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Verti-Block.com
For digital copies and additional design resources, please visit our TOOLBOX at www.verti-block.com
Native gravelly soil, edge of excavation

Native soil compacted in place as each course is set

Geotextile Filter

General Information

Section 1
General Information

Company Information

Verti-Block™ is the latest innovative forming system from Verti-Crete, LLC. Recognized worldwide for outstanding aesthetics and performance, Verti-Crete’s proprietary and patented forming systems produce the most durable, cost effective and attractive precast elements anywhere. Verti-Crete continues to help precasters around the world provide contractors, developers, and property owners with smart precast solutions.

Verti-Crete’s heritage in the precast, concrete, and aggregate industries reaches back decades. From Window Wells to Battery Molds, each innovation has been fueled by our passion for bringing out the beauty of precast concrete. Concrete has been known for centuries for its durability. Through innovative research and design and the application of custom molding technology, Verti-Crete is making concrete known for its low cost and beauty.

Verti-Block Unique Features

- Versatility
- Project Compatibility
- Less Concrete Required
- Engineered Hollow Core
- Lower Transportation Costs
- Faster Return on Investment

Verti-Block was created with landscaping in mind -- we’ve made it easy to transport and install, even in tight access spots. Blocks can be moved and put into place with smaller equipment; there’s no need for heavy machines like a telehandler or crane. The male and female connection eliminates placement error, ensuring strength and an exact installation every time. Also, the engineered hollow cavities allow for more flexibility with drainage and less concrete required for each block which will save time and money.

Verti-Block is ideal for a variety of landscaping projects including residential communities, commercial campuses, schools, parks, back yards, and more. Able to accommodate winding landscapes and even tight curves, Verti-Block is designed to add interest to any landscape while securely retaining earth. For projects also requiring a privacy wall, Verti-Block allows fencing or guard rails to be constructed directly on top of the Verti-Block structure. Fencing can be placed right on the edge of the wall for an attractive, continuous space.
Unique Size and Design

A hollow block measuring 2’ × 4’ × 3’, Verti-Block is perfectly proportioned for the most popular types of landscaping projects, including gravity walls up to 14’ high—even higher when reinforced. Its hollow design makes it affordable and easier to handle than solid blocks. Plus, Verti-Block is less labor intensive than small, hand-laid blocks and offers a more practical solution than a cast-in-place retaining wall.

Strong and Versatile

Even more appealing, Verti-Block is incredibly strong and versatile thanks to its interlocking design. Featuring a male-and-female style connection, Verti-Block units ensure you’ll get a secure fit that guarantees the correct amount of setback on every installation. Verti-Block’s hollow design saves money by using less concrete and lowering transportation costs. It also ensures the right amount of crushed stone backfill. Experienced installers know that too much crushed stone wastes money—too little can build hydrostatic pressure and cause the retaining wall to fail.

Easy Installation

Verti-Block was created with landscaping in mind—meaning we’ve made it easy to transport and install, even in tight access spots. Blocks can be moved and put into place with smaller equipment; there’s no need for heavy machines like a telehandler or crane. The male-and-female connection eliminates placement error, ensuring strength and an exact installation every time.
A Look Like no Other
Beyond its structural purpose, Verti-Block is a favorite of property owners for its beautiful rockwork look. Verti-Block showcases a 5-inch depth of relief, hiding joints, and making a finished wall appear more like stacked stone. Plus, Verti-Block is easily stained to complement its surroundings with a beautiful, weather and UV-resistant finish.

Engineered for Strength
While the hollow nature of Verti-Block makes it cost effective and easier to handle, it also improves its ability to retain earth. Even in poor soil conditions, Verti-Block can be stacked higher than other blocks without the use of tiebacks or geogrid. The male-and-female design of Verti-Block adds a stronger connection than blocks relying on friction alone. The crushed stone fill also interlocks and creates a continuous mass for greater strength.

A Cost Effective Solution
Best of all, Verti-Block delivers tremendous cost savings. As a hollow block, Verti-Block is lighter, requiring less manpower, equipment, and transportation costs. It’s quick to install, and the product itself is less expensive to manufacture than solid block options. The internal drainage through the block’s infill means no over-or under-excavating because no additional crushed stone backfill is required. Property owners will appreciate the affordability and value of Verti-Block. Add that to the right look and right strength of this unique product, and you’ll know Verti-Block is the right solution for a great landscape installation.
Perfect for Landscape Projects Big and Small

Verti-Block is ideal for a variety of landscaping projects including residential communities, commercial campuses, schools, parks, back yards, and more. Able to accommodate winding landscapes and even tight curves, Verti-Block is designed to add interest to any landscape while securely retaining earth. For projects also requiring a privacy wall or traffic barrier, Verti-Blocks allow fencing or railing to be constructed directly on top of the Verti-Block structure. Fencing can be placed right to the edge of the wall for an attractive, continuous appearance.

Disclosure

It is important to note that the design parameters for a Verti-Block™ installation come with a suggested maximum height under assumed conditions. Verti-Block wall specifications are calculated using assumed loading conditions and material properties and may fluctuate from location depending on varying soil properties and terrain. In addition to the information included in this manual, please consult with your engineer to determine the specific design requirements for your site as soil and terrain vary by location.

Verti-Crete, LLC provides forming systems to independent Licensed Producers and does not build the actual precast concrete elements themselves. Therefore, Verti-Crete, LLC does not assume any responsibility regarding structural stability of any particular blocks or wall system. Verti-Crete, LLC also assumes no responsibility in connection with any property damage, injury or death claim whatsoever whether asserted against a Leasee, Leasor, Purchasor or others arising out of or attributable to the operation of or products produced with Verti-Crete, LLC equipment.
## 36" BLOCK SERIES

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Measurement</th>
<th>Block Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Block</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>1,755 LBS</td>
</tr>
<tr>
<td>Standard Top Block</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>1,313 LBS</td>
</tr>
<tr>
<td>Half Block</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>1,068 LBS</td>
</tr>
<tr>
<td>Half Top Block</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>746 LBS</td>
</tr>
<tr>
<td>Corner Block</td>
<td>2'-0&quot; x 4'-0&quot;</td>
<td>1,595 LBS</td>
</tr>
<tr>
<td>Corner Top Block</td>
<td>2'-0&quot; x 4'-0&quot;</td>
<td>1,360 LBS</td>
</tr>
<tr>
<td>Standard Block</td>
<td>2'-0&quot; x 4'-0&quot;</td>
<td>1,313 LBS</td>
</tr>
<tr>
<td>Half Block</td>
<td>2'-0&quot; x 3'-0&quot;</td>
<td>1,068 LBS</td>
</tr>
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</tr>
<tr>
<td>Corner Top Block</td>
<td>2'-0&quot; x 4'-0&quot;</td>
<td>1,360 LBS</td>
</tr>
</tbody>
</table>

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MASS EXTENDER REGULAR BLOCK SERIES

48" MASS EXTENDER

\[ \text{BLOCK WEIGHT} \quad 1,392 \text{ LBS} \]

60" MASS EXTENDER

\[ \text{BLOCK WEIGHT} \quad 2,674 \text{ LBS} \]

MASS EXTENDER HALF BLOCK SERIES

48" HALF BLOCK MASS EXTENDER

\[ \text{BLOCK WEIGHT} \quad 1,392 \text{ LBS} \]

60" HALF BLOCK MASS EXTENDER

\[ \text{BLOCK WEIGHT} \quad 2,674 \text{ LBS} \]
## MASS EXTENDER REGULAR BLOCK SERIES CONT.

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Dimensions</th>
<th>Block Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>72&quot; MASS EXTENDER</td>
<td>2'-0&quot; x 6'-0&quot; x 4'-0&quot;</td>
<td>4,300 LBS</td>
</tr>
<tr>
<td>84&quot; MASS EXTENDER</td>
<td>2'-0&quot; x 7'-0&quot; x 4'-0&quot;</td>
<td>5,100 LBS</td>
</tr>
</tbody>
</table>

## MASS EXTENDER HALF BLOCK SERIES CONT.

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Dimensions</th>
<th>Block Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>72&quot; HALF BLOCK MASS EXTENDER</td>
<td>2'-0&quot; x 6'-0&quot; x 2'-0&quot;</td>
<td>1,905 LBS</td>
</tr>
<tr>
<td>84&quot; HALF BLOCK MASS EXTENDER</td>
<td>2'-0&quot; x 7'-0&quot; x 2'-0&quot;</td>
<td>2,140 LBS</td>
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HALF-STEP SERIES

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Dimensions</th>
<th>Block Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD HALF-STEP BLOCK</td>
<td>4'0&quot; x 3'0&quot; x 1'0&quot;</td>
<td>972 LBS</td>
</tr>
<tr>
<td>HALF-STEP TOP BLOCK</td>
<td>4'0&quot; x 3'0&quot; x 1'0&quot;</td>
<td>642 LBS</td>
</tr>
<tr>
<td>HALF-STEP HALF BLOCK</td>
<td>2'0&quot; x 3'0&quot; x 1'0&quot;</td>
<td>574 LBS</td>
</tr>
<tr>
<td>HALF-STEP HALF TOP BLOCK</td>
<td>2'0&quot; x 3'0&quot; x 1'0&quot;</td>
<td>273 LBS</td>
</tr>
<tr>
<td>HALF-STEP CORNER BLOCK</td>
<td>4'0&quot; x 2'0&quot; x 1'0&quot;</td>
<td>824 LBS</td>
</tr>
<tr>
<td>CORNER TOP BLOCK</td>
<td>4'0&quot; x 2'0&quot; x 1'0&quot;</td>
<td>689 LBS</td>
</tr>
</tbody>
</table>

BLOCK WEIGHT

- STANDARD HALF-STEP BLOCK: 972 LBS
- HALF-STEP TOP BLOCK: 642 LBS
- HALF-STEP HALF BLOCK: 574 LBS
- HALF-STEP HALF TOP BLOCK: 273 LBS
- HALF-STEP CORNER BLOCK: 824 LBS
- CORNER TOP BLOCK: 689 LBS
2 & 3 SIDED BLOCK SERIES

2-SIDED BLOCK WITH LUG

2-SIDED BLOCK WITHOUT LUG

3-SIDED BLOCK WITH LUG

3-SIDED BLOCK WITHOUT LUG

BLOCK WEIGHT
2126 LBS

BLOCK WEIGHT
2162 LBS

BLOCK WEIGHT
2118 LBS

BLOCK WEIGHT
2170 LBS

2 & 3 SIDED BLOCKS

DRAWN BY: R FONTANESI
DATE: 12/7/2018

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

REV.: BD-13
SHEET: 1 OF 3
## 2 & 3 SIDED BLOCK SERIES

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-SIDED PLANTER BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>1623 LBS</td>
</tr>
<tr>
<td>3-SIDED PLANTER BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>1867 LBS</td>
</tr>
<tr>
<td>2-SIDED IMPACT PROTECTION BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>2008 LBS</td>
</tr>
<tr>
<td>3-SIDED IMPACT PROTECTION BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>2065 LBS</td>
</tr>
<tr>
<td>2-SIDED VARIABLE CURVE BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>1896 LBS</td>
</tr>
<tr>
<td>3-SIDED VARIABLE CURVE BLOCK</td>
<td>4'0&quot; x 2'0&quot;</td>
<td>2009 LBS</td>
</tr>
</tbody>
</table>

**Drawn by:** R Fontanesi  
**Date:** 12/7/2018  
**Address:** 16500 South 500 West, Bluffdale, Utah 84065  
**Phone:** (801) 571-2028  
**Rev.:** BD-13  
**Sheet:** 2 of 3
## 2 & 3 Sided Block Series

<table>
<thead>
<tr>
<th>2 Sided Impact Protection/Planter Block</th>
<th>2 Sided Impact Protection/Planter Block</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Block Image" /></td>
<td><img src="image2.png" alt="Block Image" /></td>
</tr>
<tr>
<td>BLOCK WEIGHT</td>
<td>BLOCK WEIGHT</td>
</tr>
<tr>
<td>1696 LBS</td>
<td>1848 LBS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Sided Variable Curve/Planter Block</th>
<th>3 Sided Variable Curve/Planter Block</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Block Image" /></td>
<td><img src="image4.png" alt="Block Image" /></td>
</tr>
<tr>
<td>BLOCK WEIGHT</td>
<td>BLOCK WEIGHT</td>
</tr>
<tr>
<td>1608 LBS</td>
<td>1809 LBS</td>
</tr>
</tbody>
</table>

**Drawn by:** R Fontanesi  
**Date:** 12/7/2018  
**Title:** 2 & 3 Sided Blocks  
**Dwg No.:** BD-13  
**Rev.:** 02  
**16500 South 500 West Bluffdale, Utah 84065 Phone: (801) 571-2028**  
**Scale:** NA  
**Weight:** See Above  
**Sheet:** 3 of 3
## 6" CAP & FREE STANDING COLUMN

<table>
<thead>
<tr>
<th>2-SIDED 6&quot; CAP</th>
<th>3-SIDED 6&quot; CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6&quot; MAX THICKNESS</strong></td>
<td><strong>6&quot; MAX THICKNESS</strong></td>
</tr>
<tr>
<td>4'0&quot;</td>
<td>4'1&quot;</td>
</tr>
<tr>
<td>2'2&quot;</td>
<td>2'2&quot;</td>
</tr>
</tbody>
</table>

**UNIT WEIGHT**
- 2-SIDED: 460 LBS
- 3-SIDED: 470 LBS

### FREE STANDING COLUMN

- **UNIT WEIGHT**: 1032 LBS
- **UNIT WEIGHT**: 220 LBS

---

**CAPS & FREE STANDING COLUMN**

**DRAWN BY**: RYAN STUCKI  
**DATE**: 5/1/2019  
**TITLE**: CAPS & FREE STANDING COLUMN  
**DRAW NO.**: BD-26  
**REV.**: 01  
**SCALE**: NA  
**WEIGHT**: SEE ABOVE  
**SHEET**: 1 OF 1

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**36" STANDARD BLOCK & GRAVEL INFILL**

**CONCRETE BLOCK DATA**
- **Design Unit Weight** ($W_c$) = 142 pcf
- **Volume** ($V_c$) = 12.36 cft
- **Block Weight** ($W_b$) = 1,755 lbs
- **Center of Gravity (COG) ($COG_c$)** = 19.65" (SEE NOTES)

**GRAVEL INFILL DATA**
- **Design Unit Weight** ($W_g$) = 110 pcf
- **Volume** ($V_g$) = 11.64 cft
- **Gravel Infill Weight** ($W_g$) = 1,280 lbs
- **Center of Gravity (COG) ($COG_g$)** = 15.87" (SEE NOTES)

**COMBINED UNIT DATA**
- **Design Unit Weight** ($W_t$) = (1,755 lbs + 1,280 lbs) / 24 cft = 126 pcf
- **Volume** ($V_t$) = 12.36 cft + 11.64 cft = 24.00 cft
- **Total Unit Weight** ($W_t$) = 3,035 lbs
- **Center of Gravity (COG) ($COG_t$)** = 18.14" (SEE NOTES)

**NOTES:**
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK
**36" HALF BLOCK & GRAVEL INFILL**

**CONCRETE BLOCK DATA**
- Design unit weight ($W_c$) = 142 pcf
- Volume ($V_c$) = 7.52 cft
- Block weight ($W_b$) = 1,068 lbs
- Center of gravity (COG) = 19.75" (SEE NOTES)

**GRAVEL INFILL DATA**
- Design unit weight ($W_g$) = 110 pcf
- Volume ($V_g$) = 4.48 cft
- Gravel infill weight ($W_{gl}$) = 493 lbs
- Center of gravity (COG) = 15.84" (SEE NOTES)

**COMBINED UNIT DATA**
- Design unit weight ($W_{t}$) = $\frac{(1,068\text{ lbs} + 493\text{ lbs})}{12\text{ cft}} = 130$ pcf
- Volume ($V_{t}$) = $7.52\text{ cft} + 4.48\text{ cft} = 12.00\text{ cft}$
- Total unit weight ($W_{t}$) = 1,561 lbs
- Center of gravity (COG) = 18.16" (SEE NOTES)

**NOTES:**
- Volume, weight and COG calculations were done using CAD software.
- COG measurements are from back of block.

---

**Drawing Information**

- **Dwg No.:** BD-03
- **Title:** HALF BLOCK
- **Scale:** 1:15
- **Dwg No.:** BD-03
- **Date:** 11/25/2013
- **Drawn By:** DAN BALLING
- **Address:** 16500 SOUTH 500 WEST
  BLUFFDALE, UTAH 84065
- **Phone:** (801) 571-2028

---

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24" CORNER BLOCK & GRAVEL INFILL

CONCRETE BLOCK DATA

- DESIGN UNIT WEIGHT ($W_c$) = 142 pcf
- VOLUME ($V_c$) = 11.23 cft
- BLOCK WEIGHT ($W_b$) = 1,595 lbs
- CENTER OF GRAVITY (COG$_c$) = 12.75" (SEE NOTES)

GRAVEL INFILL DATA

- DESIGN UNIT WEIGHT ($W_g$) = 110 pcf
- VOLUME ($V_g$) = 4.77 cft
- GRAVEL INFILL WEIGHT ($W_g$) = 508 lbs
- CENTER OF GRAVITY (COG$_g$) = 9.92" (SEE NOTES)

COMBINED UNIT DATA

- DESIGN UNIT WEIGHT ($W_{11}$) = (1,595 lbs + 508 lbs) / 16 cft = 131 pcf
- VOLUME ($V_{11}$) = 11.23 cft + 4.77 cft = 16.00 cft
- TOTAL UNIT WEIGHT ($W_{11}$) = 2,103 lbs
- CENTER OF GRAVITY (COG$_{11}$) = 12.07" (SEE NOTES)

NOTES:

- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK

 DRAWN BY | DATE | TITLE
---------|------|-------
 DAN BALLING | 11/25/2013 | CORNER BLOCK

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

SCALE: 1:15 | SHEET 1 OF 1
CONCRETE BLOCK DATA
DESIGN UNIT WEIGHT ($W_c$) = 142 pcf
VOLUME ($V_c$) = 18.83 cft
BLOCK WEIGHT ($W_c$) = 2,674 lbs
CENTER OF GRAVITY (COG$_c$) = 23.08" (SEE NOTES)

GRAVEL INFILL DATA
DESIGN UNIT WEIGHT ($W_g$) = 110 pcf
VOLUME ($V_g$) = 13.17 cft
GRAVEL INFILL WEIGHT ($W_g$) = 1,449 lbs
CENTER OF GRAVITY (COG$_g$) = 25.17" (SEE NOTES)

COMBINED UNIT DATA
DESIGN UNIT WEIGHT ($W_t$) = (2,674 lbs + 1,449 lbs) / 32 cft = 129 pcf
VOLUME ($V_t$) = 18.83 cft + 13.17 cft = 32.00 cft
TOTAL UNIT WEIGHT ($W_t$) = 4,123 lbs
CENTER OF GRAVITY (COG$_t$) = 23.82" (SEE NOTES)

NOTES:
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK

48" MASS EXTENDER BLOCK & GRAVEL INFILL

**Design Unit Weight**: 142 pcf

**Volume**: 18.83 cft

**Block Weight**: 2,674 lbs

**Center of Gravity (COG)**: 23.08" (SEE NOTES)

**Gravel Infill Data**

**Design Unit Weight**: 110 pcf

**Volume**: 13.17 cft

**Gravel Infill Weight**: 1,449 lbs

**Center of Gravity (COG)**: 25.17" (SEE NOTES)

**Combined Unit Data**

**Design Unit Weight**: (2,674 lbs + 1,449 lbs) / 32 cft = 129 pcf

**Volume**: 18.83 cft + 13.17 cft = 32.00 cft

**Total Unit Weight**: 4,123 lbs

**Center of Gravity (COG)**: 23.82" (SEE NOTES)

**Notes**: Volume, weight and COG calculations were done using CAD software. COG measurements are from back of block.
### GRAVEL INFILL DATA
- DESIGN UNIT WEIGHT ($Y_g$) = 110 pcf
- VOLUME ($V_g$) = 6.20 cft
- GRAVEL INFILL WEIGHT ($W_g$) = 682 lbs
- CENTER OF GRAVITY (COG$_g$) = 24.26" (SEE NOTES)

### COMBINED UNIT DATA
- DESIGN UNIT WEIGHT ($Y_z$) = (1,392 lbs + 682 lbs) / 16 cft = 130 pcf
- VOLUME ($V_z$) = 9.80 cft + 6.20 cft = 16.00 cft
- TOTAL UNIT WEIGHT ($W_z$) = 2,074 lbs
- CENTER OF GRAVITY (COG$_z$) = 21.49" (SEE NOTES)

### NOTES:
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK.
60" MASS EXTENDER BLOCK & GRAVEL INFILL

CONCRETE BLOCK DATA
DESIGN UNIT WEIGHT \( (\gamma_c) \) = 142 pcf
VOLUME \( (V_c) \) = 24.71 cft
BLOCK WEIGHT \( (W_c) \) = 3,509 lbs
CENTER OF GRAVITY \( (\text{COG}_c) \) = 28.15" (SEE NOTES)

GRAVEL INFILL DATA
DESIGN UNIT WEIGHT \( (\gamma_g) \) = 110 pcf
VOLUME \( (V_g) \) = 15.29 cft
GRAVEL INFILL WEIGHT \( (W_g) \) = 1,682 lbs
CENTER OF GRAVITY \( (\text{COG}_g) \) = 32.79" (SEE NOTES)

COMBINED UNIT DATA
DESIGN UNIT WEIGHT \( (\gamma_l) \) = \( \frac{(3,509 \text{ lbs} + 1,682 \text{ lbs})}{40 \text{ cft}} = 130 \text{ pcf} \)
VOLUME \( (V_l) \) = 24.71 cft + 15.29 cft = 40.00 cft
TOTAL UNIT WEIGHT \( (W_l) \) = 5,191 lbs
CENTER OF GRAVITY \( (\text{COG}_l) \) = 29.65" (SEE NOTES)

NOTES:
* VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
* COG MEASUREMENTS ARE FROM BACK OF BLOCK

DAN BALLING 11/25/2013

60" MASS EXTENDER

BD-07
60" HALF BLOCK MASS EXTENDER & GRAVEL INFILL

**CONCRETE BLOCK DATA**
- DESIGN UNIT WEIGHT ($\gamma_{c}$) = 142 pcf
- VOLUME ($V_c$) = 11.70 cft
- BLOCK WEIGHT ($W_c$) = 1,661 lbs
- CENTER OF GRAVITY (COG) = 32.60" [SEE NOTES]

**GRAVEL INFILL DATA**
- DESIGN UNIT WEIGHT ($\gamma_g$) = 110 pcf
- VOLUME ($V_g$) = 8.30 cft
- GRAVEL INFILL WEIGHT ($W_g$) = 913 lbs
- CENTER OF GRAVITY (COG) = 26.54" [SEE NOTES]

**COMBINED UNIT DATA**

**NOTES:**
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK

**DESIGN UNIT WEIGHT** ($\gamma_{c}$) = \frac{(1,661 \text{ lbs} + 913 \text{ lbs})}{20 \text{ cft}} = 129 \text{ pcf}

**TOTAL UNIT WEIGHT ($W_{tot}$)** = 2,574 lbs

**CENTER OF GRAVITY (COG)** = 30.45" [SEE NOTES]
**CONCRETE BLOCK DATA**
- **Design Unit Weight**: 142 pcf
- **Volume**: 30.26 cft
- **Block Weight**: 4297 lbs
- **Center of Gravity (COG_c)**: 33.79" (SEE NOTES)

**GRAVEL INFILL DATA**
- **Design Unit Weight**: 110 pcf
- **Volume**: 17.85 cft
- **Gravel Infill Weight**: 1964 lbs
- **Center of Gravity (COG_g)**: 39.76" (SEE NOTES)

**COMBINED UNIT DATA**
- **Design Unit Weight**: \( \frac{4297 \text{ lbs} + 1964 \text{ lbs}}{48.11 \text{ cft}} = 130 \text{ pcf} \)
- **Volume**: \( 30.26 \text{ cft} + 17.85 \text{ cft} = 48.11 \text{ cft} \)
- **Total Unit Weight**: 6261 lbs
- **Center of Gravity (COG_t)**: 36.01" (SEE NOTES)

**NOTES:**
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK.

---

**DRAWN BY**
R Fontanesi
10/31/2016

**TITLE:**
72" MASS EXTENDER

**DWG NO.**
BD-12
84" BLOCK MASS EXTENDER & GRAVEL INFILL

CONCRETE BLOCK DATA
- DESIGN UNIT WEIGHT = 142 pcf
- VOLUME = 35.9 cft
- BLOCK WEIGHT = 5098 lbs
- CENTER OF GRAVITY (COG_c) = 36.54" (SEE NOTES)

GRAVEL INFILL DATA
- DESIGN UNIT WEIGHT = 110 pcf
- VOLUME = 20.2 cft
- GRAVEL INFILL WEIGHT = 2222 lbs
- CENTER OF GRAVITY (COG_g) = 46.41" (SEE NOTES)

COMBINED UNIT DATA
- DESIGN UNIT WEIGHT = (5098 lbs + 2222 lbs)/56.1 cft = 130 pcf
- VOLUME = 56.1 cft
- TOTAL UNIT WEIGHT = 7320 lbs
- CENTER OF GRAVITY (COG_t) = 42.02" (SEE NOTES)

NOTES:
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASUREMENTS ARE FROM BACK OF BLOCK.

DWA NO.  BD-10  REV.  01
SCALE: NA  WEIGHT: 5117.25  SHEET 1 OF 1

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DATE: 11/2/2017

R FONTANESI
Native gravelly soil, edge of excavation

Native soil compacted in place as each course is set

Geotextile Filter

Design Tables
Section 3

U.S. Version
Release 4.0

www.verti-block.com
TYPICAL GRAVITY WALL WITH VERTI-BLOCK MASS EXTENDERS

5° BATTER ANGLE
10° 15°

GROUND LEVEL SLOPE
MIN 2% AWAY FROM BLOCKS

FILL CORES WITH CLEAN 1” & CRUSHED STONE AS EACH COURSE IS SET.

36” STANDARD BLOCK

NATIVE SOIL EDGE OF EXCAVATION

2 3/16 TYP.

BACKFILLED NATIVE SOIL COMPACTED IN PLACE AS EACH COURSE IS SET.

WALL HEIGHT

36” STANDARD BLOCK

60” MASS EXTENDER

8” MASS EXTENDER

LEVELING PAD

CRUSHED STONE LEVELING PAD 6” MIN. DEPTH

PERFORATED DRAIN PIPE

NONWOVEN GEOTEXTILE FILTER

DRAWN BY: DAN BALLING
DATE: 12/30/2013

TITLE: 12’ SECTION W/ MASS EXTENDERS

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

规模: 1:30

单张: 1/1
# Gravity Wall Matrix with Standard and Mass Extender Blocks

## Soil Type

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Silty Internal Angle of Friction ≥ 28°</th>
<th>Sandy Internal Angle of Friction ≥ 30°</th>
<th>Gravely Sand Internal Angle of Friction ≥ 35°</th>
<th>Gravely Internal Angle of Friction ≥ 40°</th>
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<tbody>
<tr>
<td></td>
<td>Exposed Wall Height</td>
<td>Min. Bury Depth</td>
<td>Leveling Pad</td>
<td>Exposed Wall Height</td>
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<tr>
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<td>11</td>
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<tr>
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<td>1</td>
<td>13</td>
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<tr>
<td>36&quot; w/ (2) 48&quot; &amp; (1) 60&quot; bottom rows</td>
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</tr>
<tr>
<td>36&quot; w/ (2) 48&quot; &amp; (3) 60&quot; bottom rows</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>17</td>
</tr>
<tr>
<td>36&quot; w/ (4) 60&quot; bottom rows</td>
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</tbody>
</table>

## Load Condition

### Level Backfill / No Surcharge

<table>
<thead>
<tr>
<th>Load Condition</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
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<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
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### Level Backfill / 250 psf Surcharge

<table>
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<tr>
<th>Load Condition</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
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<td>9.5</td>
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<td>7.5</td>
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### 2:1 Sloping Backfill / No Surcharge

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<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
<th>Min. Bury Depth</th>
<th>Leveling Pad</th>
<th>Exposed Wall Height</th>
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<td>--</td>
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</table>

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Notes: Unit weight of soil is 120 psf. When friction angle of 28 degrees was used 50 lbs of cohesion was assumed. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Seismic forces have not been considered. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95% modified proctor density.
20' GEOGRID FRICTION CONNECTION

- Fill cores with clean 1" gravel as each course is set.
- Native sandy soil slope is greater than or equal to 30° from edge of excavation.
- Geotextile filter.
- GeoGrid mesh.
- GeoGrid mesh.
- Perforated drain pipe.
- Gravel base course 6" min. depth.
- 12" embedment.

DAN BALLING 12/12/2013
16120 S. PONY EXPRESS RD
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

TITLE: 20' FRICTION CONNECTION DETAIL
M-03

DRAWN BY DATE DWG NO.
DAN BALLING 12/12/2013 M-03

SCALE: NA
REVISION: 02 (4/18/2019) SHEET 1 OF 1

Verti-Crete, LLC, All Rights Reserved - Ver 4.0
FILL CORES WITH CLEAN 1" Ø GRAVEL AS EACH COURSE IS SET

TOP LAYER

GEOGRID MESH

GEOGRID MESH

PERFORATED DRAIN PIPE

GRAVEL BASE COURSE 6" MIN. DEPTH

GEOTEXILE FILTER

GEOGRID IS LOOPED THROUGH HOLLOW CORE OF EACH BLOCK

12" EMBEDMENT

NATIVE SANDY SOIL SLOPE IS GREATER THAN OR EQUAL TO 30° FROM EDGE OF EXCAVATION

20' GEOGRID POSITIVE CONNECTION DETAIL
### Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Silty Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>Level Backfill / No Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>≥ 28°</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
</table>

#### Design Tables

<table>
<thead>
<tr>
<th>Wall Height (feet)</th>
<th>Bury Depth (feet)</th>
<th>Level Pad (feet)</th>
<th>Dimensions measured in feet from face of block</th>
<th>VP – Geogrid Verticle Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.5</td>
<td>0.5</td>
<td>VP</td>
<td>GT</td>
<td>None</td>
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<tr>
<td>10</td>
<td>0.5</td>
<td>0.5</td>
<td>VP</td>
<td>GT</td>
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<tr>
<td>12</td>
<td>0.57</td>
<td>0.5</td>
<td>VP</td>
<td>GT</td>
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<tr>
<td>14</td>
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<td>0.5</td>
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<td>GT</td>
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<tr>
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<td>GT</td>
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<td>GT</td>
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<td>GT</td>
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<td>GT</td>
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<td>GT</td>
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</tr>
</tbody>
</table>

The above chart was prepared by Verti-Crete, LLC for estimating and conceptual design purposes only. All information is believed to be true and accurate; however Verti-Crete, LLC assumes no responsibility for the use of these design charts for actual construction. Determination of the suitability of each chart is the sole responsibility of the user. Final designs for construction purposes must be performed by a registered Professional Engineer, using the actual conditions of the proposed site.

Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95% modified proctor density. Designs are in general accordance with NCMA guidelines.
Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Silty Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>Level Backfill / 250 psf Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>≥ 28°</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>VP – Geogrid Vertical Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
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<td>0.5’</td>
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<td>10’</td>
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<td>0.57’</td>
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<tr>
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<td>0.67’</td>
<td>0.5’</td>
<td>2 500 10.8</td>
<td>2 500 10.8</td>
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</tr>
<tr>
<td>16’</td>
<td>0.76’</td>
<td>0.5’</td>
<td>2 500 12.1</td>
<td>2 500 12.1</td>
<td></td>
</tr>
<tr>
<td>18’</td>
<td>0.86’</td>
<td>0.5’</td>
<td>2 500 13.3</td>
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<td>0.95’</td>
<td>0.5’</td>
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<td>22’</td>
<td>1.05’</td>
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</table>

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Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Silty Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>2:1 Sloping Backfill / No Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>≥ 28°</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>VP – Geogrid Vertical Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>2 200</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.6 200</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td>10'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td>9.5 500</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11.1 500</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>14'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13.0 500</td>
<td>13.0</td>
<td></td>
</tr>
<tr>
<td>16'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.0 500</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>18'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17.0 500</td>
<td>17.0</td>
<td></td>
</tr>
<tr>
<td>20'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 600</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19.0 600</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>22'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 600</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21.0 600</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td>24'</td>
<td>0.6'</td>
<td>0.5'</td>
<td>2 600</td>
<td>4</td>
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<td>23.0 600</td>
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</table>

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### Reinforced Wall Matrix

**Soil Type**  
Sandy Soil

**Load Condition**  
Level Backfill / No Surcharge

**Internal Angle of Friction**  
≥ 30°

**Suggested Geogrid**  
Stratagrid®

### Design Tables

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>VP – Geogrid Verticle Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>8’</td>
<td>0.5’</td>
<td>0.5’</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10’</td>
<td>0.5’</td>
<td>0.5’</td>
<td>None</td>
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<td></td>
</tr>
<tr>
<td>12’</td>
<td>0.57’</td>
<td>0.5’</td>
<td>2 200 8.5</td>
<td>8 500 9.8</td>
<td></td>
</tr>
<tr>
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<td>0.67’</td>
<td>0.5’</td>
<td>2 500 9.8</td>
<td>8 500 9.8</td>
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</tr>
<tr>
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<td>0.76’</td>
<td>0.5’</td>
<td>2 500 11.1</td>
<td>8 500 11.1</td>
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</tr>
<tr>
<td>18’</td>
<td>0.86’</td>
<td>0.5’</td>
<td>2 500 13.6</td>
<td>8 500 13.6</td>
<td></td>
</tr>
<tr>
<td>20’</td>
<td>0.95’</td>
<td>0.5’</td>
<td>2 600 14.9</td>
<td>10 600 14.9</td>
<td></td>
</tr>
<tr>
<td>22’</td>
<td>1’</td>
<td>0.5’</td>
<td>2 600 16.2</td>
<td>12 600 16.2</td>
<td></td>
</tr>
<tr>
<td>24’</td>
<td>1.14’</td>
<td>0.5’</td>
<td>2 600 17.4</td>
<td>14 600 17.4</td>
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</tr>
<tr>
<td>26’</td>
<td>1.24’</td>
<td>0.5’</td>
<td>2 600 18.7</td>
<td>16 600 18.7</td>
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</tr>
<tr>
<td>28’</td>
<td>1.33’</td>
<td>0.5’</td>
<td>2 600 20.0</td>
<td>18 600 20.0</td>
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</tr>
<tr>
<td>30’</td>
<td>1.43’</td>
<td>0.5’</td>
<td>2 600 22.0</td>
<td>20 600 22.0</td>
<td></td>
</tr>
</tbody>
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### Reinforced Wall Matrix

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<thead>
<tr>
<th>Soil Type</th>
<th>Sandy Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>Level Backfill / 250 psf Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>$\geq 30^\circ$</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>VP – Geogrid Verticle Placement</th>
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<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>2 200 7.9 4 200 7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>2 200 9.2 4 200 9.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td>0.57'</td>
<td>0.5'</td>
<td>2 500 9.5 4 500 9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14'</td>
<td>0.67'</td>
<td>0.5'</td>
<td>2 500 10.8 4 500 10.8 6 500 10.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16'</td>
<td>0.76'</td>
<td>0.5'</td>
<td>2 500 12.1 4 500 12.1 6 500 12.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18'</td>
<td>0.86'</td>
<td>0.5'</td>
<td>2 500 13.3 4 500 13.3 6 500 13.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20'</td>
<td>0.95'</td>
<td>0.5'</td>
<td>2 600 14.6 4 600 14.6 6 600 14.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22'</td>
<td>1.05'</td>
<td>0.5'</td>
<td>2 600 15.9 4 600 15.9 6 600 15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24'</td>
<td>1.14'</td>
<td>0.5'</td>
<td>2 600 17.1 4 600 17.1 6 600 17.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26'</td>
<td>1.24'</td>
<td>0.5'</td>
<td>2 600 18.4 4 600 18.4 6 600 18.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28'</td>
<td>1.33'</td>
<td>0.5'</td>
<td>2 600 19.7 4 600 19.7 6 600 19.7</td>
<td></td>
<td></td>
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Reinforced Wall Matrix

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<thead>
<tr>
<th>Soil Type</th>
<th>Sandy Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>2:1 Sloping Backfill / No Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>≥ 30°</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>Dimensions measured in feet from face of block</th>
<th>VP – Geogrid Verticle Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP GT L</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP GT L</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14'</td>
<td>0.67'</td>
<td>0.5'</td>
<td>VP GT L [2 200, 4 200, 6 200]</td>
<td>8.4 8.4 8.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16'</td>
<td>0.76'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>9.8 9.8 9.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18'</td>
<td>0.86'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>10.8 10.8 10.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20'</td>
<td>0.95'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>12 12 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22'</td>
<td>1.05'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>13.2 13.2 13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24'</td>
<td>1.14'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>14.5 14.5 14.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26'</td>
<td>1.24'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>15.6 15.6 15.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28'</td>
<td>1.33'</td>
<td>0.5'</td>
<td>VP GT L [2 500, 4 500, 6 500]</td>
<td>16.8 16.8 16.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30'</td>
<td>1.4'</td>
<td>0.5'</td>
<td>VP GT L [2 600, 4 600, 6 600]</td>
<td>18 18 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30' +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heights above 30 feet are achievable. Please contact your Verti-Block dealer for more details.

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<table>
<thead>
<tr>
<th>Wall Height (ft)</th>
<th>Bury Depth (ft)</th>
<th>Level Pad (ft)</th>
<th>Dimensions measured in feet from face of block</th>
<th>VP – Geogrid Verticle Placement</th>
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</thead>
<tbody>
<tr>
<td>8'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP GT L</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP GT L 2 200 6.8 4 200 6.8</td>
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<td></td>
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<td>VP GT L 2 200 7.9 4 200 7.9</td>
<td></td>
<td></td>
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<td>14'</td>
<td>0.67'</td>
<td>0.5'</td>
<td>VP GT L 2 500 9 4 500 9 6 500 9 8 500 9</td>
<td></td>
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<td>0.95'</td>
<td>0.5'</td>
<td>VP GT L 2 500 12 4 500 12 6 500 12 8 500 12 10 500 12 12</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>22'</td>
<td>1.05'</td>
<td>0.5'</td>
<td>VP GT L 2 500 13.2 4 500 13.2 6 500 13.2 8 500 13.2 10 500 13.2 12 500 13.2 14</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>24'</td>
<td>1.14'</td>
<td>0.5'</td>
<td>VP GT L 2 500 14.4 4 500 14.4 6 500 14.4 8 500 14.4 10 500 14.4 12 500 14.4 14 500 14.4 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26'</td>
<td>1.25'</td>
<td>0.5'</td>
<td>VP GT L 2 500 15.6 4 500 15.6 6 500 15.6 8 500 15.6 10 500 15.6 12 500 15.6 14 500 15.6 16 500 15.6 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28'</td>
<td>1.33'</td>
<td>0.5'</td>
<td>VP GT L 2 600 16.8 4 600 16.8 6 600 16.8 8 600 16.8 10 600 16.8 12 600 16.8 14 600 16.8 16 600 16.8 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30' +</td>
<td></td>
<td></td>
<td>VP GT L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Gravely/Sandy Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>2:1 Sloping Backfill / No Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
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<th>Bury Depth</th>
<th>Level Pad</th>
<th>Dimensions measured in feet from face of block</th>
<th>VP – Geogrid Verticle Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>8'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP</td>
<td>GT</td>
<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>None</td>
<td></td>
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</tr>
<tr>
<td>10'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>VP</td>
<td>GT</td>
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<tr>
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<td>None</td>
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<td>0.5'</td>
<td>2 200</td>
<td>4 200</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>12'</td>
<td>0.57'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4 500</td>
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<tr>
<td>14'</td>
<td>0.67'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4 500</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>16'</td>
<td>0.76'</td>
<td>0.5'</td>
<td>2 500</td>
<td>4 500</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
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<td>4 500</td>
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</tr>
<tr>
<td>20'</td>
<td>0.95'</td>
<td>0.5'</td>
<td>2 600</td>
<td>4 600</td>
<td>13.5</td>
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</tr>
<tr>
<td>22'</td>
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<td>0.5'</td>
<td>2 600</td>
<td>4 600</td>
<td>14.9</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
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</tr>
</tbody>
</table>

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Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Gravely Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Condition</td>
<td>Level Backfill / No Surcharge</td>
</tr>
<tr>
<td>Internal Angle of Friction</td>
<td>≥ 40°</td>
</tr>
<tr>
<td>Suggested Geogrid</td>
<td>Stratagrid®</td>
</tr>
</tbody>
</table>

### Design Tables

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<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
<th>Level Pad</th>
<th>VP – Geogrid Verticle Placement</th>
<th>GT – Geogrid Type (Strata 200, 500, 600)</th>
<th>L – Geogrid Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>14'</td>
<td>0.5'</td>
<td>0.5'</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16'</td>
<td>0.76'</td>
<td>0.5'</td>
<td>VP 2 200 GT L 9.6</td>
<td>200 200 8 200</td>
<td></td>
</tr>
<tr>
<td>18'</td>
<td>0.86'</td>
<td>0.5'</td>
<td>VP 2 200 GT L 10.8</td>
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</tr>
<tr>
<td>20'</td>
<td>0.95'</td>
<td>0.5'</td>
<td>VP 2 200 GT L 12</td>
<td>200 200 12 200</td>
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</tr>
<tr>
<td>22'</td>
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<td>0.5'</td>
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<td>500 500 13.2</td>
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<tr>
<td>24'</td>
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<td>VP 2 500 GT L 14.4</td>
<td>500 500 14.4</td>
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</tr>
<tr>
<td>26'</td>
<td>1.24'</td>
<td>0.5'</td>
<td>VP 2 500 GT L 15.6</td>
<td>500 500 15.6</td>
<td></td>
</tr>
<tr>
<td>28'</td>
<td>1.33'</td>
<td>0.5'</td>
<td>VP 2 500 GT L 16.8</td>
<td>500 500 16.8</td>
<td></td>
</tr>
<tr>
<td>30'</td>
<td>1.43'</td>
<td>0.5'</td>
<td>VP 2 500 GT L 18</td>
<td>500 500 18</td>
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</tr>
<tr>
<td>32'</td>
<td>1.52'</td>
<td>0.5'</td>
<td>VP 2 500 GT L 19.2</td>
<td>500 500 19.2</td>
<td></td>
</tr>
<tr>
<td>34'</td>
<td>1.62'</td>
<td>0.5'</td>
<td>VP 2 500 GT L 20.4</td>
<td>500 500 20.4</td>
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</tr>
<tr>
<td>34' +</td>
<td></td>
<td></td>
<td>VP</td>
<td></td>
<td>Heights above 34 feet are achievable. Please contact your Verti-Block dealer for more details</td>
</tr>
</tbody>
</table>
Verti-Crete, LLC, All Rights Reserved - Ver 4.0

### Reinforced Wall Matrix

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Gravely Soil</th>
</tr>
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<tr>
<td>Load Condition</td>
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</tr>
<tr>
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</tr>
</tbody>
</table>

#### Table: Reinforced Wall Matrix

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<th>Wall Height</th>
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</thead>
<tbody>
<tr>
<td>10’</td>
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<td>0.5’</td>
<td>VP GT L</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>12’</td>
<td>0.57’</td>
<td>0.5’</td>
<td>VP GT L</td>
<td>2 200 7.2</td>
<td>4 200 7.2</td>
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</tr>
<tr>
<td>14’</td>
<td>0.67’</td>
<td>0.5’</td>
<td>VP GT L</td>
<td>2 200 8.4</td>
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</tr>
<tr>
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<td>2 200 9.6</td>
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</tr>
<tr>
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<td>2 200 10.8</td>
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<td>2 500 18</td>
<td>4 500 18</td>
<td>6 500 18</td>
</tr>
<tr>
<td>30’+</td>
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<td></td>
<td>VP GT L</td>
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<td></td>
<td></td>
</tr>
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### Reinforced Wall Matrix

**Soil Type**  
Gravely Soil

**Load Condition**  
2:1 Sloping Backfill / No Surcharge

**Internal Angle of Friction**  
≥ 40°

**Suggested Geogrid**  
Stratagrid®

<table>
<thead>
<tr>
<th>Wall Height</th>
<th>Bury Depth</th>
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<td>0.5'</td>
<td>0.5'</td>
<td>None</td>
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<td></td>
</tr>
<tr>
<td>14'</td>
<td>0.67'</td>
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</tr>
<tr>
<td>20'</td>
<td>0.95'</td>
<td>0.5'</td>
<td>2 200 12 200 12 200 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22'</td>
<td>1.05'</td>
<td>0.5'</td>
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</tr>
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**TYPICAL GRAVITY WALL WITH 12" SETBACK**

- **26" BATTER ANGLE 60°**
- **36" STANDARD BLOCK**
- **48" MASS EXTENDER**
- **60" MASS EXTENDER**
- **12" (TYP.)**
- **LEVELING PAD**
- **CRUSHED STONE LEVELING PAD 6" MIN. DEPTH**
- **GROUND LEVEL SLOPE MIN. 2% AWAY FROM BLOCKS**
- **FILL CORES WITH CLEAN 1" Ø CRUSHED STONE AS EACH COURSE IS SET.**
- **PERFORATED DRAIN PIPE**
- **NONWOVEN GEOTEXTILE FILTER**
- **BACKFILLED NATIVE SOIL COMPACTED IN PLACE AS EACH COURSE IS SET.**
- **NATIVE SOIL EDGE OF EXCAVATION**

**Design Tables**

- **WALL HEIGHT**
- **LEVELING PAD**
- **BLOCK EXTENDER**

---

**12' GRAVITY WALL W/ 12" SETBACK**

**Title:**

**DRAWN BY:** R Fontanesi

**DATE:** 1/6/2016

**TITLE:** 12' GRAVITY WALL W/ 12" SETBACK

**DRAW NO.:** WD-34

**SCALE:** 1:30

**Sheet 1 of 1**

**VERTI-BLOCK**

16500 South 500 West
Bluffdale, Utah 84065
Phone: (801) 571-2028
# Gravity Wall Matrix with Mass Extenders and 12” Batter

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Silty Internal Angle of Friction ≥ 28°</th>
<th>Sandy Internal Angle of Friction ≥ 30°</th>
<th>Gravely Sand Internal Angle of Friction ≥ 35°</th>
<th>Gravely Internal Angle of Friction ≥ 40°</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load Condition</strong></td>
<td><strong>Exposed Wall Height</strong></td>
<td><strong>Min. Bury Depth</strong></td>
<td><strong>Leveling Pad</strong></td>
<td><strong>Exposed Wall Height</strong></td>
</tr>
<tr>
<td><strong>Level Backfill / No Surcharge</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>36” Blocks Only</td>
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</tr>
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<td>36” Blocks Only</td>
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<tr>
<td>36” Blocks Only</td>
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</tr>
<tr>
<td>36” w/ (1) 48” bottom row</td>
<td>12.5</td>
<td>1.5</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>36” w/ (1) 48” bottom row</td>
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<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>36” w/ (1) 60” bottom rows</td>
<td>14</td>
<td>2</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>36” w/ (1) 48” &amp; (1) 60” bottom rows</td>
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<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level Backfill / 250 psf Surcharge</th>
<th><strong>Exposed Wall Height</strong></th>
<th><strong>Min. Bury Depth</strong></th>
<th><strong>Leveling Pad</strong></th>
<th><strong>Exposed Wall Height</strong></th>
<th><strong>Min. Bury Depth</strong></th>
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<th><strong>Min. Bury Depth</strong></th>
<th><strong>Leveling Pad</strong></th>
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</thead>
<tbody>
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<td>0.5</td>
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<td>1</td>
</tr>
<tr>
<td>36” Blocks Only</td>
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<td>1.5</td>
<td>1</td>
<td>8.5</td>
<td>1.5</td>
<td>1</td>
<td>11</td>
<td>1</td>
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<td>15</td>
<td>1</td>
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</tr>
<tr>
<td>36” w/ (1) 48” bottom row</td>
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<td>--</td>
<td>--</td>
<td>--</td>
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<td>10.5</td>
<td>1.5</td>
<td>1</td>
<td>13</td>
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<td>1</td>
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<tr>
<td>36” w/ (1) 48” bottom rows</td>
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The above chart was prepared by Verti-Crete, LLC for estimating and conceptual design purposes only. All information is believed to be true and accurate; however Verti-Crete, LLC assumes no responsibility for the use of these design charts for actual construction. Determination of the suitability of each chart is the sole responsibility of the user. Final designs for construction purposes must be performed by a registered Professional Engineer, using the actual conditions of the proposed site.

Notes:
- Unit weight of soil is 120 psf.
- Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0.
- Seismic forces have not been considered.
- Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design.
- Backfill material to be

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Version 2.1
Our innovative blocks wouldn’t be complete without this two-in-one package. Estimate your projects and design layouts beforehand, and then run performance analysis on your Verti-Block walls with our analysis software. Available to designers and engineers for free download, the Verti-Block Design Software offers:

**Analysis Mode**
- The ability to switch between gravity and reinforced design
- NCMA, AASHTO ASD & LRFD, CAN_CSA specifications
- Built-in Verti-Block parameters
- Built-in Stratagrid parameters and geogrid connection strengths
- Seismic design considerations
- Global stability analysis

**Layout Mode**
- Convert plan views to Verti-Block wall layouts
- Run section-by-section analysis to check your design
- Generate full wall takeoffs, complete with block count and geogrid requirements
- Export takeoffs in CAD format to edit in your preferred application

Installation Setup

This installation manual is designed to provide general information and assist in the proper techniques required to build Verti-Block™ walls. The manual covers the basics of wall construction and contains many of the details encountered in site work. Before you start construction, take the time to complete necessary planning and preparation. This process will help ensure a safe, efficient, and quality installation. Proper planning will also help avoid costly mistakes.

Checklist

- **SAFETY**
  Safety should always be your primary concern. Verti-Block™ walls must be installed following proper procedures to ensure work site safety and the integrity of the wall. All local, state, and federal safety regulations must be followed.

- **ENGINEERING AND PERMITS**
  Obtain necessary engineering approvals and permits for your project. Your local building department is an excellent resource to help determine the requirements for your project. Note: This installation manual is intended to supplement a detailed, site-specific wall design prepared for your project by a professional engineer. The construction documents for your project will supersede any recommendations presented in this manual.

- **REVIEW THE PROJECT PLANS**
  Take the time to review and understand the project plans and specifications. Make sure that the plans take into account current site and soil conditions. Pay close attention to silty or clay soils, ground water or surface water on the site. A pre-construction meeting with the wall designer, construction inspector, wall contractor, and owner or representative is recommended.

- **CONSTRUCTION PLANNING**
  Develop a plan to coordinate construction activities on your site. Make sure your plan specifically addresses how to control surface water during construction.

- **UTILITY LOCATION**
  Make sure to have underground utilities located and marked on the ground before starting any construction. In the United States, call 8-1-1 or go online to www.call811.com to schedule utility marking for your project site.

- **MATERIAL STAGING**
  Store blocks in a location close to the proposed wall. Blocks should be kept clean and mud free. Blocks should be stored in a location which will minimize the amount of handling on the project site. Store geogrid in a clean, dry location close to the proposed wall. Keep the geogrid covered or in the shade and avoid exposure to direct sunlight. Be careful where you stockpile excavation and backfill material. Do not stockpile soils over buried utility lines which could be damaged by the extra weight.
Equipment and Supplies

Make sure you have the proper equipment to handle Verti-Blocks and install the wall. Standard Verti-Blocks weigh 1755 lbs (790 Kg.) Mass Extenders can weigh up to 3642 lbs (1639 Kg.) each. Make sure excavators and other construction equipment are properly sized to handle the terrain and each Verti-Block. The following tools are recommended, but should not be limited to this list. Site conditions may require other equipment, tools and materials.

Earth Handling Equipment

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Block Handling Equipment

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<td>Telehandler / Crane</td>
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* Always follow safe use and rigging procedures when handling the blocks for Verti-Block forms
## Installation

### Tools and Equipment

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Tools and Equipment

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MATERIALS
- Wall Base Material (Crushed Stone)
- Unit Fill Material (Crushed Stone)
- Perforated Drain Pipe
- Geotextile Filter Fabric (if required)
- Hand Rail (if required)

SITE PREPARATION
- Review the approved site plan to confirm lot lines, wall location, length and elevations
- Schedule preconstruction meeting
- Verify the on-site soil conditions
- Call the local utility companies to confirm the location of underground utilities
- Obtain all necessary building permits
- Confirm drainage to avoid erosion or buildup of water behind the wall
Lay out the location and length of the wall. If possible, always start the wall base at the lowest elevation of the wall. Set wall elevations using a laser level and stakes prior to excavating. Excavate as required for installation of the retaining wall system. Use caution not to over-excavate beyond depth needed for the foundation. Slope or shore excavation as necessary for safety and for conformance with applicable OSHA requirements.

- Excavate and prepare leveling pad trench 6” (or 12” if necessary) below the first course
- Normal trench burial depth is 6” to 12”
Foundation soils shall be excavated as required by the plan specifications. Foundation soil should be observed by a Geotechnical Engineer to confirm that the bearing soils are similar to the design conditions or assumptions. Foundation soil shall be proof rolled and compacted a minimum of 95 percent of the maximum dry density (ASTM D 698, Standard Proctor) and inspected by the Owner's Engineer prior to placement of leveling pad materials. The contractor shall replace any unsuitable soils discovered during excavation at the direction of the engineer.

- Compact Sub Base to 95% Standard Proctor Density or greater
- Remove any poor soils in the Sub Base and replace with proper fill materials before compacting

Foundation Preparation

Step 2
Construct the wall base to the lines and grades shown on the plans. The base is most often constructed using crushed stone. However, you may construct the base from concrete if desired. The choice of which type of leveling pad to use is made by the wall designer and depends on several factors including the bearing capacity of the native soil, location of the drain outlet and conditions at the base of the wall.

Construct base with the material and to the dimensions shown on the plans. Over excavated areas shall be filled with additional concrete or crushed stone material. Wall base shall consist of concrete with a minimum 28-day compressive strength of 3,000 psi, or a dense graded crushed stone. A minimum of 75% of coarse material shall have 2 or more fractured faces.

Compact the leveling pad to provide a hard and level surface to support the Verti-Block™ unit. Leveling pad material shall be compacted to a minimum of 95 percent of the maximum dry density (ASTM D 698, Standard Proctor). Prepare and smooth the crushed stone to ensure complete contact of the first course with the wall base. The surface of leveling pad may be dressed with finer aggregate to aid leveling, provided that the thickness of dressing layer should not exceed 3 times the maximum particle size used. It is important to ensure that the wall base has proper drainage. Consult with the engineer if added drainage is needed.
Lay the perforated drain pipe in the center of the leveling pad so the blocks can be placed on top of the pipe.

Place the first course of Verti-Block™ units directly on the wall base. If possible, begin placing blocks at the lowest section of the wall. The unit shall be leveled side-to-side, front-to-rear and with adjacent unit. Ensure that each Verti-Block™ units are in full contact with the compacted leveling pad. The first course is the most important to ensure accurate and acceptable results.

In some cases a mass extender may be used to achieve taller gravity walls. These units shall be installed in accordance with the plans.
Fill all voids between and within the unit with crushed stone. Unit fill shall consist of a screened crushed stone. A minimum of 75% of coarse material shall have 2 or more fractured faces.

When required, provide a geotextile filter fabric for separation from backfill at the tails of the unit. The geotextile shall be a needle punched non-woven fabric with a minimum grab tensile strength of 120 pounds according to ASTM D 4632. If used, the geotextile may cover the entire back face of the unit or may be cut in strips to cover the gaps between tail units with a minimum of 6 inches of overlap over the concrete tail on both sides.

**Drain Pipe Alternate Configuration:** Depending on the project, it may be an option to install the perforated drain pipe within the leveling pad. This is acceptable as long as the drain pipe is not damaged or crushed during the compaction process.
Remove all excess aggregate and other materials from the top of the unit before laying up the next course. Place the next course of blocks in running bond with the previous course. Place the female notch over the male spacing riser from the unit below, and pull the unit forward to contact the male riser. This alignment will produce a batter of 2 3/16 inches for every 24 inches of vertical wall height. Check each Verti-Block™ for level and alignment. The layout of radius and corners shall be installed in accordance with the plans or shop drawings.

Continue placing successive courses to the elevations shown on the plans. Construct wall in level stages, placing the unit at each course for the entire length of the wall, if possible. Unit fill and backfill should be placed to the level of the top of the facing unit before placing the next course. Provide temporary swales to divert runoff away from wall excavation and away from face during the construction phase. Complete the last course by installing the Verti-Block™ top unit. Place unit fill and backfill level with the back face of the unit. If using geogrid reinforcement go to step 7, otherwise skip to step 9.

**Geotextile Placement**

- As required, place Geotextile filter fabric between blocks and compacted backfill
- Compact backfill behind blocks in lifts no more than 12” high
- Lay 2nd course of blocks on top of the 1st course
- Continue to fill voids with crushed stone for proper drainage
安装

在每道混凝土砌块完成后，将顶部清理，回填土并进行压实，然后放置土工格栅。

获取工作所需的土工格栅类型。剪裁土工格栅条根据设计工程师的指示长度。所需土工格栅类型和长度是墙的高度、土层条件和加载的函数。

首先一层土工格栅垂直于墙的表面。该层应与墙的前端保持2"-3"的距离。继续铺设土工格栅层，重叠约2"，直到整个砌块层被土工格栅覆盖。

切割土工格栅以允许锚点通过。重复这个过程，根据设计调整土工格栅类型和长度。

- 在每道混凝土砌块层的顶部铺设土工格栅条
- 土工格栅相邻层重叠约2英寸。

每次工作层完成，顶部被清理，回填土并压实，然后可以放置土工格栅。获取所需的土工格栅类型的适量。剪裁土工格栅条至长度，根据设计工程师规定的长度。

所需的土工格栅类型和长度是墙的高度、土层条件和加载的函数。

先铺设一层土工格栅垂直于墙的表面。该条的末端应与砌块的前端保持2"-3"的距离。继续铺设土工格栅层，重叠约2"，直到整个工作层被土工格栅覆盖。

切割土工格栅以允许锚点通过。重复这个过程，根据设计调整土工格栅类型和长度。

- 在每道混凝土砌块层的顶部铺设土工格栅条
- 土工格栅相邻层重叠约2英寸。

每次工作层完成，顶部被清理，回填土并压实，然后可以放置土工格栅。获取所需的土工格栅类型的适量。剪裁土工格栅条至长度，根据设计工程师规定的长度。

所需的土工格栅类型和长度是墙的高度、土层条件和加载的函数。

首先铺设一层土工格栅垂直于墙的表面。该层的末端应与砌块的前端保持2"-3"的距离。继续铺设土工格栅层，重叠约2"，直到整个工作层被土工格栅覆盖。

切割土工格栅以允许锚点通过。重复这个过程，根据设计调整土工格栅类型和长度。

- 在每道混凝土砌块层的顶部铺设土工格栅条
- 土工格栅相邻层重叠约2英寸。

每次工作层完成，顶部被清理，回填土并压实，然后可以放置土工格栅。获取所需的土工格栅类型的适量。剪裁土工格栅条至长度，根据设计工程师规定的长度。

所需的土工格栅类型和长度是墙的高度、土层条件和加载的函数。
Place native soil backfill behind the unit in maximum loose lifts of 12 inches and compact. Backfill and compact behind the first course before installing other courses.

Compact all backfill to a minimum of 95 percent of the maximum dry density (ASTM D 698, Standard Proctor). For cohesive soils, the moisture content at the time of compaction should be adjusted to within -3 and +4 percent of optimum. Place backfill in successive lifts until level with the top of the facing unit. Additional unit fill is not required behind the unit, but may be placed for the convenience of the contractor.

All other backfill behind and in front of the wall shall consist of suitable on-site soil or imported borrow approved by the Geotechnical Engineer. Backfill shall generally consist of sands, silts, or lean clays with a liquid limit less than 45 and a plasticity index less than 20. Fat clay soils, cobbles, and large rock should generally be avoided unless approved by the Geotechnical Engineer based on local practices. Frozen soils, excessively wet or dry soils, debris, and deleterious materials should not be used.

Final grade above and below the retaining wall shall provide for positive drainage and prevent ponding. Protect completed wall from other construction. Do not operate large equipment or store materials above the wall that exceed the design surcharge loads.
Final Grade and Landscape

- Ensure that final grading is done on top and bottom of the wall
- Make sure to protect newly placed planting soil from erosion during heavy rains or surface runoff

Once the final grade is completed both above and below the wall, landscaping should be installed to complete the aesthetic look to compliment the wall design and appearance. It is important to take precautions to protect planting soils from erosion that may occur during heavy rains or surface run off.
Typicals

Typical Gravity Wall (WD-14) ........................................... 5.1
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### Half-Steps & Step Downs

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### Water Applications & 2/3 Sided

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<tr>
<td>River Detail (WD-19)</td>
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### Railing & Misc.

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<th>Page</th>
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</tbody>
</table>
TYPICAL GRAVITY WALL WITH 36" VERTI-BLOCK

- 5° BATTER ANGLE
- 1 1/2” WALL
- 36” STANDARD BLOCK
- 3 3/16” (TYP.) WALL HEIGHT
- LEVELING PAD
- CRUSHED STONE LEVELING PAD 6” MIN. DEPTH
- PERFORATED DRAIN PIPE
- GROUND LEVEL SLOPE MIN .2% AWAY FROM BLOCKS.
- FILL CORES WITH CLEAN 1” Ø CRUSHED STONE AS EACH COURSE IS SET.
- NATIVE SOIL EDGE OF EXCAVATION
- NONWOVEN GEOTEXTILE FILTER
- BACKFILLED NATIVE SOIL COMPACTED IN PLACE AS EACH COURSE IS SET.

DRAWN BY: DAN BALLING
DATE: 12/30/2013

TYPICAL GRAVITY WALL WITH 36" VERTI-BLOCK

Title: 12' RETAINING SECTION
Dwg No: WD-14

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TYPICAL GRAVITY WALL WITH VERTI-BLOCK MASS EXTENDERS

LEVELING PAD

WALL HEIGHT

48" MASS EXTENDER

60" MASS EXTENDER

5" BATTER ANGLE

GROUND LEVEL SLOPE

FILL CORES WITH CLEAN 1" CRUSHED STONE AS EACH COURSE IS SET.

36" STANDARD BLOCK

2-3/16 (TYP.)

6" MIN. DEPTH LEVELING PAD

CRUSHED STONE LEVELING PAD 6" MIN. DEPTH

BACKFILLED NATIVE SOIL COMPACTED IN PLACE AS EACH COURSE IS SET.

NATIVE SOIL EDGE OF EXCAVATION

PERFORATED DRAIN PIPE

GEOTEXTILE FILTER

6" MIN. DEPTH CRUSHED STONE DRAIN PIPE BACKFILLED NATIVE IN PLACE AS EACH COURSE IS SET.

TITLE: 12' SECTION W/ MASS EXTENDERS

DRAWN BY: DAN BALLING

DATE: 12/30/2013

DWG NO.: WD-15

SCALE: 1:30

SHRIT 1 OF 1
20' GEOGRID FRICTION CONNECTION

- **Start Geogrid at Front of Block**
- **Fill Cores with Clean 1" 0" Gravel as Each Course is Set**
- **Top Layer**
- **Gravel Base Course 6" Min. Depth**
- **Perforated Drain Pipe**
- **Geotextile Filter**
- **NATIVE SANDY SOIL SLOPE IS GREATER THAN OR EQUAL TO 30\(^\circ\) FROM EDGE OF EXCAVATION**
- **GEOGRID MESH**

**Construction Drawings**

**DWG NO.: M-03**

**DRAWN BY:**

DAN BALLING

**DATE:**

12/12/2013

**TITLE:**

20' FRICTION CONNECTION DETAIL

**SCALE:**

NA

**REVISION:**

02 (4/18/2019)

**Sheet 1 of 1**
20' GEOGRID POSITIVE CONNECTION DETAIL

- GEOTEXTILE FILTER
- FILL CORES WITH CLEAN 1" Ø GRAVEL AS EACH COURSE IS SET
- GEOGRID MESH
- GEOGRID IS LOOPED THROUGH HOLLOW CORE OF EACH BLOCK
- TOP LAYER
- 30°
- GRAVEL BASE COURSE 6" MIN. DEPTH
- NATIVE SANDY SOIL SLOPE IS GREATER THAN OR EQUAL TO 30° FROM EDGE OF EXCAVATION
- 12" EMBEDMENT
- PERFORATED DRAIN PIPE

20' POSITIVE CONNECTION DETAIL

R FONTANESI 3/8/2016
16120 S. PONY EXPRESS RD BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028

WD-36

SCALE: NA REVISION: 02 (4/18/2019) SHEET 1 OF 1
GEOGRID FRICTION CONNECTION DETAIL

CUT MESH FOR R-ANCHORS

MESH SHOULD LAY FLAT ON TOP OF BLOCK

DRAWN BY: DAN BALLING  DATE: 12/12/2013

16120 S. PONY EXPRESS RD
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

TITLE: FRICITION CONNECTION

DWG NO.: M-01

SCALE: NA  REVISION: 03  (4/19/2019)  SHEET 1 OF 1
GEOGRID POSITIVE CONNECTION DETAIL

24" GEOGRID MESH

1" RADIUS MIN. TOP & BOTTOM ALL SHARP EDGES MUST BE REMOVED

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

DRAWN BY: R FONTANESI
DATE: 3/8/2016
TITLE: POSITIVE CONNECTION
WDG NO.: WD-35
16120 S. PONY EXPRESS RD
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

SCALE: NA
REVISION: 02 (4/19/2019)
SHEET 1 OF 1
OUTSIDE CORNER DETAIL

ROW 1

ONE SHORTENED SHEAR LUG ADJACENT TO THE 2' SIDE ON EVERY CORNER BLOCK

ROW 2

ONE SHORTENED SHEAR LUG ADJACENT TO THE 2' SIDE ON EVERY CORNER BLOCK

CONFLICTING POINT

OUTSIDE CORNER

WD-3

DRAWN BY: DAN BALLING
DATE: 12/12/2013

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028
OUTSIDE CORNER WITH MASS EXTENDERS DETAIL

ROW 2

- 60" MASS EXTENDER BLOCK
- 48" MASS EXTENDER BLOCK ADJACENT TO 2’ SIDE OF CORNER BLOCK

ROW 1

- ONE SHORTENED SHEAR LUG ADJACENT TO THE 2’ SIDE ON EVERY CORNER BLOCK

OUTSIDE CORNER W/ ME

WD-05

DAN BALLING 12/12/2013

OUTSIDE CORNER WITH MASS EXTENDERS DETAIL

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5.8
OUTSIDE CORNER WITH MASS EXTENDERS DETAIL

- **ROW 2**
  - 72" MASS EXTENDER BLOCK
  - ONE SHORTENED SHEAR LUG ADJACENT TO THE 2' SIDE ON EVERY CORNER BLOCK

- **ROW 1**
  - 48" MASS EXTENDER BLOCK ADJACENT TO 2' SIDE OF CORNER BLOCK
  - 84" MASS EXTENDER BLOCK
  - 72" MASS EXTENDER BLOCK

**Configuration Details**

- **Outside Corner with 84" ME**
- **Drawing Information**:
  - **DRAWN BY**: R Fontanesi
  - **DATE**: 6/5/2015
  - **DWG NO.**: WD-22
  - **SCALE**: N/A
  - **SHEET**: 1 of 1

**Address**: 16500 South 500 West, Bluffdale, Utah 84065
**Phone**: (801) 571-2028
DOUBLE 90° OUTSIDE CORNER

C-03

DRAWN BY: R Fontanesi
DATE: 3/8/2016

TITLE: DOUBLE 90° OUTSIDE CORNER

DWG NO.: C-03

SCALE: 1:30

SHEET 1 OF 1

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INTERLACED INSIDE CORNER DETAIL

Each level will be set back and toward the inside corner by 2-3/16" than the one below.

ALTERNATE CORNER OVERLAP

ROW 1

ROW 2

ROW 3

DAN BALING
12/12/2013

INTERLACED INSIDE CORNER

WD-1

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

SCALE: 1:60

SHEET 1 OF 1
HALF BLOCK NEEDED ON EVERY OTHER ROW

START OVERLAP FROM MIDDLE OF BLOCK
OVERLAP = 2-3/16" X # OF ROWS

DRAWN BY
PHONE: (801) 571-2028

BUTT-JOINT INSIDE CORNER DETAIL

ROW 1

ROW 2

ROW 3

ROW 4

DAN BALLING
14500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DRAWN BY DATE TITLE
DAN BALLING 12/12/2013 BUTT-JOINT INSIDE CORNER

WD-2

SHEET 1 OF 1

SCALE 1:40

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ENSURE GRAVEL FILL IS WELL COMPACTED BENEATH OVERHANGING CORNER OF MASS EXTENDER BLOCK

84" MASS EXTENDER BLOCKS

60" MASS EXTENDER BLOCKS

ALTERNATING CORNER OVERLAP

ROW 1

ROW 2
DOUBLE 90° INSIDE CORNER

C-02

ALTERNATE OVERLAPPING BLOCKS

DAN BALLING 12/12/2013
NOTE: REFERENCE OUTSIDE CORNER DETAIL (WD-3) FOR SHORTENED SHEAR LUG

DRAWN BY     DATE           TITLE
DAN BALLING   12/12/2013     PLANTER ROW OUTSIDE CORNER

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO.     PR-02

SCALE: 1:4    SHEET 1 OF 1
PLANTER ROW INSIDE CORNER DETAIL

STEPOVER INCREASES BY 2-3/16" FOR EACH ROW

DRAWN BY: DAN BALLING  
DATE: 12/12/2013  
TITLE: PLANTER ROW INSIDE CORNER  

DWG NO.: PR-03  
SCALE: NA  
REVISION: 02 (4/23/2019)  
SHEET 1 OF 1
Construction Drawings

PLANTER ROW WALL

PR-01

DRAWN BY: DAN BALLING
DATE: 12/12/2013

LEVELING PAD

SOIL

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

SCALE: 1:4
SHEET 1 OF 1
STRAIGHT FACE WITH SIMPLE 2' RETURNS

DAN BALLING  12/12/2013
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

2' RETURN
WD-4
STRAIGHT FACE WITH SIMPLE 4' RETURNS

CORNER BLOCKS BACK TO BACK

LEVEL 1

6" SHEAR LUG BLOCKOUT NEEDED

LEVEL 2

HALF TOP BLOCK REQUIRES BLOCKOUT ON BLOCK BELOW

LEVEL 3

DRAWN BY: DAN BALLING  DATE: 12/12/2013

TITLE: 4' RETURN

DWG NO.: WD-07

16500 SOUTH 500 WEST  BLUFFDALE, UTAH 84065  PHONE: (801) 571-2028

SCALE: 1:30  SHEET 1 OF 1
HALF BLOCKS REQUIRED ON EVERY OTHER ROW

EVERY COURSE WILL BE 15/16” CLOSER TO THE CORNER THAN THE COURSE BELOW IT.

WALLS ARE COMPLETELY SEPARATE AND DO NOT INTERLOCK OR SHARE A RUNNING BOND WITH EACH OTHER.

45° SEPARATE WALLS

C-04
FIRST COURSE

CENTER BLOCK WILL NEED TO BE SET BACK 2-1/8" FROM ADJACENT BLOCKS AND PLACED AT 15° ANGLES TO EACH OTHER

SECOND COURSE

CENTER BLOCK WILL PROTRUDE 2-1/8" FROM ADJACENT BLOCKS
20 1/2" SETBACK FROM THEORETICAL CORNER ON FIRST ROW

RUNNING BOND SHIFTS 3/4" FURTHER ON EACH ROW
NOTE:
TOP ROW MINIMUM RADIUS IS 16’.
SETBACK IS 1 5/16” AND EACH ROW
WILL INCREASE THE RADIUS BY 1 5/16”
MORE THAN THE ROW ABOVE IT.
NOTE:
BOTTOM ROW MINIMUM RADIUS IS 16'.
SETBACK IS 2 3/4" AND EACH ROW
WILL INCREASE THE RADIUS BY 2 3/4"
MORE THAN THE ROW BELOW IT.
1 ROW OF HALF STEP BLOCKS
1 ROW OF HALF STEP BLOCKS
2' STEP DOWN WITH TOP CORNER GAP INSERTS

TOP CORNER GAP INSERTS

TOP CORNER GAP INSERT

2' STEP DOWN

WD-8

DRAWN BY: DAN BALLING
DATE: 12/12/2013

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 371-2028

SCALE: 1:40

SHEET 1 OF 1
6' STEP DOWN WITH TOP STANDARD GAP INSERT

6' STEP DOWN

WD-9

DRAWN BY
DAN BALLING

DATE
12/12/2013

16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

SCALE: 1:40

SHEET 1 OF 1
6' STEP DOWN WITH HALF-STEP BLOCK
AND TOP CORNER GAP INSERT

HALF-STEP CORNER TOP BLOCK

TOP CORNER GAP INSERT

6' STEP W/ HALF STEP BLOCK

WD-10
10' STEP DOWN WITH HALF-STEP BLOCK AND TOP STANDARD GAP INSERT

HALF-STEP CORNER TOP BLOCK

TOP STANDARD GAP INSERT

10' STEP W/ HALF STEP BLOCK

WD-11
**DRAIN PIPE PLACEMENT OPTIONS**

**OPTION 1: BOTTOM CAVITY**

DRAIN PIPE IS PLACED ON TOP OF THE LEVELING PAD AND INSIDE THE BOTTOM CAVITY OF THE BLOCK, THEN COVERED WITH GRAVEL INFILL.

**OPTION 2: LEVELING PAD**

DRAIN PIPE IS PLACED INSIDE THE COMPACTED GRAVEL OF THE LEVELING PAD.

**OPTION 3: BEHIND BLOCK**

DRAIN PIPE IS PLACED ON TOP OF THE LEVELING PAD AND BEHIND THE BLOCK.*

*NOTE: THIS OPTION REQUIRES 12" OF LOOSE GRAVEL BEHIND THE WALL. WHERE DRAINAGE IS A MAJOR CONCERN, THIS OPTION MAY BE COMBINED WITH OPTION 1 OR 2.
CULVERT OPTIONS

BOX CULVERT

TO ACCOUNT FOR WALL BATTER:
PLACE BOTTOM ROW IN FRONT OF
CULVERT SO THAT TOP ROW DOES
NOT SIT TOO FAR BEHIND CULVERT.

MID-HEIGHT OF WALL SHOULD BE
NEARLY FLUSH WITH CULVERT.

PIPE CULVERT

CUT BLOCKS TO
FIT CONTOUR OF
PIPE CULVERT.

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Construction Drawings

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

FOR SCENARIOS WHERE WATER MAY FREEZE, PRECAUTIONS SHOULD BE TAKEN TO ADDRESS POTENTIAL ICE EXPANSION INSIDE HOLLOW CORES OF BLOCKS.

RIVER DETAIL
WD-19
5.36 Verti-Crete, LLC, All Rights Reserved - Ver 4.0

GROUND SURFACE

1" MINUS GRAVEL INSIDE AND BEHIND BLOCK
(DEPTH BELOW AND BEHIND WALL MUST BE DETERMINED BY LICENSED ENGINEER USING SITE SPECIFIC CONDITIONS)

STONE TO BE PLACED ON NON-WOVEN GEOTEXTILE FABRIC
(STONE SIZE AND VOLUME TO BE SPECIFIED BY LOCAL LICENSED ENGINEER)

NON-WOVEN GEOTEXTILE FABRIC

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.
FOR SCENARIOS WHERE WATER MAY FREEZE, PRECAUTIONS SHOULD BE TAKEN TO ADDRESS POTENTIAL ICE EXPANSION INSIDE HOLLOW CORES OF BLOCKS.

DRAWN BY  DATE  TITLE
DAN BALLING  12/12/2013  SEA WALL DETAIL

VDW 13

16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028

SCALE: 1:4  SHEET 1 OF 1
LEVELING PAD

TOTAL WALL HEIGHT

LAKE DEPTH AT SHORE

EMBEDMENT*

LEVELING PAD

*EMBEDMENT MUST BE DEEP ENOUGH FOR LEVELING PAD TO BE BELOW SCOUR LINE

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

FOR SCENARIOS WHERE WATER MAY FREEZE, PRECAUTIONS SHOULD BE TAKEN TO ADDRESS POTENTIAL ICE EXPANSION INSIDE HOLLOW CORES OF BLOCKS.
GROUTY WALL WITH 36" & 2-SIDED BLOCKS

GROUND LEVEL SLOPE MIN .2% AWAY FROM BLOCKS.

EXPOSED WALL HEIGHT BACK SIDE

FILL CORES WITH CLEAN 1" CRUSHED STONE AS EACH COURSE IS SET.

LEVELING PAD

EXPOSED WALL HEIGHT FRONT SIDE

CRUSHED STONE LEVELING PAD 6" MIN. DEPTH

GROUNDED SOIL EDGE OF EXCAVATION

BACKFILLED NATIVE SOIL COMPACTED IN PLACE AS EACH COURSE IS SET.

FILL CORES WITH CLEAN 1" CRUSHED STONE AS EACH COURSE IS SET.

PERFORATED DRAIN PIPE

CRUSHED STONE LEVELING PAD 6" MIN. DEPTH

NONWOVEN GEOTEXTILE FILTER

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

SHEAR LUG SHORTENED WITH 15" BLOCKOUT

FDW No. 10' WALL WITH 2-SIDED BLOCKS

WD-27
2 & 3 SIDED VARIABLE CURVE DETAIL

*NOTE: LENGTH OF CUT APPLIES TO BOTH SIDES OF 2-SIDED BLOCK (SEE TOP VIEW). CUTTING GUIDE RADIISES ARE APPROXIMATE. IT IS RECOMMENDED TO CUT BLOCKS ON SITE TO FIT WALL CONTOUR. CAPS MAY NEED TO BE CUT AT AN ANGLE TO AVOID LARGE GAPS.

<table>
<thead>
<tr>
<th>LENGTH OF CUT*</th>
<th>RADIUS (INNER)</th>
<th>RADIUS (OUTER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1/2&quot;</td>
<td>13'</td>
<td>15'</td>
</tr>
<tr>
<td>2&quot;</td>
<td>16' 6&quot;</td>
<td>18' 6&quot;</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>22' 6&quot;</td>
<td>24' 6&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
<td>34' 6&quot;</td>
<td>36' 6&quot;</td>
</tr>
</tbody>
</table>

VERTI-BLOCK

VARIABLE CURVE

WD-52

DRAWN BY: RYAN STUCKI  
DATE: 8/28/2019

16120 S. PONY EXPRESS RD  
BLUFFDALE, UTAH 84065  
PHONE: (801) 571-2028

SCALE: NA  
REVISION: 01  
SHEET 1 OF 1
**6" CAP BLOCK DETAIL**

### 2&3 SIDED BLOCK WITH CAP

- **Overhang**: 1"  
- **Width**: 26"  

### STANDARD BLOCK WITH CAP

- **Width**: 48"  

### 2-SIDED CAP OVERHANG

- **Bottom Cavity**: 16"  
- **2" Taper on all sides**  
- **Height**: 48"  

### 3-SIDED CAP

- **Width**: 49"  

**Note:** Conflicting area requires 13" shear lug blockout or saw cut* and removal of R-anchor.

*See shear lug modification guide

**Note:** Cap thickness tapers from 6" (at center) to 5-3/4" (at edges) to allow for water runoff.

---

**Drawing Information**

**Drawn By**: RYAN STUCKI  
**Date**: 8/28/2019  
**Title**: CB-02  
**Sheet**: 1 of 1  
**Scale**: NA  
**Revision**: 01  

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2 & 3 SIDED IMPACT PROTECTION SYSTEM

- **Rebar Cage Runs**
  - Horizontal across planter cavity in top row of 2-sided blocks

- **Bent Rebar or Threaded Rod**
  - With nut & washer secures top row of 2-sided blocks to bottom row of 2-sided blocks

- **Bent Rebar (U-shape) Ties**
  - R-anchors of adjacent 2-sided blocks

- **Bent Rebar (S-shape)**
  - Secures bottom row of 2-sided blocks to top row of standard blocks

- **HORIZONTAL REBAR RUNS**
  - Through bottom cavities of standard blocks

- **All areas with rebar to be filled with concrete**

---

**NOTE:** DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.
NOTE: THE LAYOUT SHOWN HERE DEPICTS ONE POSSIBLE METHOD OF USING THE VERTI-BLOCK 6" CAP UNIT TO CREATE STAIRS.
### SHEAR LUG MODIFICATION GUIDE

**FOR TOP CAPS:**

1. Measure 13 3/8" from points A to B and make first saw cut.

2. Make cuts every 2" and remove 2" sections.

3. Saw cut r-anchors to be nearly flush with shear lugs.

**FOR 2 & 3 SIDED BLOCKS:**

1. Use (2) 13" shear lug blockouts in the mold.

2. Use (2) 15" shear lug blockouts in the mold.

**FOR ON-SITE CUTS:**

1. Measure 13 3/8" from points A to B and make first saw cut.

2. Make cuts every 2" and remove 2" sections.

3. Saw cut r-anchors to be nearly flush with shear lugs.
SHEAR LUG MODIFICATION GUIDE

SHORT LUG FOR CORNERS:

Use (1) 6\" shear lug blockout in the mold.

FOR ZERO BATTER:

Use (2) 2\" shear lug blockouts in the mold.

FOR ON-SITE CUTS:
(SEE PREVIOUS PAGE)

NOTE: ONLY ONE SHEAR LUG IS SHORTENED
**WIDE FLANGE GUARD RAIL**

- **Rail**
- **Wide Flange Post**
- **Gravel Infill**

Post is grouted in place between blocks in 2nd row down.

**Section A-A**

Wide flange post is positioned inside cavity of top block and between adjacent blocks below.

**NOTE:** Drawings provided by Verti-Crete are for reference only. Consult licensed engineer for final design.

**Drawing Information:**
- **Drawn by:** Ryan Stucki
- **Date:** 8/5/2019
- **Company:** 16120 S. Pony Express Rd. Bluffdale, Utah 84065
- **Phone:** (801) 571-2028
- **Title:** WIDE FLANGE GUARD RAIL
- **DWG No.:** WD-54
- **Scale:** NA
- **Revision:** 01
- **Sheet:** 1 of 1
VERTI-CRETE FENCE ON WALL

- Pour concrete through column core to create bond
- Verti-Crete column
- Gravel fill
- Block cavities and gaps between blocks filled with concrete to secure rebar
- Rebar post anchor
- Counterweight against wind load, cast in place and secured with rebar
- Depth of rebar post anchor to be determined by local engineer

NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

DRAWN BY: RYAN STUCKI
DATE: 8/28/2019

VC FENCE DETAIL
WD-50

DRAWN BY: RYAN STUCKI
DATE: 8/28/2019

16120 S. PONY EXPRESS RD
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028
Verti-Block Material Specification

SPECIFICATION FOR VERTI-BLOCK™
GEOSYNTHETIC REINFORCED
Mechanically Stabilized Earth (MSE) SYSTEM

1 GENERAL

1.1 Description

The work consists of supplying and installing all aspects of the Verti-Block™ Precast Mechanically Stabilized Earth (MSE) units as specified in the construction drawings or as established by the Owner, Architect or Engineer.

1.1.1 Related Work
1.1.1.1 Section 02100 Site Preparation
1.1.1.2 Section 02200 Earthwork
1.1.1.3 Section 02070 Geosynthetic Reinforcement Walls
1.1.1.4 Section 02832 MSE Walls
1.1.1.5 Section 01270 Unit Prices

1.2 Reference Standards

1.2.1 Engineering Design
• AASHTO M288 Geotextile Specification for Highway Applications
• AASHTO LFRD, version 6, Standard Specifications for Highway Bridges
• ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

1.2.2 Geosynthetic Reinforcement
• ASTM D 4595 Tensile Properties of Geosynthetics by the Wide Width Strip Method
• ASTM D 5262 Evaluating the Unconfined Creep of Geosynthetics
• ASTM D 6638 Grid Connection Strength (MSEU-1)
• ASTM D 6916 Grid Shear Strength (MSEU-2)
• GRI GG 1 Single Rib Geogrid Tensile Strength
• GRI GG 4 Determination of Long Term Design Strength of Geogrids
• GRI GG 5 Determination of Geogrid (soil) Pullout
• GRI GG 6 Determination of Geotextile (soil) Pullout

1.2.3 Soils
• ASTM D 698 Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort
• ASTM D 422 Gradation Analysis of Soil Particles
• ASTM D 4318 Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
• ASTM D 51 Testing Methods for Measuring pH of Soil
• ASTM D 2487 Standard Classification of Soils (Unified Soil Classification System)
1.2.4 Drainage Pipe
• ASTM D 3034 Specification for Type PSM Polyvinyl Chloride (PVC) pipe
• ASTM D 1248 Corrugated Plastic Pipe
• The Owner or Owner’s Representative shall determine the final application if the specifications and reference documents conflict.

1.2.5 Concrete
• ACI 211 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
• ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete.
• AASHTO T-22
• AASHTO T-23
• AASHTO T-119
• AASHTO T-141
• AASHTO T-152
• AASHTO T-196

1.3 Design Submittals
1.3.1 Material installation and description data should be submitted for each product specified.

1.3.2 The MSE designs and drawings should include geosynthetic layout, bottom and top of wall elevation, drainage details and any other unique applications.

1.3.3 Design Method and Calculations should be in accordance with the AASHTO LRFD Specifications for Highways or NCMA current editions. Global stability analysis should be calculated as part of the final design.

1.3.4 Samples of the MSE units, color and texture should be submitted as per design specifications. Geosynthetic sample should also be furnished as per design.

1.3.5 All test reports should be performed by an independent laboratory.

1.3.6 Delivery, Storage and Handling
• The Contractor shall inspect all materials delivered to the site to ensure proper type and grade of materials have been received as per the project specifications.
• The Contractor shall ensure proper storage, handling and protection from damage of the materials. Damaged materials shall not be used in the construction of the Mechanically Stabilized Earth structure.
• The Contractor shall prevent excessive mud, wet concrete, and like materials from coming in contact with the wall materials.

2 MATERIALS

2.1 Concrete Mechanically Stabilized Earth (MSE) units
MSE concrete units shall be Verti-Block™ units as manufactured by licensed producer in accordance with NPCA, ASTM or AASHTO standards and conform as per project engineer specifications.
Verti-Block Material Specification

2.1.1 Verti-Block™ units shall have a minimum 28 days compressive of equal to 4,000 psi (27.6 MPa) (or greater if specified).

2.1.2 Verti-Block™ units shall satisfy the following dimensional tolerances:
   a. Height: +/- 1/8 inch (3mm)
   b. Width: +/- 1/2 inch (13mm)
   c. Depth: +/- 1/2 inch (13mm); excludes variable depth of the textured face

2.1.3 Color for the Verti-Block™ units shall be ________________.

2.1.4 ASTM C 666 for freeze-thaw durability shall be standard for areas subject to repeated freeze-thaw cycles, or an approved DOT mix design shall be used.

2.1.5 The Verti-Block™ 2-4 units shall have a face area of 8 sq ft (.75 sq m) and Verti-Block™ 1-4 units shall have a face area of 4 sq ft (.375 sq m).

2.1.6 The Verti-Block™ standard unit weight (without gravel infill) is approximately 1700 lbs.

2.1.7 The Verti-Block™ units shall be sound and free of cracks, chips or other defects that may prevent the contractor from properly installing the wall units or reduce the long term strength of the wall structure.

2.1.8 Verti-Block™ capping units shall be the 6 inch solid cap unit cable attached to the unit below for a positive connection.

2.1.9 Concrete sample in accordance with AASHTO T-141, Compression test in accordance with AASHTO T-23 and AASHTO T-22, Air content testing in accordance with AASHTO T-152 or AASHTO T-196, Slump test in accordance with AASHTO T-119, 28 day testing in accordance with AASHTO T-23 and AASHTO T-22 or as specified by the project engineer.

2.2 Geosynthetic Reinforcements

2.2.1 Geosynthetic reinforcements shall be high tensile Geogrid or Geotextile manufactured for soil reinforcement applications that have been tested and have the appropriate design parameters established with the Verti-Block™ product.

2.2.2 The construction design and drawings shall show the type, strength and location of the geosynthetics. Manufactures specifications shall be used for test data and installation procedures.

2.2.3 Geosynthetics shall be evaluated in accordance with AASHTO specifications.

2.3 Foundation Soil

2.3.1 Foundation soils should be suitable, relatively undisturbed native soils approved by the design engineer or placed on a specific thickness of properly placed and compacted structural fill as recommended by the design engineer.

2.3.2 The foundation soils shall be approved by a design engineer before installing base leveling gravel.
2.3.3 Unsuitable foundation soils shall be removed and replaced with structural fill or otherwise stabilized as specified by the design engineer.

2.4 Backfill Soil

2.4.1 Backfill soils shall be free of organic materials and other unsuitable materials.

2.4.2 Soils classifying as GP, GM, GP-GM, GW, GP-GW, SP, SM, SP-SM, SW, SW-SM or in accordance with ASTM D 2487 should be suitable. Other classifications may be acceptable upon approval from the design engineer. All backfill soils should be approved by the design engineer.

2.5 Base Leveling Materials

2.5.1 A minimum 6 inch thick crushed stone leveling pad should be used. Alternate materials such as low-strength, unreinforced concrete may be used at the discretion of the design engineer or DOT requirements.

2.5.1.1 AASHTO specifications will be followed when constructing concrete footing for DOT projects.

2.6 Drainage and Unit Infill Aggregate

2.6.1 Drainage Aggregate shall be clean crushed gravel meeting the gradation in accordance with ASTM D 448.

2.6.2 Drainage Aggregates shall be placed in all unit voids with uniform particle size less than 1” (25mm) and not more than 5% passing through the No. 200 sieve.

2.7 Drainage Pipe

2.7.1 Drainage pipe shall be perforated PVC or corrugated HDPE pipe with a minimum size of 3” in diameter.

2.8 Geotextile Fabric

2.8.1 Geotextiles, if required by the design engineer, shall be a non-woven, permeable material.

2.9 AASHTO

2.9.1 When constructing DOT projects all AASHTO and ASTM specifications should be followed unless otherwise specified by the design engineer.

3 WALL DESIGN

3.1 Design Standard

3.1.1 The wall design engineer and/or geotechnical engineer shall consider the internal, local stability, external stability, bearing capacity and global stability of the soil mass above, behind and below the wall structure.

3.1.2 Geosynthetic reinforcement vertical spacing shall not exceed 4 feet or 2 Verti-Block™ units.
3.1.3 Geosynthetic reinforcement shall be 100% horizontal coverage parallel to the length of the wall unless specified by the design engineer.

3.1.4 If designing the Verti-Block™ wall system in accordance with the Design Manual for Mechanically Stabilized Earth walls, according to AASHTO LRFD methodology, version 6, the minimum CDR shall be a minimum of the following:
- External Stability; Base Sliding = 1.0, Eccentricity = \(L/3\) [9/20L internal units], Bearing Capacity = 1.0, Global Stability = 1.3
- Internal Stability; Tensile Overstress = 1.0, Pullout = 1.0, Internal Sliding = 1.0
- Local Stability; Facing Shear = 1.0, Connection = 1.0

3.1.5 If designing the Verti-Block™ wall system in accordance with the Design Manual for Segmental Retaining Walls, NCMA, 3rd Edition the minimum Factors of Safety shall be:
- Static; Sliding = 1.50, Overturning = 2.00, Bearing Capacity = 2.0
- Seismic; 75 percent of static values
- Reinforcing FoS; Uncertainties = 1.50, Pullout = 1.50
- Local Stability; Shear = 1.50, Bending = 1.50

3.2 Soil Standards

3.2.1 The following soil design parameters shall be used (or specified by design engineer)

3.2.1.1 Drainage/Unit Fill;
- Soil Unit Weight = ____pcf (KN/m3),
- Friction Angle = ____degree,
- Cohesion = ____lbs/sq ft (0 kPa)

3.2.1.2 Reinforced Backfill;
- Soil Unit Weight = ____lb/cub ft (KN/m3),
- Friction Angle = ____ degree,
- Cohesion = ____ lbs/sq ft (0 kPa)

3.2.1.3 Base Leveling Pad;
- Soil Unit Weight = ____pcf (KN/cub m),
- Friction Angle = ____degree,
- Cohesion = ____lb/sq ft (0 kPa)

3.3 Project Design

3.3.1 The site grades and information will determine the length, height and overall elevations for the Verti-Block™ retaining wall requirements.

3.3.2 The design height (H) shall be measured from the top of the base leveling pad to the top of the wall cap units.

3.3.3 The slopes above and below the wall details will be on the site construction drawings.

3.3.4 The minimum embedment depth of the wall shall be H/10 but no less than 6”.
3.3.5 Reinforcement minimum length shall be specified by the design engineer but not be less than 70% of the height of the wall (0.7H) measured from the block face.

4 CONSTRUCTION

4.1 Qualifications

4.1.1 Contractor and site supervisor shall have proven qualified experience to complete the installation of the Mechanically Stabilized Earth system.

4.2 Excavation

4.2.1 The contractor shall excavate to the lines and grades shown on the project grading plans.

4.2.2 Over excavated or filled areas shall be well compacted and inspected by a design engineer.

4.3 Foundation Preparation

4.3.1 Foundation trench shall be excavated to the dimensions indicated on the construction drawings.

4.3.2 The reinforced zone and leveling pad foundation soil shall be approved by the design engineer to ensure proper bearing strength.

4.3.3 Unsuitable soils shall be removed and replaced with structural fill.

4.3.4 Structural fill material shall be approved by the design engineer and shall be compacted to a minimum of 95% Modified Proctor dry density, before placing leveling pad. (ASTM D 1557)

4.4 Base Leveling Pad

4.4.1 The granular leveling pad shall be a minimum 6 inches thick and 1 foot wider than the depth of the wall unit and shall be placed and compacted to a minimum of 95% Modified Proctor dry density or greater.

4.4.2 The base leveling pad shall be level horizontally and back to front to ensure the first course of units are level.

4.4.3 Top of base leveling pad elevation and installation of granular materials shall be in accordance of the specifications and construction drawings. The toe of the wall burial depth shall be constructed as shown on the construction drawings.

4.4.4 A reinforced concrete footing, when used, should be placed below the frost level and constructed in accordance to the specification and construction drawings.

4.5 Units Installation

4.5.1 The first course of Verti-Block™ units shall be carefully placed on the leveling pad.
4.5.2 The first row of units shall be level from unit to unit and from back to front.

4.5.3 A string line can be used to align a straight wall or PVC flex pipes can be used to establish smooth convex or concave curved walls.

4.5.4 Use the smooth back of the units for alignment and measuring to ensure smooth curves and straight walls.

4.5.5 The second course of units shall have the concrete connecting lugs in the unit voids and pulled backward resting the lugs against the front edge of the upper unit voids.

4.5.6 All units shall be laid snugly together and parallel to the straight or curved lines.

4.5.7 The Verti-Block™ units shall be swept clean of all dirt or rocks before installing the next layer of units or placing the geosynthetics.

4.5.8 After laying each course, perform a visual or string line straightness check.

4.6 Geosynthetic Reinforcing Installation

4.6.1 The geosynthetic reinforcement shall be installed at the wall height, horizontal location, and to the extents as shown on the design drawings.

4.6.2 The geosynthetic reinforcement shall be laid horizontally on compacted infill and the concrete Verti-Block™ units.

4.6.3 Correct orientation (roll direction) of the geosynthetic reinforcement, to ensure the principal design strength direction is perpendicular to the wall face, shall be verified by the Contractor, prior to Verti-Block™ and Unit Fill placement.

4.6.4 After the geosynthetic is installed, place the next course of Verti-Block™ units and Unit Fill.

4.6.5 The geosynthetic should then be pulled taut and free of wrinkles prior to placement of soil fill. The geosynthetic may be secured in place with staples, pins or fill. Type of geosynthetic restraint will be based on fill properties, fill placement procedures, weather conditions; or as directed by the design engineer.

4.6.6 The procedure for tensioning geosynthetic reinforcement shall be uniform throughout wall length and height.

4.6.7 Overlaps:

4.6.7.1 Overlap of the geosynthetic in the design strength direction will not be permitted. The design strength direction is that length of geosynthetic perpendicular to the wall face and shall be one continuous piece of material.
4.6.7.2 In general, butting of adjacent roll edges of reinforcement is acceptable. If required, overlaps of adjacent rolls shall be in accordance with manufacturer’s recommendations and shall occur only in the reinforced (infill) soil zone. An overlap within the Verti-Block™ Unit or Unit fill is prohibited. Geosynthetic reinforcement will be continuous throughout wall length, except for curves, see drawings

4.7 Fill Placement over Geosynthetic

4.7.1.1 Reinforced infill soil material shall be placed in maximum 12-inch compacted lifts on the geosynthetic according to the requirements of Section 4.8, or as directed by the design engineer.

4.7.1.2 The geosynthetic shall be pre-tensioned by hand to remove wrinkles. Tensioning is usually facilitated by the use of steel rakes. Apply constant tension to each section of geosynthetic until soil fill has been placed. Soil fill shall be placed, spread, and compacted in such a manner that prevents the development of wrinkles and/or movement of the geosynthetic.

4.7.1.3 Only hand-operated compaction equipment shall be allowed within 3 feet of the front of wall face.

4.7.1.4 If possible, soil fill shall be placed from the wall face outward to ensure that the geosynthetic remains taut. Soil shall be placed in uniform lifts.

4.7.1.5 Tracked construction equipment shall not be operated directly on the geosynthetic. A minimum fill thickness of 8 inches is required prior to operation of tracked vehicles over the geosynthetic. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geosynthetic.

4.7.1.6 If in accordance with manufacturer’s recommendations, rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.

4.7.1.7 Surface drainage during, and after each day of construction of the wall shall be sloped away from wall face and provided to minimize water infiltration in the reinforced soil zone.

4.7.1.8 The General Contractor shall be responsible for securing the site against any water that could enter into the wall construction zone.

4.8 Drainage Gravel

4.8.1 Verti-Block™ unit voids shall be filled with a free-draining granular material as described in Section 2.6.

4.8.2 Drainage gravel shall be placed into the unit voids each course before placing the geosynthetic reinforcement layer.
4.9 Backfill

4.9.1 The reinforced backfill materials shall be placed in maximum lifts of 12” and shall be compacted to a minimum 95% Modified Proctor density, in accordance with ASTM D 1557.

4.9.2 Only hand-operated compaction equipment shall be used within 3 feet of the back of the wall.

4.9.3 Soil density testing shall not be taken within the 3 foot area.

4.9.4 The backfill shall be smooth and level so that the geosynthetic lays flat with no dips or bumps.

4.9.5 The toe of the wall shall be filled and compacted as the wall is being constructed.

4.10 Cap Installation

4.10.1 The Verti-Block™ full size cap units should be placed in the same installation procedures as the regular Verti-Block™ units.

4.10.2 A non-woven geotextile should be used as a soil separator between the final layer of backfill and drainage materials and the top soil materials to prevent fines from migrating into the drainage gravel or through the wall face.

4.10.3 A special Verti-Block™ 6” high cap can be used to complete the top of the wall. Concrete adhesive should be used to glue the cap units to the regular units.

5 CONSTRUCTION QUALITY CONTROL AND ASSURANCE

5.1 Construction Quality Control

5.1.1 The project wall installer is responsible to ensure that all installation and materials meet the quality specified in the construction drawings.

5.1.2 A qualified independent party may be responsible to verify that installation procedures have been installed in accordance with the specifications and construction drawings.

5.1.3 All site construction tolerances for vertical alignment, horizontal locations for elevations, corner and radius locations, wall batter and minimum bulging will be within AASHTO/NCMA specifications.

5.2 Quality Assurance

5.2.1 The owner is responsible to engage testing and inspection services to provide independent quality construction assurance.

5.2.2 Compaction testing of the reinforcement backfill soils shall be performed every 2 vertical feet of material installation or more frequent.

5.2.3 The tests shall be done a minimum of every 50 lineal feet along the wall at each level of testing.
5.2.4 Testing shall not be closer than 3 feet from the back of the wall and done at a variety of locations to cover the entire reinforced soil zone.

5.2.5 Independent inspection professionals shall ensure all parameters and construction specifications have been followed in accordance to the design drawings and specifications.

6 PAYMENT

Payment for the installation of the Verti-Block™ wall shall be based on the unit price per square face foot (square face meter) of wall product installed. The shipping and delivery slips shall be verified by both Contractor and Owner or Owner representative at the time of product delivery to the site and this will be the bases of the final count or product used.
1 GENERAL

1.1 Description
The work consists of supplying and installing all aspects of the Verti-Block™ Precast Segmental Retaining Wall (SRW) units as specified in the construction drawings or as established by the owner, architect or design engineer.

1.1.1 Related Work

1.1.1.1 Section 02100 Site Preparation
1.1.1.2 Section 02200 Earthwork
1.1.1.3 Section 01270 Unit Prices

1.2 Reference Standards

1.2.1 Engineering Design
• AASHTO M288 Geotextile Specification for Highway Applications
• AASHTO LFRD, version 6, Standard Specifications for Highway Bridges
• ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

1.2.2 Soils
• ASTM D 698 Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort
• ASTM D 422 Gradation Analysis of Soil Particles
• ASTM D 4318 Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
• ASTM D 51 Testing Methods for Measuring pH of Soil
• ASTM D 2487 Standard Classification of Soils (Unified Soil Classification System)

1.2.3 Drainage Pipe
• ASTM D 3034 Specification for Type PSM Polyvinyl Chloride (PVC) pipe
• ASTM D 1248 Corrugated Plastic Pipe
• The Owner or Owner’s Representative shall determine the final application if the specifications and reference documents conflict.

1.2.4 Concrete
• ACI 211 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
• ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete.
• AASHTO T-22
• AASHTO T-23
1.3 Design Submittals

1.3.1 Material installation and description data should be submitted for each product specified.

1.3.2 The SRW designs and drawings should include bottom and top of wall elevation, drainage details and any other unique applications.

1.3.3 Design Method and Calculations should be in accordance with the AASHTO LRFD Specifications for Highways or NCMA current editions. Global stability analysis should be calculated as part of the final design.

1.3.4 Samples of the SRW units, color and texture should be submitted as per design specifications.

1.3.5 All test reports should be performed by an independent laboratory.

1.3.6 Delivery, Storage and Handling

• The Contractor shall inspect all materials delivered to the site to ensure proper type and grade of materials have been received as per the project specifications.

• The Contractor shall ensure proper storage, handling and protection from damage of the materials. Damaged materials shall not be used in the construction of the Mechanically Stabilized Earth structure.

• The Contractor shall prevent excessive mud, wet concrete, and like materials from coming in contact with the wall materials.

2 MATERIALS

2.1 Concrete Segmental Retaining Wall (SRW) units

SRW concrete units shall be Verti-Block™ units as manufactured by licensed producer in accordance with NPCA, ASTM or AASHTO standards and conform as per project engineer specifications.

2.1.1 Verti-Block™ units shall have a minimum 28 days compressive of equal to 4,000 psi (27.6 MPa) (or greater if specified).

2.1.2 Verti-Block™ units shall satisfy the following dimensional tolerances:

a. Height: +/- 1/8 inch (3mm)

b. Width: +/- 1/2 inch (13mm)

c. Depth: +/- 1/2 inch (13mm); excludes variable depth of the textured face

2.1.3 Color for the Verti-Block™ units shall be ________________.

2.1.4 ASTM C 666 for freeze-thaw durability shall be standard for areas subject to repeated freeze-thaw cycles, or an approved DOT mix design shall be used.
2.1.5 The Verti-Block™ 2-4 units shall have a face area of 8 sq ft (.75 sq m) and Verti-Block™ 1-4 units shall have a face area of 4 sq ft (.375 sq m).

2.1.6 The Verti-Block™ standard unit weight (without gravel infill) is approximately 1700 lbs.

2.1.7 The Verti-Block™ units shall be sound and free of cracks, chips or other defects that may prevent the contractor from properly installing the wall units or reduce the long term strength of the wall structure.

2.1.8 Verti-Block™ capping units shall be the 6 inch solid cap unit cable attached to the unit below for a positive connection.

2.1.9 Concrete sample in accordance with AASHTO T-141, Compression test in accordance with AASHTO T-23 and AASHTO T-22, Air content testing in accordance with AASHTO T-152 or AASHTO T-196, Slump test in accordance with AASHTO T-119, 28 day testing in accordance with AASHTO T-23 and AASHTO T-22 or as specified by the project engineer.

2.2 Foundation Soil

2.2.1 Foundation soils should be suitable, relatively undisturbed native soils approved by the design engineer or placed on a specific thickness of properly placed and compacted structural fill as recommended by the design engineer.

2.2.2 The foundation soils shall be approved by a design engineer before installing base leveling gravel.

2.2.3 Unsuitable foundation soils shall be removed and replaced with structural fill or otherwise stabilized as specified by the design engineer.

2.3 Backfill Soil

2.3.1 Backfill soils shall be free of organic materials and other unsuitable materials.

2.3.2 Soils classifying as GP, GM, GP-GM, GW, GP-GW, SP, SM, SP-SM, SW, SW-SM or in accordance with ASTM D 2487 should be suitable. Other classifications may be acceptable upon approval from the design engineer. All backfill soils should be approved by the design engineer.

2.4 Base Leveling Materials

2.4.1 A minimum 6 inch thick crushed stone leveling pad should be used. Alternate materials such as low-strength, unreinforced concrete may be used at the discretion of the design engineer or DOT requirements.

2.4.1.1 AASHTO specifications will be followed when constructing concrete footing for DOT projects.

2.5 Drainage and Unit Infill Aggregate

2.5.1 Drainage Aggregate shall be clean crushed gravel meeting the gradation in accordance with ASTM D 448.
2.5.2 Drainage Aggregates shall be placed in all unit voids with uniform particle size less than 1” (25mm) and not more than 5% passing through the No. 200 sieve.

2.6 Drainage Pipe

2.6.1 Drainage pipe shall be perforated PVC or corrugated HDPE pipe with a minimum size of 3” in diameter.

2.7 Geotextile Fabric

2.7.1 Geotextiles, if required by the design engineer, shall be a non-woven, permeable material.

2.8 AASHTO

2.8.1 When constructing DOT projects all AASHTO and ASTM specifications should be followed unless otherwise specified by the design engineer.

3 WALL DESIGN

3.1 Design Standard

3.1.1 The wall design engineer and/or geotechnical engineer shall consider the external stability, bearing capacity and global stability of the soil mass above, behind and below the wall structure.

3.1.2 The minimum design Factors or Safety shall be:
- Static; Sliding = 1.50, Overturning = 2.00, Bearing Capacity = 2.0
- Seismic; 75 percent of static values

3.2 Soil Standards

3.2.1 The following soil design parameters shall be used (or specified by design engineer)

3.2.1.1 Drainage/Unit Fill;
- Soil Unit Weight = ____pcf (KN/m³),
- Friction Angle = ____degree,
- Cohesion = ____lbs/sq ft (0 kPa)

3.2.1.2 Reinforced Backfill;
- Soil Unit Weight = ____lb/cub ft (KN/m³),
- Friction Angle = ____degree,
- Cohesion = ____ lbs/sq ft (0 kPa)

3.2.1.3 Base Leveling Pad;
- Soil Unit Weight = ____pcf (KN/cub m),
- Friction Angle = ____degree,
- Cohesion = ____lb/sq ft (0 kPa)
3.3 **Project Design**

3.3.1 The site grades and information will determine the length, height and overall elevations for the Verti-Block™ retaining wall requirements.

3.3.2 The design height (H) shall be measured from the top of the base leveling pad to the top of the wall cap units.

3.3.3 The slopes above and below the wall details will be on the site construction drawings.

3.3.4 The minimum embedment depth of the wall shall be H/10 but no less than 6”.

4 **CONSTRUCTION**

4.1 **Qualifications**

4.1.1 Contractor and site supervisor shall have proven qualified experience to complete the installation of the Segmental Retaining Wall system.

4.2 **Excavation**

4.2.1 The contractor shall excavate to the lines and grades shown on the project grading plans.

4.2.2 Over excavated or filled areas shall be well compacted and inspected by a design engineer.

4.3 **Foundation Preparation**

4.3.1 Foundation trench shall be excavated to the dimensions indicated on the construction drawings.

4.3.2 The reinforced zone and leveling pad foundation soil shall be approved by the design engineer to ensure proper bearing strength.

4.3.3 Unsuitable soils shall be removed and replaced with structural fill.

4.3.4 Structural fill materials shall be approved by the design engineer and shall be compacted to a minimum of 95% Modified Proctor dry density or greater, before placing leveling pad. (ASTM D 1557)

4.4 **Base Leveling Pad**

4.4.1 The granular leveling pad shall be a minimum 6 inches thick and one foot wider than the depth of the wall unit and shall be placed and compacted to a minimum of 95% Modified Proctor dry density or greater.

4.4.2 The base leveling pad shall be level horizontally and back to front to ensure the first course of units are level.
4.4.3 Top of base leveling pad elevation and installation of granular materials shall be in accordance of the specifications and construction drawings. The toe of the wall burial depth shall be constructed as shown on the construction drawings.

4.4.4 A reinforced concrete footing, when used, should be placed below the frost level and constructed in accordance to the specification and construction drawings.

4.5 Units Installation

4.5.1 The first course of Verti-Block™ units shall be carefully placed on the leveling pad.

4.5.2 The first row of units shall be level from unit to unit and from back to front.

4.5.3 A string line can be used to align a straight wall or PVC flex pipes can be used to establish smooth convex or concave curved walls.

4.5.4 Use the smooth back of the units for alignment and measuring to ensure smooth curves and straight walls.

4.5.5 The second course of units shall have the concrete connecting lugs in the unit voids and pulled backward resting the lugs against the front edge of the upper unit voids.

4.5.6 All units shall be laid snugly together and parallel to the straight or curved lines.

4.5.7 The Verti-Block™ units shall be swept clean of all dirt or rocks before installing the next layer of units.

4.5.8 After laying each course, perform a visual or string line straightness check.

4.6 Fill Placement

4.6.1.1 Infill soil material shall be placed in maximum 12-inch compacted lifts according to the requirements of Section 4.8, or as directed by the design engineer

4.6.1.2 Only hand-operated compaction equipment shall be allowed within 3 feet of the front of wall face.

4.6.1.3 Soil shall be placed in uniform lifts.

4.6.1.4 If in accordance with manufacturer’s recommendations, rubber-tired equipment may pass over the backfill zone at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.

4.6.1.5 Surface drainage during, and after each day of construction of the wall shall be sloped away from wall face and provided to minimize water infiltration in the backfill zone.

4.6.1.6 The General Contractor shall be responsible for securing the site against any water that could enter into the wall construction zone.
4.7 Drainage Gravel

4.7.1 Verti-Block™ unit voids shall be filled with a free-draining granular material as described in Section 2.6.

4.7.2 Drainage gravel shall be placed into the unit voids each course before moving on to the next course.

4.8 Backfill

4.8.1 The backfill materials shall be placed in maximum lifts of 12” and shall be compacted to a minimum 95% Modified Proctor density, in accordance with ASTM D 1557.

4.8.2 Only hand-operated compaction equipment shall be used within 3 feet of the back of the wall.

4.8.3 Soil density testing shall not be taken within the 3 foot area.

4.8.4 The backfill shall be smooth and level.

4.8.5 The toe of the wall shall be filled and compacted as the wall is being constructed.

4.9 Cap Installation

4.9.1 The Verti-Block™ full size cap units should be placed in the same installation procedures as the regular Verti-Block™ units.

4.9.2 A non-woven geotextile should be used as a soil separator between the final layer of backfill and drainage materials and the top soil materials to prevent fines from migrating into the drainage gravel or through the wall face.

4.9.3 A special Verti-Block™ 6” high cap can be used to complete the top of the wall. Concrete adhesive should be used to glue the cap units to the regular units.

5 CONSTRUCTION QUALITY CONTROL AND ASSURANCE

5.1 Construction Quality Control

5.1.1 The project wall installer is responsible to ensure that all installation and materials meet the quality specified in the construction drawings.

5.1.2 A qualified independent party may be responsible to verify that installation procedures have been installed in accordance with the specifications and construction drawings.

5.1.3 All site construction tolerances for vertical alignment, horizontal locations for elevations, corner and radius locations, wall batter and minimum bulging will be within AASHTO/NCMA specifications.
5.2 Quality Assurance

5.2.1 The owner is responsible to engage testing and inspection services to provide independent quality construction assurance.

5.2.2 Compaction testing of the reinforcement backfill soils shall be performed every 2 vertical feet of material installation or more frequent.

5.2.3 The tests shall be done a minimum of every 50 lineal feet along the wall at each level of testing.

5.2.4 Testing shall not be closer than 3 feet from the back of the wall and done at a variety of locations to cover the entire reinforced soil zone.

5.2.5 Independent inspection professionals shall ensure all parameters and construction specifications have been followed in accordance to the design drawings and specifications.

6 PAYMENT

Payment for the installation of the Verti-Block™ wall shall be based on the unit price per square face foot (square face meter) of wall product installed. The shipping and delivery slips shall be verified by both Contractor and Owner or Owner representative at the time of product delivery to the site and this will be the bases of the final count or product used.
Verti-Block Units

Verti-Block is available in a range of shapes to accommodate all your landscape design needs.

Standard Block
1,755 lbs. (790 kg)

Top Block
1,308 lbs. (590 kg)

Half Block
1,066 lbs. (480 kg)

Half Step Block
973 lbs. (440 kg)

Corner Block
1,596 lbs. (720 kg)

Mass Extender
48" Block 2,674 lbs. (1,210 kg)
60" Block 3,509 lbs. (1,590 kg)

Verti-Block is recognized worldwide for outstanding aesthetics and a patented system that produces top-quality construction materials. Verti-Block continues to help contractors, developers, and property owners with smart precast solutions.

Verti-Block may be purchased through a local, licensed Verti-Block manufacturer. Please call 801-571-2028 to find a producer near you.