CUMBERLAND FARMS #V0636
22095 US HIGHWAY 441
BOCA RATON, FL 33428

Scope of Work

NOTE: THIS DOES NOT TAKE PRECEDENCE OVER PLANS AND SPECIFICATIONS, BUT IS TO PROVIDE INFORMATION IN FURTHER DETAIL IN CONJUNCTION WITH THE PLANS AND SPECIFICATIONS

LIST OF DRAWINGS:

CS	10/12/12	A5.2	12/07/12
SP-01	10/12/12	A6.1	12/07/12
CV-1	12/11/12	A6.2	11/29/12
CV-2	12/11/12	A6.3	12/07/12
C-1	01/02/13	A8.1	08/29/12
C-2	01/02/13	PP1.1	12/07/12
C-3	12/11/12	S1.1	12/07/12
C-4	01/02/13	S1.2	12/07/12
C-5	01/02/13	S2.1	12/07/12
C-6	01/02/13	S2.2	12/07/12
C-7	01/02/13	M1.1	12/07/12
CD-1	12/27/12	M2.1	12/07/12
CD-2	12/11/12	P1.1	12/07/12
CD-3	12/11/12	P1.2	12/07/12
CD-4	12/11/12	P1.3	12/07/12
Sheet 14 of 24	Jan 2012	P2.1	12/07/12
Sheet 15 of 24	Jan 2012	FA0.01	08/29/12
Sheet 16 of 24	Jan 2012	EP1.0	10/12/12
Sheet 17 of 24	Jan 2012	E0.01	08/29/12
Boundary Survey	12/17/12	E0.02	08/29/12
L-01	10/10/12	E0.03	08/29/12
L-02	10/10/12	E0.04	08/29/12
L-03	10/10/12	E1.01	08/29/12
IR-01	10/10/12	E2.01	08/29/12
IR-02	10/10/12	E3.01	08/29/12
A0.1	08/29/12	E4.01	08/29/12
A1.1	12/07/12	E5.01	08/29/12
A1.1a	08/29/12	E5.02	08/29/12
A1.2	08/29/12	E5.03	08/29/12
A1.3	12/07/12	E5.04	08/29/12
A1.4	08/29/12	F-1	10/12/12
A1.5	12/07/12	F-2	10/12/12
A1.5a	08/29/12	F-3	10/12/12
A1.6	12/07/12	F-4	10/12/12
A2.1	12/07/12	F-5	10/12/12
A2.1A	12/07/12	F-6	10/12/12
A3.1	08/29/12	F-7	10/12/12
A3.2	08/29/12	F-7A	10/12/12
A4.2	12/07/12	F-8	10/12/12
A4.3	12/07/12	F-9	10/12/12
A4.4	12/07/12	F-10	10/12/12
A4.5	12/07/12	F-11	10/12/12
A4.6	08/29/12	F-12	10/12/12
A5.1	12/07/12		

To view and download plans instantly via our website, go to:

www.aventuracorp.com

Click on the FTP site at the top right hand corner of the page.

Sign in to the FTP site as follows:

Username (case sensitive): **floridasub**
Password (case sensitive): **subcontractor!**

Select "Bidding" then select "Cumberland Farms #V0636"

ALL SUBCONTRACTORS

- **This is a fast track 90 day project which will require a 6 day work week.**
- **Please bid accordingly.**

DEMOLITION CONTRACTOR

- Scope of Work

  - Furnish & install silt fence as shown on Erosion Control Plan.
  - Closure of existing monitoring wells by Owner.
  - File 10 day notification to obtain demo permit.
  - Coordinate with gas provider to properly cap and remove existing gas service.
  - Contact electrical/water/gas provider to disconnect electrical/water/gas service.
  - Demolition of existing fuel islands, fuel piping and fuel tanks by fuel contractor.
  - Demo existing building including footings and foundations and dispose of according to County Requirements.
  - Demo existing curbs and asphalt on and off site and properly dispose.
  - Demo existing Cumberland ID sign and foundations.
  - Demo and properly dispose of existing grease trap and existing storm system.
  - Demo existing irrigation system.
  - Demo existing lights and bases and miscellaneous concrete pads and foundations.
  - Leave site clean of all debris and graded flat.
  - Review Asbestos Report and provide ***alternate*** to remove and dispose of asbestos.

SITE WORK CONTRACTOR

- Scope of Work

  - Maintain silt fence throughout project.
  - Install construction entrance as shown on plans.
  - Prepare building pad to elevation 19.00, includes compactable material.
  - Install all storm drainage as per plans. Include filter fabric at exfiltration trenches (not shown in detail).
  - Bring all roof drains to locations shown on plans with boots to accept downspouts.
  - Install sanitary as per plans and specifications, including all necessary taps, structures, pipe and clean outs.
  - Install water service as shown on drawings including 2" tap, backflow preventers and meters. Site contractor is responsible for coordination with Palm Beach County Water. Also provide connection for landscape irrigation and water line to air/water tower.
  - Relocate existing fire hydrant as shown on plans. Coordinate with Fire Department and Palm Beach County for submittals and final acceptance. Painting of fire hydrant and approved bollards are also part of this scope.
  - Include fine grading and compaction of entire site.
  - Provide 6" of topsoil in all landscape areas after installation of curbs.
  - Provide excavation for 10 (ten) 5' x 5' x 7' deep canopy footings and the monument sign.
  - Saw cut roadway along Sandalfoot Boulevard and restore asphalt to match existing and new concrete ramp.
  - Control all inspections by 3rd party and municipalities for storm, sanitary and water, and obtain final approvals. In addition, all structures and pipes are to be cleaned prior to final turnover.
  - Control all inspections by 3rd party and municipalities for soil compaction.

LIQUID BOOT

- Scope of Work

  -Provide an alternate cost to provide Liquid Boot 500 spray applied gas vapor barrier system as manufactured by Cetco, 1-800-527-9948. www.Cetco.com. Application should extend 5'0" outside the footprint of the building slab.

CONCRETE CONTRACTOR

- Scope of Work
  - Responsible for excavation of building, trash enclosure, equipment pad foundations and area light bases (site contractor will excavate canopy footings and monument sign).
  - Supply and install rebar and concrete for foundations and stem walls.
  - Install anchor bolts (supplied by others) in building and canopy footings and area lights.
  - Install steel bollards (furnished by others) in front of building, at trash enclosure and at fuel islands as shown on plans.
  - Perimeter building foundation insulation and floor insulation with wood for freezer shall be supplied and installed by concrete contractor.
  - Termite spray for building pad and building sidewalk.
  - All fine grading and compaction is by concrete contractor.
  - Poly under slabs shall be supplied and installed by concrete contractor.
  - Pour building, trash enclosure and equipment slabs as per plans. Building floor must be level and without defects or cracks. Leveling or repairs required to finish floor will be backcharged to concrete contractor.
  - Pour footings for privacy wall.
  - Install curbing as per plans.
  - Islands 10 (ten) at 10' x 3' and tank mat 30' x 45' will be poured by the fuel contractor. Remainder of the site is concrete which is by the concrete contractor.
  - Drill and pour area light bases.
  - Install all sidewalks and pads as shown, both on site and off site.
  - All handicap ramp material shall be supplied and installed by concrete contractor.
  - Supply and install all Sika flex sealing compound at control and expansion joints.
  - Pour 2 (two) raised pads 5" high for A/C units. Coordinate with HVAC contractor for exact size and location.
  - Review bollard installation details for storefront bollards with grout.
  - Provide non-shrink grout at canopy and building base plates.
  - Provide medium broom finish on all walkways and drive grades. One straight and consistent broom pull from joint to joint must be used.
  - Coordinate with 3rd party inspector to ensure compaction and concrete testing is done prior to pouring. Once slump has been approved no additional water can be added to the mix.
  - In order to achieve consistent color, all concrete mix designs and suppliers must remain the same.
  - **Concrete will need to be pumped at the area of the site exfiltration trench as there is only 12" of material covering the type which would not support the weight of a concrete truck.**
  - **Concrete will need to be pumped at the entire building slab and the sidewalks around the building as there is limited access to these areas due to the location of the tank hole.**

FUEL CONTRACTOR

- Scope of Work
  - Owner will provide 3rd party closure reports, fuel contractor to notify County.
  - Demolition of existing underground storage tanks.
  - Demolition of existing dispensers.
  - Demolition of existing underground piping.
  - Demolition of existing vents.
  - Backfill and compaction of excavations.
  - Furnish and install shoring system.
  - Furnish and install Dewatering System.
  - Owner will supply water treatment and discharge permits.
  - Furnish and install filter fabric throughout tank excavation and piping trenches.
  - Excavate and dispose of all material associated with tank and piping excavations.

FUEL CONTRACTOR (CONTINUED)

- Owner will supply soil testing services to ensure excavated material is clean.
- If material is contaminated, credit for clean disposal is applied to stockpile and loading into Owner supplied trucks.
- Furnish and install 2 (two) monitoring wells at tank field.
- Install 2 – 20K and 1 – 6K Owner supplied tanks.
- Furnish and install all water for tank ballast.
- Furnish and install all required pea gravel.
- Install Owner supplied straps, turnbuckles and dead men.
- Install Owner supplied tank and dispenser sumps.
- Install Owner supplied island forms and island bollards.
- Furnish and install all steel tank risers with 3M wrap and all vent risers.
- Install Owner supplied submersible pumps, flex hoses and shutoff valves in sumps (note: all steel elbows and nipples by fuel contractor)
- Install Owner supplied tank and dispenser sump penetrations.
- Install all Owner supplied fiberglass pipes and fittings.
- Install Owner supplied manholes, spill buckets, extractors, and fill and vapor adaptors as shown.
- Pour concrete island forms.
- Set and install Owner supplied dispensers including flex hoses, impact valves (note: steel fittings supplied by fuel contractor).
- Maintain pressure on both primary, secondary and tank annular space throughout construction. Daily pressure readings must be maintained.
- Pump out all tank ballast water dry tanks with venturi.
- Paint manholes, vents, etc.
- Install Owner supplied decals and price signs as shown on drawings.
- Install Owner supplied hoses, nozzles and breakaways.
- Receive Owner supplied fuel and provide locks on fills.
- Install all overfill devices and tank gauging probes.
- Coordinate with Dresser Wayne (start up contractor) for system start up.
- Coordinate with Veeder Root contractor for system start up.
- Coordinate with Cumberland Farms on tank registration information.
- Coordinate all inspections from County and State as required.
- Coordinate with Cumberland Farms for 3rd party tank and line testing.
- Install fire extinguishers at islands as shown on plans.
- Purge fuel system and provide 1 (one) filter change with Owner supplied filters.
- Fuel contractor is responsible for routing canopy drainage through islands and cut holes at ends of each island for discharge.
- Fuel contractor to supply and install concrete for 10 (ten) 10' x 3' islands and 45' x 30' tank mat .
- Crown details at all manholes must be as per plans and specifications.

STEEL CONTRACTOR

- Scope of Work
  - Provide all anchor bolts with necessary nuts and washers and embeds for concrete contractor.
  - Provide and install columns, beams and K bracing for building.
    Special Note: perimeter top flange on beams to be drilled to accept bolts for wood plates. See detail on S2.2.
  - Provide shop drawings prior to fabrication for approval.
  - Provide and install gates for trash enclosure and equipment pads, includes hinges and cane bolts.
  - Provide 6" bollards for trash enclosure.
  - Provide 4 (four) galvanized equipment racks for refrigeration units. See drawing A1.1a.

ROUGH CARPENTRY CONTRACTOR

- Scope of Work

- Supply and install all necessary labor and material to frame and sheath entire building including, but not limited to:

- Exterior wall framing, blocking and sheathing - note framing at K bracing
- Roof truss system with necessary framing and sheathing
- Faux dormers with sheathing
- Dormer windows
- All synthetic wood trim – note trim details at windows & LCC flashing
- All soffits including curved synthetic at front entrance
- Fiberglass columns and shrouds
- Vinyl siding on building and trash enclosure
- Specialty mouldings including, gingerbreads, brackets, and louvered vents
- All nail or screw holed and trim joints and specialty mouldings must be caulked and sanded, ready for paint.
- All hurricane strapping material

All filtration barrier material

- #15 asphalt felt material
- All wood plates including bolts, nuts and washers
- Obtain all inspections and final approvals for their work
- Provide and install paintable Trex on trash enclosure and equipment gates (metal gates by others)

FRAMING / DRYWALL /FINISH CARPENTRY CONTRACTOR

- Scope of Work

- All interior metal framing for walls, ceilings and soffits.
- All blocking for bathroom fixtures, handicap devices, shelving, partitions and misc. items shown on plans.
- Sheetrock finished to Level 4, ready for paint.
- Install only Owner supplied door, frames and all door hardware and trim, including door stops, sweeps, closures and signs.
- Hot water heater shelf.
- Install only Owner supplied FRP as shown on drawings
- Install only Owner supplied Marlite Panels and all associated trim as shown on drawings.
- Install only Owner supplied bathroom partitions as shown on drawings.
- Install only Owner supplied bathroom accessories including, but not limited to, grab bars, soap dispensers, toilet and paper towel dispensers, mirrors, coat hooks and baby changing station.
- Install only shelving in backroom above Owner supplied three compartment sink and along back wall.
- Mount Owner supplied LCD menu boards.
- Coordinate with other subs to ensure proper size openings are provided for other trades.
- Expect to return to correct any defects found while paint finishes are being applied.
- Provide 2 (two) finish carpenters for 1 (one) day for opening week.
- Install F/R plywood behind electrical panels and phone board.

ROOFING CONTRACTOR

- Scope of Work

- Supply and install Grace ice and water shield under all areas to receive roofing.
- Supply and install all ridge vents and roof vents as shown on plans.

ROOFING CONTRACTOR (CONTINUED)

- Supply and install asphalt shingles as per manufacturer's specifications and Florida approval requirements.
- Provide manufacturer's warranty certification upon completion.
- Supply and install Alcoa Traditional Select 5 – 6" Aluminum Gutter System and Downspouts. Coordinate with drainage contractor to ensure proper location of underground drainage to downspout locations.
- Responsible for all inspections and sign offs from building department.

INSULATION CONTRACTOR

- Scope of Work

  - Supply and install all wall insulation as shown.
  - Supply and install ceiling insulation including vapor barrier and lath 16" on center.
  - Obtain all necessary inspections and sign offs associated with their work.

ACOUSTICAL CEILING CONTRACTOR

- Scope of Work

  - Supply and install all grid as shown on plans.
  - Install Owner supplied ceiling tile.

DOORS AND HARDWARE CONTRACTOR

- Scope of Work

  - Supply all doors and hardware as shown on drawings, including Eliason door.
  - Provide alternate to install all doors and hardware.

STOREFRONT CONTRACTOR

- Scope of Work

  - Supply and install a complete Kawneer Storefront System including doors and glazing as per plans and specifications, and Miami-Dade approval.
  - Supply and install all necessary break metal at the storefront system to match storefront material.
  - Provide all necessary inspections and approvals with local jurisdictions.

PAINTING AND CAULKING CONTRACTOR

- Scope of Work

  - Supply all paint and materials.
  - Caulk all joints prior to receiving paint, including doors and window frames.
  - Prime and repair any minor defects prior to installation of finish coats.
  - Provide 2 (two) coats of finish paint on all areas receiving paint.
  - Seal concrete floors as shown on drawings.
  - In addition to the building interior and exterior, painting contractor shall paint the following site items:
    - All 4" and 6" steel bollards
    - Block interior of equipment enclosure
    - Block interior of trash enclosure
    - Fiberglass columns and shrouds
    - Trash enclosure and equipment enclosure gates

PAINTING AND CAULKING CONTRACTOR

- Fire hydrant
- Area light poles
- Fill and vapor bucket covers at fuel tank field, 4 fills and 4 vapors
- 3 (three) 18" interstitial manhole covers
- Vent stand at fuel tank field

FLOORING CONTRACTOR

- Scope of Work

NOTE: THE PLANS DO NOT REFLECT THE CORRECT FLOORING SYSTEM

- Install Adore Wood Flooring System – Color: Hickory Long Plank. Wood flooring is supplied by Owner. Flooring system shall be installed throughout entire building with the exception of walk-in boxes and freezers.
- Install Owner supplied Armstrong vinyl cove base at all areas receiving wood floors.
- Install Owner supplied vinyl tile in front of electrical panels as shown on plans.
- Supply and install Adore transition strip from wood floors to yellow vinyl tile in front of electrical panels.

PLUMBING CONTRACTOR

- Scope of Work

- Plumbing contractor to provide all necessary labor, equipment and material to deliver a completed project, including all necessary trade permits, inspections and final approvals

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- Plumbing contractor will install the following Owner supplied equipment:
    - Water closets
    - Lavatory sinks
    - Urinals
    - Mop sinks
    - Three (3) compartment sinks
    - Customer Service sink
    - Cashier Service sink
    - Utility hand sink
    - 12 gallon hot water heater
    - 40 gallon hot water heater
    - Water filtration system

-- Plumbing contractor will supply and install the following equipment:
    - Grease trap
    - Drinking fountain
    - Wall hydrants
    - Floor sinks
    - Floor drains
    - Clean outs and escutcheons, etc.
    - Direct and indirect drains
    - All pipe valves and fittings
    - Insulation of exposed piping
    - Insulation and heat tape on refrigeration condensate drainage
    - Handicap required insulation of sink drains in restrooms

- Final water and drainage connections to all countertop equipment including but not limited to:
    - Coffee makers, regular and iced

PLUMBING CONTRACTOR (CONTINUED)

- Cappuccino machines
- Ice machines
- Frozen beverage dispensers
- Bag in the box (soda systems)

HVAC/REFRIGERATION SYSTEMS CONTRACTOR

- Scope of Work

Provide all necessary labor, material and equipment to install the following equipment:

- HVAC units supplied by Owner.
- HVAC ductwork supplied by HVAC contractor.
- HVAC registers, grilles and diffusers supplied by HVAC contractor.
- Bathroom exhaust fans EF1 and EF2 with grills and vents supplied by HVAC contractor.
- EF3 exhaust fan with grills and vents by HVAC contractor.
- Insulation and waterproofing of ductwork by HVAC contractor.
- Thermostats supplied by Owner and installed by HVAC contractor.
- Walk-in cooler condensers and evaporators supplied by Owner. Installation, piping and start up by HVAC contractor.

HVAC/REFRIGERATION SYSTEMS CONTRACTOR

- Walk-in freezer condenser and evaporators supplied by Owner. Installation, piping and start up by HVAC contractor.
- Walk-in storage freezer condenser and evaporators supplied by Owner. Installation, piping and start up by HVAC contractor.
- Walk-in cooler doors supplied by Owner. Installation by HVAC contractor.
- Walk-in freezer doors supplied by Owner. Installation by HVAC contractor.
- Sandwich cooler with remote condenser supplied Owner. Installation, piping and start up by HVAC contractor.
- Ice/beverage dispenser with remote condenser supplied by Owner. Installation, piping, and start up by HVAC contractor.
- Two (2) frozen carbonated beverage dispensers with remote condensers supplied by Owner. Installation, piping and start up by HVAC contractor.
- One (1) chill zone air compressor supplied by Owner. Installation by HVAC contractor.
- One (1) bag in the box rack system supplied by Owner. Installation, soda piping, air and water, and start up by HVAC contractor.
- HVAC contractor to obtain permits, inspections and sign offs for all work they complete.
- All workmanship shall be warranted for 1 (one) year.

ELECTRICAL CONTRACTOR

- Scope of Work

Pump and Tank

- Excavation and installation of all underground conduit and wiring.
- Number of conduits and wiring shall be as per plans.
- All conduits penetrating building floor must be rigid steel hot dipped galvanized. They may transition to PVC until they enter Class 1 areas at which time they will return to galvanized conduit. Code approved PVC to GRC fittings must be used.
- All fittings in Class 1 zone must meet Class 1 Group O requirements.
- All fuel systems conduits shall have approved seal-off fittings and shall be properly sealed after testing is complete.
- Submersible pumps will have electronic leak detectors and shall be wired accordingly.

ELECTRICAL CONTRACTOR (CONTINUED)

- Wiring of all fuel system components including, dispensers, submersible pumps, Veeder Root System, pump controllers, and POS systems. No power shall be turned on to any of these systems until start up contractors approve wiring connections.
- Supply all necessary conduit, wire, cable and fittings for a complete operational system.
- Install Owner supplied Veeder Root System. Owner will supply Veeder Root cable.
- Install and wire electronic price signs on dispensers.
- Coordinate with Dresser Wayne and Veeder Root start up contractors.
- Coordinate all required inspections and approvals.

Canopy and Site

- Provide excavation and all necessary conduit and wiring for canopy and site components including lighting, monument and canopy signage, main electrical service, irrigation system, utility outlets at signs and area lights, and air and water areas.
- Provide rigid galvanized piping at all penetrations through building floors, foundations and slabs, or through any Class 1 zones. Transition to PVC must be done with GRC to PVC approved fittings in compliance with codes.
- Review both line voltage and low voltage requirements for signs and associated data with sign provider to ensure proper cabling requirements.
- Provide and install any disconnects as required by code for signage or equipment on site.

Canopy and Site

- Provide data and power to all price signs and message boards and their respective controllers. Final connections are by sign providers contractor.
- Coordinate with electrical company for the disconnect of existing electrical service, temporary construction service and all coordination of new electric and telephone service. This includes applications/load letter and fees for new service which are reimbursable.
- Assemble, set and wire area lights (concrete bases by others).
- Provide rigid conduit on canopy roof deck for lights and signage.
- Wire all canopy lights supplied and installed by Owner and canopy contractor.
- All exterior conduits shall have seal-offs as per code and be properly sealed after testing.
- Review all cut sheets and specifications on exterior equipment to ensure proper wire sizing and locations.
- Obtain all necessary inspections and sign offs.
- Pay for and obtain all necessary trade permits.
- Supply and install all required grounding for new service or equipment as per code.
- Provide temporary power and mount Cumberland Farm cameras (2) on G/C trailer. Electrical contractor shall move (1) camera to building interior when building shell is completed and provide power.
- Electrical contractor fully understands that electrical service (both temporary and final) and coordination with other trades and equipment suppliers are critical to project completion and has a competent person managing this process.

Building

- Excavation and installation of all conduit and wiring under slab. Penetrations through the slab or footings must be rigid and can transition to PVC with the use of proper PVC to GRC fittings as per code.
- Review building electrical drawings and equipment schedules to ensure all necessary conduits, wire, fittings, disconnects, date and final connections are included in his proposal.
- Install C.P.I. panel boards and transfer switch provided by Owner.
- Wire from transfer switch CT cabinet to panel board is by electrical contractor.
- Provide fire alarm system for building only. Canopy will not require F/S system.
- Provide all required disconnects for all electrical equipment as required by code.

ELECTRICAL CONTRACTOR (CONTINUED)

- Provide all disconnects switches for all signage systems.
- Provide all necessary plugs and outlets for counter top equipment.
- Provide and install gable fans and thermostatic controls.
- Install (3) three emergency shut down switches (2) two on exterior and (1) one at transaction counter provided by Owner.
- Install all Owner supplied lighting packages.
- Provide and install all outlets and data ports as shown on drawings.
- Wire Owner supplied intercom system.
- Wire all Owner supplied refrigeration systems.
- Review all equipment cut sheets and specifications to ensure proper wire and circuit size.
- Run all necessary data and phone lines and ensure dial up systems are functionally for fire alarm and Veeder Root.
- Responsible for all inspections and sign offs to close line and low voltage permits.
- Electrical contractor shall provide smoke detectors for HVAC systems.

TECHNICAL DATA

LIQUID BOOT® 500

SPRAY-APPLIED GAS VAPOR BARRIER

DESCRIPTION

Liquid Boot® 500 is a seamless, spray-applied, water-based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. Liquid Boot® 500 spray-application directly to penetrations, footings, grade beams, pile caps and other irregular surfaces, provides for a fully-adhered gas vapor barrier system.

APPLICATION

Liquid Boot® 500 is used as an underslab gas vapor barrier, used to minimize vapor migration into buildings. Liquid Boot® 500 is ideal for methane migration control.

BENEFITS

- Can be installed more economically than Liquid Boot®, resulting in greater savings
- Liquid Boot® 500 is comprised of the same elements as Liquid Boot®
- Unique formulation provides superior protection from methane gas

INSTALLATION

Protect all adjacent areas not to receive gas vapor barrier. Ambient temperature shall be within man-ufacturer's specifications. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be secured in their proper positions and appropriately protected prior to membrane application. Gas vapor barrier shall be installed before placement of reinforcing steel. Expansion joints must be filled with a conventional waterproof expansion joint material. Surface preparation shall be per manufacturer's specification. A minimum thickness of 60 dry mils, unless specified otherwise.

TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
PROPERTY	TEST METHOD	RESULT
Elongation	ASTM D 412	800%
Bonded Seam Strength Tests	ASTM D 6392	Passed
Methane Permeability	ASTM D 1434	None Detected
Chemical Resistance:	Tested at 20,000 ppm	<1% weight change
Micro Organism Resistance (Soil Burial):	ASTM D4068-88	Passed
Oil Resistance Test	ASTM D543-87	Passed
Heat Aging:	ASTM D4068-88	Passed
Dead Load Seam Strength	City of Los Angeles	Passed
Environmental Stress-Cracking	ASTM D1693-78	Passed
Water Vapor Permeability	ASTM E96	0.22 perms
Adhesion to Concrete	ASTM C-836	Passed
Hardness	ASTM C-836	Passed
Hydrostatic Head Resistance (Tested at 20 psi)	ASTM D-751	Passed

Liquid Boot® 500 spray-application effectively seals penetrations, footings, grade beams and other irregular surfaces that are considered critical vapor intrusion pathways.

PACKAGING

Liquid Boot® 500 is available in the following packaging options:

- 55 Gallon Drum
- 275 Gallon Tote

EQUIPMENT

- COMPRESSOR: Minimum output of 155-185 cubic feet per minute (CFM)
- PUMPS: For "A" drum, an air-powered piston pump of 4:1 ratio (suggested model: Graco, 4:1 Bulldog). For "B" drum, an air-powered diaphragm pump (0 -100 psi)
- HOSES: For "A" drum, ½" wire hose with a solvent resistant core (for diesel cleaning flush), hose rated for 500 psi minimum. For "B" drum, a 3/8" fluid hose rated at only 300 psi may be used.
- SPRAY WAND: Only the spray wand sold by CETCO is approved for the application of Liquid Boot®.
- SPRAY TIPS: Replacement tips can be purchased separately from CETCO.

2870 Forbs Avenue, Hoffman Estates, IL 60192
800.527.9948 | http://remediation.cetco.com

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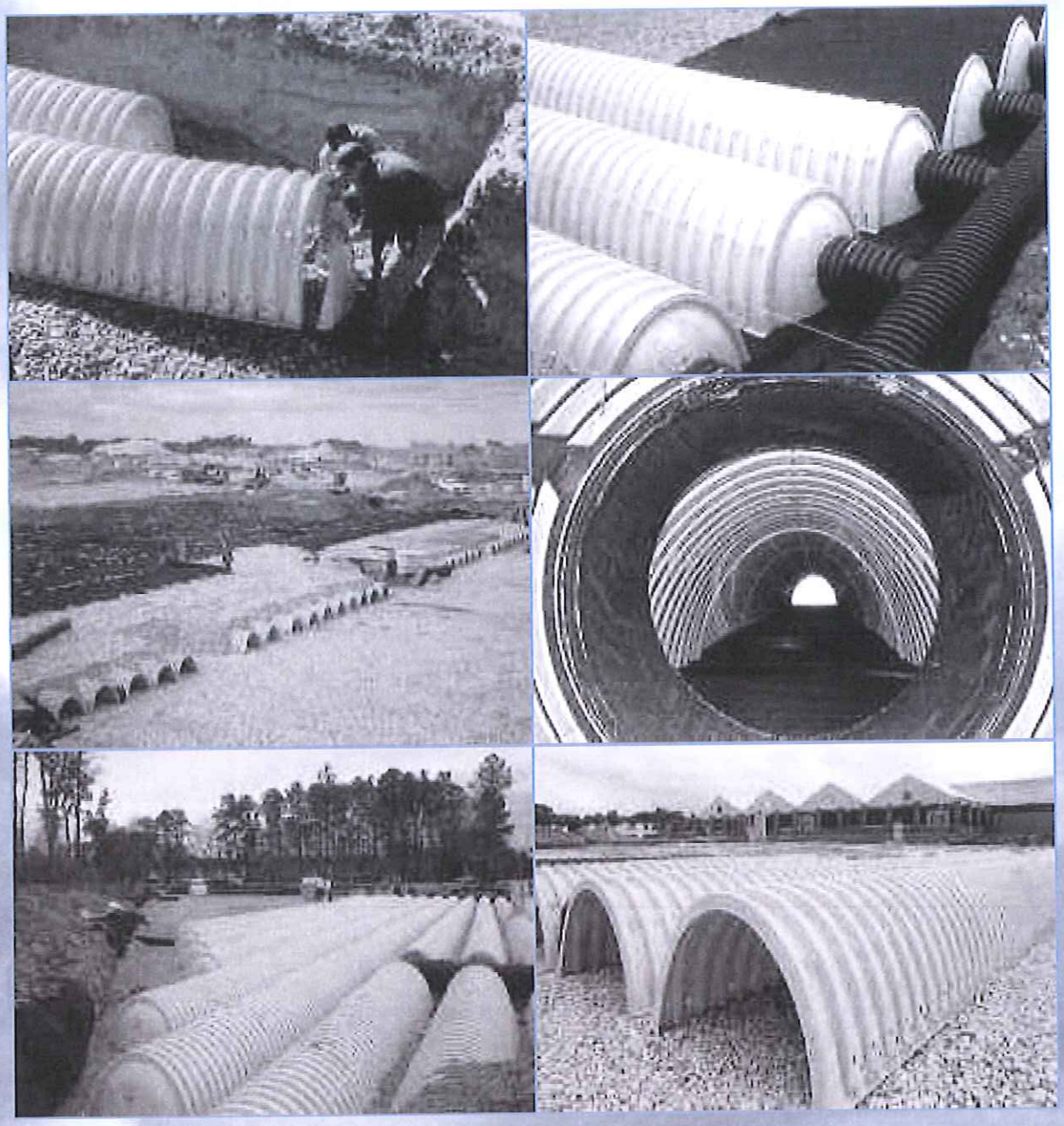

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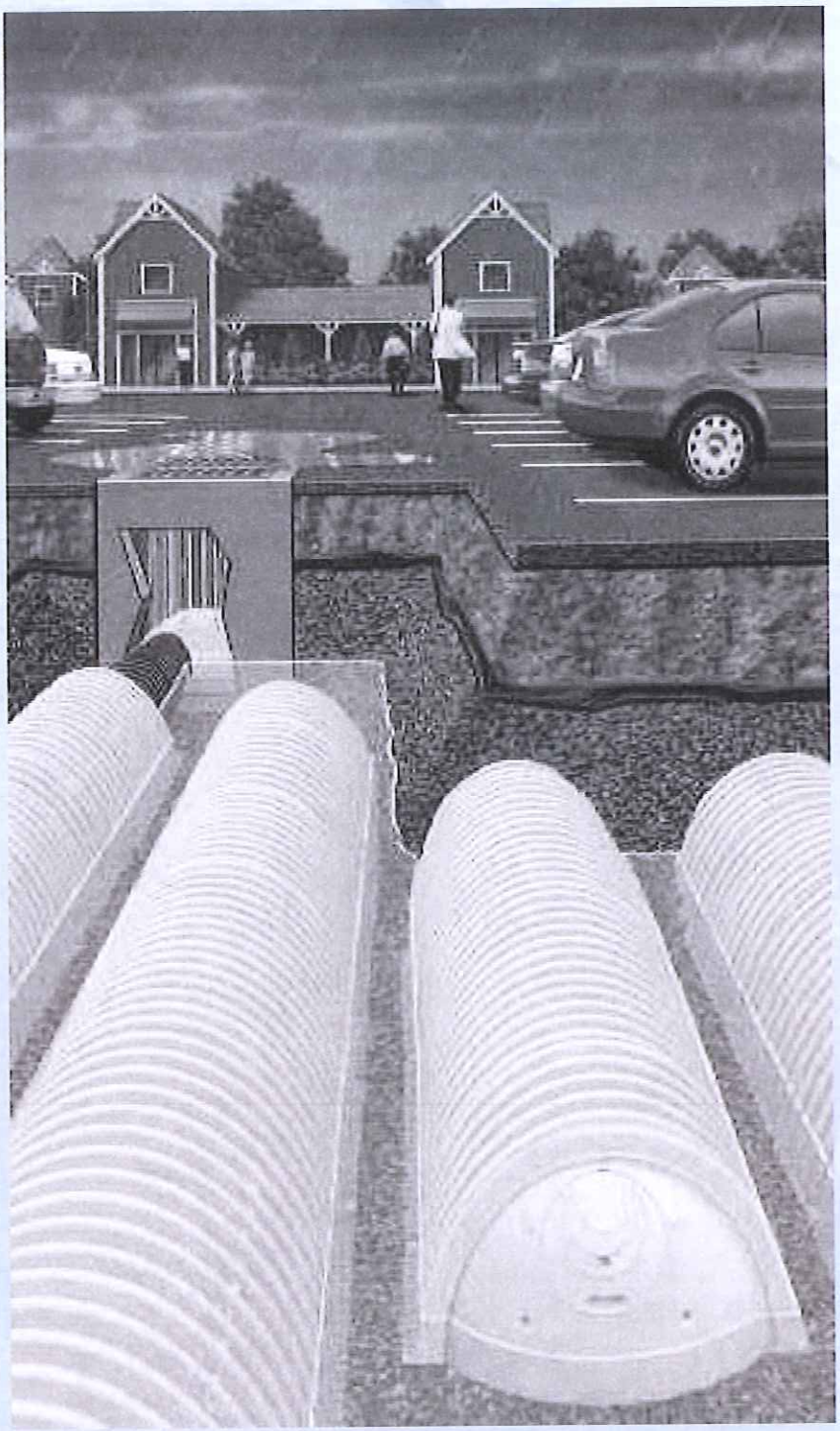
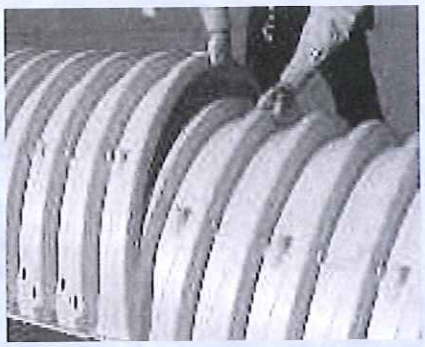
Subsurface Stormwater Management℠

SC-310 / SC-740 / DC-780





Installation Instructions

StormTech® Chamber System for Stormwater Management

Before You Begin

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable nominal ¾" – 2" (19 - 51 mm) clean, crushed, angular stone per **Tables 4 & 5** on page 10
- Acceptable fill materials per **Table 5** on page 10
- Geotextiles
- StormTech end caps
- StormTech chambers
- Reciprocating saw or router (to custom cut end cap holes)
- OSHA compliance
- Stone bucket
- Tracked excavator
- Transit or laser
- Vibratory roller with maximum gross vehicle weight of 12,000 lbs (53 kN) and a maximum dynamic force of 20,000 lbs (89 kN)

Requirements for System Installation

1 StormTech requires installing contractors to use and understand StormTech's most current installation instructions prior to beginning system installation.

All illustrations and photographs are examples of typical situations. Actual designs may vary. Be sure to follow the engineer's drawings.

2 StormTech offers installation consultations to installing contractors. Contact StormTech at least 30 days prior to system installation to arrange a pre-installation consultation. Our representatives can answer questions, address comments and provide information about the StormTech chamber system's installation requirements. Call **1-888-892-2694** or visit **www.stormtech.com** to receive the most current version of our installation instructions.

3 Contact local underground utility companies prior to construction.

4 StormTech's requirements for systems with pavement design (asphalt, concrete pavers, etc.): Minimum cover for the SC-740, DC-780 and SC-310 chambers is 18" (457 mm) not including pavement; Maximum cover for the SC-740 and SC-310 chambers is 96" (2438 mm) including pavement design; Maximum cover for the DC-780 chamber is 12' (3.66 m) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 24" (610 mm), maximum cover is as stated above.

5 The contractor must report any discrepancies with the system subgrade soil's bearing capacity to the design engineer.

6 Check chambers for shipping damage prior to installation. Units that have been damaged must not be installed. Contact StormTech immediately upon discovery of any damage.

7 Geotextile must be used as indicated in the engineer's drawings.

8 To maintain row separation distances and prevent chamber displacement, place stone between chamber rows and around perimeter as required by the most current version of StormTech's Installation Instructions.

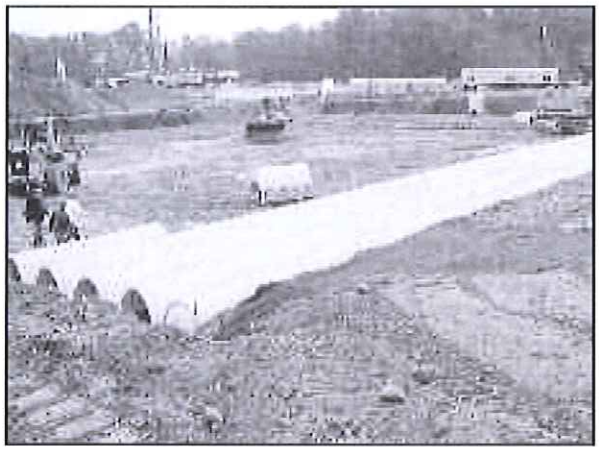
9 Backfilling of the chamber system must be in accordance with the most current version of StormTech's Installation Instructions.

10 The contractor must refer to StormTech's Installation Instructions for Tables of Acceptable Vehicle Loads at various depths of cover. This information is also available at **www.stormtech.com**. The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from traveling over the stormwater system.

11 The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.

12 StormTech products must be designed and installed in accordance with StormTech's minimum requirements as noted in the StormTech Design Manual. Failure to do so will void the limited warranty.

Requirements for Excavating and Preparing the Site



Far side of bed being prepared while near side is concurrently installed.

Geotextile and underdrains installed.

1 Excavate and level the designated area. Be sure to excavate at least one extra foot (305 mm) around the perimeter to allow for proper fit and adequate compaction.

2 Excavation must be free of standing water. Dewatering measures must be taken if required. Positive drainage of the excavation must be maintained.

3 Prepare the chamber bed subgrade soil as outlined in the engineer's drawings.

4 Place ADS 601 non-woven geotextile (or equal) over the prepared subgrade soils and up the excavated walls. **Table 3** lists other suitable geotextiles. The geotextile must overlap at least 2 feet (610 mm) where the geotextile edges meet.

5 Place ADS 601 non-woven geotextile (or equal) around the perimeter of the excavated bed including the manifold system as specified in the engineering drawing.
NOTE: (Geotextile is required over the top of the entire chamber system after the 6" (152 mm) of stone is placed over chambers.)

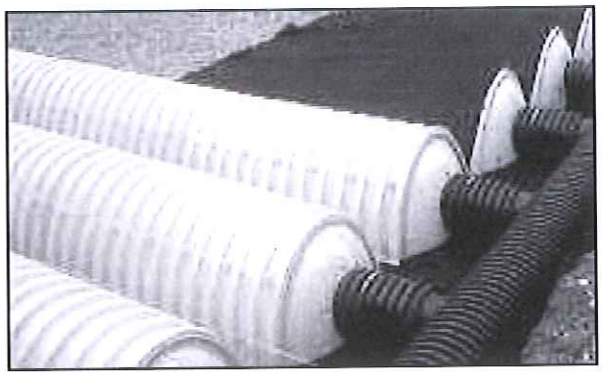
6 Install perforated underdrains as required by the engineer's drawings. Underdrains may be located around the perimeter of the bed or under the chambers with proper separation from the foot of the chamber to the top of the underdrain pipe.

7 Place acceptable nominal ¾-2" (19-51 mm) clean, crushed, angular stone foundation material over the entire bottom surface of the bed (see **Tables 4 & 5** for stone requirements). Refer to the engineer's drawings for subgrade soil preparation and required stone foundation thickness.
NOTE: Frozen aggregates or backfill shall never be used in the construction of these systems.

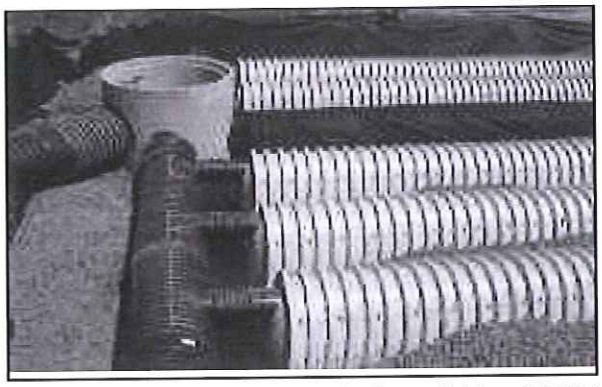
8 Compact the stone using a vibratory roller with its full dynamic force applied to achieve a flat surface.

Requirements for Assembling Inlet Pipes

NOTE: Depending on the system's design, it may be advantageous to lay out the inlet and outlet pipe systems prior to forming the bed of chambers.



Scour protection geotextile at manifold.



24" (600 mm) inlets are the maximum size that can fit into an SC-740/ DC-780 end cap and must be prefabricated with a 24" (600 mm) pipe stub. SC-310 chambers with a 12" (300 mm) inlet pipe must use a prefabricated end cap with a 12" (300 mm) pipe stub.

1 Temporarily layout the header/manifold system according to the engineer's drawings.

2 Place a minimum 12.5 feet (3.8 m) of ADS 315ST (or equal) woven geotextile over the bedding stone under each inlet stub off the manifold system. Check the engineer's drawing to determine if additional scour control measures are required.

3 Set first chamber of each row aligned with their inlet pipes if applicable. A minimum 6" (152 mm)* clear spacing, measured between feet, is required between adjacent rows. Separate chambers and inlet fittings as necessary to maintain 6" (152 mm) clear space between chamber rows.

4 With a reciprocating saw, cut an opening for the inlet piping in the applicable endcaps at the specified invert height.

NOTE: Inlet pipe openings may be cut anywhere on an endcap. To do this, take a short length of pipe and use a marker to draw an outline of the pipe on the endcap at the correct height.

5 Insert the distribution pipes into the endcaps.

6 Once chamber spacing requirements are met, the header/ manifold system may be permanently assembled.

***6" (152 mm) is the minimum spacing. A wider spacing may be required as indicated on the engineer's drawings.**

NOTE: If Isolator Rows are specified on the engineer's plans, see page 11 for installation instructions.

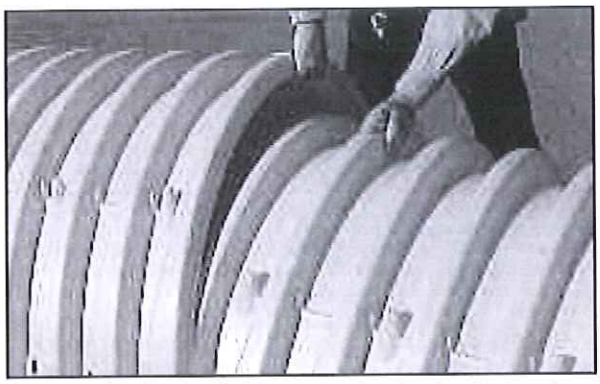
Requirements for Installing the Chambers

Maintain a minimum of 6" (152 mm) between chamber feet.

1 To begin building the chamber bed, orient the chambers so the end labeled "Build Rows in This Direction" is closest to the bed's edge and the arrows point in the direction of the build. ***Maintain a minimum 6" (152 mm) separation between chamber rows (measurement taken from the edge of the foot of the chambers).***

All pipe connections into and out of the chambers must be through the end caps or the inspection port knock-out. Never cut a hole in the sides of the chamber.

Requirements for Joining the Chambers



Construct the chamber bed by overlapping the chamber's end corrugations.

A chamber's end corrugations are sized differently to allow for an overlapping joint. To ensure proper joint fit, orient all chambers in the bed with their arrows pointing in the direction of the build. The chamber's overlapping feet are a distinguishing feature to help quickly identify the proper chamber orientation.

1 Construct the chamber bed by overlapping the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber onto the end corrugation of the last chamber in the row. Be sure that chamber placement does not exceed the reach of the construction equipment used to place the stone.

NOTE: Do not overlap more than one corrugation.

Requirements for Attaching the End Caps

Lift the end of the chamber and place the end cap into the end corrugation.

1 Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber's end corrugation.

NOTE: End caps are required only at the beginning and the end of each row of chambers.

Requirements for Placing Stone Over the Chambers

A minimum of three feet (914 mm) cover is required for trucks to dump stone. (See page 7)

Clean, crushed, angular stone meeting the specifications in **Tables 4 & 5** and **Figure 1** on page 10 may be placed over the chambers with an excavator, pushed with a dozer or walked in with a stone conveyer boom. Each method has benefits and limitations. These three processes will be explained separately, however there are some common requirements for each: The 6" (152 mm) minimum clear spacing must always be maintained between adjacent StormTech's chamber rows; and, construction vehicle loads must not exceed the requirements of **Tables 1 & 2** on page 9.

Requirements for Placing Stone with an Excavator

Carefully ladle nominal 3/4-2" (19-51 mm) clean, crushed, angular stone over the centerline of the chamber row.

Placing stone with an excavator is a common method of placing stone over StormTech's chambers. Its biggest limitation is the reach of the excavator arm. For larger beds it is common practice to work across a bed by joining only a few rows of chambers and placing their angular stone embedment, the geotextile and soil fill before moving onto the next few rows.

A bed may be built either parallel to or perpendicular to the chamber row's direction with this process. The excavator typically works inside the excavation, leading the way across the bed. It is also possible for the excavator to work at grade over the recently placed chambers following the build across. If this process is done it is required that the depth of cover between tops of chambers and the excavator's tracks be the minimum required by **Tables 1 & 2** on page 9.

1 Anchor chambers by carefully ladling the stone directly over the centerline of the chambers. Evenly distribute stone to minimize chamber movement while maintaining row separation distances.

2 After chambers are anchored, continue to place the stone, surrounding the chambers and filling the perimeter areas to a minimum of 6" (152 mm) over the top of chambers and manifolds. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2** on page 9.

3 Repeat steps 1 & 2 until all the chambers are laid to the dimensions of the engineer's drawing.

Requirements for Pushing Stone with a Dozer

Low ground pressure track vehicle pushing stone parallel with rows.

A dozer may be used to push the stone embedment into place over the chambers. There are some strict requirements for this process.

1 **All stone must be pushed in a direction parallel with the rows of chambers.** Pushing stone perpendicular across chamber rows may cause the chambers to move, possibly reducing the required 6" (152 mm) minimum spacing between rows.

2 Always maintain the required cover between the tops of chambers and the dozer tracks, per **Table 2** on page 9. The contractor must check **Table 2** on page 9 to determine if their construction vehicles can be used over the chamber bed.

Requirements for Pushing Stone with a Dozer (cont.)

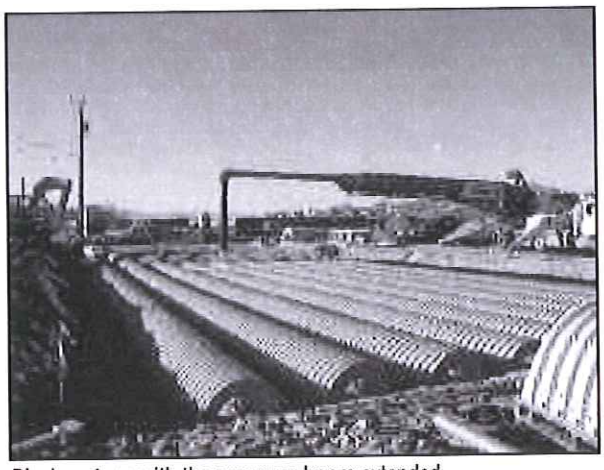
StormTech

3 The angular stone cover height should never differ by more than 2 feet (610 mm) over adjacent chambers unless there is a minimum cover of 3 feet (914 mm) over the chambers. Stone should be pushed in small piles and spread evenly to prevent movement of chamber rows.

4 Full dump trucks can often be the heaviest loads on a construction site. StormTech requires a minimum of 3 feet (914 mm) of cover during the initial installation of the chamber bed when large dump truck loads are present. The additional cover helps to offset affects from any wheel rutting that may occur as well as large loads induced on the back wheels during dumping loads.

During paving operations, dump truck axle loads on 18" (457 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18" (457 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.

Requirements for Placing Stone with a Telescoping Conveyer Boom



Placing stone with the conveyor boom extended.

Telescoping aggregate conveyer trucks are only limited by the range of the boom. Typical trucks have a boom range between 50 to 130 feet (15-40 m). Booms can convey up to 360 cubic feet (10.2 m^3) of stone per hour.

1 Anchor chambers by carefully ladling clean, crushed, angular stone directly over the centerline of the chambers. Evenly distribute stone to minimize chamber movement while maintaining row separation distances.

2 After chambers are anchored, continue to place the stone, surrounding the chambers and filling the perimeter areas including manifolds to a minimum of 6" (152 mm) over the top of chambers. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2 on page 9.**

3 Repeat steps 1 & 2 above until all the chambers are laid to the dimensions of the engineer's drawings.

Requirements for Backfilling the System

Roll out non-woven geotextile over the angular stone.

Backfill the bed using an acceptable fill material.

Continue to backfill the chamber bed.

1 Place the required clean, crushed, angular stone over the entire bed area as described in previous sections.

2 Cover the entire installation area with ADS 601 non-woven geotextile (or equal). Take the geotextile from the trench walls and lay it over the top of the stone. The geotextile must overlap at least 2 feet (610 mm) where the edges of the geotextile meet.

3 The first 12 inches (305 mm) of fill material must meet the requirements of **Table 5** on page 10. Backfill over the top of the geotextile in lifts that do not exceed 6 inches (152 mm). Distribute the fill with a construction vehicle that meets the maximum wheel loads or ground pressure limits specified in **Tables 1 & 2** on page 9.

4 Compact each lift of backfill as specified in the engineer's drawings. StormTech requires compacting to a minimum of 95% of the Standard Proctor density until StormTech's minimum cover requirements are met. Use a walk-behind or vibratory roller not to exceed a maximum gross vehicle weight of 12,000 lbs (53 kN) and a maximum dynamic force of 20,000 lbs (89 kN).

5 Once StormTech's minimum cover requirements are met, continue to backfill over the chamber bed until the specified grade is achieved. The SC-740, SC-310 and DC-780 minimum cover requirement is 18" (457 mm) to bottom of flexible pavement. The SC-740 and SC-310 maximum cover requirement is 8 ft (2.44 m). The DC-780 maximum cover requirement is 12 ft (3.66 m). For pavement subbase or special fill requirements, see engineer's drawings.

The backfill height differential should never differ by more than 2 feet (610 mm) over adjacent chambers. Minimum cover heights must be met before vehicles are allowed on top of the system. Large rocks and organic matter such as roots, stumps, etc. must not be part of the backfill material. Refer to **Table 5** on page 10 for Acceptable Cover Materials or contact the design engineer for approved fill types.

Acceptable Vehicle Loads

StormTech

Table 1 – Maximum Allowable Axle Loads for Wheeled Vehicles at Various Cover Depths

Fill Depth (in. over chamber) [mm]	Max. Axle Load (lbs) [kN]
6 [152]	8,000 [35]
12 [305]	16,000 [71]
18 with pavement [457]	32,000 [142]
24+ without pavement [610]	32,000 [142]

NOTE: 36" (914 mm) of cover over the chambers is required for full dump truck travel and dumping. See instruction number 4 on page 7.

Table 2 – Maximum Allowable Ground Pressures for Various Vehicle Track Widths and Fill Depths

Fill Depth (in. over chamber) [mm]	Track Width (in.) [mm]	Max. Ground Pressure (PSF)* [kPa]
6 [152]	12 [305]	1070 [51]
	18 [457]	900 [43]
	24 [610]	800 [38]
	30 [762]	760 [36]
	36 [914]	720 [34]
12 [305]	12 [305]	1540 [74]
	18 [457]	1190 [57]
	24 [610]	1010 [48]
	30 [762]	910 [43]
	36 [914]	840 [40]
18 [457]	12 [305]	2010 [96]
	18 [457]	1480 [71]
	24 [610]	1220 [58]
	30 [762]	1060 [51]
	36 [914]	950 [45]

* Ground pressure is vehicle operating weight divided by total track contact area for both tracks.

Acceptable Geotextiles

Table 3 – Some Suitable Geotextiles

Manufacturer	AASHTO M288 Class 2 Non-Woven*	AASHTO M288 Class 1 Woven**
Belton Industries	—	Beltech 977
Carthage Mills	FX-60HS, FX-80HS	FX-66
GSE Lining Technology	NW6, NW8	—
Maccaferri	MacTex MX245, MacTex MX275	—
Pavco-Amanco	NT3000M, NT4000M	TR 4000
Propex	Geotex 651, Geotex 861, Geotex 601, Geotex 701, Geotex 801	Geotex 315ST, Geotex 2x2HF, Geotex 250ST
SKAPS Industries	GT 160NW, GT 180 NW	W315
Tencate Mirafi	Mirafi 160N, Mirafi 180N	Mirafi 600X, Filterweave 403, Filterweave 404, Geolon HP570, Geolon HP665, Geolon HP770
TNS Advanced Tech.	R060, R070, R080, R100	—
US Fabrics	US 205NW, US 160NW	US 315

*AASHTO M288 Class 2 Non-Woven Geotextile Application: 1. Separation layer between angular stone cover and fill to prevent fines intrusion. 2. Filter layer over the chambers of the Stormtech Isolator™ Row to prevent fines migration out of row while maintaining adequate hydraulic flows.

**AASHTO M288 Class 1 Woven Geotextile Application: 1. Stabilization layer for the angular stone foundation of the StormTech Isolator™ Row to prevent scouring of the stone base during the JetVac maintenance procedure, modest hydraulic flows maintained. 2. At each inlet row to prevent scouring of the foundation stone.

Acceptable Fill Materials

Table 4 – Criteria for Acceptable Nominal 3/4 – 2" (19-51 mm) Clean, Crushed, Angular Stone

Clean Crushed Stone	Description	Criteria
Acceptable	Angular	Stones have sharp edges and relatively plane sides with unpolished surfaces
	Subangular	Stones are similar to angular description but have rounded edges
Unacceptable	Subrounded	Stones have nearly plane sides but have well-rounded corners and edges
	Rounded	Stones have smoothly curved sides and no edges

NOTE: See Ⓐ & Ⓑ of Table 5 for additional angular stone requirements.

Table 5 – Acceptable Fill Materials

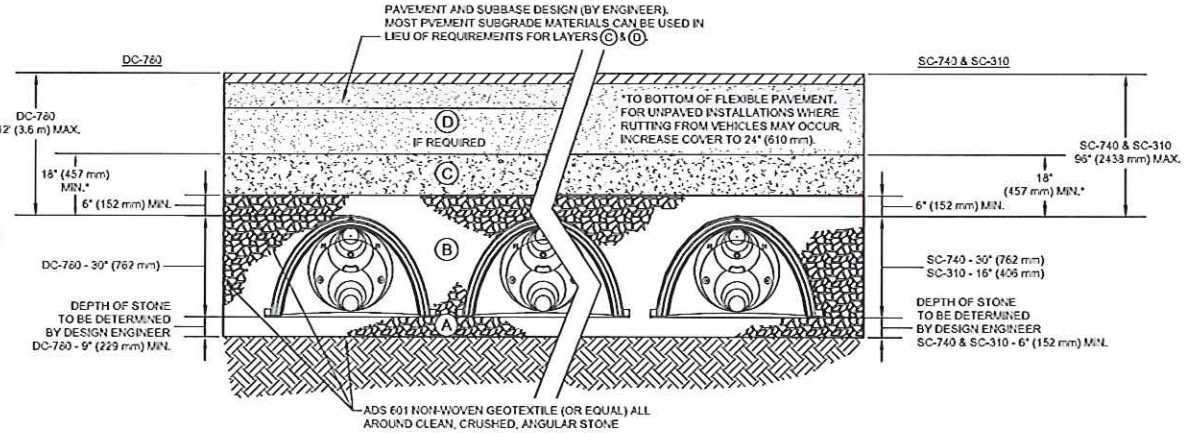
Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (457 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines. Most pavement subbase materials can be used in lieu of this layer.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (305 mm) of material over the chambers is reached. Compact additional layers in 6" (152 mm) max. lifts to a min. 95% Standard Proctor density. Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN).
Ⓑ Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone nominal particle size distribution 3/4 - 2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	No compaction required.
Ⓐ Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone, nominal size distribution 3/4-2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	Plate compact or roll to achieve a 95% Standard Proctor Density.[2]

PLEASE NOTE:

1. *The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone."*
2. *As an alternate to Proctor Testing and field density measurements on open graded stone, StormTech compaction requirements are met for 'A' location materials when placed and compacted in 9" (229 mm) (max.) lifts using two full passes with an appropriate compactor.*

Figure 1 – Fill Material Locations

Once layer 'C' is placed any soil/material can be placed in layer 'D' up to the finished grade. Most pavement subbase soils can be used to replace either layer 'C' or 'D' at the design engineer's discretion.



Requirements for Assembling the StormTech Isolator Row

1 The Isolator Row is designed with an access manhole just upstream of the Isolator Row inlet. It is recommended that the access manhole be installed prior to assembling the Isolator Row. The access manhole typically contains a high flow weir that diverts the first flows to the Isolator Row. Flows that exceed the design capacity of the Isolator Row over top the bypass weir and discharge to the distribution manifold. For weir construction details, see the engineer's drawings.

2 Installation of the Isolator Row may begin after the stone foundation is laid and prepared per the engineer's drawings. See *Requirements for Excavating and Preparing the Site* in this manual.

3 Roll out bottom material in a continual strip. Use ADS 315ST (or equal) over the angular stone foundation so the area where the Isolator Row chambers will be placed will be completely covered. There must not be any seams in the woven geotextile. **Table 3** lists acceptable woven geotextiles. See **Figure 2** for the width of the geotextile strip required.

4 Form the Isolator Row by joining Stormtech chambers centered over the woven geotextile. *See Requirements for Joining Chambers* in this manual.

5 A short segment of pipe is typically used to connect the manhole to the Isolator Row through a StormTech fabaricated end cap.

6 Drape a strip of ADS 601 non-woven geotextile (or equal) over the row of chambers. This is the same type of non-woven geotextile used as a separation layer around the angular stone of a StormTech system. A single continuous piece is preferred. **Table 3** lists suitable non-woven geotextiles.

7 See *Requirements for Placing Stone and Requirements for Backfilling the System* in this manual for directions on completing the Isolator Row installation.

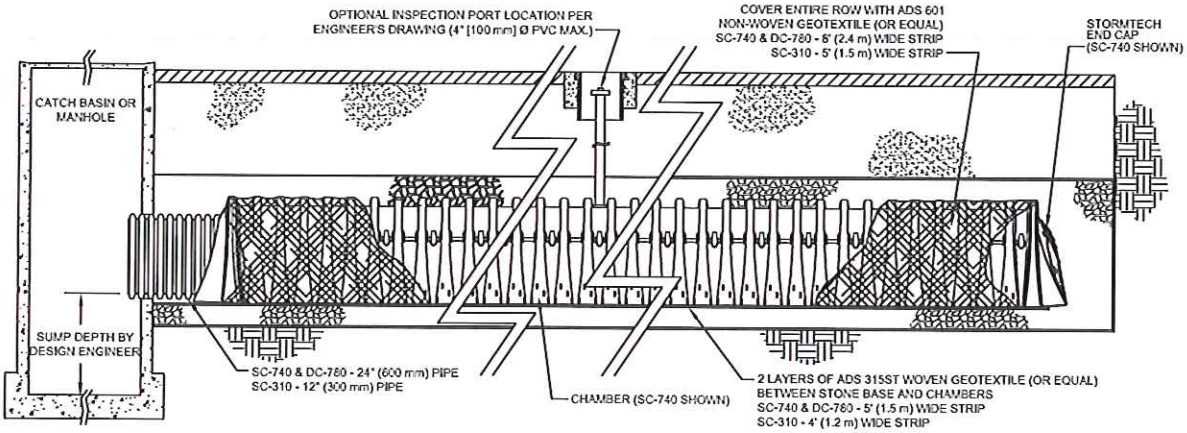



Figure 2 – StormTech Isolator Row Detail