

## CON/SPAN<sup>®</sup> StormFilter Installation Guide



## Foundation Preparation

Use standard construction procedures for the construction of the footings for CON/SPAN Detention Systems. As with any construction project, take all standard safety precautions.

- Prepare the subgrade in accordance with the project specification and any available geotechnical report prepared for the project.
- Follow the project plans for the foundation's dimensions and elevations. The top of the footing must not vary in elevation from the plan dimensions more than 1/4 inch per 10 feet. Deviations in the top surface of the footing will make it more difficult to set the units.
- Pour the foundation in accordance with the specifications and details.
- Use a floated finish at the top of the footing. The horizontal alignment of the keyway is critical when setting the units, particularly on longer structures.



## Site Access

Prepare the site for easy access before delivery of the precast units or the arrival of the crane, and communicate the truck route to the CONTECH representative.

## Delivery

Provide access for the trucks delivering the units to be unloaded next to the crane, and include a convenient turn around for the trucks to back into the unloading area. Additional room for tipping of units that are delivered on their side may also be necessary. Expect rutting on non-paved surfaces due to the weight of the trucks, so a piece of equipment should be available to repair and level the surface as units are delivered.



## Crane Selection

A representative from the crane company should visit the jobsite prior to the selections of the size of the crane. The crane representative and/or contractor should determine the distance from center of the crane's position to the center of the final position of the precast units. The CONTECH representative will provide you with the weights of the precast units. The weight and the distance from the center of the crane's position to the center of the final position of the precast units determines the crane size. The end units are typically the heaviest and also require the longest reach.

Locate the crane as close to the installation as possible. The staging area for the crane must be stabilized and crane supplier should be prepared to supply outrigger mats.



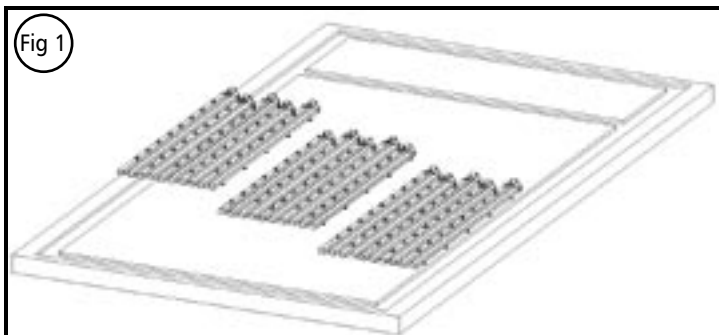
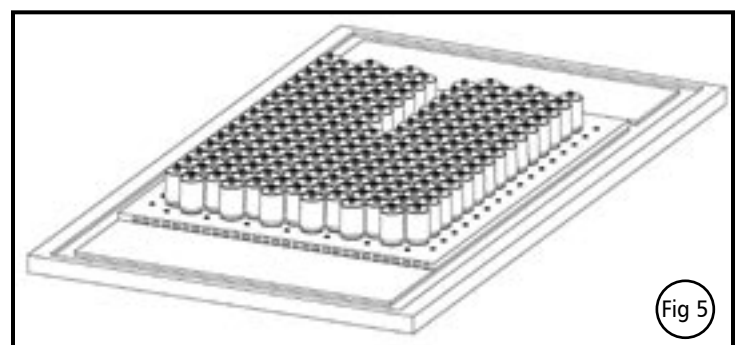
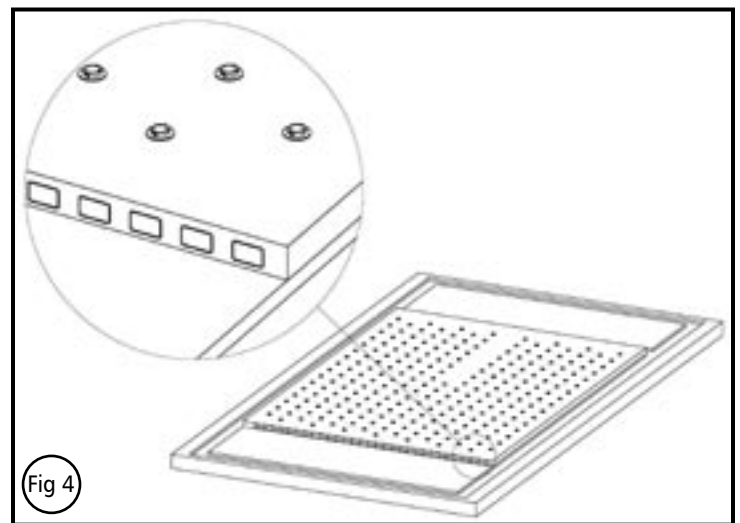
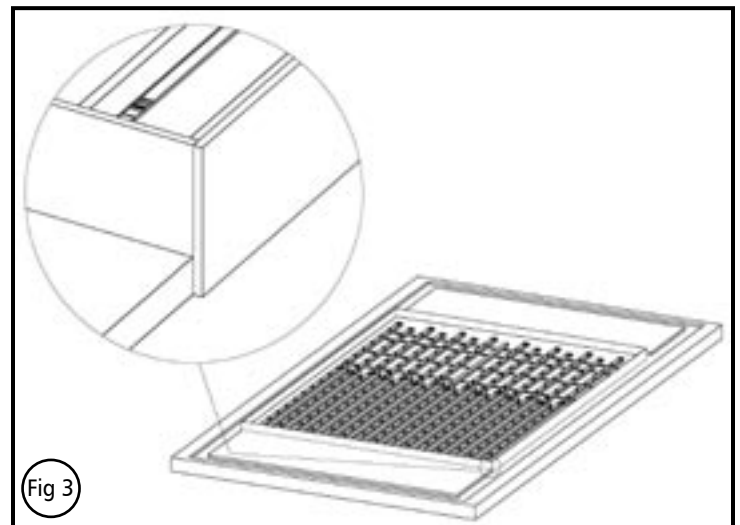
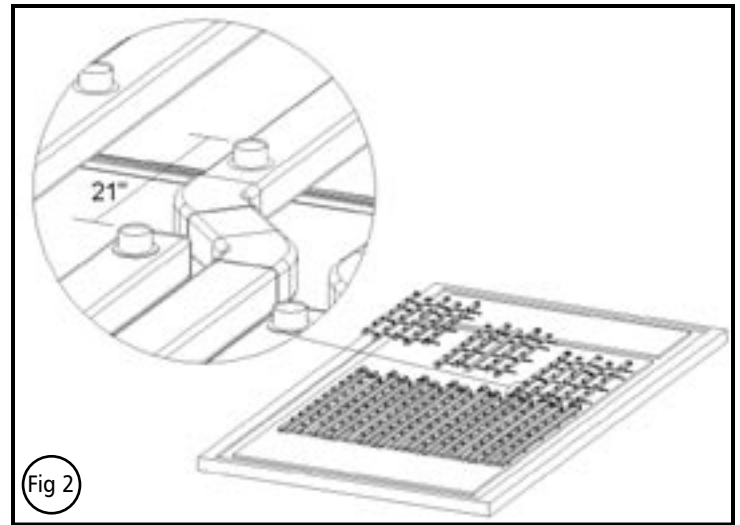
## Other Considerations

Other opportunities to improve site conditions before installation include the following:

- Clear all tree branches and remove or shield overhead obstacles (wires, etc.) that may interfere in any way during erection of the precast units.
- Dewater the site to a level below the top of the footing. A properly dewatered site will speed up the job and result in better workmanship.
- Clear all footings of dirt and large concrete burrs.

## StormFilter Manifold

1. Install the under-drain manifold on the filter bay section of the foundation. See the site specific installation drawing for specific layout, **the spacing and locations are critical.** (See Fig. 1)
2. Mark the location of the wall between the filter bay and the outlet bay. Lay out the manifold sections that penetrate under this wall, they should be flush with far side of wall.
3. Lay out and attach additional sections with ABS cement (contractor supplied). Verify 21" filter spacing is maintained over the joint between first sections and additional sections. All joints must be tight enough to keep out concrete until it hardens, use additional sealant if necessary. Verify the manifold is fully constructed and matches the layout in the provided installation drawing before moving on. The center of each filter location should be at least 10-1/2" from any arches or walls to be installed. Bolt all sections down to the foundation with concrete wedge anchors (contractor supplied). (See Fig 2)
4. Ensure all openings into the manifold are sealed with protective tape. Build a form for the flowkit pour. Use the keyways as guides where possible, otherwise use the end of the pipes that enter the outlet bay or mark out the locations of the CON/SPAN walls. Note: Systems with two filter bays will require two forms; the outlet bay will be between them and its floor level remains at the original foundation. (See Fig 3)
5. Pour concrete just to the top of the openings in the manifold. Let concrete set. Remove form and cut away all protective tape.
6. Install cartridge stubs in all openings in floor with ABS cement. (See Fig 4)
7. Attach cartridges to cartridge stubs with a quarter turn, cartridge will click to a stop. Do not install cartridges in the outer-most row or column until after the CON/SPAN arches are installed. (See Fig 5)



## CON/SPAN Units

CON/SPAN units have differing sets of lift holes, based on the span of the unit. Two to six cables with a minimum length of 20' for spans under 24' (30' in length for units with spans between 28' and 36') are needed. Spans greater than 36' should have cable lengths determined by the CONTECH engineer. Coordinate the supply of these cables between the CONTECH representative and the crane supplier. Coordinate the lifting mechanisms necessary to connect the cables to the unit (type and source) with your CONTECH representative. Use equalizer systems for spans greater than 24' during handling.



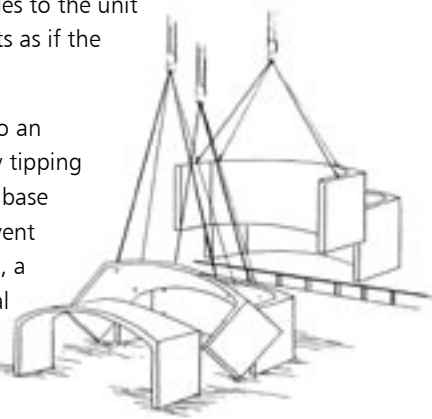
Units delivered upright may be lifted off the trucks and set directly in place. Units delivered on their side require special care and should be discussed prior to shipping of the units.

There are two ways to lift units delivered on their side:

1. Lift each unit off the truck using the edge lift points and set on the ground on its side.

2. Reconnect the cables to the unit at the top lift points as if the unit was upright.

3. Pull the unit over to an upright position by tipping the unit about the base of the legs. To prevent spalling of the legs, a bed of soft material (sand) should be provided in the tipping area.



4. Set the unit in place.

Alternatively:

1. Lift each unit and tilt at the same time, and set down upright. This requires an eight point connection lift and a double drum crane.

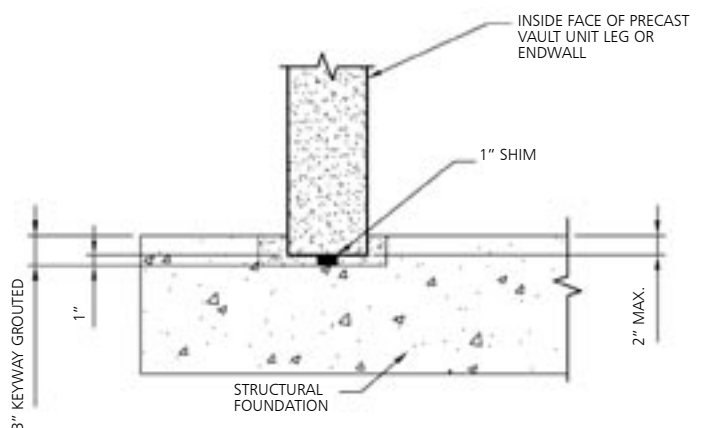
2. Release the side connect points and set the unit in place.

## Setting Units

Prepare to set units by cleaning (sweeping) all footings and confirm its length and layout. Then do the following:

1. When checking the length of footing, allow for 1/2" joint creep for each joint between units. For example, if you have six units 8' wide, allow for five joints at 1/2" for a total length of 48'-2 1/2". Once you have laid out the total length on one footing, starting at one end turn a 90° angle to the opposite footing and layout the starting point on the footing. Follow the same procedure at opposite ends of the footings and chalk a reference line (to the outside of the units) for alignment purposes.
2. Identify the high point on the foundation prior to setting the shims. The precast units will be set on top of shim pads in the foundation keyway. These shims raise the units at least 1" above the keyway. Set shims 1' in from the corner of each unit. Check the bottom of the footing for any high spots and use the high spot as the control elevation. Add 1" to this high elevation and set all shim pads to this elevation.

**Note:** When installing units on a sloping grade, shoot elevation control points approximately every 50' and run a string line between these elevations to set other shims. Another method is to use a 6' level with a spacer taped to one end to match the required vertical elevation change across a 6' distance. Use this level to then set shim pads from one pad to another.



3. Select a crew of at least four and assign one as the leader (decision maker) to provide the signals to the crane operator. Have a short safety meeting between all crew members before beginning to set units.

4. Start with setting an end unit with or without an attached endwall. The alignment of this first unit is critical to the alignment of the rest of the units. Secure a 2x4 block to the top of the footing at the starting line for the units on each footing. This will act as a stop when setting the units and will assist in the alignment of the unit. Stay out from underneath the unit until the unit is set on the footing.

5. When setting the unit have one person with a heavy spud bar at each side to position the unit as the crane is lowering it. Spud the unit up against the 2x4 blocks and check it for alignment with the chalked reference line. Check the vertical front face of the unit with a level for vertical alignment. If necessary adjust the shims accordingly to achieve the required alignment of the front face. Do not use your hands directly under a unit to adjust shims. Use a stick or a tool to reach under the unit.

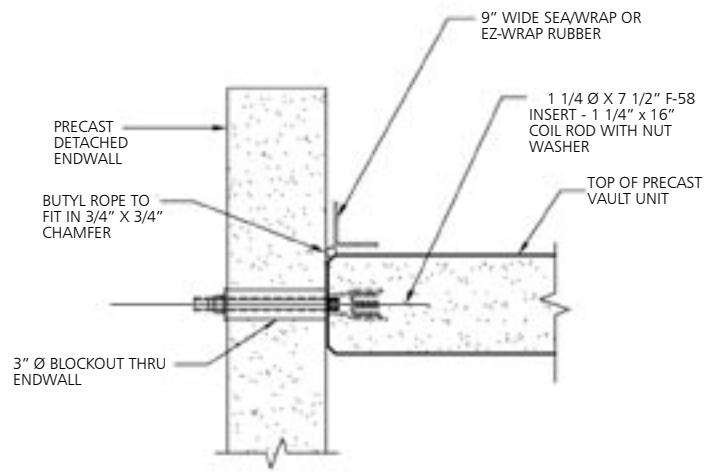
**Note:** When setting successive units you will achieve better joints and save time if the unit to be set is hanging such that the top of the unit is leaning away from the previously set unit. Adjust the length of the lifting cables so that the cables on the side of the unit away from the previously set unit are slightly longer than the near side cables. If necessary, add a shackle to the far-side cables to lengthen the cables.

## Setting Detached Precast Endwalls

Clean the face of the unit and the bottom and face of the endwall before setting the endwall unit in place, and then do the following:

1. The back face of the endwall should be placed flush with the front face of the CON/SPAN.
2. Align the holes in the endwall over the inserts in the face of the CON/SPAN unit. A spud bar may be necessary. Once the endwall has been set down, loosely set the first bolt in place. After all of the bolts have been aligned in the inserts, use the double nuts on the bolts to thread the bolts into the inserts as far as possible.

**Note:** Before backfilling, remove the nuts and grout the sleeve surrounding the bolts. Replace the nuts and apply any waterproofing material.



## Grouting

Mix grout per project specifications; admixtures such as a plasticizers may be added to make a more flowable fill.

1. For watertight structures, review site specific installation drawings for grouting details.
2. For non-watertight structures, completely grout underneath all unit legs to the tops of the sides of the keyway. Mound the grout on one side of the leg and vibrate the grout until it passes through to the other side of the leg. Repeat on the other side where needed.
3. Grout or plug the lift holes in the units and then seal them with mastic and/or a joint wrap.

## Sealing Joints — External

Cover all butt joints made by two adjoining units with a 7/8" x 1 3/8" piece of butyl rope and a minimum of a 9" wide joint wrap.

1. Cover all joints continuously from the bottom of one unit leg, across the top of the arch, and to the bottom of the opposite unit side. Laps must be a minimum of six inches long, with the overlap running downhill.
2. In addition to the joints between units, seal the joint between the end unit and endwall.

The external wrap can be one of the following products (or an approved equal):

- EZ Wrap Rubber by Press-Seal Gasket Corporation
- Seal Wrap by MAR-MAC Manufacturing CO. Inc.

**Note:** The surface must be free of dirt before applying joint material. Apply a primer compatible with the joint wrap for a minimum width of nine inches on each side of the joint.



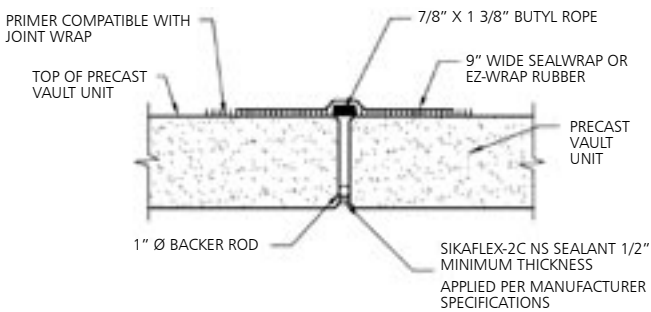
## Sealing Joints — Internal

Water-tight joints require the addition of a polyurethane sealant on the interior joints.

1. Insert backer rod between sections to minimize excess material
2. Insert a backer rod or bond breaker along full length of keyway.
3. Apply polyurethane sealant per manufacturer specifications

The material can be one of the following:

- Sikaflex®-2c NS two component, non-sag polyurethane elastomeric sealant
- Sikaflex®-1a one part polyurethane, elastomeric sealant/adhesive



## Pipe Connection Details

Openings for pipes will be cast into precast units. Pipes will be connected via a "pipe boot" cast in the unit or into an oversized hole or arch-shaped blockout. Holes oversized to accommodate piping without a pipe boot should be grouted with non-shrink grout prior to backfilling.



## Backfill Material

The backfill of a CON/SPAN structure is an important element of the overall structure. Not only is it important to provide the necessary support for the structure, it is also important to support any roadway approaches above the installation.

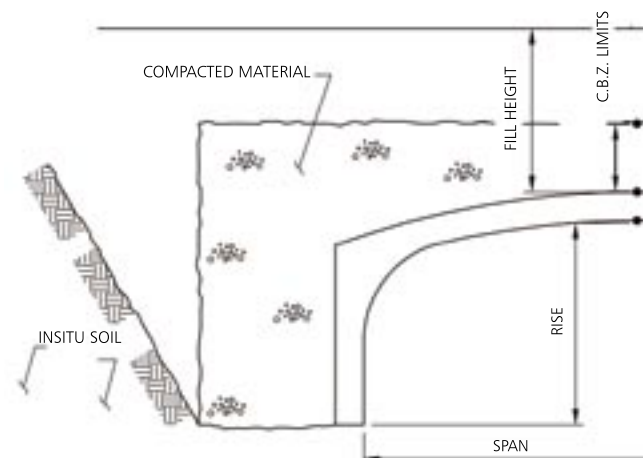
Backfill in accordance with the CON/SPAN specifications or the project specifications, whichever is more severe. For heights of fill over 12', no backfilling may begin until a backfill compaction testing plan has been coordinated with, and approved by, CONTECH.

Backfill is considered as all replaced excavation and new embankment adjacent to the CON/SPAN units. The project construction and materials specifications (which include the specifications for excavation for structures and roadway excavation and embankment construction) apply, except as modified in this section.

The Critical Backfill Zone (CBZ) around the structure extends a minimum of 4' on either side of the structure, and from the base of the unit to 2' above the crown.

If	Then
Final fill height < 2'	Finished grade = CBZ boundary
Span ≤ 24' and fill height < 12'	Backfill must meet AASHTO A1, A2, A3, or A4
Span > 24' or fill height > 12'	Backfill must meet AASHTO A1 OR A3.

Group Classification	Backfill Description (AASHTO M 145-91)							
	A-1		A-3	A-2			A-4	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7	
Sieve Analysis, Percent Passing (100% Passing 3" Sieve)								
No. 10	50 max.		51 min.					
No. 40	30 max.	50 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.
No. 200	15 max.	25 max.						
Characteristics of Fraction Passing No. 40								
Liquid Limit				40 max.	41 min.	40 max.	41 min.	40 max.
Plasticity Index	6 max.		N.P.	10 max.	10 max.	11 min.	11 min.	10 max.
Usual Types of Significant Constituent Materials	Stone Fragments Gravel and Sand		Fine Sand	Silty or Clayey Gravel and Sand				Silty Solids
General Rating as Subgrade			Excellent to Good					Fair to Poor

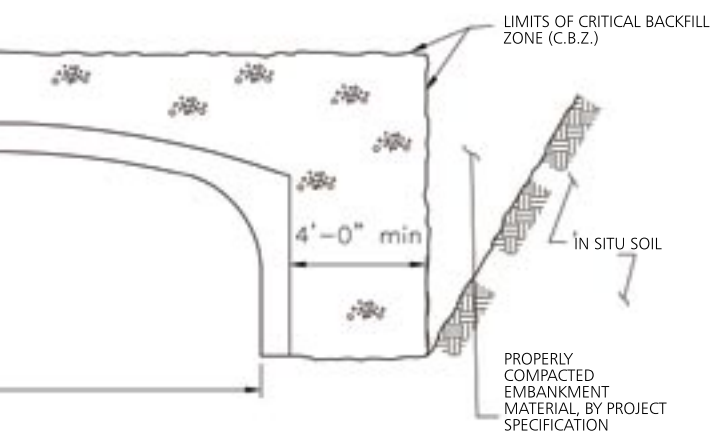


## Backfill procedure

1. Place and compact backfill in layers until the density is not less than 95% of the maximum dry density. All material outside the Critical Backfill Zone must be good quality well-compacted embankment or in situ soil.
2. Do not place backfill against any structural element until approved by the engineer. Avoid damage to waterproofing material when placing backfill against a waterproofed surface.
3. Use mechanical tampers or approved compacting equipment to compact all backfill and embankment immediately adjacent to each side of the installation and over the top of the installation to a minimum depth of 1'.
4. Place backfill within 4' of each side of the units in lifts of eight inches or less (loose depth). Do not use heavy compaction in this area or over the installation until it is covered to a depth of 1', unless the design cover is less than 1'. Lightweight dozers and graders may be operated over units having one foot of compacted cover. But heavy earthmoving equipment (larger than a D-4 Dozer weighing in excess of 12 tons and having track pressures of 8 psi or greater) requires 2' of cover unless the design cover is less than 2'. As a precaution against introducing unbalanced stresses in the vault units, place and compact the backfill to within 2' of the same elevation on both sides of the installation before proceeding to the next layer.

**Note:** No equipment in excess of the design load noted on the manufacturers shop drawings is permitted over the installation unless approved by CONTECH.

Any additional fill and subsequent excavation required to provide minimum cover will be made at no additional cost to the project.



## Final internal components

Install any remaining internal components per the installation drawing. This includes filters near the edges, flow spreaders, weir boxes and energy dissipators.

Flow spreaders, weir boxes and energy dissipators bolt to the walls. If pre-caster installed inserts, bolt these units to the inserts. If no inserts are supplied, use concrete wedge anchors (contractor supplied).

If system has two filter bays, install transfer pipes and weir boxes per installation drawing.

## Place the CON/SPAN StormFilter Offline

It is imperative that stormwater runoff from the site during construction bypasses the CON/SPAN StormFilter treatment system. If the system is not placed offline, the treatment system could become contaminated and require maintenance before the owner is allowed occupancy. The final installation step for the contractor is to plug the inlet(s) into the CON/SPAN StormFilter to prevent flows from entering the unit (plugs provided by contractor). Once the project is paved and the site is stabilized the plug can be removed and the system placed online.

## Tool Checklist

The hand tools and equipment needed to install CON/SPAN are similar any construction project.

Tools and equipment essential for setting the units are as follows:

- A minimum of 2- 60" pry bars or "Burke" bars
- A 48" spirit level
- A long straight clean 2" x 4" block
- A transit level to provide elevation transfers
- A minimum of 2- 8' ladders
- Chalk line and spray paint marking material
- Large crescent box end and/or ratchet wrenches

## Material Checklist

A few materials will be needed during the installation of the CON/SPAN units. These are typically provided by the CON/SPAN supplier.

Listed below are the materials that will be necessary to complete a CON/SPAN installation.

- CON/SPAN installation drawings
- 6"x6"x1/4" and 1/8" Masonite shims (approximately 16 per unit)
- Joint Wrap Material/Filter Fabric/Joint Sealing Material
- Lift Hole Plugs if applicable

Also needed is the project contract for specifications, to be provided for the project.

# Pre-Construction Checklist

CONTECH Primary Contact: \_\_\_\_\_

Phone: \_\_\_\_\_

Contractor Primary Contact: \_\_\_\_\_

Phone: \_\_\_\_\_

Project Site Address: \_\_\_\_\_

- Review site accessibility (double drop/low riding/spotting)
- Expected number of truckloads \_\_\_\_\_
- Expected number of installation days \_\_\_\_\_
- Maximum piece weight \_\_\_\_\_
- Crane reach & expectations \_\_\_\_\_
- Necessary rigging \_\_\_\_\_
- Cables/rolling blocks \_\_\_\_\_
- Foundation preparation
  - Flow Kit Installation
  - Flow Kit 2nd Pour
- Unloading units
- Review cable tie height if applicable
- Attached or detached endwalls and hardware \_\_\_\_\_
- Installation of exterior joint wrap
  - Internal sealing required  Y  N
  - Internal sealing material specifications
- Grouting materials and procedure
- Cartridge Installation
- Backfill procedures - in situ or imported fill \_\_\_\_\_
  - Even backfill lifts
  - 95% compaction
- Construction traffic loading
- Pipe and riser connection details
- Contractor labor expectations
- Safety considerations

## Support

- Drawings and specifications are available at [contechstormwater.com](http://contechstormwater.com).
- Site-specific design support is available from our engineers.

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