Stormwater Solutions / Storage / **Chambers**

HydroStor®

Construction Guide



PRINSCO
WATER MANAGEMENT SOLUTIONS

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Introduction

To ensure a trouble-free installation, it is essential that the installer is familiar with the minimum requirements specified in this guide.

Adherence to this guide is necessary to maintain the structural integrity of the HydroStor Chamber system. In addition, the chamber supplier, chamber installer (site contractor), and the design engineer may meet for a pre-construction meeting to discuss any questions relating to the installation process and the guidelines herein.

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Material and Equipment Checklist

Materials

- ❑ HydroStor chambers and end caps
- ❑ Woven and non-woven geotextiles
- ❑ Manifold pipe, fittings and couplers
- ❑ Acceptable backfill material found in Table 2 on page 14
- ❑ Pre-treatment system
- ❑ Inlet diversion structure for sediment row (optional)
- ❑ PVC pipe and fittings for inspection port (optional)

Equipment

- ❑ Forklift equipment for pallet dimensions below:

		Dimensions	*Weight (approximate)*
HS31	*Chambers*	*70" x 91" (178 cm x 230 cm)*	*3,380 lbs. (1,530 kg)*
	End Caps	*54" x 38" (137 cm x 97 cm)*	*270 lbs. (120 kg)*
HS75	*Chambers*	*52" x 88" (131 cm x 223 cm)*	*2,360 lbs. (1,070 kg)*
	End Caps	*55" x 38" (140 cm x 97 cm)*	*310 lbs. (140 kg)*
HS180	*Chambers*	*78" x 89" (199 cm x 227 cm)*	*2,500 lbs. (1,140 kg)*
	End Caps	*79" x 52" (201 cm x 132 cm)*	*700 lbs. (320 kg)*
HS290	*Chambers*	*102" x 54" (259 cm x 137 cm)*	*1,350 lbs. (610 kg)*
	End Caps	*95" x 75" (241 cm x 191 cm)*	*1,000 lbs. (450 kg)*

- ❑ Reciprocating saw or hole saw for coring holes in end caps/chambers
- ❑ Approved compaction equipment
- ❑ Excavator to dig trench and place stone and soil backfill
- ❑ Stone conveyor/lightweight tracked dozer not exceeding 4.5 psi (31 kPa) to grade backfill
- ❑ Wire cutters
- ❑ Transit/laser level

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Handling

Receiving

- Visually inspect chambers and end caps for damage.
- Ensure accurate quantities.



Unloading

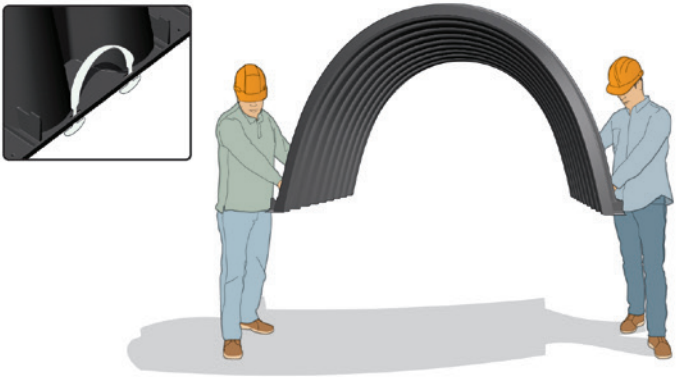
- Unload chamber pallets using forklift.

Use a forklift with a minimum of 72" (1.8 m) forks when unloading the chamber pallets.



Moving

- Use handles on each side of larger chambers when moving.



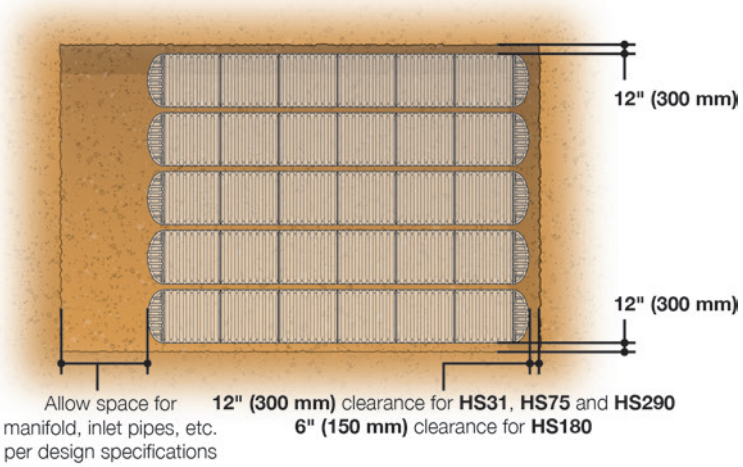
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Subgrade and Foundation Preparation

Excavation

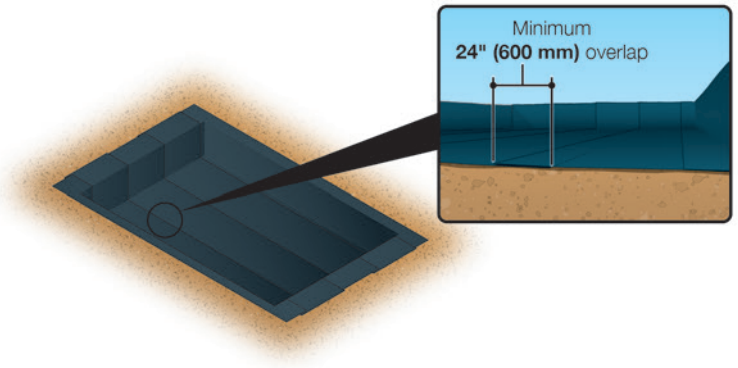
- Excavate area according to project plans.
- Maintain required clearance around chamber system (see illustration below for minimum clearance).

> ⚠ If subgrade is wet or unstable, take appropriate measures to correct. Consult design engineer if necessary.



Placing Geotextile

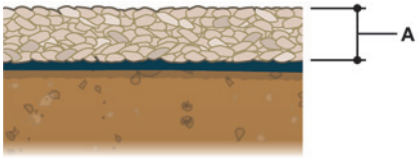
- Place an AASHTO M288 Class 2 or Class 3 non-woven geotextile on foundation bottom and sidewalls; overlap all seams 24" (600 mm).



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Placing Foundation

- Place base of ¾" - 2" (19-51 mm) clean, crushed, angular stone over geotextile.
- Maintain depth as indicated on project plans (see chart below).



Chamber	Foundation Stone Depth (A)
HS31	6" (150 mm) minimum
HS75	6" (150 mm) minimum
HS180	9" (230 mm) minimum
HS290	9" (230 mm) minimum

Minimum foundation depths are shown in the table above. The site design engineer or geotechnical engineer should verify the subgrade bearing capacity. Additional foundation stone may be required based on the bearing capacity and cover height.

- Compact stone with a vibratory compactor.

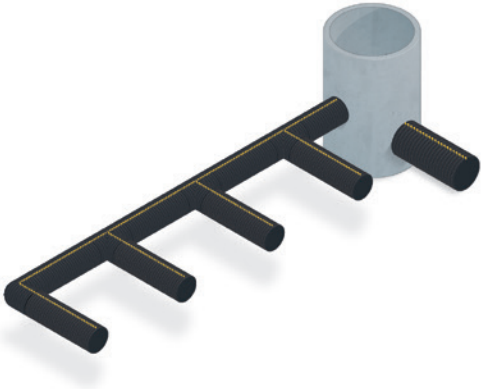


- Install perimeter underdrain if specified on project plans.

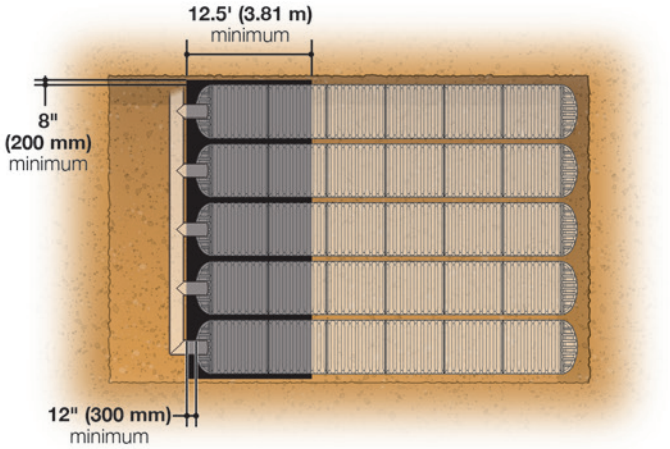
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Manifold Assembly

- Assemble manifold system according to project plans.



- To alleviate scour at inlets, lay a strip of AASHTO M288 Class 1 woven geotextile with a minimum width of 12.5 ft. (3.81 m) under inlets as specified in the project plans.

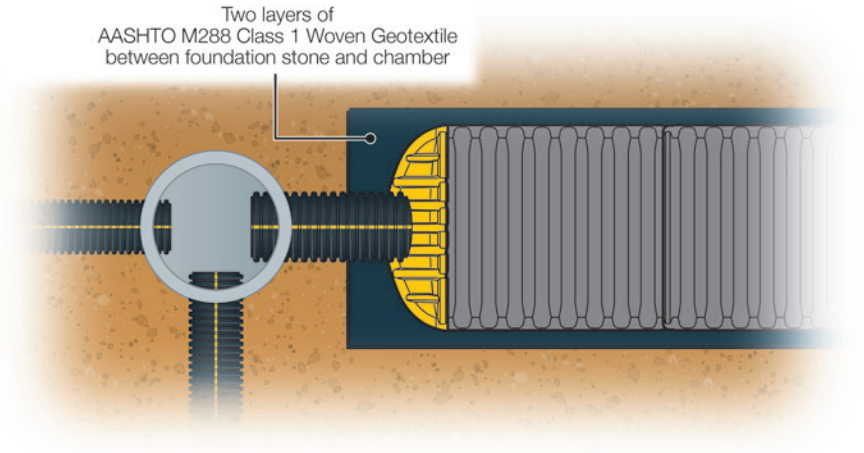


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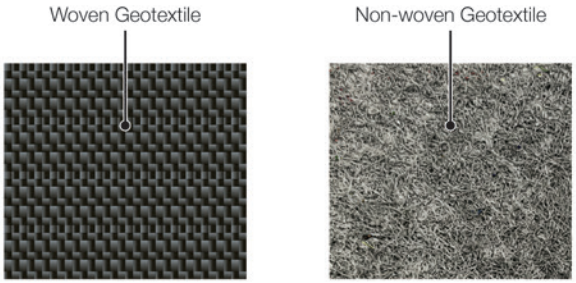
Pre-Treatment/Sediment Row

Prinsco recommends pretreatment of stormwater runoff using a Prinsco Water Quality Unit and/or sediment row. Review design plan for installation.

- If specified in the design plans, installation of the sediment row fabric may begin after the foundation has been placed.
- The sediment row(s) consist of a row of chambers installed directly over two layers of AASHTO Class 1 woven geotextile, in accordance with the project plans and applicable detail drawings.

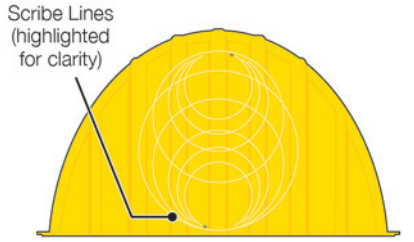


Woven vs. Non-woven Geotextiles



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End Cap and Chamber Assembly



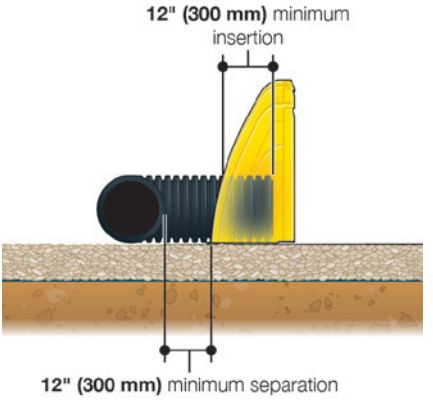
Connecting End Caps to Manifold

For prefabricated end cap/ inlet:

- Connect to manifold using split coupler.

For on-site end cap/inlet fabrication:

- Core an opening in the end cap the same size as the inlet pipe, using the indicated scribe lines as a guide.
- Insert inlet pipe a minimum of 12 in. (300 mm) into end cap.
- Cover any voids greater than ¾ in. (19 mm) with non-woven geotextile.



- Connect to manifold using split coupler.

Adding Chambers

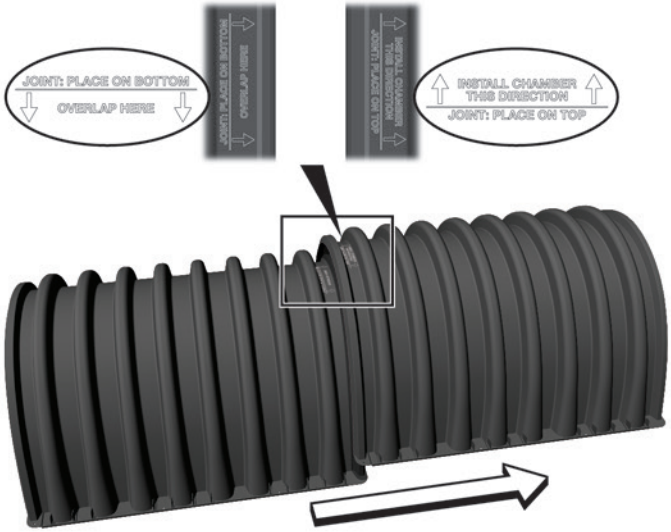
Note overlap and orientation instructions labeled on chamber ends (see illustration on next page).

- Place first corrugation of chamber under end cap, following direction arrow on chamber end.

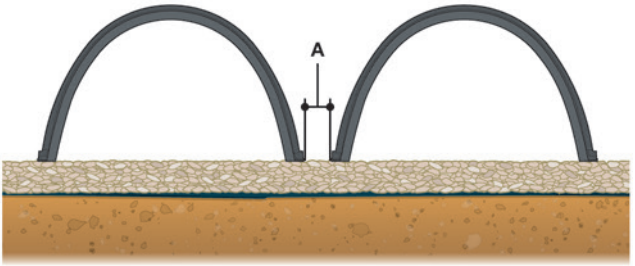


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- Assemble each row by placing following chamber on top of previous chamber.



- Maintain required minimum row spacing (see chart below).
- Use a spacer block to maintain chamber spacing throughout.



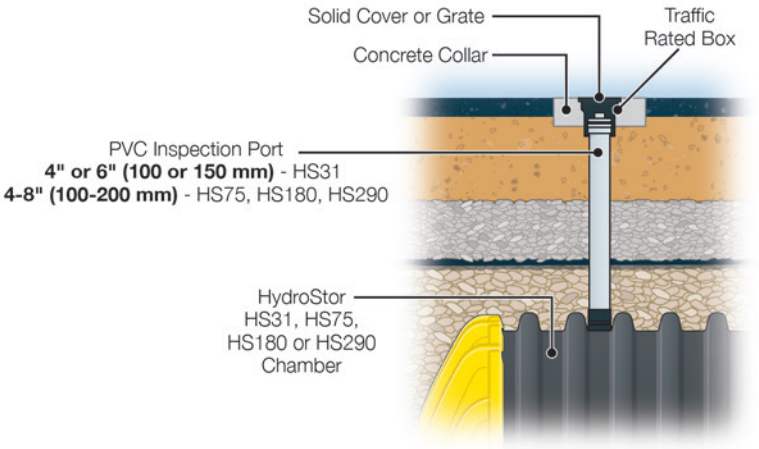
Chamber	Distance Between Chambers (A)
HS31	3" (75 mm) minimum
HS75	6" (150 mm) minimum
HS180	5" (130 mm) minimum
HS290	8.5" (220 mm) minimum

- Row assembly should not exceed reach of backfill placement equipment.
- Terminate each row with end cap.

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Inspection Port Placement

- Identify chamber(s) to be fitted with inspection port(s).
- Cut a 4-8" (100-200 mm) diameter opening at the appropriate location(s) per the design plans.
- Build inspection port(s) using a tap tee connection to join Sch 40 or SDR 35 PVC pipe and fittings.



Chamber Backfill Process

Embedment Stone

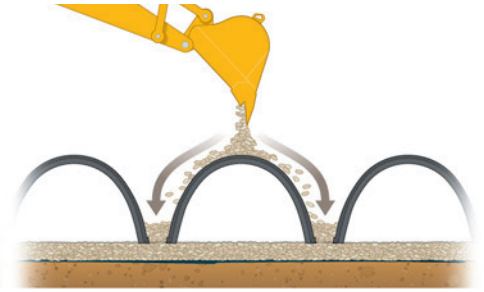
Review Tables 1 and 2 for more details on allowable backfill and equipment prior to beginning.

No construction equipment shall be situated atop of the chamber system.

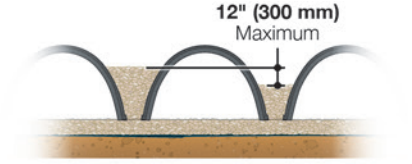
- Use ¾" - 2" (19-51 mm) particle size, washed, crushed, angular stone.

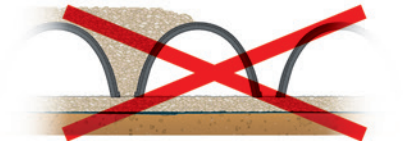
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- Carefully deposit embedment stone along chamber centerline using excavator or stone shooter.

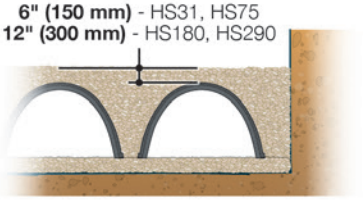


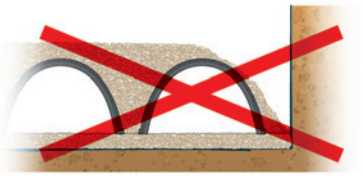
- Stone height between rows and sidewalls should not differ by more than 12" (300 mm).





- Embedment stone minimum cover height: 6" (150 mm) for HS31 and HS75, and 12" (300 mm) for HS180 and HS290.

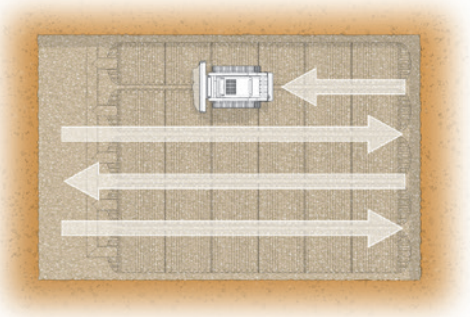




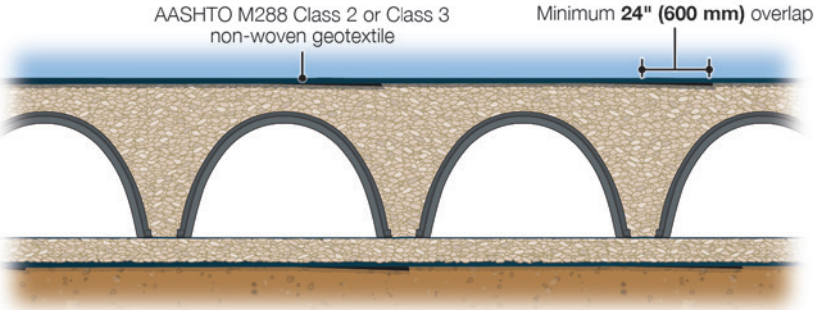
Wheel and Roller Loads Not Allowed. Minimum of 6" (150 mm) of cover for HS31 and HS75 chambers, and a minimum of 12" (300 mm) of cover for HS180 and HS290 chambers before a skid loader or small dozer is allowed over chambers.

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- Finalize grading with tracked dozer with ground pressure less than 4.5 psi. (31 kPa), running dozer parallel to rows at all times.



- Cover with AASHTO M288 Class 2 or Class 3 non-woven geotextile; overlap all seams 24" (600 mm).



Initial Backfill

- With an excavator or rock shooter positioned off the bed, add a layer of well-graded granular material to a height above the embedment stone of 10" (250 mm) for the HS31, 12" (300 mm) for the HS75 and HS290, and 6" (150 mm) for the HS180.
- Compaction can then begin with travel parallel with chamber rows. Refer to Tables 2 and 3 for more information on compaction and loads allowed.

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Final Backfill

- Refer to design plans for final backfill specifications.

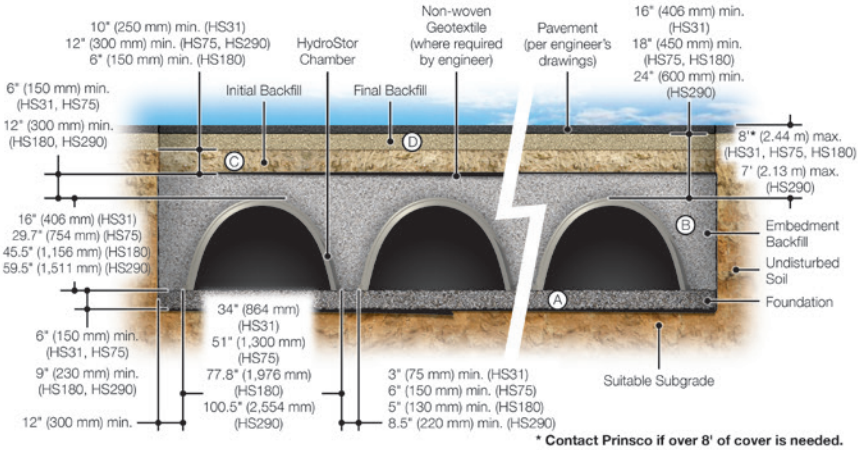


Table 1 - Backfill Materials

Fill Material Location	Material Description	AASHTO M43 Designation
[D] Final Backfill - Fill material for Layer D starts at the top of the C layer to the bottom of the pavement or to the finished grade of an unpaved surface. The pavement sub-base may be part of the final backfill.	Any backfill which provides adequate subgrade for the project per the engineer's plans. Plans shall indicate subgrade requirements.	N/A
[C] Initial Backfill - Material for layer C has a depth of 10" (250 mm) for the HS31, 12" (300 mm) for the HS75 and HS290, and 6" (150 mm) for the HS180 starting at the top of the embedment zone (layer B). The pavement sub-base may be part of the initial backfill layer.	Well graded granular material, <35% fines.	AASHTO M45 A-1, A-2, A-3 or AASHTO M43 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9,10
[B] Embedment Stone - Embedment stone will surround the chambers and extends from the top of the foundation stone (layer A) to the bottom of the fabric layer.	3/4" to 2" (19 to 51 mm) washed, crushed, angular stone.	AASHTO M43 3, 357, 4, 467, 5, 56, 57
[A] Foundation Stone - Foundation Stone extends from the subgrade to the foot of the chambers.	3/4" to 2" (19 to 51 mm) washed, crushed, angular stone.	AASHTO M43 3, 357, 4, 467, 5, 56, 57

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Table 2 - Placement Methods

Fill Material Location	Placement Methods / Restrictions	Compaction Requirements	
[D] Final Backfill	A variety of placement methods may be used. All construction loads must not exceed the limits in Table 3 on page 15.	Subgrade will be placed and compacted to the requirements as shown on the site plans.	
[C] Initial Backfill	Use of an excavator positioned off bed is recommended. Small excavators and small dozers may be allowed based on the information in Table 3 on page 15.	**For HS31 and HS75:** Compaction will not begin until a minimum 16" (406 mm) and 18" (450 mm) for the HS31 and HS75 chamber, respectively, of material is placed over the chambers. Additional layers shall be compacted in 6" (150 mm) lifts to a minimum of 95% standard proctor density for well graded material.	**For HS180 and HS290:** Compaction will not begin until a minimum 18" (450 mm) and 24" (600 mm) for the HS180 and HS290 chamber, respectively, of material is placed over the chambers. Additional layers shall be compacted in 12" (300 mm) lifts to a minimum of 95% standard proctor density for well graded material.
		Roller gross vehicles are not to exceed 12,000 lbf (53.38 kN) and dynamic force not to exceed 20,000 lbf (88.96 kN).	
[B] Embedment Stone	No equipment is allowed on bare chambers. Use excavator or stone conveyor positioned off bed to evenly place the backfill around and on top of all of the chambers.	No compaction required	
[A] Foundation Stone	Placement with a variety of equipment is acceptable to provide a stable, level base.	**For HS31 and HS75:** Placed in 6" (150 mm) lifts and compacted with a vibratory roller.	**For HS180 and HS290:** Placed in 9" (230 mm) lifts and compacted with a vibratory roller.

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Table 3 - Construction Loading

Material Location	Fill Depth Above Chambers in. (mm)		Max Allowable Wheels Loads		Max Allowable Track Loads		Max Allowable Roller Loads
			Max Single/ Tandem Axle Load for Trucks lbf (kN)	Max Wheel Load for Loaders lbf (kN)	Track Width in. (mm)	Max Ground Pressure psf (kPa)	Max Drum Weight Dynamic Force lbf (kN)
[D] Final Fill Material	36" (900) Compacted	**HS31 HS75**	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	3,900 (186.73) 2,650 (126.88) 2,050 (98.15) 1,700 (81.40) 1,475 (70.62)	38,000 (169)
		HS180 HS290	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	4,050 (193.92) 2,775 (132.87) 2,150 (102.94) 1,775 (84.99) 1,550 (74.21)	38,000 (169)
[C] Initial Fill	24" (600) Compacted	**HS31 HS75**	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,700 (129.28) 1,900 (90.97) 1,500 (71.82) 1,300 (62.24) 1,150 (55.06)	20,000 (89)
		HS180 HS290	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,750 (131.67) 1,925 (92.17) 1,525 (73.02) 1,325 (63.44) 1,200 (57.46)	20,000 (89)
	24" (600) Dumped	**HS31 HS75**	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,400 (114.91) 1,700 (81.40) 1,375 (65.84) 1,200 (57.46) 1,100 (52.67)	**HS31/HS75:** 20,000 (89) Gross weight of roller not to exceed 12,000 lbs (5,443 kg)
		HS180 HS290	24,000 (107)/ 18,750 (83)	12,000 (53)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,450 (117.31) 1,750 (83.79) 1,400 (67.03) 1,225 (58.65) 1,100 (52.67)	**HS180/HS290:** 16,000 (71) Gross weight of roller not to exceed 12,000 lbs (5,443 kg)
	18" (450)	**HS31 HS75**	32,000 (142)/ 25,000 (111)	16,000 (71)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,125 (101.75) 1,525 (73.02) 1,250 (59.85) 1,100 (52.67) 1,025 (49.08)	**HS31/HS75:** 20,000 (89) Gross weight of roller not to exceed 12,000 lbs (5,443 kg)
		HS180 HS290	24,000 (107)/ 18,750 (83)	12,000 (53)	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	2,150 (102.94) 1,550 (74.21) 1,275 (61.05) 1,125 (53.87) 1,050 (50.27)	**HS180/HS290:** 5,000 (22) Gross weight of roller not to exceed 12,000 lbs (5,443 kg)
[B] Embedment Zone	12" (300)	**HS31 HS75**	16,000 (71)/ 12,500 (56)	Not Allowed	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	1,540 (73.74) 1,190 (56.98) 1,010 (48.36) 910 (43.57) 850 (40.70)	**HS31/HS75:** 20,000 (89) Gross weight of roller not to exceed 12,000 lbs (5,443 kg)
		HS180 HS290	Not Allowed	Not Allowed	12" (300) 18" (450) 24" (600) 30" (750)	1,100 (52.67) 715 (34.23) 660 (31.60) 580 (27.77)	Not Allowed
	6" (150)	**HS31 HS75**	8,000 (36)/ 6,250 (28)	Not Allowed	12" (300) 18" (450) 24" (600) 30" (750) 36" (900)	1,070 (51.23) 900 (43.09) 800 (38.30) 760 (36.39) 725 (34.71)	Not Allowed
		HS180 HS290	Not Allowed	Not Allowed	12" (300) 18" (450) 24" (600) 30" (750)	Not Allowed	Not Allowed

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Notes:

1. 36" (900 mm) of stabilized cover is required over chambers before full dump trucks may travel and dump on chamber system.
2. To calculate the ground pressures for small tracked dozers, determine the vehicle operating weight and divide by total ground contact area for both tracks. The ground pressures for tracked excavators will be greater due to the loaded bucket weight and boom extension.
3. Allowable track loads based on the vehicle travel only. Excavators shall not operate on chamber beds until a minimum of 3 feet (900 mm) of stabilized cover has been placed over the chambers.
4. Mini excavators (<8,000 lbs. [3,629 kg]) can be used with at least 12" (300 mm) of stone cover over the chambers and are limited based on the ground pressures shown in Table 3 on page 15.
5. During paving operations, loaded dump trucks at minimum cover heights may be necessary. Precautions must be taken to ensure that rutting of the sub-base layer does not occur, that minimum cover heights are met, and that adequate compaction of the sub-base is maintained. Refer to Table 3 on page 15 or contact your local Prinsco Representative for more information about allowable axle loads.
6. Construction materials, excess equipment, or spoil piles should not be positioned over a HydroStor chamber system. For equipment not listed in Table 3 on page 15, contact your Local Prinsco Representative for more information.
7. Compaction of the initial backfill layer should not begin until the minimum cover over the chambers has been reached (minimum 16" [406 mm] for HS31, minimum 18" [450 mm] for HS75 and HS180, and minimum 24" [600 mm] for HS290).

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Notes:

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HS31	HS75		HS180	HS290
29.6 ft³(.84 m³) per chamber	75 ft³ (2.12 m³) per chamber	Installed Storage Capacity*	176 ft³(5.0 m³) per chamber	164.5 ft³(4.66 m³) per chamber
16" (406 mm)	29.7" (754 mm)	Height	45.5" (1,156 mm)	59.5" (1,511 mm)
34" (864 mm)	51" (1,300 mm)	Width	77.8" (1,976 mm)	100.5" (2,554 mm)
87.3" (2,220 mm)	87.1" (2,210 mm)	Unit Length	88.7" (2,253 mm)	51.8" (1,317 mm)
85.5" (2,170 mm)	84.9" (2,160 mm)	Installed Length	85.3" (2,167 mm)	48.3" (1,227 mm)
34 lbs (15 kg)	69 lbs (31 kg)	Weight	122 lbs (55.3 kg)	112 lbs (50.8 kg)
90	33	Chambers/Pallet	19	10
PP	PP	Material	PP	PP
Injection Molding	Injection Molding	Mfg. Process	Injection Molding	Injection Molding
Lightweight Option	Lightweight Option	Special Features	Lightweight Option	Lightweight Option
Meets or Exceeds	Meets or Exceeds	ASTM Standards	Meets or Exceeds	Meets or Exceeds
6" (150 mm)	6" (150 mm)	Minimum Backfill Above Chamber	12" (300 mm)	12" (300 mm)
6" (150 mm)	6" (150 mm)	Minimum Bedding	9" (230 mm)	9" (230 mm)
3" (75 mm)	6" (150 mm)	Minimum Chamber Spacing	5" (130 mm)	8.5" (220 mm)
34" (864 mm)	51" (1,300 mm)	Chamber Width	77.8" (1,976 mm)	100.5" (2,554 mm)
12" (300 mm)	12" (300 mm)	Backfill At Edge Of System	12" (300 mm)	12" (300 mm)
16" (406 mm)	18" (450 mm)	Minimum Cover	18" (450 mm)	24" (600 mm)
8' (2.44 m)	8' (2.44 m)	Maximum Burial Depth	8' (2.44 m)	7' (2.13 m)

** Assuming 40% void volume with minimum spacing, foundation stone, embedment stone, and side spacing for all chambers.*

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