

# CUDO® CUBES

---

## SUBMITTAL PACKAGE

---



---

# TABLE OF CONTENTS

---

1 - FEATURES & BENEFITS

2 - ACCESSORIES

3 - PRODUCT SPECIFICATIONS

4 - INSTALLATION MANUAL

5 - OPERATIONS & MAINTENANCE

---

---

# SECTION 1

---

## FEATURES & BENEFITS

# **CUDO® CUBES**

*Reshaping the Future of Stormwater Management*



A new approach to underground stormwater storage, infiltration, treatment, harvesting or other stormwater management needs.

Potential LEED® credits for Sustainable Sites (6.1, 6.2), Materials & Resources (4, 5 in CA, AZ, NV, OR, UT) and Water Efficiency (1, 3)



Call us today **(800) 579-8819** or visit our website for detailed product information, drawings and design tools at [www.oldcastlestormwater.com](http://www.oldcastlestormwater.com)

## CUDO® Water Storage System

A modular plastic cube for underground water storage

Cubes incorporate an arched design that adds structural integrity, increased water storage and enhanced access for inspection and maintenance. Made in the USA of injection molded polypropylene plastic, a single CUDO assembly requires just two modules and two end caps.

Per application, either a filter fabric or plastic liner is wrapped around the CUDO modules, encasing the entire system. Geo-grid or other structural enhancement may be incorporated into the CUDO installation, depending on the loading requirements.

### FEATURES AND BENEFITS

- Large interior openings offer ease of access for inspection and maintenance
- High water storage capacity (95%)
- CUDO size (24" x 24" x 24") offers ease of handling and installation
- Unique shape offers superior strength, rated for traffic loading under parking lots or driveways
- Minimal number of components required for assembly
- May be integrated into bioretention systems (rain gardens)



CUDO stacks ready for installation in San Rosa, California



*CUDO components snap together, forming a single or multiple stack. Assembled stacks are installed to form the desired system size and shape, with a maximum amount of footprint flexibility.*

---

## SECTION 2

---

### ACCESSORIES

## Product Specification - Structural Geogrid BX1200

*Tensar Earth Technologies, Inc. reserves the right to change its product specifications at any time. It is the responsibility of the specifier and purchaser to ensure that product specifications used for design and procurement purposes are current and consistent with the products used in each instance. Please contact Tensar Earth Technologies at 800-836-7271 for assistance.*

The structural geogrid shall be an integrally formed grid structure manufactured of a stress resistant polypropylene material with molecular weight and molecular characteristics which impart: (a) high resistance to loss of load capacity or structural integrity when the geogrid is subjected to mechanical stress in installation; (b) high resistance to deformation when the geogrid is subjected to applied force in use; and (c) high resistance to loss of load capacity or structural integrity when the geogrid is subjected to long-term environmental stress.

The structural geogrid shall accept applied force in use by positive mechanical interlock (i.e. by direct mechanical keying) with: (a) compacted soil or construction fill materials; (b) contiguous sections of itself when overlapped and embedded in compacted soil or construction fill materials; and (c) rigid mechanical connectors such as bodkins, pins or hooks. The structural geogrid shall possess sufficient cross sectional profile to present a substantial abutment interface to compacted soil or particulate construction fill materials and to resist movement relative to such materials when subject to applied force. The structural geogrid shall possess sufficient true initial modulus to cause applied force to be transferred to the geogrid at low strain levels without material deformation of the reinforced structure. The structural geogrid shall possess complete continuity of all properties throughout its structure and shall be suitable for reinforcement of compacted soil or particulate construction fill materials to improve their long term stability in structural load bearing applications such as earth retention systems. The structural geogrid shall have the following characteristics:

**Product Type:** Integrally Formed Structural Geogrid  
**Load Transfer Mechanism:** Positive Mechanical Interlock

### Product Properties Index

| Properties   | Units           | MD Values <sup>1</sup> | XMD Values <sup>1</sup> |
|--|-----------------|------------------------|-------------------------|
| ▪ Aperture Dimensions <sup>2</sup>                 | mm (in)         | 25 (1.0)               | 33 (1.3)                |
| ▪ Minimum Rib Thickness <sup>2</sup>               | mm (in)         | 1.27 (0.05)            | 1.27 (0.05)             |
| <b>Load Capacity</b>                               |                 |                        |                         |
| ▪ True Initial Modulus in Use <sup>3</sup>         | kN/m(lb/ft)     | 400 (27,420)           | 650 (44,550)            |
| ▪ True Tensile Strength @ 2% Strain <sup>3</sup>   | kN/m(lb/ft)     | 6.0 (410)              | 9.0 (620)               |
| ▪ True Tensile Strength @ 5% Strain <sup>3</sup>   | kN/m(lb/ft)     | 11.8 (810)             | 19.6 (1,340)            |
| <b>Structural Integrity</b>                        |                 |                        |                         |
| ▪ Junction Efficiency <sup>4</sup>                 | %               | 93                     |                         |
| ▪ Flexural Stiffness <sup>5</sup>                  | mg-cm           | 750,000                |                         |
| ▪ Aperture Stability <sup>6</sup>                  | kg-cm/deg       | 6.5                    |                         |
| <b>Durability</b>                                  |                 |                        |                         |
| ▪ Resistance to Installation Damage <sup>7</sup>   | %SC / %SW / %GP | 95 / 93 / 90           |                         |
| ▪ Resistance to Long Term Degradation <sup>8</sup> | %               | 100                    |                         |

### Dimensions and Delivery

The structural geogrid shall be delivered to the jobsite in roll form with each roll individually identified and nominally measuring 3.0 meters (9.8 feet) or 4.0 meters (13.1 feet) in width and 50.0 meters (164 feet) in length. A typical truckload quantity is 165 to 220 rolls. On special request, the structural geogrid may also be custom cut to specific lengths or widths to suit site specific engineering designs.

### Notes

1. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D-4759. Brief descriptions of test procedures are given in the following notes. Complete descriptions of test procedures are available on request from Tensar Earth Technologies, Inc.
2. Nominal dimensions.
3. True resistance to elongation when initially subjected to a load measured via ASTM D6637 without deforming test materials under load before measuring such resistance or employing "secant" or "offset" tangent methods of measurement so as to overstate tensile properties.
4. Load transfer capability measured via GRI-GG2-87. Expressed as a percentage of ultimate tensile strength.
5. Resistance to bending force measured via ASTM D-5732-95, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a "ladder"), and of length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Stiffness is calculated as the square root of the product of machine-and cross-machine-direction Flexural Stiffness values.
6. Resistance to in-plane rotational movement measured by applying a 20 kg-cm moment to the central junction of a 9 inch x 9 inch specimen restrained at its perimeter (U.S. Army Corps of Engineers Methodology for measurement of Torsional Rigidity).
7. Resistance to loss of load capacity or structural integrity when subjected to mechanical installation stress in clayey sand (SC), well graded sand (SW), and crushed stone classified as poorly graded gravel (GP). The geogrid shall be sampled in accordance with ASTM D5818 and load capacity shall be measured in accordance with ASTM D6637.
8. Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments measured via EPA 9090 immersion testing.



## Mirafi<sup>®</sup> 140NC

Mirafi<sup>®</sup> 140NC is a non-woven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi 140NC is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

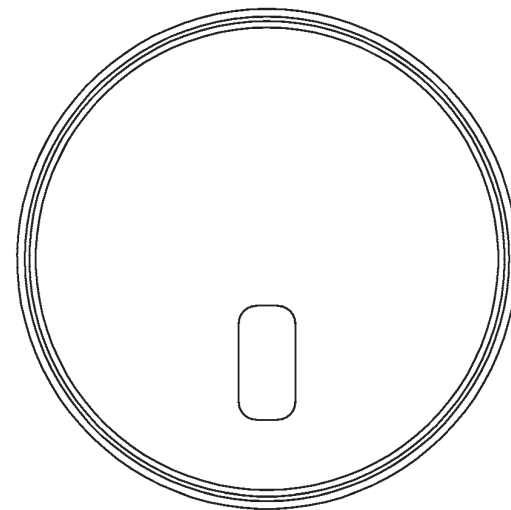
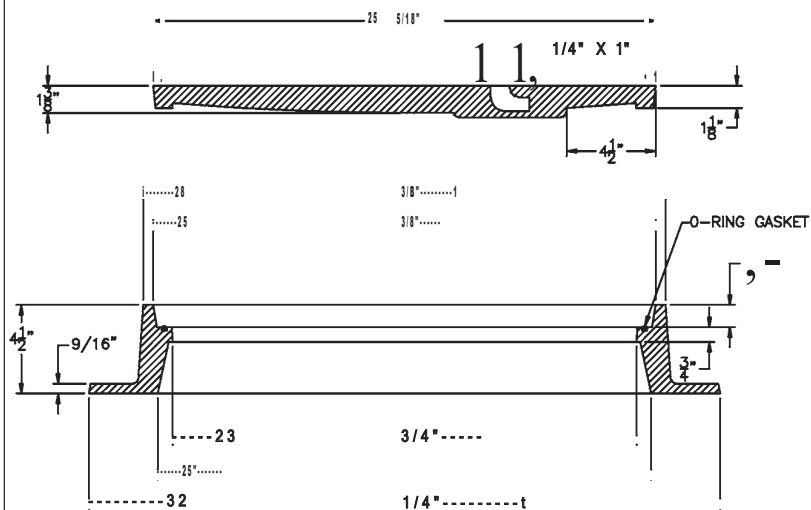
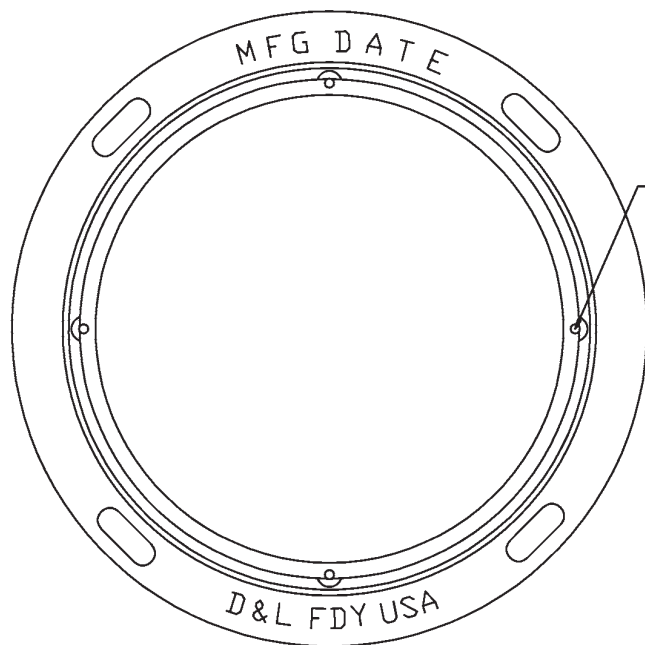
| Mechanical Properties          | Test Method                        | Unit   | Minimum Average Roll Value |            |
|--------------------------------|------------------------------------|--|----------------------------|------------|
|                                |                                    |  | MD                         | CD         |
| Grab Tensile Strength          | ASTM D 4632                        | kN (lbs)   | 0.45 (100)                 | 0.45 (100) |
| Grab Tensile Elongation        | ASTM D 4632                        | %  | 60                         | 60         |
| Toughness                      | Grab Tensile Strength x Elongation | lbs  | 6000                       |            |
| Trapezoid Tear Strength        | ASTM D 4533                        | kN (lbs)   | 0.20 (45)                  | 0.20 (45)  |
| Mullen Burst Strength          | ASTM D 3786                        | kPa (psi)  | 1447 (210)                 |            |
| Puncture Strength <sup>1</sup> | ASTM D 4833                        | kN (lbs)   | 0.29 (65)                  |            |
| CBR Puncture Strength          | ASTM D 6241                        | kN (lbs)   | 1.12 (250)                 |            |
| Apparent Opening Size (AOS)    | ASTM D 4751                        | mm<br>(U.S. sieve)                                 | 0.212<br>(70)              |            |
| Permittivity                   | ASTM D 4491                        | sec <sup>-1</sup>                                  | 1.8                        |            |
| Flow Rate                      | ASTM D 4491                        | l/min/m <sup>2</sup><br>(gal/min/ft <sup>2</sup> ) | 5704<br>(140)              |            |
| Mass / Unit Area               | ASTM D 5261                        | g/m <sup>2</sup> (oz/yd <sup>2</sup> )             | 136 (4.0)                  |            |
| UV Resistance (at 500 Hours)   | ASTM D 4355                        | % strength retained                                | 70                         |            |

<sup>1</sup> ASTM D 4833 has been replaced with ASTM D 6241.

| Physical Properties                 | Test Method | Unit                              | Typical Value             |                         |
|-------------------------------------|-------------|-----------------------------------|---------------------------|-------------------------|
| Thickness                           | ASTM D 5199 | mm (mils)                         | 0.99 (39)                 |                         |
| Roll Dimensions<br>(width x length) | --          | m<br>(ft)                         | 3.8 x 110<br>(12.5 x 360) | 4.5 x 110<br>(15 x 360) |
| Roll Area                           | --          | m <sup>2</sup> (yd <sup>2</sup> ) | 418 (500)                 | 502 (600)               |
| Estimated Roll Weight               | --          | kg (lb)                           | 69 (152)                  | 83 (182)                |

**Disclaimer:** TenCate assumes no liability for the accuracy or completeness of this information or for the ultimate use by the purchaser. TenCate disclaims any and all express, implied, or statutory standards, warranties or guarantees, including without limitation any implied warranty as to merchantability or fitness for a particular purpose or arising from a course of dealing or usage of trade as to any equipment, materials, or information furnished herewith. This document should not be construed as engineering advice.





CAST IRON  
TO CONFORM TO  
ASTM A-48, CLASS 35B

**A-1024**

D&L MODEL #  
mason utt

**D&L** FOUNDRY&SUPPLY

CALIFORNIA SALES: (800) 422-0848  
WASHINGTON SALES: (888) 765-0054  
UTAH SALES: (800) 453-9802

---

# SECTION 3

---

## PRODUCT SPECIFICATIONS

# CUDO Stormwater System

## Underground Retention/Detention/ Infiltration/Water Reuse Systems

### Product Specifications

#### PART 1 – GENERAL

##### 1.01 General Provisions

- A. The Conditions of the Contract and all Sections of Division 1 are hereby made a part of this Section.

##### 1.02 Description of Work

- A. Work Included:
  - 1. Provide excavation and base preparation per Geotechnical Engineer's recommendations and/or as shown on drawings, to provide adequate support for project design loads and safety from excavation sidewall collapse. See 2.02 Materials.
  - 2. Provide CUDO cube modular system products, and install per the manufacturer's instructions furnished under this section.
- B. Related Work:
  - 1. Subgrade excavation and preparation under Section 02300 – Earthwork.
  - 2. Surface Drainage materials – Section 02700 – Subsurface Drainage and Structures, as needed.

##### 1.03 Quality Assurance

- A. Follow Section 01340 requirements.
  - B. Installation: Performed only by skilled work people with satisfactory record of performance on bulk earthworks, pipe, chamber, or pond/landfill construction projects of comparable size and quality.
-

## CUDO Technical Specifications

---

### 1.04 Submittals

- A. Submit manufacturer's product data and installation instructions.
- B. Submit CUDO module for review. Reviewed and accepted samples will be returned to the Contractor.
- C. Submit material certificates for geotextile, geogrid, base course and backfill materials.

### 1.05 Delivery, Storage, and Handling

- A. Protect CUDO cube modular system products from damage during delivery, and store under tarp to protect from sunlight when time of delivery to installation exceeds one week. Storage should occur on smooth surfaces, free from dirt, mud and debris.
- B. Handling is to be performed with equipment appropriate to the size (height) of cubes and site conditions, and may include hand, hand cart, forklifts, extension lifts, etc.

### 1.06 Project Conditions

- A. Review installation procedures and coordinate CUDO cube installation with other work affected, such as grading, excavation, utilities, construction access and erosion control to prevent all non-installation related construction traffic over completed CUDO cube installation, especially with loads greater than design load.
  - B. Cold weather:
    - 1. Do not use frozen materials or materials mixed or coated with ice or frost.
    - 2. Do not build on frozen, wet, saturated or muddy subgrade.
    - 3. Care must be taken when handling CUDO cubes when air temperature is at 40 degrees or below as plastic becomes brittle.
  - C. Protect partially completed CUDO cube installation against damage from other construction traffic when work is in progress and following completion of backfill by establishing a perimeter with highly visible construction tape, fencing, or other means until construction is complete.
  - D. Protect adjacent work from damage during CUDO cube installation.
-

## CUDO Technical Specifications

---

### PART 2 – PRODUCTS

#### 2.01 Availability

- A. Manufactured by Oldcastle Precast, 7100 Longe Street, Stockton, California, 95206.

#### 2.02 Materials

- A. Base of excavation: Shall be smooth, level and free of lumps or debris.
- B. Geotextile: Use non-woven geotextile with weight of at least 4 oz per square yard, appropriate for the soil type and depth conditions. Fabric shall be placed on the floor of the excavation, and the sides and top of the modular system.
- C. CUDO cube modular units: The CUDO product will arrive onsite with the required number of components to complete your project. Those components will consist of (as required) CUDO half cubes, top/bottom grates, stacking couplers, side plugs, and/or lateral connectors. Assembly of the completed system will be done onsite per project specific assembly details with their simple snap together feature.
- D. Side and top backfill: Using structural fill, sand or other free-draining material material as specified by the project engineer, backfill the sides of the CUDO system evenly in 12" lifts to a minimum of 95% with a mechanical compactor. Bring the backfill to the top of the CUDO system and then continue backfill placement in accordance with the project's specific requirements for the type and location of Geogrid over the top of the CUDO system.
- E. Geogrid: Use Tensar BX-1200 or equivalent to reinforce backfill above CUDO cubes to support H2O loads (otherwise not required). Geogrid should extend 3 feet beyond the cube footprint.
- F. Utility marker: Use metallic tape at corners of install to mark the area for future utility detection.

### PART 3 – EXECUTION

#### 3.01 Site Excavation

- A. The contractor shall excavate the site to the width, depth and length necessary to accommodate and install the CUDO stormwater system including provisions for cover over the system and depth below the system in accordance with the project engineer's specifications.
  - B. Examine prepared excavation for smoothness, compaction and level. Do not start installation of CUDO cubes until unsatisfactory conditions are corrected. Check for presence of high water table, which must be kept at levels below the bottom of the CUDO structure at all times.
-

## CUDO Technical Specifications

---

- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance. If existing conditions are found unsatisfactory, contact Project Manager for resolution.

### 3.02 Base Preparation

- A. Generally a base material of sand or stone should be used and be compacted to 95%. The specific nature of the material will depend upon a myriad of factors, including but not limited to soil reports and end use of system (detention or retention). The base must be finished evenly to provide a level surface for the CUDO installation.
- B. It is helpful to identify the outline of the structure on the floor of the excavation, using spray paint or chalk line, to ensure squareness during cube placement.

### 3.03 Installation of CUDO Cubes

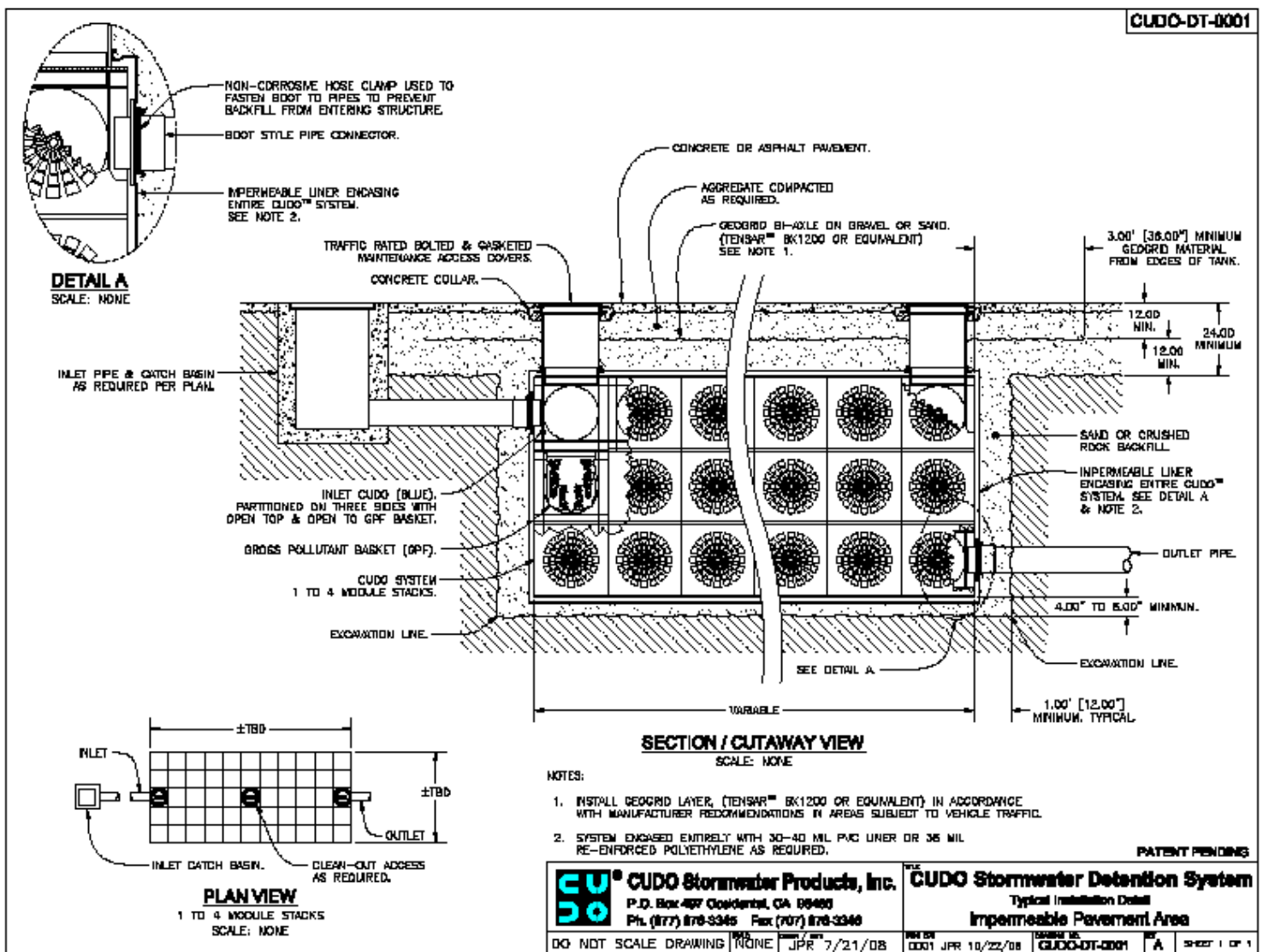
- A. Either a non-woven filter fabric material or an impermeable liner will be required to surround the perimeter of the CUDO system. Either product shall be laid to the contour of the excavation bottom and side walls with a minimum of 12" overlapping, or as specified by the project engineer.
  - B. The assembled CUDO cubes shall be placed on top of the fabric/liner material in accordance with the project's specific layout details. Maintain a level top at all times and keep the units in a straight line in each direction. Complete any inlet/outlet pipe connections in accordance with the project's details. Connect the inspection/cleanout port riser material to the top of the CUDO as shown on the project layout detail. Pull the fabric/liner material taut around the CUDO cubes to completely seal the system, using duct tape to temporarily secure the material overlaps in place.
  - C. Start backfilling with recommended backfill, compacting in 12" maximum lifts. Place backfill carefully to avoid shoving or damaging cubes. Use a powered mechanical compactor to compact backfill on structure sides with care to avoid damage to geotextile or liner.
  - D. Backfill above system should be compacted in 6" lifts. When backfill reaches an elevation 12" above the system, place a layer of geogrid directly over the top of the backfill (required only when there will be traffic loads (H20 loads) above the cubes), extending 3' beyond the cube footprint.
  - E. Place sufficient backfill (Section 2.02 E) material over geogrid to ensure support of design loads. Place cover backfill in 6" lifts and compact with vibrating plates or walk behind rollers (do not use drivable rolling compactors) to a minimum of 95% compaction. Take care to place backfill on top of structure to avoid damage to structure, geotextile or liner, using low pressure tire or track vehicles.
  - F. Ensure that all unrelated construction traffic be kept away from the limits of excavation until project is complete and final surface materials are in place.
  - G. Place surfacing materials, such as groundcovers (no shrubs or trees), or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.
-

## CUDO Technical Specifications

### 3.04 Cleaning

- A. Perform cleaning during the installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

### Sample Installation Detail



---

# SECTION 4

---

## INSTALLATION MANUAL

---



# **CUDO Stormwater System**

## **Underground Retention/Detention/ Infiltration/Water Reuse Systems**

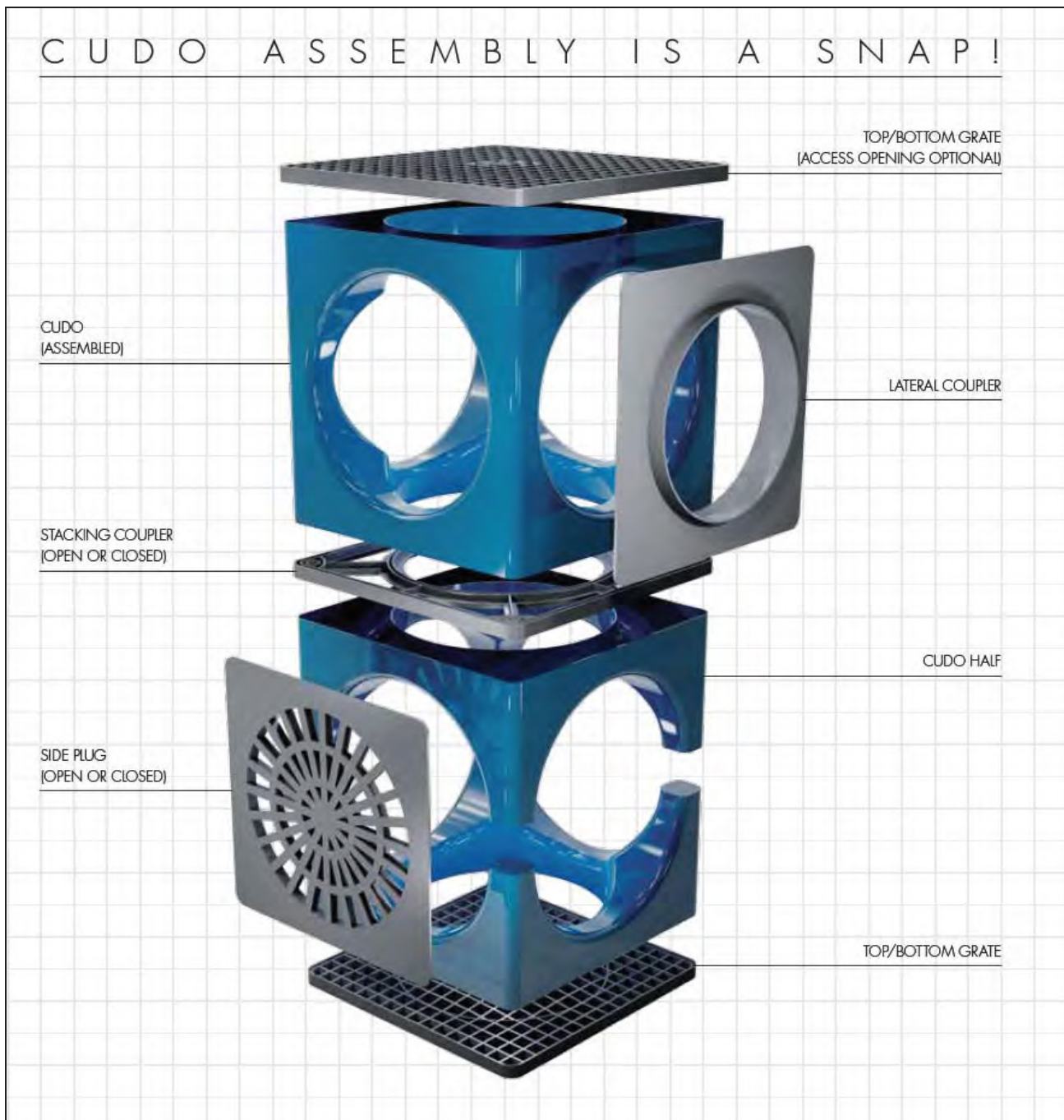
### **Installation Manual**

---

# CUDO Cube Modular Stormwater System

### CUDO Assembly

The CUDO product will arrive onsite with the required number of components to complete your project. Those components will consist of (as required) CUDO half cubes, top/bottom grates, stacking couplers, side plugs, and/or lateral connectors. Assembly of the completed CUDO system will be done onsite per project specific assembly details with their simple snap together feature.



## CUDO Installation Guide

### Site Excavation

The contractor shall excavate the site to the width, depth and length necessary to accommodate and install the CUDO stormwater system including provisions for cover over the system and depth below the system in accordance with the project engineer's specifications.

### Base Preparation

Generally a base material of sand or stone should be used and be compacted to 95%. The specific nature of the material will depend upon a myriad of factors, including but not limited to soil reports and end use of system (detention or retention). The base must be finished evenly to provide a level surface for the CUDO installation.

### Fabric/Liner Placement

Either a non-woven filter fabric material or an impermeable liner will be required to surround the perimeter of the CUDO system. Either product shall be laid to the contour of the excavation bottom and side walls with a minimum of 12" overlapping, or as specified by the project engineer.

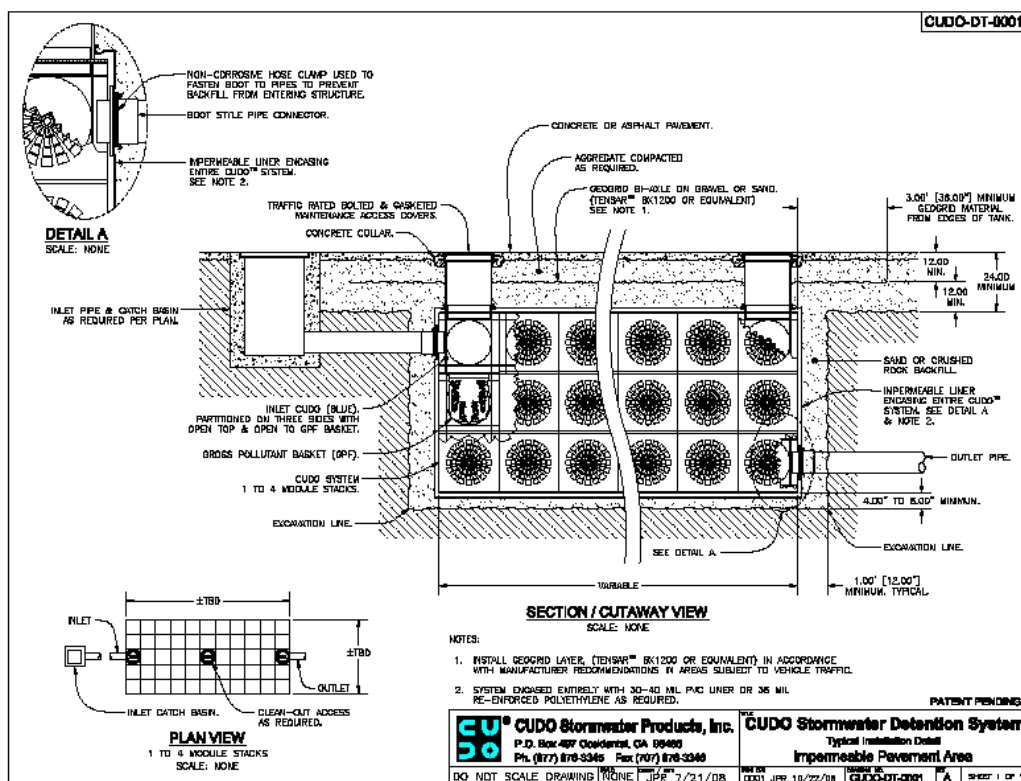
### CUDO Placement

The assembled CUDO cubes shall be placed on top of the fabric/liner material in accordance with the project's specific layout details. Maintain a level top at all times and keep the units in a straight line in each direction. Complete any inlet/outlet pipe connections in accordance with the project's details. Connect the inspection/cleanout port riser material to the top of the CUDO as shown on the project layout detail. Pull the fabric/liner material taut around the CUDO's to completely seal the system, using duct tape to temporarily secure the material overlaps in place.

### Backfilling/Geogrid Placement

Using a compactable material as specified by the project engineer, backfill the sides of the CUDO system evenly in 12" lifts to a minimum of 95% with a mechanical compactor. Bring the backfill to the top of the CUDO system and then continue backfill placement in accordance with the project's specific requirements for the type and location of Geogrid over the top of the CUDO system.

Sample Installation Detail



---

# SECTION 5

---

## OPERATIONS & MAINTENANCE

---



# CUDO® CUBES

---

## Operations and Maintenance Manual

(Underground Retention / Detention / Infiltration /  
Water Reuse Systems)

---

# CUDO® Stormwater Cube - Modular Stormwater Systems

## Description / Basic Function

CUDO is a modular stormwater system comprised of a grouping of modular polypropylene or concrete cubes that when constructed form an underground storage area for stormwater. This system can be used for infiltration, retention, detention or water reuse. CUDO can help achieve runoff detainment and storage to help attenuate the peak flow to pre-construction levels and can help conform to current Low Impact Development requirements.

## Infiltration

The purpose of a CUDO infiltration system is to capture stormwater runoff, store the runoff, and then allow it to percolate into the ground via the open space area of the cubes and perforations in the side wall. The system is backfilled with a Class I material defined by ASTM D2321 as a cleaned open graded rock or a Class II permeable sand. The rock or sand provide additional storage capacity but also allow for a percolation interface with the native material. The ground water is "recharged" with this type of system.

## Detention

The purpose of a CUDO detention system is to capture stormwater runoff, store the runoff, and then allow it to be released at a controlled rate through an appropriately sized orifice control. A detention system helps attenuate the peak flow from the site assuring that pre-development runoff flows are not exceeded as a result of the development. A CUDO detention requires the cubes to be encapsulated with an impermeable liner for the polypropylene system or the seams of the concrete system to be sealed with a water proof mastic.

## Retention

A CUDO retention system is a hybrid system. It is a combination of a detention system and an infiltration system. A retention system is utilized to attenuate peak flow as well as promote groundwater re-charge. A retention system is outfitted with an overflow pipe at the top of the system which allows the system to fill for infiltration but also outlet if the ground is saturated.

## Water Reuse

The purpose of a water-reuse CUDO system is to capture and store water for future use. The system is constructed in a similar fashion to a detention system but instead of a controlled outlet the system is constructed with an emergency overflow. A water reuse system is a Low-Impact Development (LID) device that helps attenuate peak flows as well as conserve water. Water may be reused through an active pump system or passive irrigation.

## Inspection/Cleanout Ports

Inspection and cleanout ports are 18-inch diameter vertical risers connected to the uppermost polypropylene CUDO cubes or up to 30-inch manhole access connected to the concrete CUDO. They are used for entrance into the system, or for access to place vacuum truck hoses or water-jetting devices or CCTV equipment. Ports are strategically located near inlet and outlet pipes and in other areas or probable deposition in the system. It is recommended to keep surface level access lids sealed and bolted at all times when the system is in service.

## Inlet Bay

Some systems are configured so that pretreatment of the stormwater occurs within the CUDO system. In this case, the CUDO system will house an inlet bay. The inlet bay is separated from the rest of the CUDO system by sidewall plugs and is intended to separate gross pollutants, trash and debris and floatables from the CUDO system and pre-treatment device. The bay contains its own sump area and unique access ports.

---

## **Maintenance Overview for CUDO**

State and Local regulations require that stormwater storage systems be maintained and serviced on a recurring basis. The purpose of maintaining a clean and obstruction free CUDO system is to ensure the system performs the intended function of the primary design. Trash and debris, floatables, gross pollutants and sediment can build up in the CUDO leading to clogging of the native soil interface or blockage of the inlet or outlet pipes. This can cause the system to function improperly by limiting storage volume, limiting the design percolation rates or impeding flow in and out of the system. Downstream and upstream, areas could run the risk of flooding and deleterious environmental impact.

### **Recommended Frequency of Service**

It is recommended that the CUDO stormwater systems be serviced on a regularly occurring basis. Ultimately the frequency depends on the amount of runoff, pollutant loading, and interference from trash, debris and gross pollutants as well as proper maintenance of upstream pretreatment devices. However, it is recommended that each installation be inspected at least two times per year to assess service needs.

### **Recommended Timing of Service**

Guidelines for the timing of service are as follows:

1. For areas with a definite rainy season the system should be serviced prior to and following the rainy season.
2. For areas subject to year-round rainfall service should occur on a regularly occurring basis. (A minimum of two times per year.)
3. For areas with winter snow and summer rain the system should be serviced prior to and after the snow season.
4. For installed devices that are subject to dry weather flows only (i.e. wash racks, parking garages, etc...) the unit should be serviced on a regularly occurring basis. (A minimum of two times per year.)

## **Inspection**

An inspection should be performed when the system is new. This allows the owner to establish a baseline condition for comparison to future inspections. Sediment build up can typically be monitored without entering the system. (No confined space entry.) Initial and subsequent inspection data should be recorded and filed for reference. Some regulatory agencies require that the results of the inspections be documented and reported. Inspection reports should comply with regulatory requirements and be submitted as required.

### **Inspection Procedures**

5. Locate the inspection, cleanout and access ports. Inspection and cleanout ports are typically 18-inch diameter. Access ports are typically 24-inch or 30-inch diameter. Pictures should be taken to document the location or a site map should be generated to detail the as-built locations of the ports.
6. Unbolt and remove the access port lids.
7. Insert a measuring device into the opening making note of a point of reference to determine the quantity of sediment and other accumulated material. If access is required to measure, ensure only certified confined space entry personnel having appropriate equipment are allowed to enter the system.
8. In addition, for accessible concrete CUDO systems personnel should utilize appropriate confined space entry procedures to enter the system and photograph its condition.
9. Inspect inlet and outlet locations for obstructions. Obstructions should be removed at this time.
10. Inspect the structural components of the system.
11. Fill in the CUDO Inspection/Maintenance Data Sheet and send a copy to the regulatory agency if necessary.

## **Disinfection of Water Reuse System**

Periodic disinfection of water held for reuse may be required to abate bacteria and algae growth. This may be done using calcium hypochlorite tablets or by the addition of an ozone generator in a small recirculation system.

---

## Maintenance

Cleanout of the CUDO system should be considered if there is sediment buildup of two or more inches at over 50% of the inspection ports. Cleaning shall be performed if sediment buildup is two inches or more over 75% of the system floor. In the event of a spill of a foreign substance, cleanout of the system should be considered.

## Maintenance Procedures

1. Locate the inspection, cleanout and access ports. Inspection and cleanout ports are typically 18-inch diameter. Access ports are typically 24-inch or 30-inch diameter. Pictures should be taken to document the location or a site map should be generated to detail the as-built locations of the ports.
2. Unbolt and remove the access port lids.
3. Measure the sediment buildup at each port. If access is required to measure ensure only certified confined space entry personnel having appropriate equipment are allowed to enter the system.
4. A thorough cleaning of the system (inlets, outlets, ports, and inlet bays) shall be performed by either a vacuum truck or by manual methods.
5. Inspect inlet and outlet locations for obstructions. Obstructions should be removed at this time.
6. Inspect the structural components of the system.
7. Fill in the CUDO Inspection/Maintenance Data Sheet and send a copy to the regulatory agency if necessary.

## Inspection / Maintenance Requirements

Below are some recommendations for equipment and training of personnel to inspect and maintain a CUDO system.

Personnel: OSHA Confined Space Entry Training is a prerequisite for entrance into a system. In the state of California personnel should be CalOSHA certified.

Equipment: Record Taking (pen, paper, voice recorder)  
Proper Clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)  
Flashlight  
Tape Measure  
Measuring Stick  
Pry Bar  
Traffic Control (flagging, barricades, signage, cones, etc.)  
First Aid Materials  
Debris and Contaminant Containers  
Vacuum Truck

## Disposal of Gross Pollutants, Hydrocarbons, and Sediment

The collected gross pollutants, hydrocarbons, and sediment shall be offloaded from the vacuum truck into DOT approved containers for disposal. Once in the container the maintenance contractor has possession and is responsible for disposal in accordance with local, state and federal agency requirements.

*Note: As the generator, the landowner is ultimately responsible for the proper disposal of the collected materials. Because the material likely contains petroleum hydrocarbons, heavy metals, and other harmful pollutants, the materials must be treated as EPA class 2 Hazardous Waste. Proper disposal is required.*

---



# CUDO<sup>®</sup> CUBES

## OUR MARKETS



BUILDING  
STRUCTURES



COMMUNICATIONS



WATER



ENERGY



TRANSPORTATION