

FIBERGLASS WETWELL

Installation Instructions

including Lift Stations, Vertical Pump Vaults and Basins



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FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

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INTRODUCTION

These instructions, while using the word "wetwell", will pertain to all wetwells, lift stations, vertical pump vaults and basins.

SAFETY

These instructions should not be interpreted in any way to put one's health at risk, or to harm property and/or the environment.

The following definitions will serve as a guide when reading this manual:

⚠ WARNING

Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation, which if not avoided may result in minor or moderate injury.

CAUTION

A caution without the safety alert symbol indicates a potentially hazardous situation, which if not avoided may result in property damage.

IMPORTANT INFORMATION

Proper installation of each wetwell is essential:

- To ensure the safety of all the individuals involved in the installation.
- To prevent wetwell damage and/or failure, which could lead to product loss and environmental contamination.
- To validate the wetwell warranty.

GENERAL INFORMATION

⚠ WARNING

Wetwells are a confined space per OSHA guidelines. Follow proper confined space safety procedures.

Containment Solutions fiberglass wetwells are designed for installation with concrete top pad and bottom slabs. The following instructions reflect the approved methods for installing wetwells. Follow all OSHA, Federal, State, Local or Provincial, safety and environmental codes and regulations

WETWELL WARRANTY ACTIVATION

- These instructions must be followed.
- The Wetwell Installation Checklist must be properly completed and signed by the owner's representative and the installing contractor.
- The Wetwell Installation Checklist, these instructions, and any correspondence related to the wetwell installation must be retained by the owner and provided to CSI to validate any future warranty claim.

The warranty in effect at the time of delivery will apply and is available from Containment Solutions.

FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

BEFORE YOU BEGIN

- Read, understand and follow these instructions.
- Barricade the work area.
- Review and prepare to complete the installation checklist as the installation progresses.

If you have questions on other wetwell installation details, call Technical Support at 800-537-4730.

A. HANDLING AND PREPARATION

⚠ WARNING

Do not stand on or under wetwell while it is being lifted. This could result in personal injury or death.

- Do not drop or impact the wetwell.
- Wetwells should be stored horizontally and chocked, using only appropriate materials such as sandbags, tires, or other soft or pliable materials.
- Upon wetwell delivery and when lifting wetwell, visually inspect entire exterior surface of the wetwell for shipping or handling damage.
- If the wetwell must be moved by rolling, ensure that ground to be traversed is smooth and free of rocks, debris, or other hard objects.
- Do not roll or set the wetwell on any pipe stubout, accessory or appurtenance installed on the wetwell.
- The contractor is responsible for rigging, unloading and securing the wetwell.
- When lifting the wetwell in the horizontal position, use two slings with a spreader bar.
- Use a minimum of two lift lugs when pivoting the wetwell from horizontal to vertical.
- Utilize all lift lugs provided at the wetwell top for vertical lifting.
- Only a pliable strap or rope should contact the wetwell, do not use chains, steel cables or hard metallic slings.

B. SITE PREPARATION

Dimensions of the excavation should be wide enough to provide sufficient working room around the wetwell.

Minimum bottom concrete slab dimensions and reinforcement are specified in Table 1 (Open Bottom Wetwells or Closed Fiberglass Bottom Wetwells Without External Structural Anchors) or Table 2 (Closed Fiberglass Bottom Wetwells With External Structural Anchors on the Wetwell Bottom).

Bottom concrete slab designs in Tables 1 and 2 meet American Concrete Institute Code ACI 318 Building Code Requirements for Structural Concrete with a load factor of 1.3. This is sufficient to resist bending from water head pressure and soil loading with the wetwell completely empty with water to grade and a float out Factor of Safety of at least 1.2.

BOTTOM CONCRETE SLAB

Use minimum 3000-psi concrete for bottom slabs. Final concrete depth, size, thickness and reinforcements shall meet the minimum requirements in these instructions and applicable tables. Bottom concrete slab should extend a minimum of 12" in all directions from the wetwell outer diameter (24" minimum for diameters larger than 10').

⚠ WARNING

To prevent fire or explosion hazard, CSI recommends air driven tools whenever possible. DO NOT use power tools where flammable vapors or liquids exist. Also, when electric hand tools are used, be aware of potential shock hazards. Wear protective clothing and eye protection.

Wetwells may be a confined space. Follow proper safety procedures.



ASPHYXIATION



FIRE

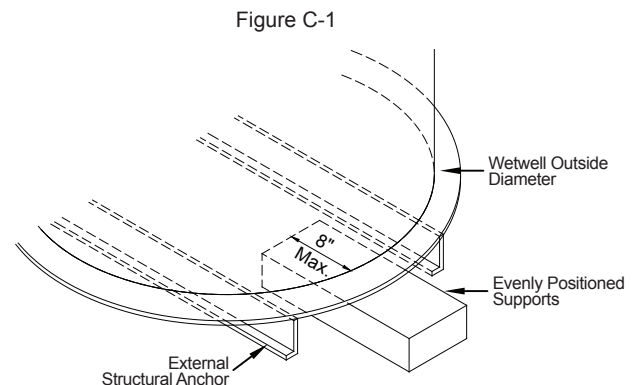


EXPLOSION

C. WETWELL POSITIONING

HEIGHT ADJUSTMENT & LEVELING

- To aid in positioning and handling the wetwell while constructing the concrete slab, supports or shims may be utilized. (see Figure C-1)
 - Supports should be made from a material that will not degrade or rot.
 - The wetwell must rest on a minimum of 3 evenly spaced supports. The supports should position the wetwell bottom above the rebar. Wetwell cannot sit on rebar reinforcement
 - The supports must be in contact with the flat bottom of the wetwell at the outside diameter, and must not contact the external structural anchors.
 - The supports must not extend more than 8" from the outside diameter of the wetwell toward the center.



FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

D1. BOTTOM SLAB FOR OPEN BOTTOM WETWELLS

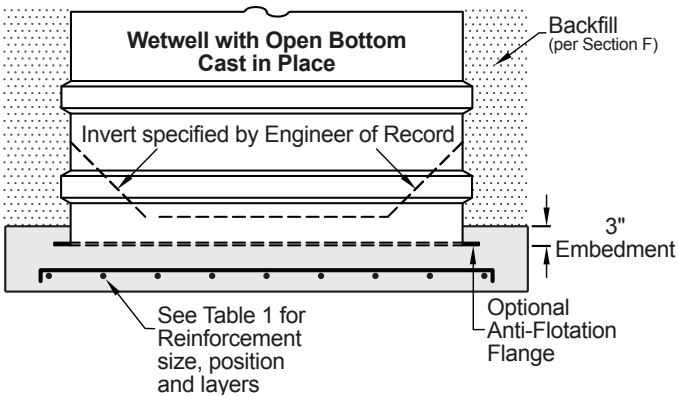
⚠ WARNING

Collapsing excavation walls can cause injury or death. Do not enter the wetwell excavation unless necessary and in compliance with OSHA regulations. Follow OSHA guidelines for excavations.

OPEN BOTTOM WETWELLS with or without Anti-Flotation Flange (refer to Table 1 and Figure D1-1 and D1-2)

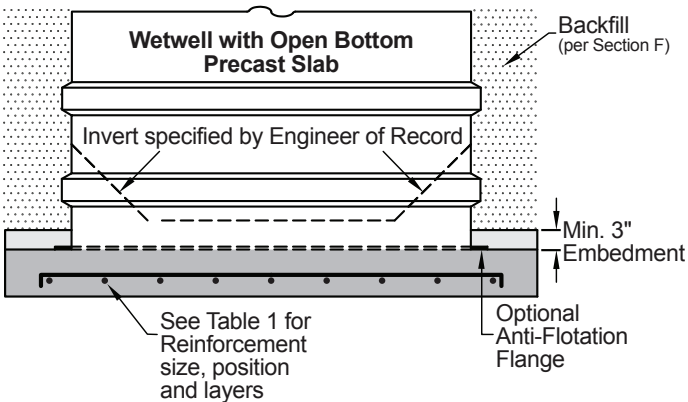
- Cast in place slabs - Lower wetwell into wet concrete until it rests at correct elevation embedded 3" into concrete, then move wetwell to plumb.

Figure D1-1



- Precast slabs - Lower wetwell until it rests on the slab. Place a minimum of 3" of concrete on top of precast slab around the circumference of the wetwell.

Figure D1-2



D2. BOTTOM SLAB FOR CLOSED BOTTOM WETWELLS WITHOUT EXTERNAL STRUCTURAL ANCHORS

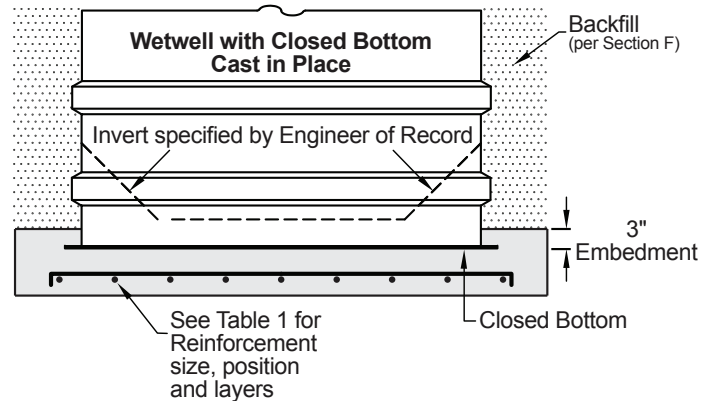
⚠ WARNING

Collapsing excavation walls can cause injury or death! Do not enter the wetwell excavation unless necessary and in compliance with OSHA regulations. Follow OSHA guidelines for excavations.

CLOSED BOTTOM WETWELLS without External Structural Anchors (refer to Table 1 and Figure D2-1 and D2-2)

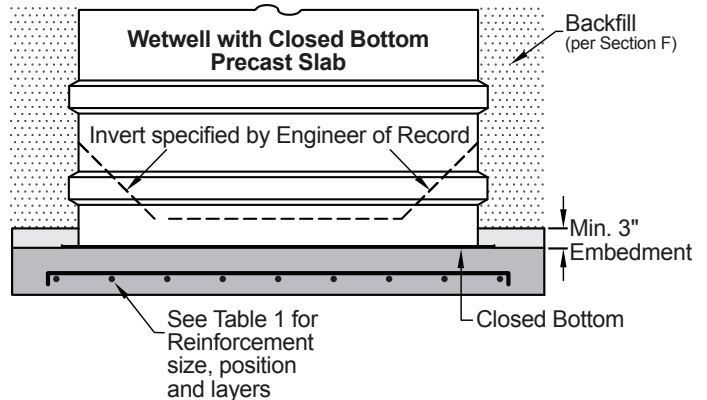
- Cast in place slabs - Lower wetwell into wet concrete until it rests at correct elevation embedded 3" into concrete, then move wetwell to plumb.
- It may be necessary to add ballast (water) inside the wetwell to counteract buoyancy until the concrete is cured.

Figure D2-1



- Precast slabs - Lower wetwell until it rests on the slab. Place a minimum of 3" of concrete on top of precast slab around the circumference of the wetwell.

Figure D2-2



D3. BOTTOM SLAB FOR CLOSED BOTTOM WETWELLS WITH EXTERNAL STRUCTURAL ANCHORS

⚠ WARNING

Collapsing excavation walls can cause injury or death! Do not enter the wetwell excavation unless necessary and in compliance with OSHA regulations. Follow OSHA guidelines for excavations.

CLOSED BOTTOM WETWELLS with External Structural Anchors (refer to Table 2 and Figure D3-1)

- Pour concrete into excavation, then lower wetwell into the wet concrete.

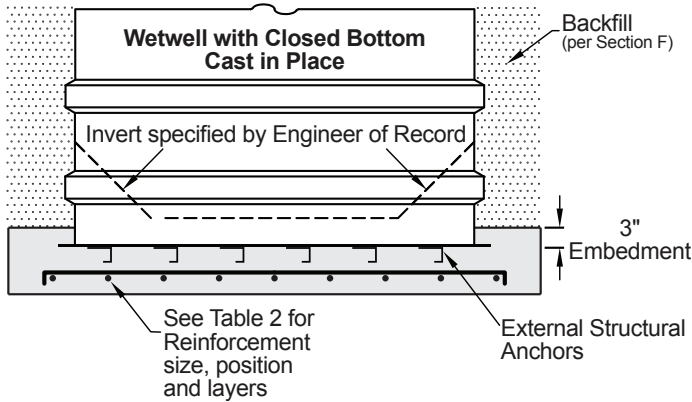
FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

- Cold concrete joints are not allowed. Fiberglass solid bottom wetwells with external structural anchors must be installed in a continuous and monolithic concrete pour including the slab, embedment, and the anti-flotation ring cover. Concrete must extend 3" above the wetwell bottom and around the entire circumference of the wetwell.
- Concrete slab must fill all gaps and voids in and around the external structural anchors.
- It may be necessary to add ballast (water) inside the wetwell to counteract buoyancy until the concrete is cured.

CAUTION

Voids in the concrete slab around external structural anchors will result in product damage and environmental contamination.

Figure D3-1



E. PIPING PENETRATIONS / FITTINGS

CAUTION

Always wear safety glasses and protective clothing when cutting on the wetwell, failure to do so can result in personal injury.

- Pipe penetration cutouts should be round holes and should be no larger than the pipe diameter plus 1".
 - Make cuts using a saw with a masonry or diamond grit blade.
 - Do not use an axe or other impact type tools.
- Accessories must be installed and used in strict accordance with the manufacturer's instructions.
- All piping must have a flexible connector installed directly on the fitting or accessory to allow for a minimum 1/2" differential settlement between the wetwell and the pipe. If more than 1/2" differential settlement is expected, choose a flexible connector designed for the expected settlement.

F. BED AND BACKFILL

Proper backfill selection and compaction is required for a proper installation. The allowed backfills are shown in Table F-1 along with the degree of compaction required.

Table F-1

Bed and Backfill Compaction	
Soil type-pipe bedding material (Unified Soil Classification System See Table F-2)	Minimum Degree of Compaction Required*
Fine - grained soils (Liquid Limit < 50) with medium to no plasticity with less than 25% coarse grained particles. CL, ML, ML - CL,	High
Fine grained soils (Liquid Limit < 50) with medium to no plasticity with more than 25% coarse grained particles. CL, ML, ML - CL	Moderate
Coarse grained soils containing more than 12% fines. GM, GC, SM, SC	Moderate
Coarse grained soils with less than 12% fines. GW, GP, SW, SP	Slight
Crushed Rock or Pea Gravel (3/4" maximum size with less than 50% passing No. 4 sieve)	Dumped

* Degree of compaction:

- Dumped - No compaction effort.
- Slight - Some compactive effort. In-place density <85% standard Proctor Density. Or < 40% Relative Density.
- Moderate - Intermediate level of compactive effort, In-place density >=85% and < 95% standard Proctor Density, or >=40% and <70% Relative Density.
- High - Considerable compactive effort. In-place density >= 95% standard Proctor Density, or >= 70% Relative Density.
- The difference in the "dumped" and "slight" degree of compaction values are significant and are based on the method of construction, not the measured densities. "Dumped" means that there is absolutely no compaction of the embedment soil. "Slight" means there was something done that increased the soil density, even if minor, such as water settling, jetting, flooding, equipment travel, and in some cases, foot traffic.

Table F-2

<u>First Letter</u>		<u>Second Letter</u>	
<u>Letter</u>	<u>Definition</u>	<u>Letter</u>	<u>Definition</u>
G	Gravel	P	Poorly Graded (uniform particle sizes)
S	Sand	W	Well Graded (diversified particle sizes)
M	Silt	H	High Plasticity
C	Clay	L	Low Plasticity
O	Organic		

The Unified Soil Classification System can be applied to most unconsolidated materials, and is represented by a two-letter symbol.

FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

Do not backfill around the wetwell until the concrete slab has hardened.

Add backfill in maximum 36" lifts evenly around the wetwell to avoid uneven backfill loads.

- A flexible joint on each connecting pipe is required to relieve stresses from differential backfill movement or soil consolidation. Backfill should be added to the invert elevation of each connecting pipe, the connection made and sealed, before continuing to backfill.

Backfill surround requirements:

- For stable soils (cohesion \geq 750 psf and / or a bearing capacity \geq 3500 psf) a minimum 12" of backfill must be placed around the wetwell.
- For unstable soils (cohesion \leq 750 psf and ultimate bearing capacity \leq 3500 psf).
 - Wetwells 48" diameter or smaller require a minimum 24" of backfill around the wetwell.
 - Wetwells larger than 48" diameter require a minimum backfill of $\frac{1}{2}$ the wetwell diameter around the wetwell
- If muck, bog, peat, or loess are present, consult with a Geotechnical Engineer for backfill and excavation requirements.
- For permafrost conditions, consult with a Geotechnical Engineer for backfill and excavation requirements.

Keep backfill dry and free of ice in freezing conditions.

Ensure that no foreign objects such as large stones, concrete clumps, tree roots/limbs, or debris is in the backfill surrounding the wetwell.

Prevent large surges of backfill from displacing the wetwell.

WETWELL INSTALLATION WITH A FIBERGLASS UNDERGROUND TANK

CAUTION

Not using approved backfill material may result in tank failure and environmental contamination.

If the wetwell is installed in the same excavation as an underground fiberglass tank, the backfill around the wetwell must also meet the tank backfill requirements so as to not compromise the tank installation. Tank backfill requirements are more restricted and strict conformance to the tank backfill requirements in INST 6001 must be met for both the wetwell and tank.

G. INVERT

Invert specified by Engineer Of Record. The invert may be at any angle and may project up the wetwell any distance.

H. TOP PAD

The wetwell is designed to support the dead weight of an 8" thick square pad 24" larger than the diameter of the wetwell (centered on the wetwell) along with a dynamic HS-20 traffic load as long as the pad is designed to distribute the loads on the wetwell perimeter and not on the interior of the lid.

If the static load will exceed the 8" pad weight or the traffic load will exceed HS-20, the pad must be 48" larger than the wetwell diameter (centered on the wetwell) and all of the pad and / or traffic loads must be supported by the soil around the wetwell and not by the wetwell itself.

Fiberglass flat tops 36" through 92" diameter are designed to support 8" concrete pads without internal supports while the concrete cures.

Fiberglass flat tops greater than 92" diameter or concrete pads thicker than 8" must have internal bracing to support the top until the concrete cures. Brace internally with 2" x 10" lumber on 24" centers supporting the top from the underside to carry the load while the concrete cures. The concrete pad must be designed to be self supporting after cured. After the concrete pad is cured, remove the bracing.

The pad shall be specified by the Engineer Of Record.

OPEN TOP WETWELLS WITHOUT TRAFFIC LOAD (see Figure H-1)

- Concrete pads can be either precast or cast on site. The pad must be larger than the wetwell a minimum of 12" in all directions.
- Maximum 8" concrete pad thickness.
- Precast top pads must have a reasonably smooth, flat bottom to provide a seal between the pad underside and wetwell top edge when using a gasket, tar, or other sealing material.

FIBERGLASS FLAT TOPS WITHOUT TRAFFIC LOAD (see Figure H-1)

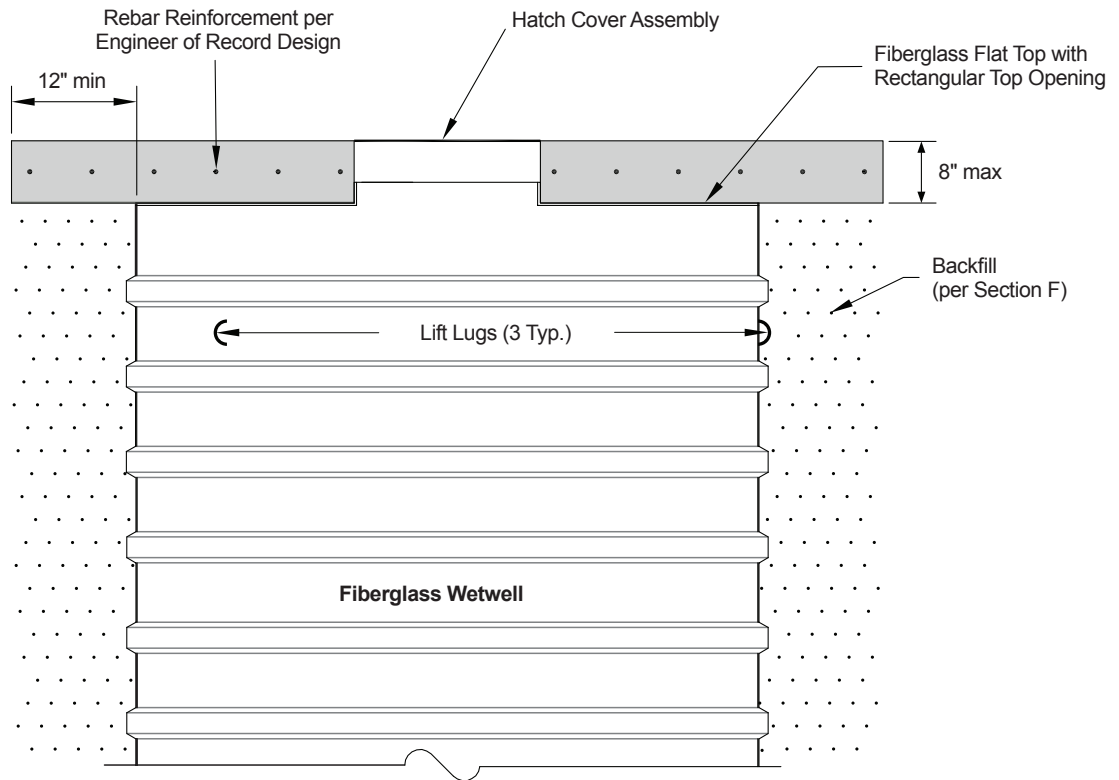
- The pad must be larger than the wetwell a minimum of 12" in all directions.
- Maximum 8" concrete pad thickness.

FIBERGLASS FLAT TOPS WITH TRAFFIC LOAD (see Figure H-2)

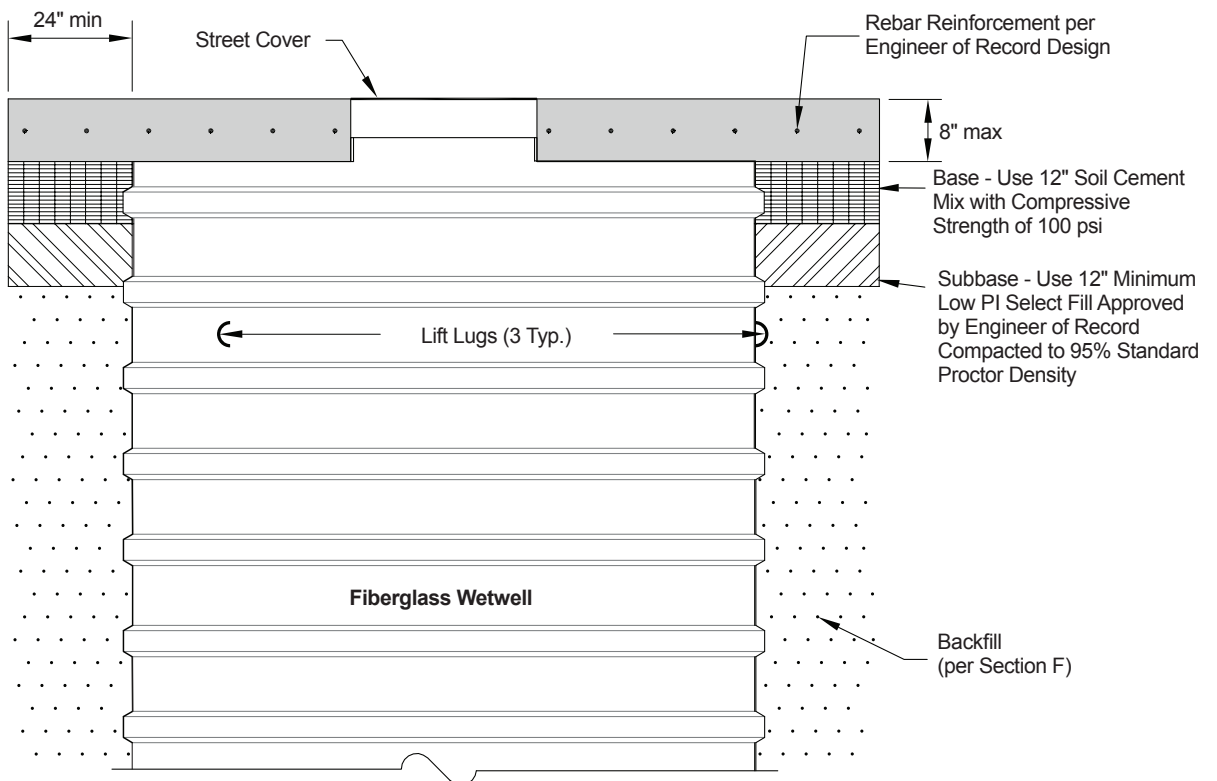
- The pad must be larger than the wetwell a minimum of 24" in all directions.
- The Engineer Of Record shall specify the pad strength and reinforcement so that the static weight of an 8" thick square pad (no more than 24" larger than the diameter of the wetwell centered on the wetwell) along with a dynamic HS-20 traffic load must be distributed on the wetwell perimeter and not on the interior of the lid.
- If either the static pad load or the dynamic traffic load is exceeded, all of the pad and / or traffic loads must be supported by the soil around the wetwell and not by the wetwell itself.

FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

NON-TRAFFIC LOAD (Figure H-1)



TRAFFIC LOAD (Figure H-2)



FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

TABLE 1

Open Bottom Wetwells or Closed Fiberglass Bottom Wetwells Without External Anchors:

Concrete slabs built to the requirements of the following table will resist buckling from external water pressure in the installed condition with the perimeter of the wetwell (including the anti-floatation flange if included) embedded in concrete.

The top layer rebar cover depth may not be changed, but the rebar size and spacing may be adjusted as long as the amount of steel specified in the following table is matched or exceeded.

Each wetwell must rest on its own slab independent of any other wetwells or other structures.

Wetwell Dia.	Depth (feet)	Required Pad Extension Beyond Wetwell OD	Concrete pad with 1 layer of rebar each way at top with 1.50" of cover (distance between top of rebar and flat of wetwell bottom). Rebar to extend to within 2" of the pad perimeter.		
		(inches)	Slab Thickness (inches)	Rebar Size (number)	Rebar Spacing (inches)
24"	10	12	6	5	20
	20	12	6	5	20
	25	12	6	5	20
36"	10	12	6	5	28
	20	12	6	5	28
	25	12	6	5	28
42"	10	12	6	5	28
	20	12	6	5	28
	25	12	6	5	28
48"	10	12	6	5	28
	20	12	6	5	28
	30	12	6	5	26
	40	12	6	5	21
54"	10	12	6	5	28
	20	12	6	5	26
	30	12	6	5	23
	40	12	6	5	17
60"	10	12	6	5	28
	20	12	6	5	26
	30	12	6	5	18
	40	12	6	5	13
66"	10	12	6	5	28
	20	12	6	5	23
	30	12	6	5	15
	40	12	6	6	14
70"	10	12	6	5	28
	20	12	6	5	19
	30	12	6	5	12
	40	12	6	6	12

- 24" thru 42" dia – flat unreinforced bottoms in this size range only go to 25' burial depth in CSI specifications
- 48" thru 72" dia – large deflection unreinforced bottoms in this size range only go to 40' burial depth in CSI specifications
- >72" dia or burial depths deeper than shown in the table require bottoms that are externally reinforced.

FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

TABLE 1

Closed Fiberglass Bottom Wetwells With External Anchors on The Wetwell Bottom:

The wetwell bottom uses the concrete slab to resist buckling of the wetwell bottom from external water pressure in the installed condition with the perimeter of the wetwell (including the anti-floatation ring if included) embedded in concrete. This table must be followed for the concrete slab design for all wetwells with a fiberglass bottom with external anchors and concrete embedment. This table allows for structural shapes on the wetwell bottom to be embedded 4" into the concrete.

The top layer rebar cover depth may not be changed, but the rebar size and spacing may be adjusted as long as the amount of steel specified in the following table is matched or exceeded.

Each wetwell must rest on its own slab independent of any other wetwells or other structures.

Wetwell Dia.	Depth (feet)	Required Slab Extension Beyond Wetwell O.D.	Concrete pad with 1 layer of rebar each way at top with 4.75" of cover (distance between top of rebar and flat of wetwell bottom). Rebar to extend to within 2" of the pad perimeter.			Concrete pad with 1 layer of rebar each way at top with 4.75" of cover (distance between top of rebar and flat of wetwell bottom). Rebar to extend to within 2" of the pad perimeter AND 1 layer of rebar each way at the bottom of the pad with #3 rebar each way w/3" of cover.		
		(inches)	Slab Thickness (inches)	Rebar Size (number)	Rebar Spacing (inches)	Slab Thickness (inches)	Top Rebar Size (number)	Rebar Spacing (inches)
24"	10	12	7.25	5	20			
	20	12	7.25	5	20			
	30	12	7.25	5	20			
	40	12	7.25	5	20			
	50	12	9.25	5	18			
36", 42"	10	12	7.25	5	23			
	20	12	7.25	5	23			
	30	12	9.25	5	18			
	40	12	9.25	5	18			
	50	12	9.25	5	18			
48"	10	12	7.25	5	23			
	20	12	7.25	5	17			
	30	12	9.25	5	18			
	40	12	9.25	5	18			
	50	12	11.25	5	15			
54"	10	12	7.25	5	23			
	20	12	9.25	5	18			
	30	12	9.25	5	18			
	40	12	9.25	5	17			
	50	12	11.25	5	15	16.75	6	12
60"	10	12	7.25	5	23			
	20	12	9.25	5	18			
	30	12	9.25	5	18			
	40	12	11.25	5	15			
	50	12	11.25	5	15			
66"	10	12	7.25	5	18			
	20	12	9.25	5	18			
	30	12	9.25	5	15			
	40	12	11.25	5	15			
	50	12	11.25	5	14			
72"	10	12	7.25	5	15			
	20	12	9.25	5	18			
	30	12	9.25	5	12			
	40	12	11.25	5	15			
	50	12	14.75	6	16			

FIBERGLASS WETWELL INSTALLATION INSTRUCTIONS

TABLE 2 (cont'd)

Wetwell Dia.	Depth (feet)	(inches)	Slab Thickness (inches)	Rebar Size (number)	Rebar Spacing (inches)	Slab Thickness (inches)	Top Rebar Size (number)	Rebar Spacing (inches)
92"	10	12	9.25	5	18			
	20	12	9.25	6	15			
	30	12	11.25	6	16			
	40	12	14.75	6	16			
	50	12	14.75	6	15			
8'	10	12	9.25	5	18			
	20	12	9.25	6	13			
	30	12	11.25	6	15			
	40	12	14.75	6	15			
	50	12	14.75	6	15			
10'	10	12	9.25	5	13			
	20	12	11.25	6	14			
	30	12	14.75	6	15			
	40	12	14.75	6	12			
	50	12				16.75	6	12
138"	10	24	9.25	6	13			
	20	24	14.75	6	15			
	30	24	14.75	6	12			
	40	24	14.75	6	9			
	50	24				16.75	6	9
12'	10	24	9.25	6	12			
	20	24	11.25	6	15			
	30	24	14.75	6	15	16.75	6	12
	40	24				16.75	6	10
	50	24				20.5	6	9
14'	10	24	11.25	6	15			
	20	24	14.75	6	12			
	30	24	14.75	6	8			
	40	24				16.75	6	7
	50	24				20.5	6	8
16'	10	24	14.75	6	15			
	20	24	14.75	6	9			
	30	24	14.75	6	6			
	40	24				20.5	6	8
	50	24				20.5	6	6
18'	10	24	14.75	6	15			
	20	24	14.75	6	7			
	30	24				16.75	6	6
	40	24				20.5	6	6
	50	24				22.5	6	5
20'	10	24	14.75	6	12			
	20	24	14.75	6	5			
	30	24				20.5	6	6
	40	24				20.5	6	4
	50	24				26	6	5



Wetwell Installation Checklist

including Lift Stations, Vertical Pump Vaults, and Basins

Complete this checklist and keep it with copies of any written authorizations for variations and/or deviations received from CSI.

Site Owner _____ Installation Date _____ Wetwell Unit Serial Number _____

Site Address _____
Street City State Zip

Installing Contractor _____
Company Street City State Zip

Fiberglass Wetwell

	Completed	N/A
1. Wetwell inspected for damage prior to installation as described in Section A.	_____	_____
2. Installation method used for Bottom Slab: (select only one)	_____	_____
Open Bottom (Section D1):		
<input type="checkbox"/> Cast in place slab		
<input type="checkbox"/> Precast slab		
Closed Fiberglass Bottom <u>without</u> external structural anchors (Section D2):		
<input type="checkbox"/> Cast in place slab		
<input type="checkbox"/> Precast slab		
Closed Fiberglass Bottom <u>with</u> external structural anchors (Section D3):		
<input type="checkbox"/> Cast in place slab		
3. Bottom Slab design according to: (select only one)	_____	_____
<input type="checkbox"/> Table 1		
<input type="checkbox"/> Table 2		
<input type="checkbox"/> Engineer of Record for the specific jobsite		
4. Backfill around exterior of the Wetwell meets requirements in Section F.	_____	_____
5. Wetwell top pad meets minimum design requirements of Section H <u>or</u> is designed specifically for this installation by the Engineer of Record.	_____	_____
6. Top pad is designed for:	_____	_____
<input type="checkbox"/> Non-traffic load		
<input type="checkbox"/> Traffic Load		

Installation was in accordance with Wetwell Installation Instructions (Pub No. MAN 4004).

Owner Representative (Print Name)

Contractor Representative (Print Name)

Owner Representative (Signature)

Date

Contractor Representative (Signature)

Date