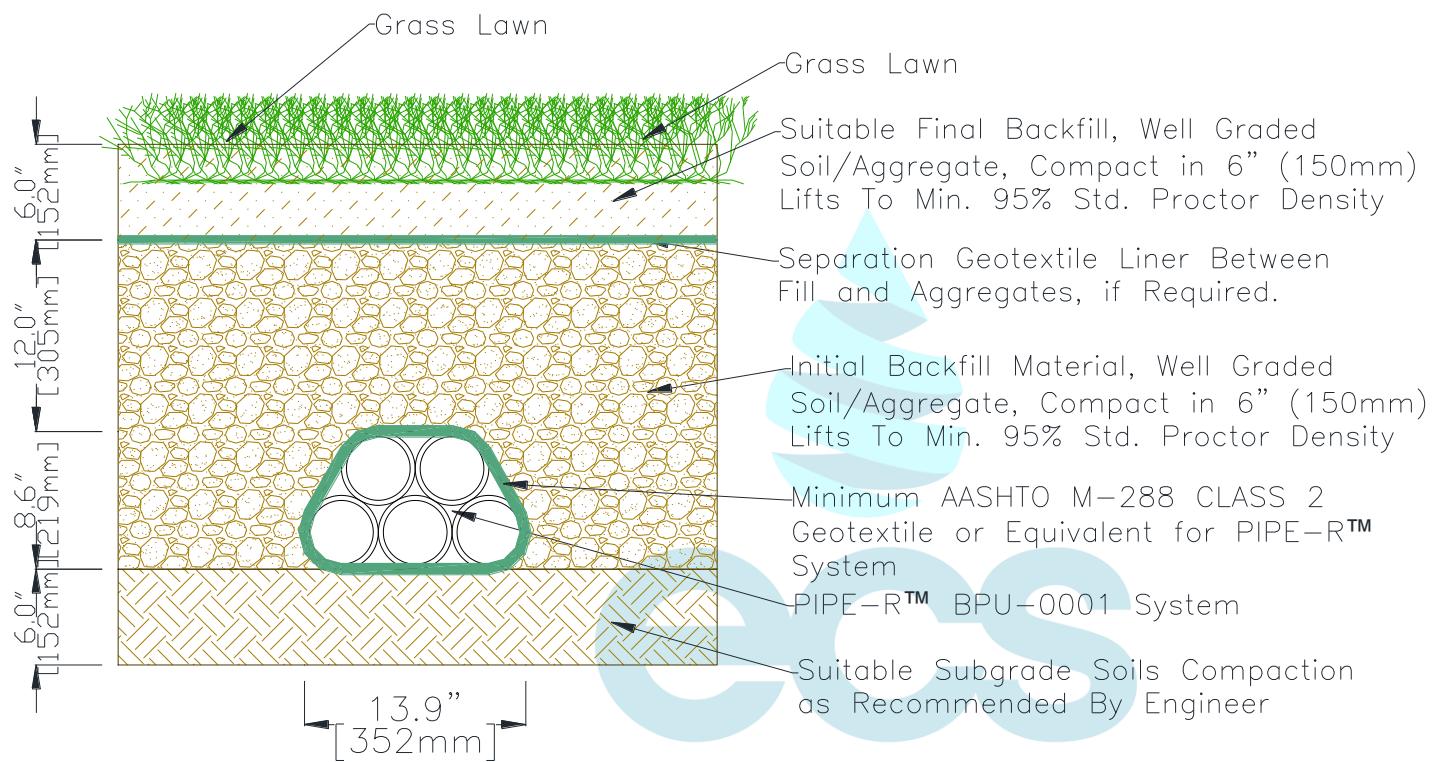


FIGURE 4 TYPICAL CROSS SECTION OF A BPU-0001 RESERVOIR SYSTEM

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BPU-0003 Reservoir System

- Figure 5 shows the cross section of **BPU-0003** reservoir unit top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

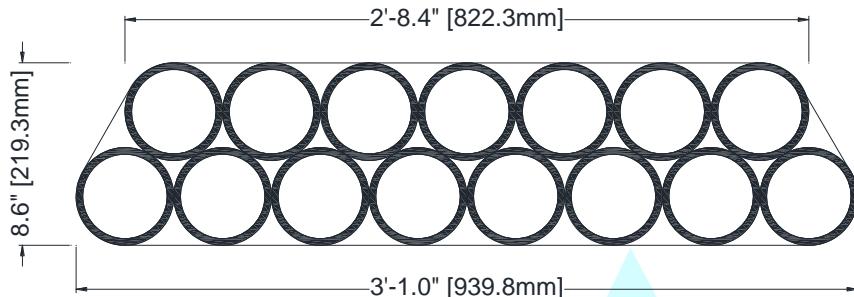


FIGURE 5 CROSS SECTION AND DIMENSIONS OF BPU-0003

- The volume occupied by a linear foot of **BPU-0003** reservoir unit is approximately 1.98 ft³/ft. (0.05 m³/m) with 96 percent void space available for storage (shown in Table 3).
- Also presented are the approximate weight of **BPU-0003** reservoir unit when empty and full with water.

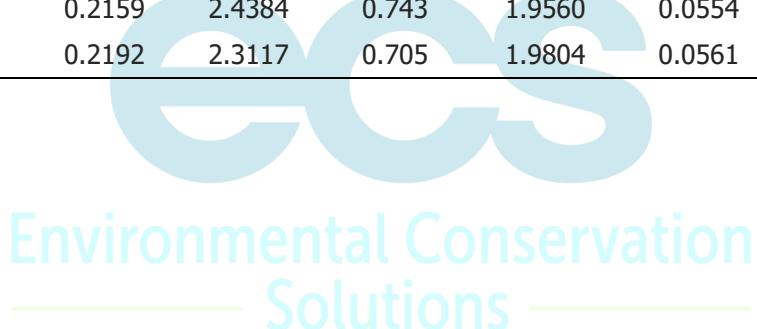
TABLE 3 PROPERTIES OF BPU-0003 RESERVOIR SYSTEM

Description	Geometry and Hydraulic Property
Size ($W_1 \times W_2 \times H$)	32.4" × 37" × 8.63" (934 × 939 × 219 mm)
Weight of Reservoir (empty)	5.0 lb. (2.25 kg)
Weight of Reservoir (full)	129.3 lb. (58.65 kg)
Reservoir Storage	1.98 ft ³ (0.05 m ³)

- The notations W_1 and W_2 are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 4 are the storage capacity at the corresponding stage heights and width of a **BPU-0003** reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4203** and **BPU-8803** reservoir units are 6.93 ft³ (0.196 m³) and 14.52 ft³ (0.41 m³), respectively.

TABLE 4 STORAGE CAPACITY OF BPU-0003 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft³/ft.	m³/m
1	0.0000	0.0000	2.6981	0.822	0.0000	0.0000
2	0.0417	0.0127	2.9376	0.895	0.1127	0.0032
3	0.0833	0.0254	3.0156	0.919	0.2318	0.0066
4	0.1250	0.0381	3.0592	0.932	0.3533	0.0100
5	0.1667	0.0508	3.0803	0.939	0.4761	0.0135
6	0.2083	0.0635	3.0808	0.939	0.5993	0.0170
7	0.2500	0.0762	3.0648	0.934	0.7222	0.0205
8	0.2917	0.0889	3.0276	0.923	0.8440	0.0239
9	0.3333	0.1016	2.9795	0.908	0.9642	0.0273
10	0.3750	0.1143	2.9315	0.894	1.0824	0.0307
11	0.4167	0.1270	2.8834	0.879	1.1987	0.0339
12	0.4583	0.1397	2.8353	0.864	1.3131	0.0372
13	0.5000	0.1524	2.7872	0.850	1.4255	0.0404
14	0.5417	0.1651	2.7391	0.835	1.5361	0.0435
15	0.5833	0.1778	2.6911	0.820	1.6447	0.0466
16	0.6250	0.1905	2.6430	0.806	1.7513	0.0496
17	0.6667	0.2032	2.5760	0.785	1.8557	0.0525
18	0.7083	0.2159	2.4384	0.743	1.9560	0.0554
19	0.7190	0.2192	2.3117	0.705	1.9804	0.0561



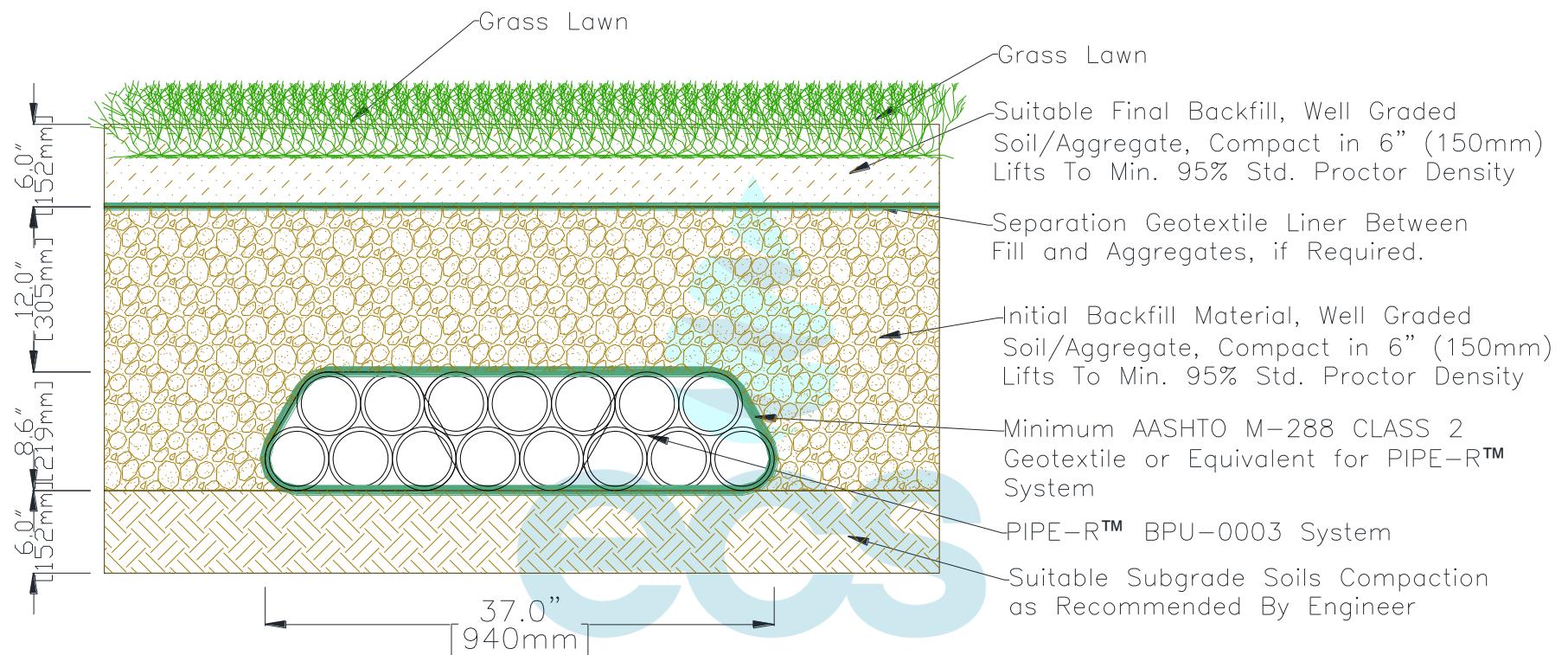


FIGURE 6 TYPICAL CROSS SECTION OF A BPU-0003 RESERVOIR SYSTEM

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BPU-0005 Reservoir System

- Figure 7 shows the cross section of **BPU-0005** reservoir unit with top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

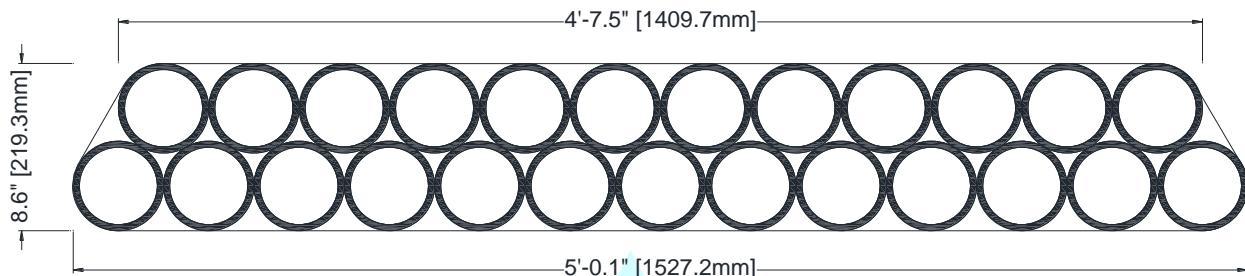


FIGURE 7 CROSS SECTION AND DIMENSIONS OF BPU-0005

- The volume occupied by a linear foot of **BPU-0005** reservoir unit is approximately 3.31 ft³/ft. (0.09 m³/m) with 96 percent void space available for storage (shown in Table 5).
- Also presented are the approximate weight of **BPU-0005** reservoir unit when empty and full with water.

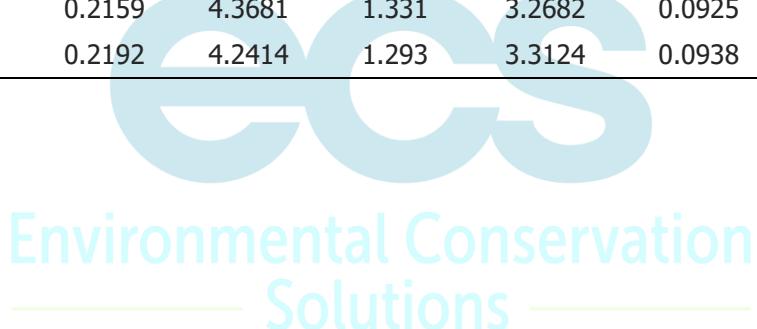
TABLE 5 PROPERTIES OF BPU-0005 RESERVOIR SYSTEM

Description	Geometry and Hydraulic Property
Size ($W_1 \times W_2 \times H$)	55.5" × 60.1" × 8.63" (1410 × 1527 × 219 mm)
Weight of Reservoir (empty)	8.3 lb. (3.74 kg)
Weight of Reservoir (full)	215.7 lb. (97.84 kg)
Reservoir Storage	3.31 ft ³ (0.09 m ³)

- The notations W_1 and W_2 are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 6 are the storage capacity at the corresponding stage heights and width of a **BPU-0005** reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4205** and **BPU-8805** reservoir units are 11.60 ft³ (0.33 m³) and 24.29 ft³ (0.69 m³), respectively.

TABLE 6 STORAGE CAPACITY OF BPU-0005 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft³/ft.	m³/m
1	0.0000	0.0000	4.6278	1.411	0.0000	0.0000
2	0.0417	0.0127	4.8673	1.484	0.1899	0.0054
3	0.0833	0.0254	4.9453	1.507	0.3862	0.0109
4	0.1250	0.0381	4.9889	1.521	0.5848	0.0166
5	0.1667	0.0508	5.0100	1.527	0.7848	0.0222
6	0.2083	0.0635	5.0105	1.527	0.9852	0.0279
7	0.2500	0.0762	4.9944	1.522	1.1853	0.0336
8	0.2917	0.0889	4.9573	1.511	1.3844	0.0392
9	0.3333	0.1016	4.9092	1.496	1.5817	0.0448
10	0.3750	0.1143	4.8611	1.482	1.7771	0.0503
11	0.4167	0.1270	4.8130	1.467	1.9706	0.0558
12	0.4583	0.1397	4.7650	1.452	2.1621	0.0612
13	0.5000	0.1524	4.7169	1.438	2.3518	0.0666
14	0.5417	0.1651	4.6688	1.423	2.5395	0.0719
15	0.5833	0.1778	4.6207	1.408	2.7253	0.0772
16	0.6250	0.1905	4.5727	1.394	2.9091	0.0824
17	0.6667	0.2032	4.5057	1.373	3.0907	0.0875
18	0.7083	0.2159	4.3681	1.331	3.2682	0.0925
19	0.7190	0.2192	4.2414	1.293	3.3124	0.0938



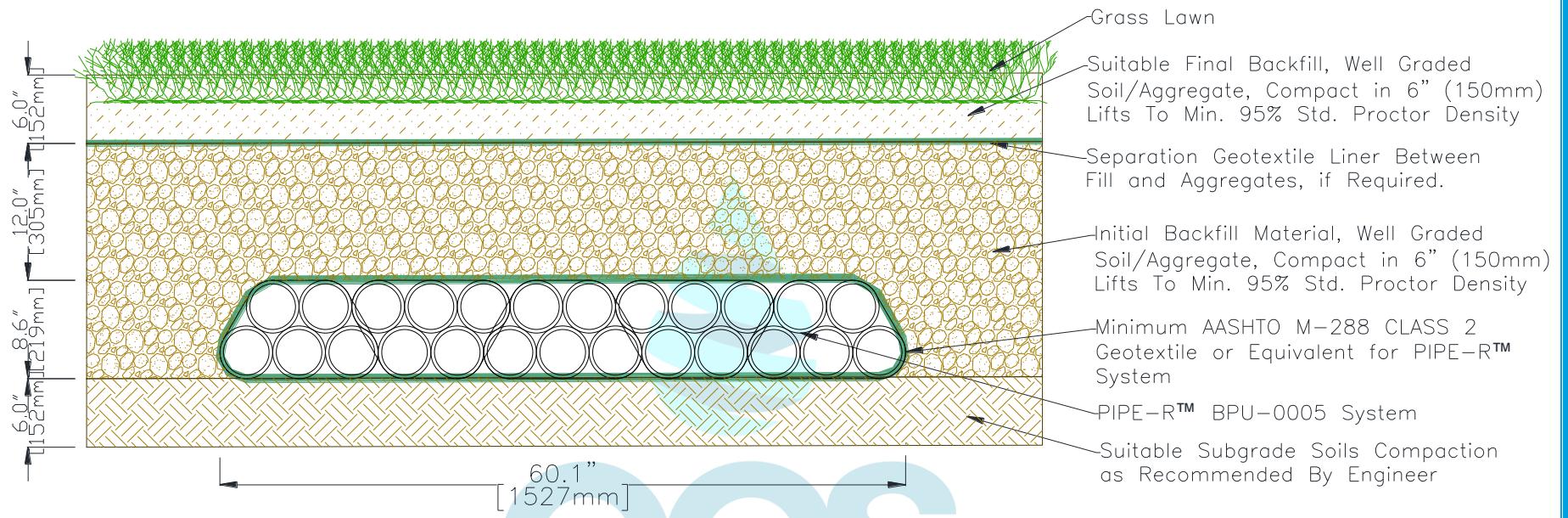


FIGURE 8 TYPICAL CROSS SECTION OF A BPU-0005 RESERVOIR SYSTEM

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BPU-0007 Reservoir System

- Figure 9 shows the cross section of **BPU-0007** reservoir unit with top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

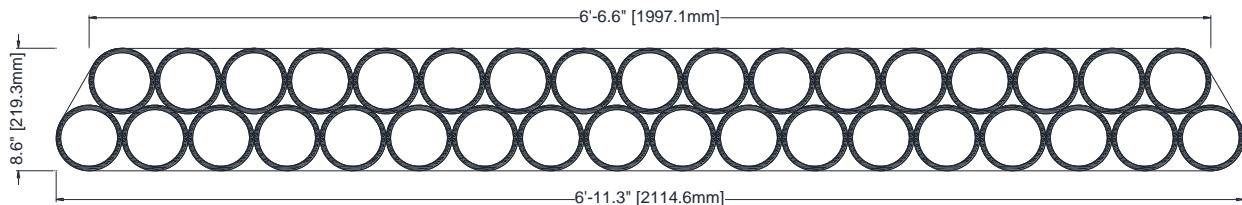


FIGURE 9 CROSS SECTION AND DIMENSIONS OF BPU-0007

- The volume occupied by a linear foot of **BPU-0007** reservoir unit is approximately 4.64 ft³/ft. (0.13 m³/m) with 96 percent void space available for storage (shown in Table 7).
- Also presented are the approximate weight of **BPU-0007** reservoir unit when empty and full with water.

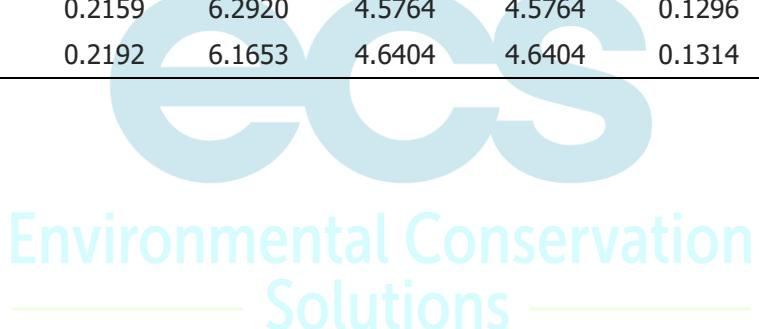
TABLE 7 PROPERTIES OF BPU-0007 RESERVOIR SYSTEM

Description	Geometry and Hydraulic Property
Size ($W_1 \times W_2 \times H$)	78.6" × 83.3" × 8.63" (1997 × 2115 × 219 mm)
Weight of Reservoir (empty)	11.6 lb. (5.24 kg)
Weight of Reservoir (full)	301.9 lb. (136.94 kg)
Reservoir Storage	4.64 ft ³ (0.13 m ³)

- The notations W_1 and W_2 are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 8 are the storage capacity at the corresponding stage heights and width of a **BPU-0007** reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4207** and **BPU-8807** reservoir units are 16.24 ft³ (0.46 m³) and 34.03 ft³ (0.96 m³), respectively.

TABLE 8 STORAGE CAPACITY OF BPU-0007 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft ³ /ft.	m ³ /m
1	0.0000	0.0000	6.5517	0.0000	0.0000	0.0000
2	0.0417	0.0127	6.7912	0.2669	0.2669	0.0076
3	0.0833	0.0254	6.8692	0.5401	0.5401	0.0153
4	0.1250	0.0381	6.9128	0.8157	0.8157	0.0231
5	0.1667	0.0508	6.9339	1.0926	1.0926	0.0309
6	0.2083	0.0635	6.9344	1.3700	1.3700	0.0388
7	0.2500	0.0762	6.9183	1.6471	1.6471	0.0466
8	0.2917	0.0889	6.8812	1.9230	1.9230	0.0545
9	0.3333	0.1016	6.8331	2.1973	2.1973	0.0622
10	0.3750	0.1143	6.7850	2.4697	2.4697	0.0699
11	0.4167	0.1270	6.7370	2.7401	2.7401	0.0776
12	0.4583	0.1397	6.6889	3.0087	3.0087	0.0852
13	0.5000	0.1524	6.6408	3.2752	3.2752	0.0927
14	0.5417	0.1651	6.5927	3.5399	3.5399	0.1002
15	0.5833	0.1778	6.5446	3.8027	3.8027	0.1077
16	0.6250	0.1905	6.4966	4.0635	4.0635	0.1151
17	0.6667	0.2032	6.4296	4.3220	4.3220	0.1224
18	0.7083	0.2159	6.2920	4.5764	4.5764	0.1296
19	0.7190	0.2192	6.1653	4.6404	4.6404	0.1314



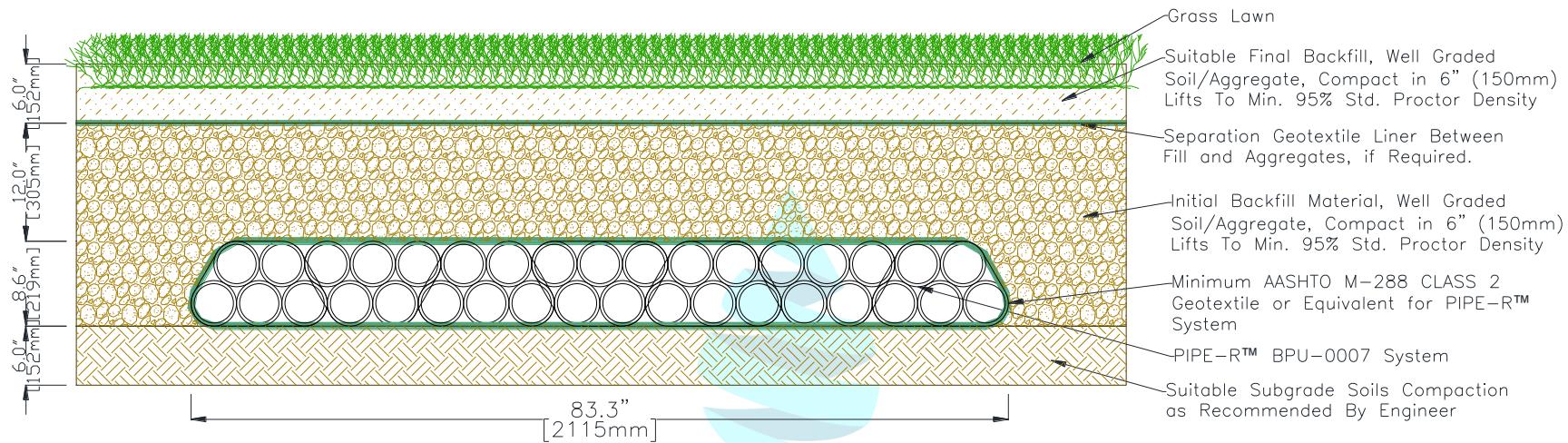


FIGURE 10 TYPICAL CROSS SECTION OF A BPU-0007 RESERVOIR SYSTEM

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BPU-0009 Reservoir System

- Figure 11 shows the cross section of **BPU-0009** reservoir unit with top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

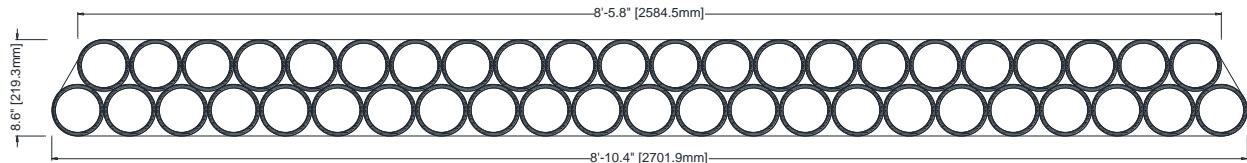


FIGURE 11 CROSS SECTION AND DIMENSIONS OF BPU-0009

- The volume occupied by a linear foot of **BPU-0009** reservoir unit is approximately 5.96 ft³/ft. (0.17 m³/m) with 96 percent void space available for storage (shown in Table 9).
- Also presented are the approximate weight of **BPU-0009** reservoir unit when empty and full with water.

TABLE 9 PROPERTIES OF BPU-0009 RESERVOIR SYSTEM

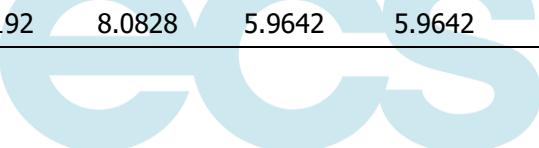
Description	Geometry and Hydraulic Property
Size (W ₁ × W ₂ × H)	101.8" × 106.2" × 8.63" (2585 × 2698 × 219 mm)
Weight of Reservoir (empty)	14.9 lb. (6.74 kg)
Weight of Reservoir (full)	387.8 lb. (175.90 kg)
Reservoir Storage	5.96 ft ³ (0.17 m ³)

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- The notations W₁ and W₂ are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 10 are the storage capacity at the corresponding stage heights and width of a **BPU-0009** reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4209** and **BPU-8809** reservoir units are 20.87 ft³ (0.59 m³) and 43.74 ft³ (1.24 m³), respectively.

TABLE 10 STORAGE CAPACITY OF BPU-0009 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft ³ /ft.	m ³ /m
1	0.0000	0.0000	8.4729	0.0000	0.0000	0.0000
2	0.0417	0.0127	8.7084	0.3436	0.3436	0.0097
3	0.0833	0.0254	8.7865	0.6935	0.6935	0.0196
4	0.1250	0.0381	8.8302	1.0459	1.0459	0.0296
5	0.1667	0.0508	8.8514	1.3995	1.3995	0.0396
6	0.2083	0.0635	8.8519	1.7536	1.7536	0.0497
7	0.2500	0.0762	8.8360	2.1073	2.1073	0.0597
8	0.2917	0.0889	8.7989	2.4600	2.4600	0.0697
9	0.3333	0.1016	8.7508	2.8110	2.8110	0.0796
10	0.3750	0.1143	8.7027	3.1601	3.1601	0.0895
11	0.4167	0.1270	8.6546	3.5072	3.5072	0.0993
12	0.4583	0.1397	8.6066	3.8524	3.8524	0.1091
13	0.5000	0.1524	8.5585	4.1957	4.1957	0.1188
14	0.5417	0.1651	8.5104	4.5371	4.5371	0.1285
15	0.5833	0.1778	8.4623	4.8766	4.8766	0.1381
16	0.6250	0.1905	8.4143	5.2141	5.2141	0.1476
17	0.6667	0.2032	8.3474	5.5493	5.5493	0.1571
18	0.7083	0.2159	8.2103	5.8805	5.8805	0.1665
19	0.7190	0.2192	8.0828	5.9642	5.9642	0.1689



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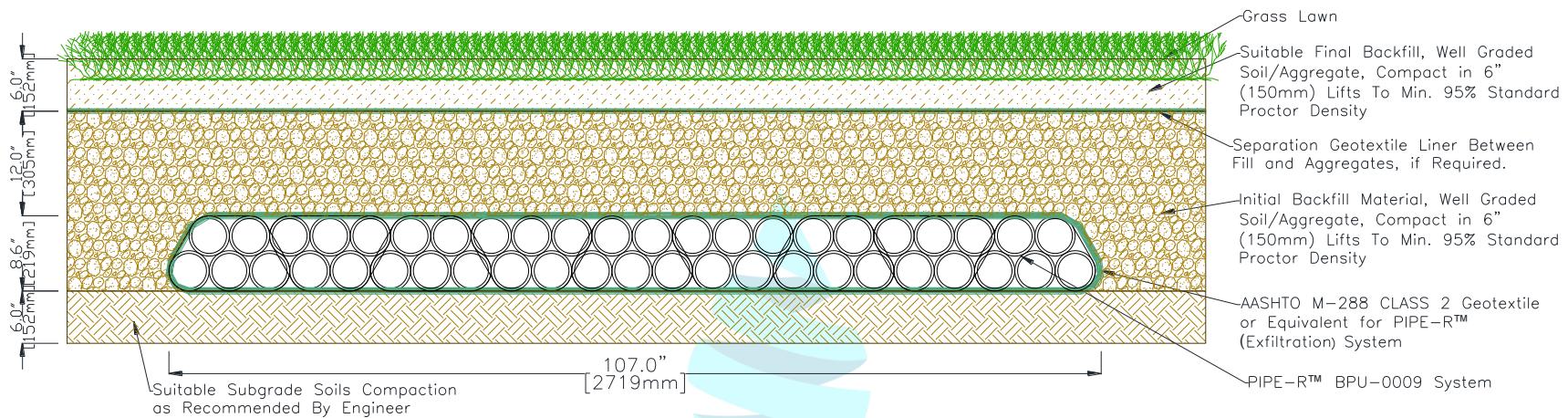


FIGURE 12 TYPICAL CROSS SECTION OF A BPU-0009 RESERVOIR SYSTEM

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BPU-0011 Reservoir System

- Figure 13 shows the cross section of **BPU-0011** reservoir unit with top width, bottom width and height dimensions. When wrapped in a geotextile liner, the percent of voids is 96% of the total volume occupied, which is available for storage.

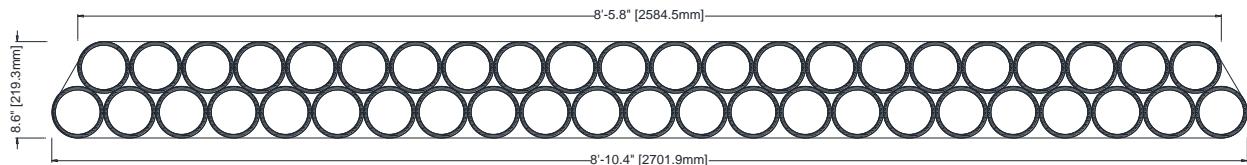


FIGURE 13 CROSS SECTION AND DIMENSIONS OF BPU-0011

- The volume occupied by a linear foot of **BPU-0011** reservoir unit is approximately 7.3 ft³/ft. (0.21 m³/m) with 96 percent void space available for storage (shown in Table 11).
- Also presented are the approximate weight of **BPU-0011** reservoir unit when empty and full with water.

TABLE 11 PROPERTIES OF BPU-0007 RESERVOIR SYSTEM

Description	Geometry and Hydraulic Property
Size ($W_1 \times W_2 \times H$)	124.9" × 129.5" × 8.63" (3171 × 3288 × 219 mm)
Weight of Reservoir (empty)	18.2 lb. (8.23 kg)
Weight of Reservoir (full)	474.6 lb. (215.27 kg)
Reservoir Storage	7.30 ft ³ (0.21 m ³)

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- The notations W_1 and W_2 are the top and bottom widths of the trapezoidal reservoir system, respectively.
- Provided in Table 12 are the storage capacity at the corresponding stage heights and width of a **BPU-0011** reservoir system wrapped in a geotextile liner.
- Storage capacities for **BPU-4211** and **BPU-8811** reservoir units are 25.55 ft³ (0.72 m³) and 53.54 ft³ (1.52 m³), respectively.

TABLE 12 STORAGE CAPACITY OF BPU-0011 WITH PAIRING OF STAGE HEIGHT TO SYSTEM WIDTH

Pairing	Stage Height		System Width		Storage Capacity	
	ft.	m	ft.	m	ft³/ft.	m³/m
1	0.0000	0.0000	10.4058	0.0000	0.0000	0.0000
2	0.0417	0.0127	10.6450	0.4210	0.4210	0.0119
3	0.0833	0.0254	10.7232	0.8484	0.8484	0.0240
4	0.1250	0.0381	10.7669	1.2782	1.2782	0.0362
5	0.1667	0.0508	10.7880	1.7093	1.7093	0.0484
6	0.2083	0.0635	10.7886	2.1408	2.1408	0.0606
7	0.2500	0.0762	10.7726	2.5720	2.5720	0.0728
8	0.2917	0.0889	10.7355	3.0022	3.0022	0.0850
9	0.3333	0.1016	10.6874	3.4307	3.4307	0.0971
10	0.3750	0.1143	10.6394	3.8572	3.8572	0.1092
11	0.4167	0.1270	10.5913	4.2818	4.2818	0.1212
12	0.4583	0.1397	10.5432	4.7045	4.7045	0.1332
13	0.5000	0.1524	10.4951	5.1253	5.1253	0.1451
14	0.5417	0.1651	10.4470	5.5441	5.5441	0.1570
15	0.5833	0.1778	10.3990	5.9610	5.9610	0.1688
16	0.6250	0.1905	10.3509	6.3760	6.3760	0.1805
17	0.6667	0.2032	10.2840	6.7887	6.7887	0.1922
18	0.7083	0.2159	10.1470	7.1973	7.1973	0.2038
19	0.7190	0.2192	10.0195	7.3009	7.3009	0.2067

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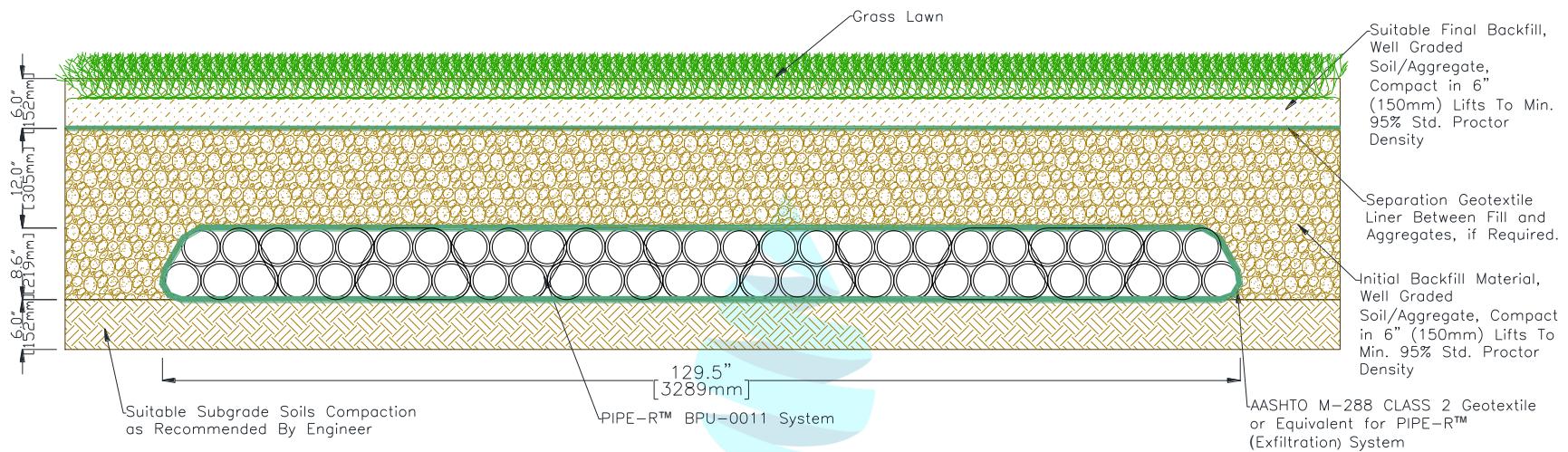


FIGURE 14 TYPICAL CROSS SECTION OF A BPU-0011 RESERVOIR SYSTEM

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