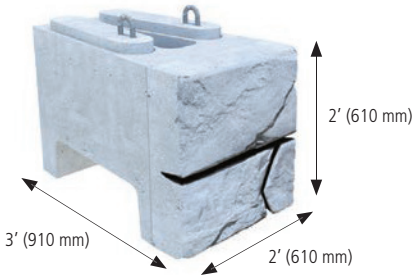
Verti-Block Units

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

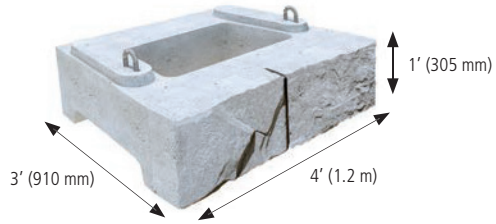
Standard Block
1,755 lbs. (790 kg)

Top Block
1,308 lbs. (590 kg)

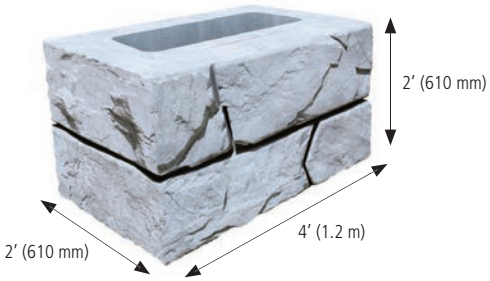
Half Block
1,066 lbs. (480 kg)



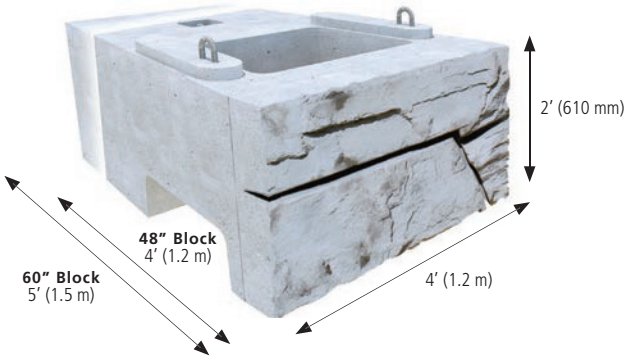
Half Step Block
973 lbs. (440 kg)



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)



Mail
PO Box 2347
Sandy, UT 84091

Plant
16500 South 500 West
Bluffdale, UT 84065

Phone 801-571-2028
Fax 801-571-3486
Email sales@verti-block.com
Web www.verti-block.com

Verti-Block Units

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.

U.S. Version
Release 3.0

Retaining Wall Design Manual

VERTI BLOCK®

www.verti-block.com

Table of Contents

Verti-Block.com

For digital copies and additional design resources, please visit our download section at www.verti-block.com

U.S. Version
Release 3.0

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.

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.

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.

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

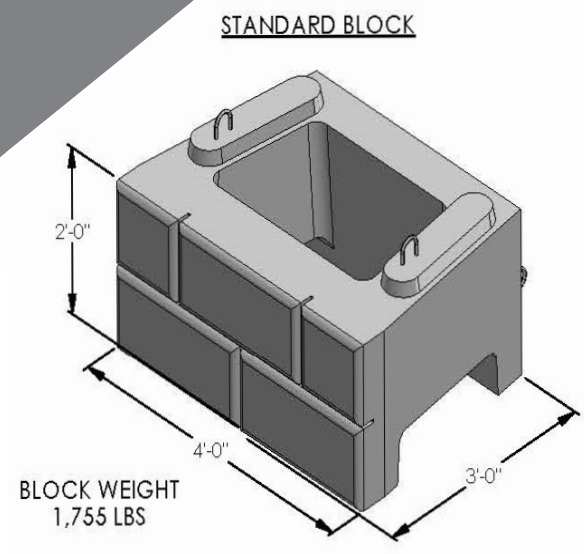
It is important to note that the design parameters for a Verti-Block™ installation come with a suggested maximum height under assumed conditions. Verti-Block wall specifications are calculated using assumed loading conditions and material properties and may fluctuate from location depending on varying 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.

U.S. Version
Release 3.0

Block Library

Section 2

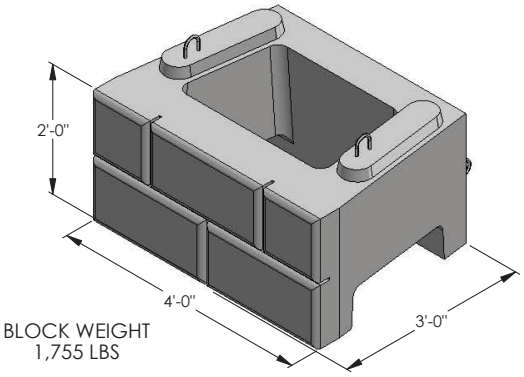


VERTI BLOCK®

www.verti-block.com

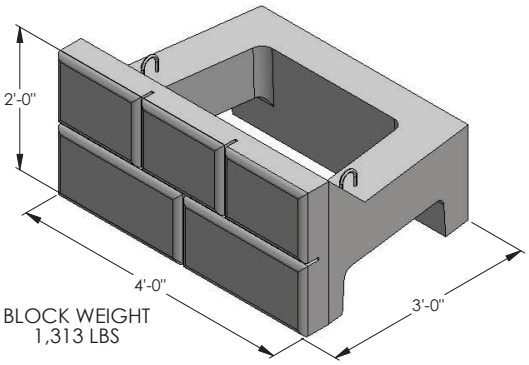
36" BLOCK SERIES

STANDARD BLOCK



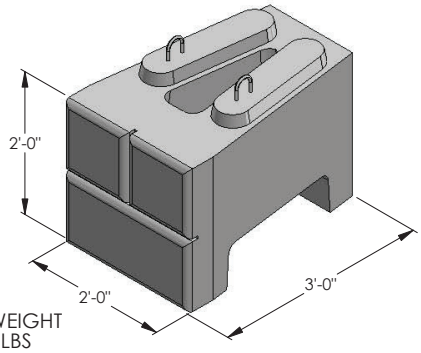
BLOCK WEIGHT
1,755 LBS

STANDARD TOP BLOCK



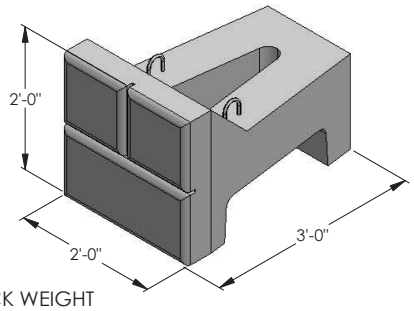
BLOCK WEIGHT
1,313 LBS

HALF BLOCK



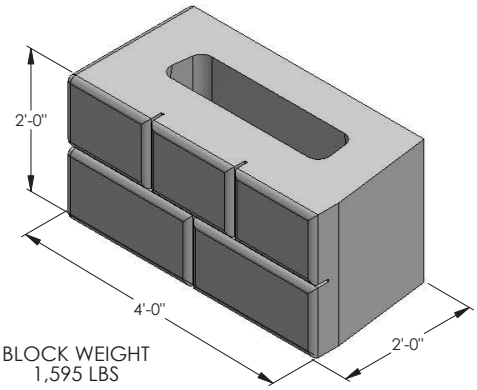
BLOCK WEIGHT
1,068 LBS

HALF TOP BLOCK



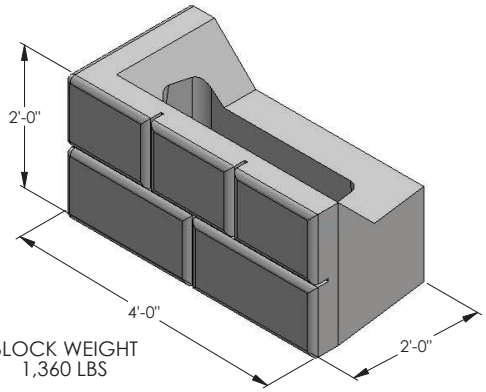
BLOCK WEIGHT
746 LBS

CORNER BLOCK



BLOCK WEIGHT
1,595 LBS

CORNER TOP BLOCK



BLOCK WEIGHT
1,360 LBS

DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	36" BLOCK SERIES

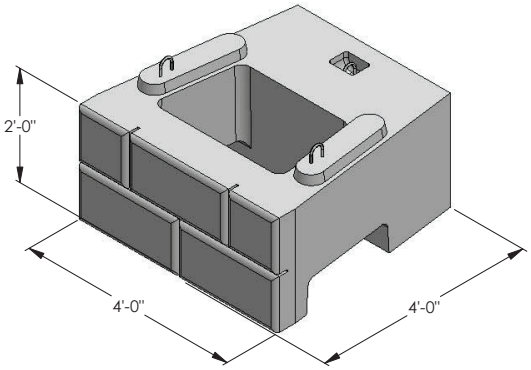
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO.
BD-01

SCALE: 1: 20 | SHEET 1 OF 1

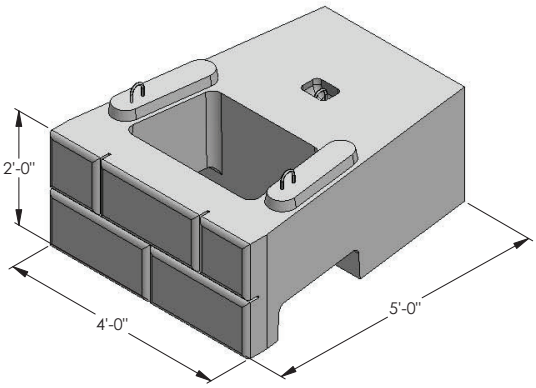
MASS EXTENDER REGULAR BLOCK SERIES

48" MASS EXTENDER



BLOCK WEIGHT
2,674 LBS

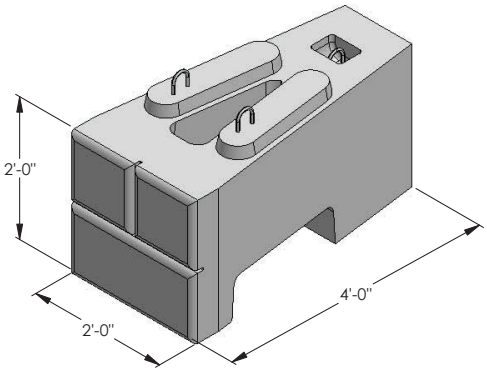
60" MASS EXTENDER



BLOCK WEIGHT
3,509 LBS

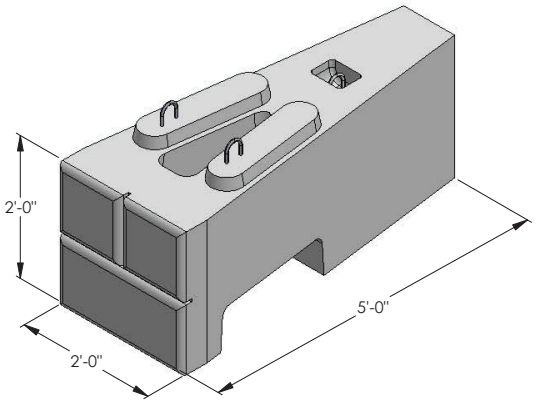
MASS EXTENDER HALF BLOCK SERIES

48" HALF BLOCK MASS EXTENDER



BLOCK WEIGHT
1,392 LBS

60" HALF BLOCK MASS EXTENDER

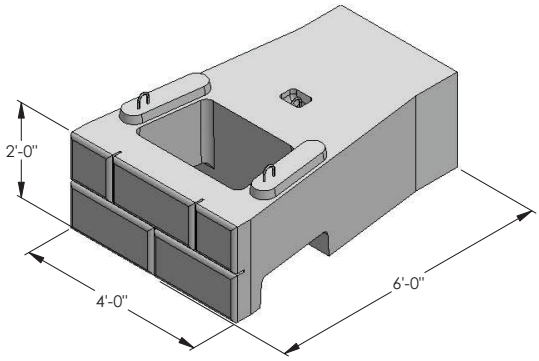


BLOCK WEIGHT
1,661 LBS

DRAWN BY	DATE	TITLE:
RYAN FONTANESI	5/23/2016	MASS EXTENDER BLOCK SERIES
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. BD-05
		SCALE: 1: 20 — SHEET 1 OF 2

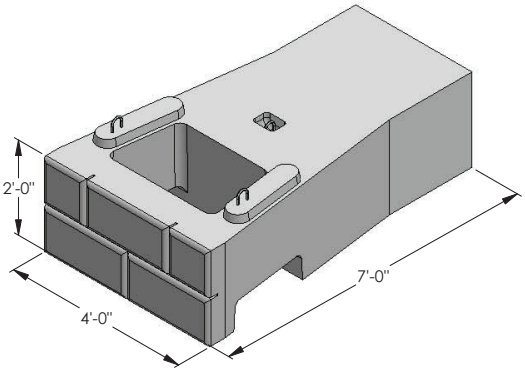
MASS EXTENDER REGULAR BLOCK SERIES CONT.

72" MASS EXTENDER



BLOCK WEIGHT
4,300 LBS

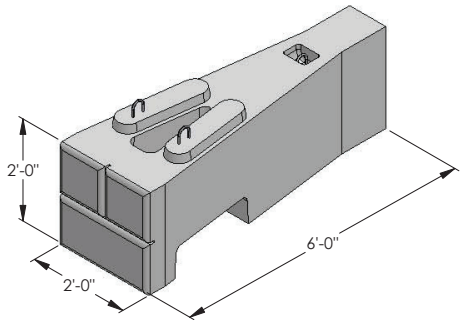
84" MASS EXTENDER



BLOCK WEIGHT
5,100 LBS

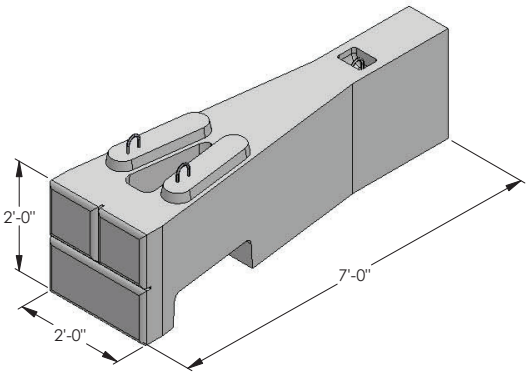
MASS EXTENDER HALF BLOCK SERIES CONT.

72" HALF BLOCK MASS EXTENDER



BLOCK WEIGHT
1,905 LBS

84" HALF BLOCK MASS EXTENDER

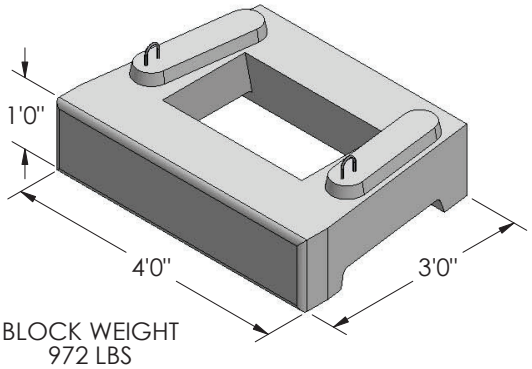


BLOCK WEIGHT
2,140 LBS

DRAWN BY	DATE	TITLE: MASS EXTENDER BLOCK SERIES
RYAN FONTANESI	5/23/2016	
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. BD-05
		SCALE: 1: 20 / SHEET 2 OF 2

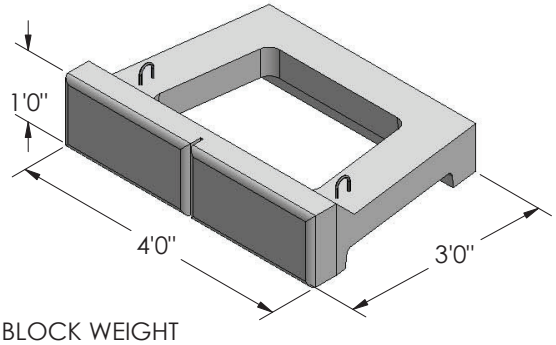
HALF-STEP SERIES

STANDARD HALF-STEP BLOCK



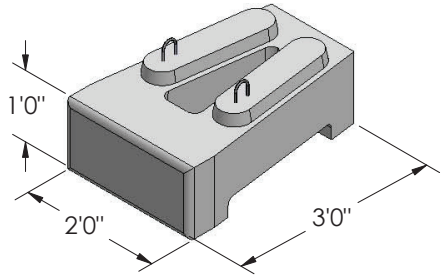
BLOCK WEIGHT
972 LBS

HALF-STEP TOP BLOCK



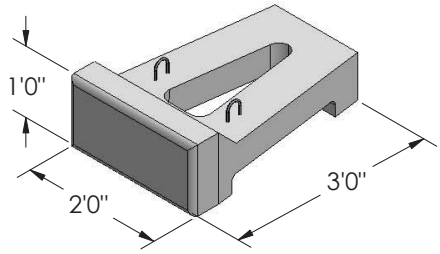
BLOCK WEIGHT
642 LBS

HALF-STEP HALF BLOCK



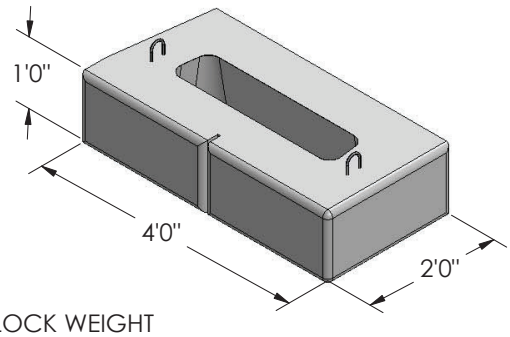
BLOCK WEIGHT
574 LBS

HALF-STEP HALF TOP BLOCK



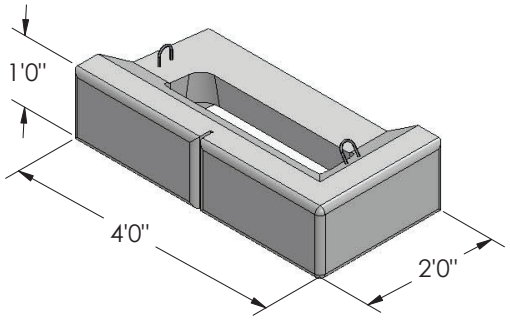
BLOCK WEIGHT
273 LBS

HALF-STEP CORNER BLOCK



BLOCK WEIGHT
824 LBS

CORNER TOP BLOCK



BLOCK WEIGHT
689 LBS

DRAWN BY	DATE	TITLE:
R FONTANESI	6/16/2015	HALF-STEP BLOCK SERIES

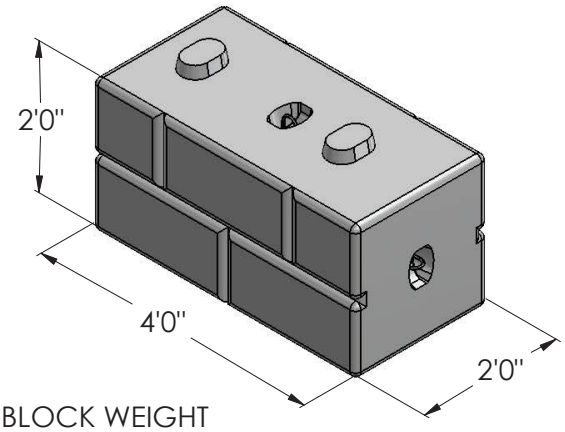
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO. BD-14

SCALE: N/A | SHEET 1 OF 1

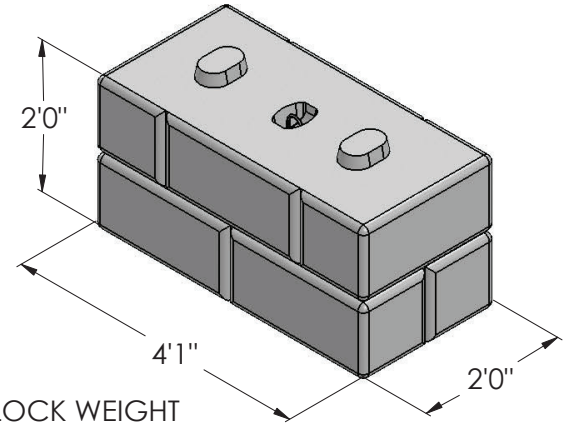
2 & 3 SIDED BLOCK SERIES

2-SIDED BLOCK WITH LUG



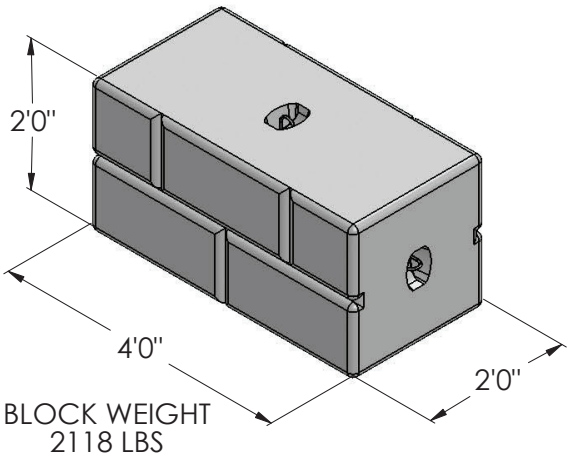
BLOCK WEIGHT
2126 LBS

3-SIDED BLOCK WITH LUG



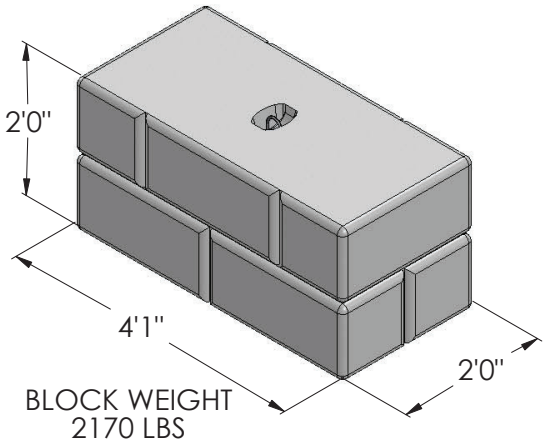
BLOCK WEIGHT
2162 LBS

2-SIDED BLOCK WITHOUT LUG



BLOCK WEIGHT
2118 LBS

3-SIDED BLOCK WITHOUT LUG

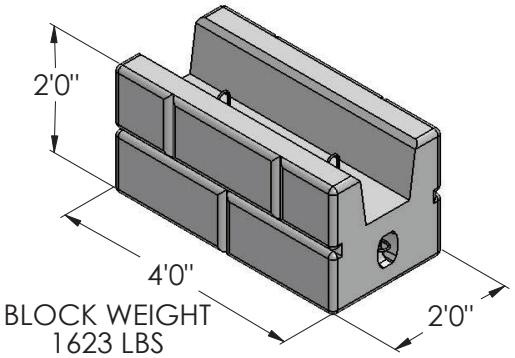


BLOCK WEIGHT
2170 LBS

DRAWN BY	DATE	TITLE: 2 & 3 SIDED BLOCKS
R FONTANESI	2/11/2016	
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. BD-13 REV. 02
		SCALE: NA / WEIGHT: SEE ABOVE / SHEET 1 OF 3

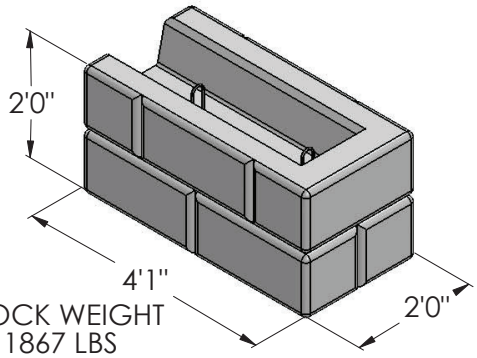
2 & 3 SIDED BLOCK SERIES

2-SIDED PLANTER BLOCK



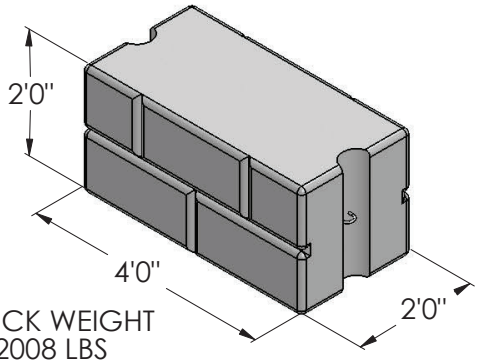
BLOCK WEIGHT
1623 LBS

3-SIDED PLANTER BLOCK



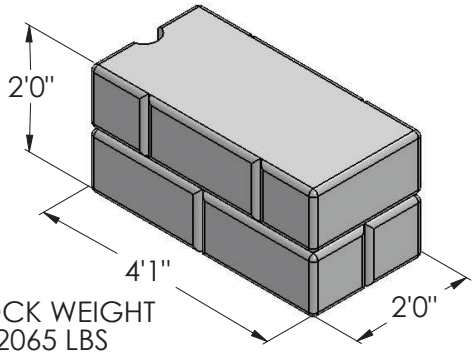
BLOCK WEIGHT
1867 LBS

2-SIDED IMPACT PROTECTION BLOCK



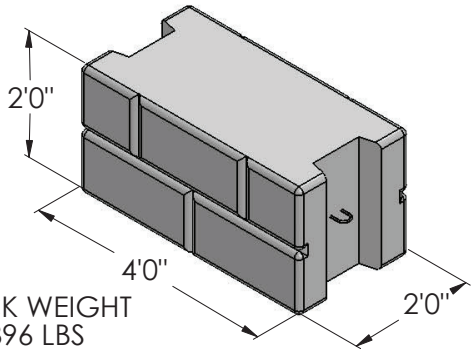
BLOCK WEIGHT
2008 LBS

3-SIDED IMPACT PROTECTION BLOCK



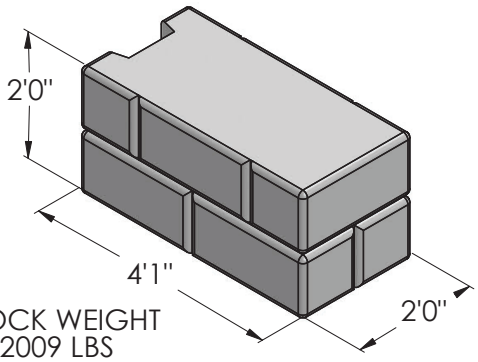
BLOCK WEIGHT
2065 LBS

2-SIDEDVARIABLE CURVE BLOCK



BLOCK WEIGHT
1896 LBS

3-SIDEDVARIABLE CURVE BLOCK



BLOCK WEIGHT
2009 LBS

DRAWN BY	DATE	TITLE:
R FONTANESI	2/11/2016	2 & 3 SIDED BLOCKS

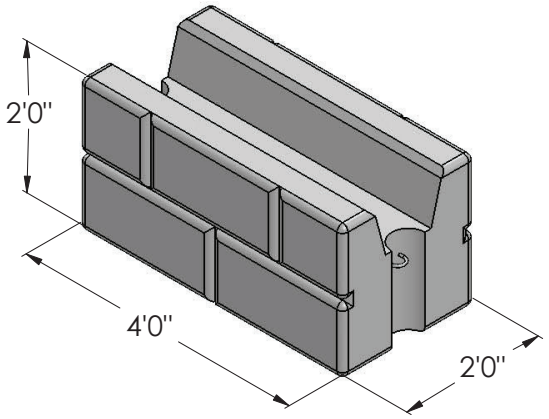
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO.	REV.
BD-13	02

SCALE: NA	WEIGHT: SEE ABOVE	SHEET 2 OF 3

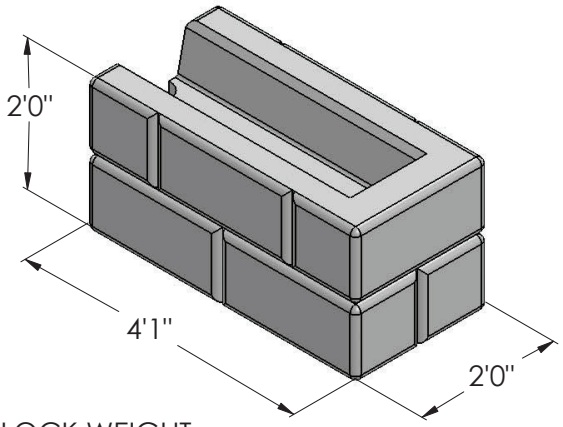
2 & 3 SIDED BLOCK SERIES

2 SIDED IMPACT PROTECTION/PLANTER BLOCK



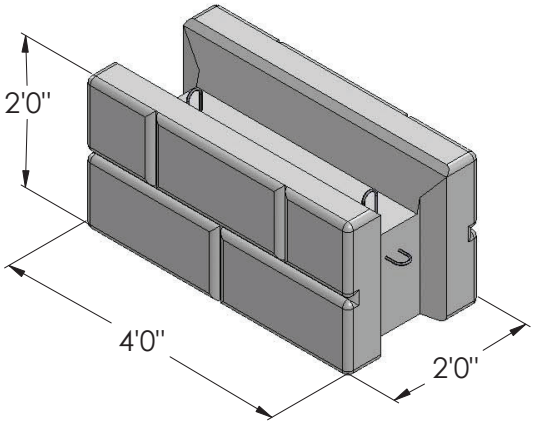
BLOCK WEIGHT
1696 LBS

2 SIDED IMPACT PROTECTION/PLANTER BLOCK



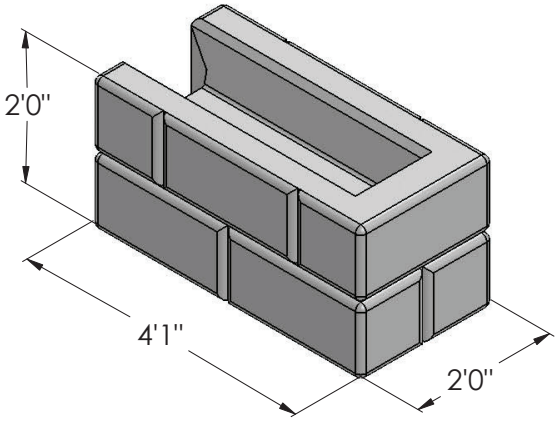
BLOCK WEIGHT
1848 LBS

2 SIDED VARIABLE CURVE/PLANTER BLOCK



BLOCK WEIGHT
1608 LBS

3 SIDED VARIABLE CURVE/PLANTER BLOCK



BLOCK WEIGHT
1809 LBS

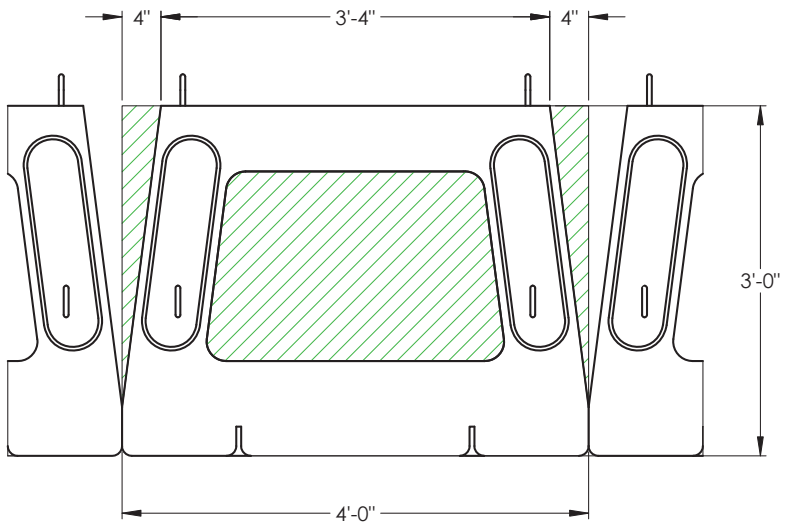
DRAWN BY	DATE	TITLE:
R FONTANESI	2/11/2016	2 & 3 SIDED BLOCKS

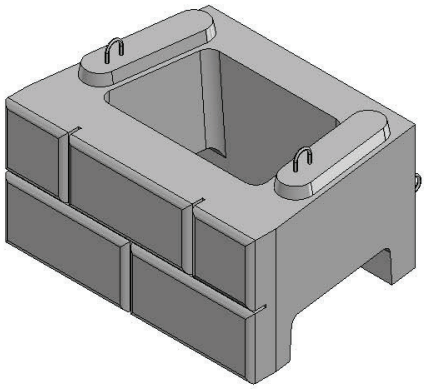
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

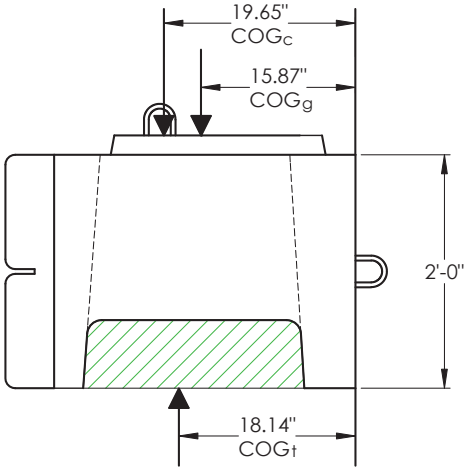
DWG NO.	REV.
BD-13	02

SCALE: NA	WEIGHT: SEE ABOVE	SHEET 3 OF 3

36" STANDARD BLOCK & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 12.36 cft
BLOCK WEIGHT (W_c) = 1,755 lbs
CENTER OF GRAVITY (COG_c) = 19.65" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_g) = 110 pcf
VOLUME (V_g) = 11.64 cft
GRAVEL INFILL WEIGHT (W_g) = 1,280 lbs
CENTER OF GRAVITY (COG_g) = 15.87" (SEE NOTES)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_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_t) = 18.14" (SEE NOTES)

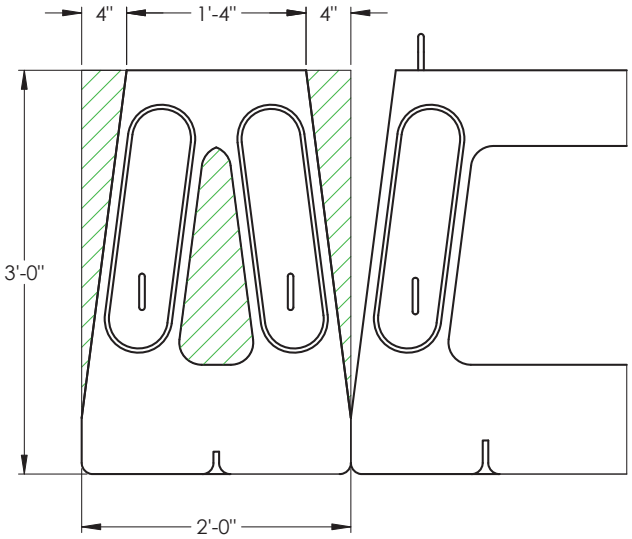
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	STANDARD BLOCK

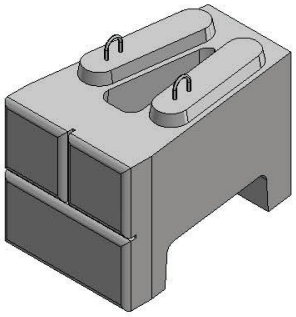
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

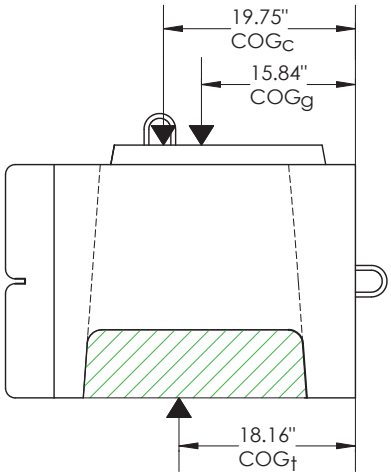
DWG NO. BD-02

SCALE: 1: 15 | SHEET 1 OF 1

36" HALF BLOCK & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 7.52 cft
BLOCK WEIGHT (W_c) = 1,068 lbs
CENTER OF GRAVITY (COG_c) = 19.75" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_g) = 110 pcf
VOLUME (V_g) = 4.48 cft
GRAVEL INFILL WEIGHT (W_g) = 493 lbs
CENTER OF GRAVITY (COG_g) = 15.84" (SEE NOTES)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_t) = (1,068 lbs +493 lbs) / 12 cft = 130 pcf
VOLUME (V_t) = 7.52 cft + 4.48 cft = 12.00 cft
TOTAL UNIT WEIGHT (W_t) = 1,561 lbs
CENTER OF GRAVITY (COG_t) = 18.16" (SEE NOTES)

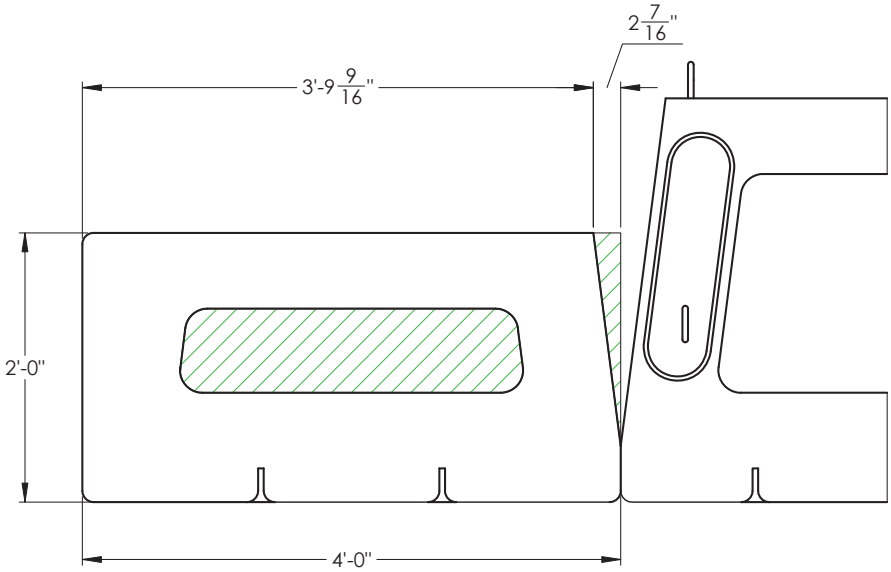
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	HALF BLOCK

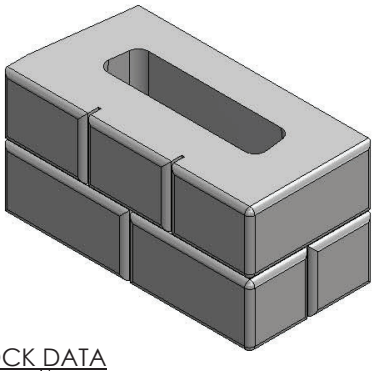
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

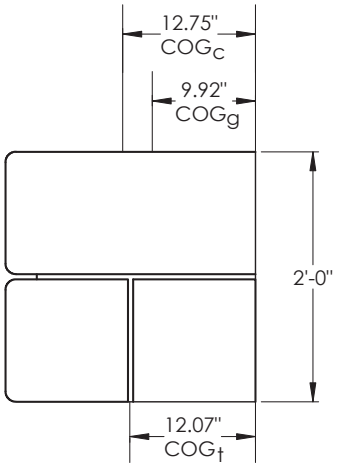
DWG NO. BD-03

SCALE: 1: 15 | SHEET 1 OF 1

24" CORNER BLOCK & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 11.23 cft
BLOCK WEIGHT (W_c) = 1,595 lbs
CENTER OF GRAVITY (COG_c) = 12.75" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_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)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_t) = (1,595 lbs + 508 lbs) / 16 cft = 131 pcf
VOLUME (V_t) = 11.23 cft + 4.77 cft = 16.00 cft
TOTAL UNIT WEIGHT (W_t) = 2,103 lbs
CENTER OF GRAVITY (COG_t) = 12.07" (SEE NOTES)

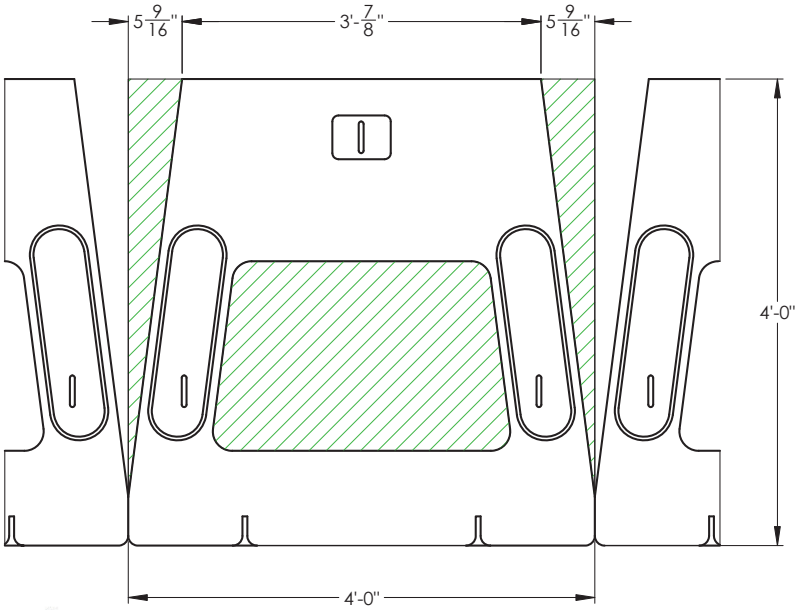
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	CORNER BLOCK

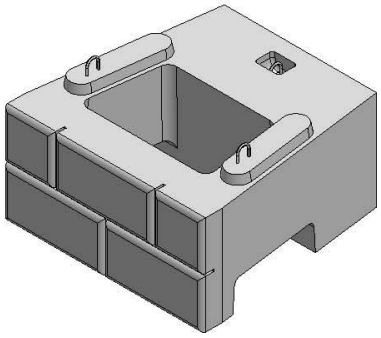
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

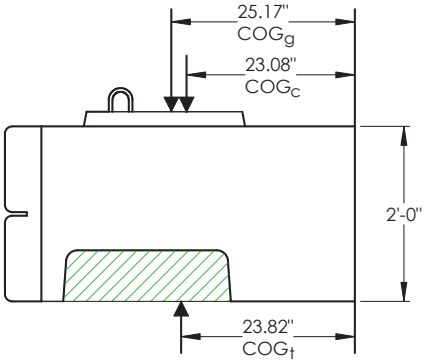
DWG NO. BD-04

SCALE: 1: 15 | SHEET 1 OF 1

48" MASS EXTENDER BLOCK & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_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 (γ_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)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_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)

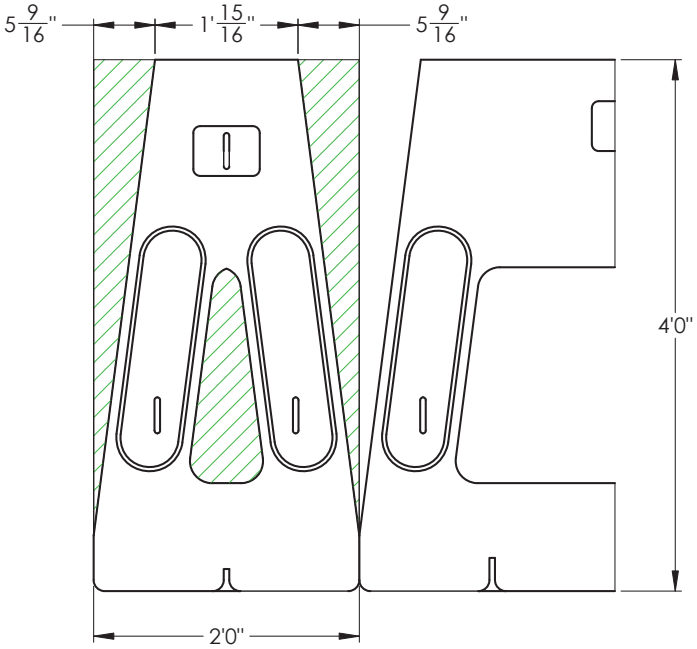
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	48" MASS EXTENDER

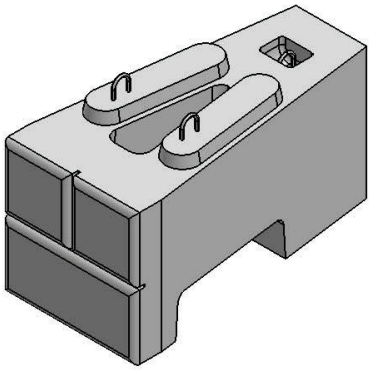
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

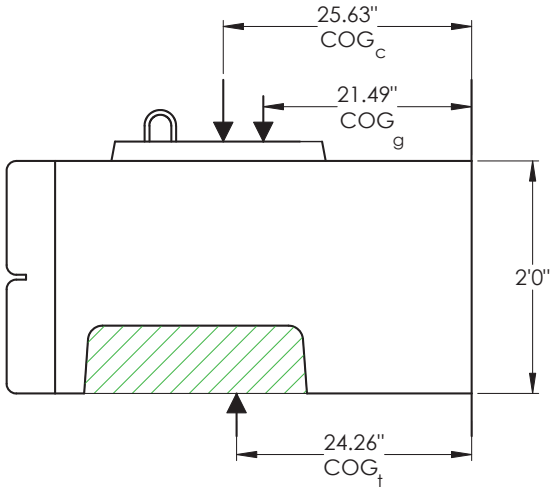
DWG NO. BD-06

SCALE: 1: 20 | SHEET 1 OF 1

48" HALF BLOCK MASS EXTENDER & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 9.80 cft
BLOCK WEIGHT (W_c) = 1,392 lbs
CENTER OF GRAVITY (COG_c) = 25.63" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_g) = 110 pcf
VOLUME (V_g) = 6.20 cft
GRAVEL INFILL WEIGHT (W_g) = 682 lbs
CENTER OF GRAVITY (COG_g) = 21.49" (SEE NOTES)

NOTES:

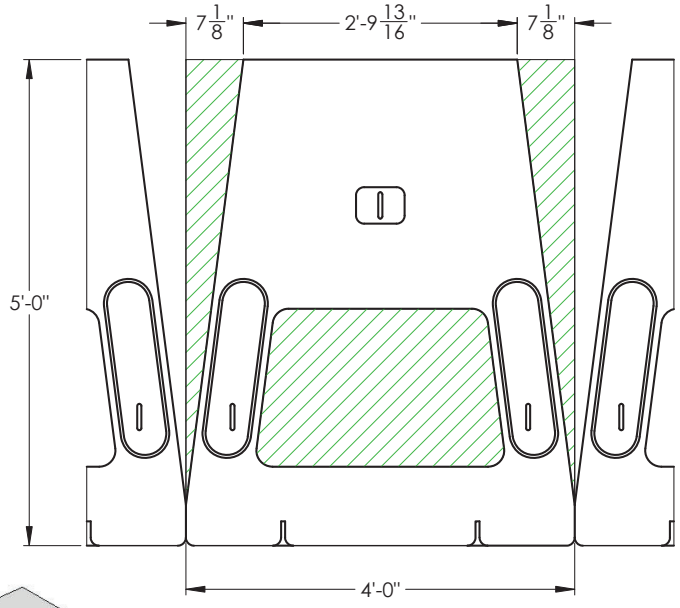
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASURMENTS ARE FROM BACK OF BLOCK

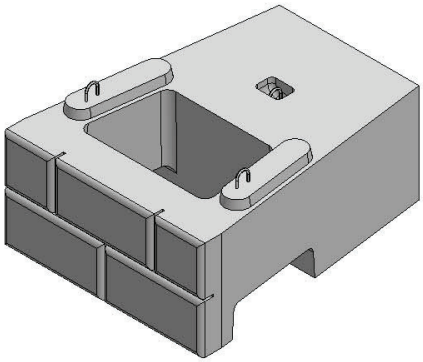
COMBINED UNIT DATA

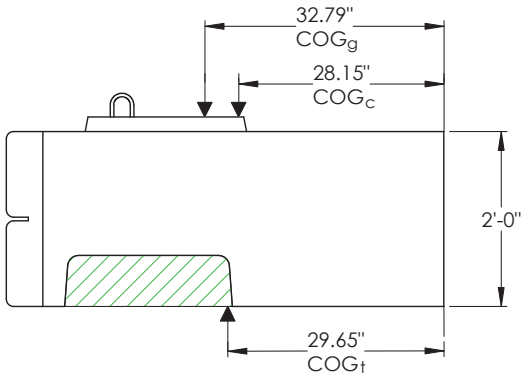
DESIGN UNIT WEIGHT (γ_t) = (1,392 lbs +682 lbs) / 16 cft = 130 pcf
VOLUME (V_t) = 9.80 cft + 6.20 cft = 16.00 cft
TOTAL UNIT WEIGHT (W_t) = 2,074 lbs
CENTER OF GRAVITY (COG_t) = 24.26" (SEE NOTES)

DRAWN BY	DATE	TITLE: 48" HALF MASS EXTENDER
R FONTANESI	11/8/2016	
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. BD-08 REV. 01
		SCALE: NA / WEIGHT: SEE ABOVE / SHEET 1 OF 1

60" MASS EXTENDER BLOCK & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 24.71 cft
BLOCK WEIGHT (W_c) = 3,509 lbs
CENTER OF GRAVITY (COG_c) = 28.15" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_g) = 110 pcf
VOLUME (V_g) = 15.29 cft
GRAVEL INFILL WEIGHT (W_g) = 1,682 lbs
CENTER OF GRAVITY (COG_g) = 32.79" (SEE NOTES)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_t) = (3,509 lbs +1,682 lbs) / 40 cft = 130 pcf
VOLUME (V_t) = 24.71 cft + 15.29 cft = 40.00 cft
TOTAL UNIT WEIGHT (W_t) = 5,191 lbs
CENTER OF GRAVITY (COG_t) = 29.65" (SEE NOTES)

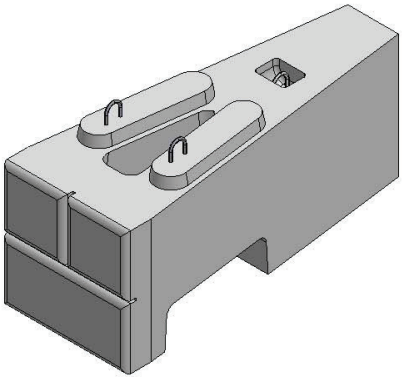
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	60" MASS EXTENDER

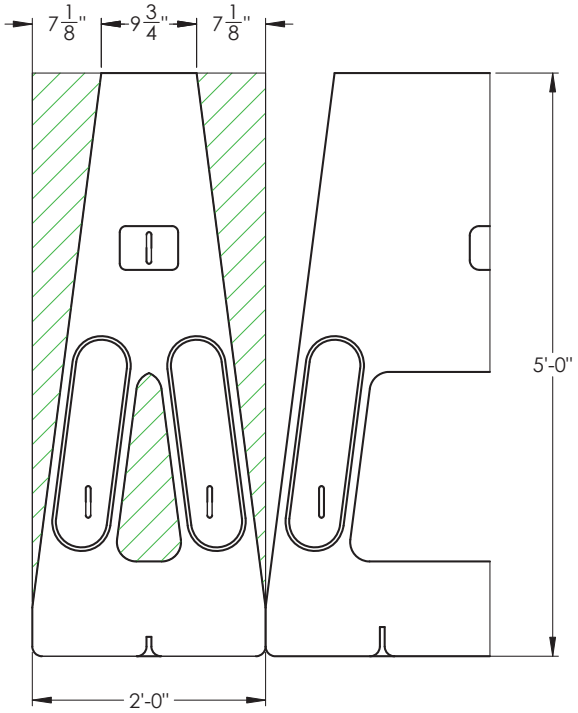
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

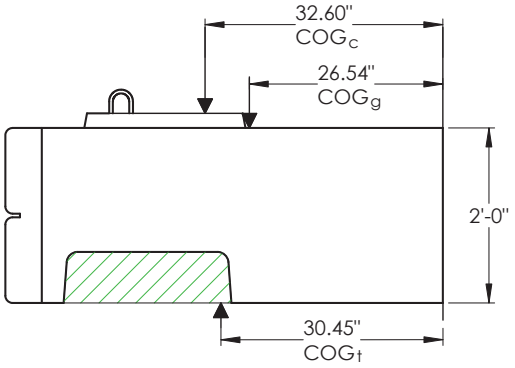
DWG NO. BD-07

SCALE: 1: 20 | SHEET 1 OF 1

60" HALF BLOCK MASS EXTENDER & GRAVEL INFILL







CONCRETE BLOCK DATA

DESIGN UNIT WEIGHT (γ_c) = 142 pcf
VOLUME (V_c) = 11.70 cft
BLOCK WEIGHT (W_c) = 1,661 lbs
CENTER OF GRAVITY (COG_c) = 32.60" (SEE NOTES)

GRAVEL INFILL DATA

DESIGN UNIT WEIGHT (γ_g) = 110 pcf
VOLUME (V_g) = 8.30 cft
GRAVEL INFILL WEIGHT (W_g) = 913 lbs
CENTER OF GRAVITY (COG_g) = 26.54" (SEE NOTES)

NOTES:

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

COMBINED UNIT DATA

DESIGN UNIT WEIGHT (γ_t) = (1,661 lbs + 913 lbs) / 20 cft = 129 pcf
VOLUME (V_t) = 11.70 cft + 8.30 cft = 20.00 cft
TOTAL UNIT WEIGHT (W_t) = 2,574 lbs
CENTER OF GRAVITY (COG_t) = 30.45" (SEE NOTES)

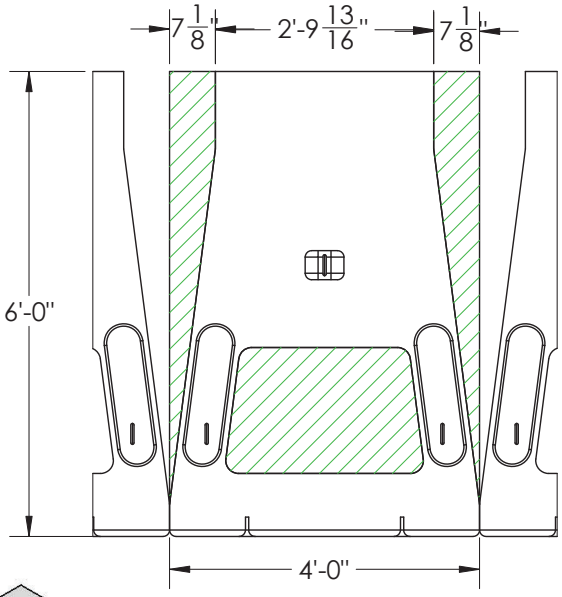
DRAWN BY	DATE	TITLE:
DAN BALLING	11/25/2013	60" HALF MASS EXTENDER

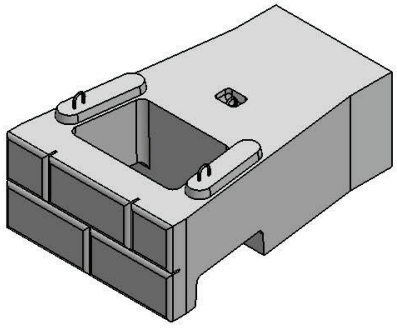
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

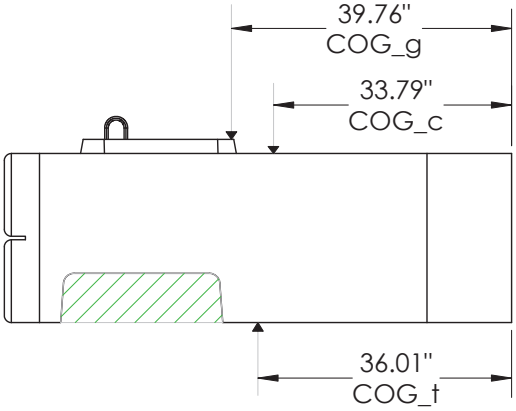
DWG NO. BD-09

SCALE: 1: 20 | SHEET 1 OF 1

72" MASS EXTENDER BLOCK & GRAVEL INFILL







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 WEIGH = 1964 lbs
CENTER OF GRAVITY (COG_g) = 39.76" (SEE NOTES)

COMBINED UNIT DATA
DESIGN UNIT WEIGHT = (4297 lbs +1964 lbs)/48.11 cft = 130 pcf
VOLUME = 30.26 cft + 17.85 cft = 48.11 cft
TOTAL UNIT WEIGHT = 6261 lbs
CENTER OF GRAVITY (COG_t) = 36.01" (SEE NOTES)

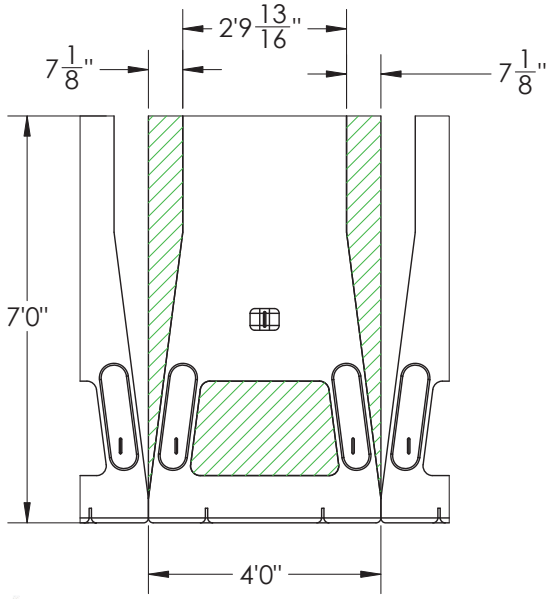
NOTES:
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASURMENTS ARE FROM BACK OF BLOCK

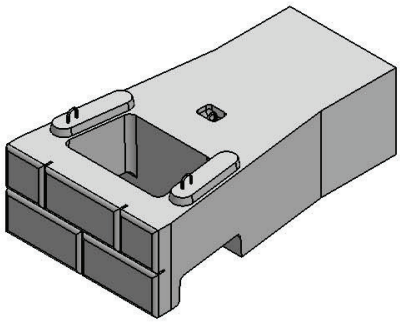
DRAWN BY	DATE	TITLE:
R FONTANESI	10/31/2016	72" MASS EXTENDER

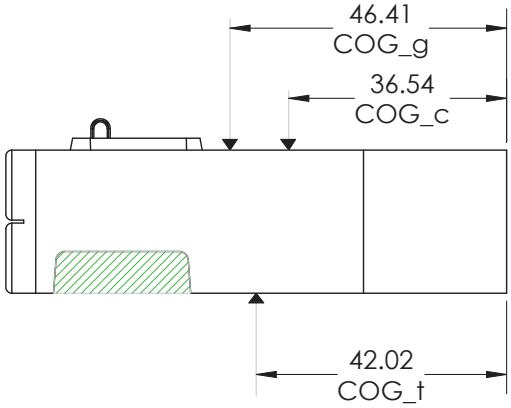
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO. BD-12

SCALE: 1: 30 | SHEET 1 OF 1







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 WEIGH = 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 = 35.9 cft + 20.2 cft = 56.1 cft
TOTAL UNIT WEIGHT = 7320 lbs
CENTER OF GRAVITY (COG_t) = 42.02" (SEE NOTES)

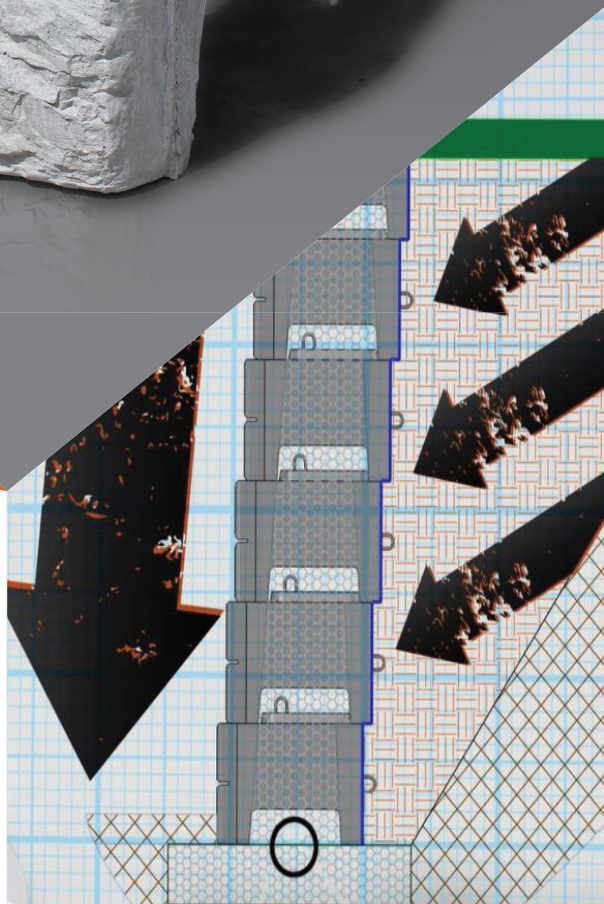
NOTES:
- VOLUME, WEIGHT AND COG CALCULATIONS WERE DONE USING CAD SOFTWARE.
- COG MEASURMENTS ARE FROM BACK OF BLOCK

DRAWN BY	DATE	TITLE: 84" MASS EXTENDER	
R FONTANESI	10/31/2016		
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. BD-10	REV. 01
		SCALE: NA	WEIGHT: 5099.15	SHEET 1 OF 1

U.S. Version
Release 3.0

Design Tables

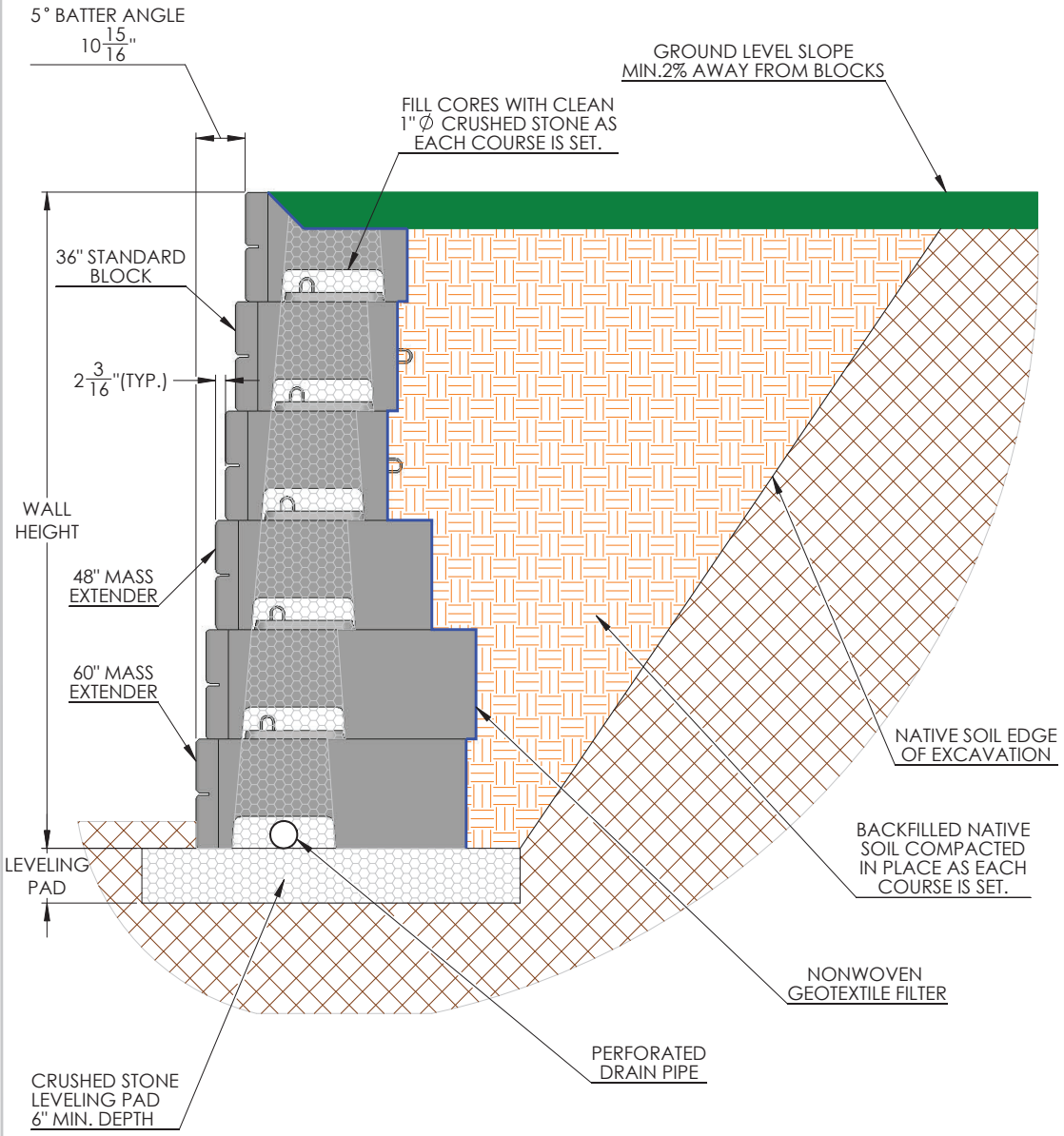
Section 3



VERTI BLOCK®

www.verti-block.com

TYPICAL GRAVITY WALL WITH VERTI-BLOCK MASS EXTENDERS



DRAWN BY	DATE	TITLE:
DAN BALLING	12/30/2013	12' SECTION W/ MASS EXTENDERS

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

DWG NO. WD-15

SCALE: 1: 30 | SHEET 1 OF 1

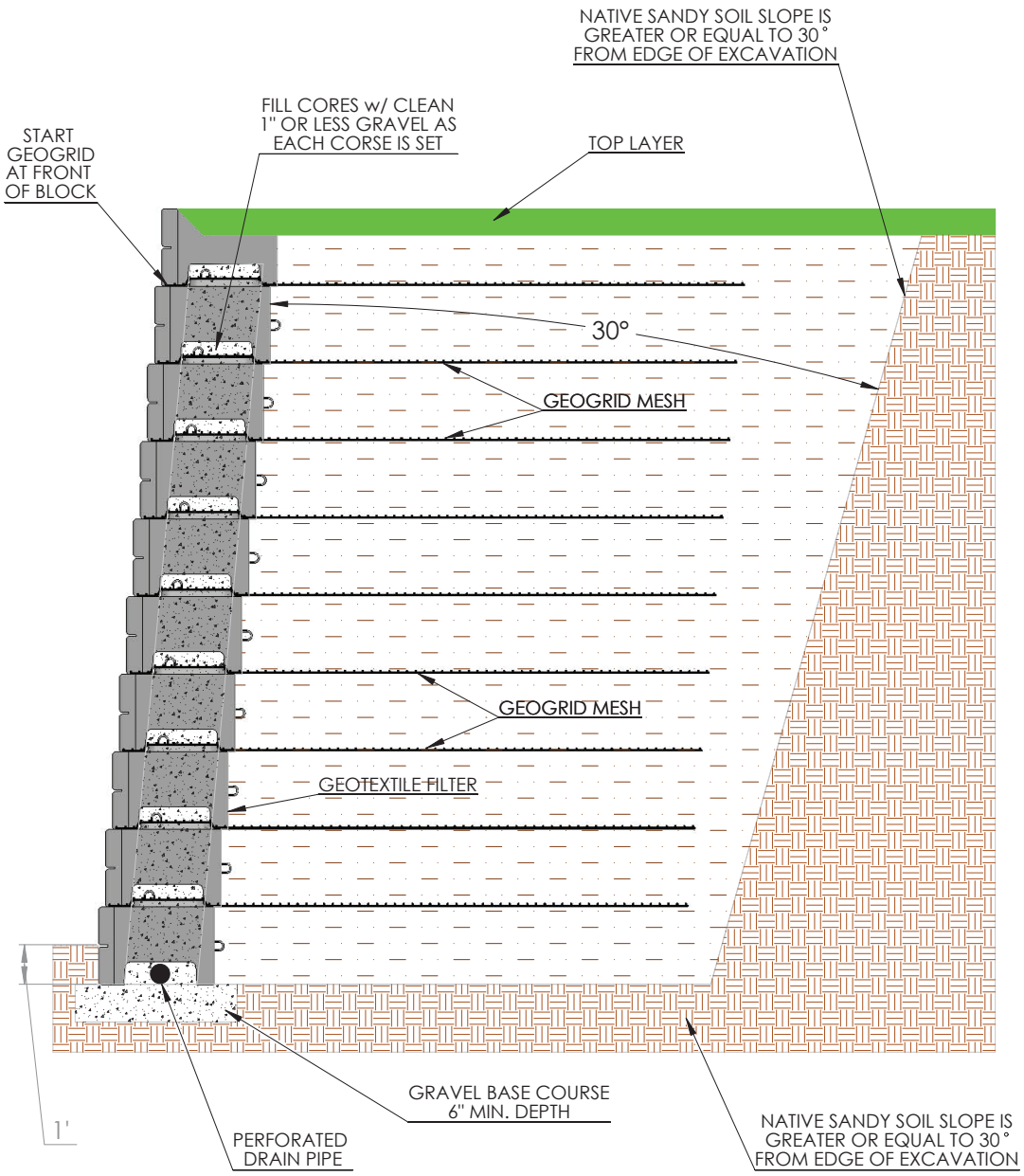
Gravity Wall Matrix with Standard and Mass Extender Blocks

Soil Type	Silty *Internal Angle of Friction ≥ 28°*			Sandy *Internal Angle of Friction ≥ 30°*			Gravely Sand *Internal Angle of Friction ≥ 35°*			Gravely *Internal Angle of Friction ≥ 40°*		
Load Condition	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad
Level Backfill / No Surcharge												
36" Blocks Only	7.5	0.5	0.5	7.5	0.5	0.5	9.5	0.5	0.5	11	1	0.5
36" Blocks Only	9.5	0.5	0.5	9.5	0.5	0.5	11	1	0.5	13	1	1
36" w/ (1) 48" bottom row	11	1	0.5	11	1	0.5	13	1	1	15	1	1
36" w/ (1) 48" & (1) 60" bottom row	13	1	1	13	1	0.5	15	1	1	17	1	1
36" w/ (2) 48" & (1) 60" bottom row	--	--	--	15	1	1	--	--	--	--	--	--
36" w/ (1) 48" & (3) 60" bottom row	--	--	--	--	--	--	17	1	1	--	--	--
36" w/ (4) 60" bottom row	--	--	--	--	--	--	--	--	--	19	1	1
Level Backfill / 250 psf Surcharge												
36" Blocks Only	5.5	0.5	0.5	5.5	0.5	0.5	7.5	0.5	0.5	9.5	0.5	0.5
36" w/ (1) 48" bottom row	7.5	0.5	0.5	7.5	0.5	0.5	9.5	0.5	0.5	11	1	0.5
36" w/ (2) 48" bottom rows	9.5	0.5	0.5	9.5	0.5	0.5	11	1	0.5	13	1	1
36" w/ (2) 48" & (1) 60" bottom rows	11	1	0.5	11	1	0.5	13	1	1	15	1	1
36" w/ (3) 48" & (1) 60" bottom rows	--	--	--	--	--	--	--	--	--	--	--	--
36" w/ (2) 48" & (4) 60" bottom rows	--	--	--	--	--	--	15	1	1	--	--	--
36" w/ (2) 48" & (5) 60" bottom rows	--	--	--	--	--	--	--	--	--	17	1	1
2:1 Sloping Backfill / No Surcharge												
36" Blocks Only	5.5	0.5	0.5	5.5	0.5	0.5	9.5	0.5	0.5	11	1	0.5
36" w/ bottom (1) 48" bottom row	--	--	--	7.5	0.5	0.5	11	1	0.5	13	1	1
36" w/ (1) 60" bottom rows	7.5	0.5	1	9.5	0.5	1	--	--	--	--	--	--
36" w/ (1) 48" & (1) 60" bottom rows	--	--	--	--	--	--	13	1	1	15	1	1
36" w/ (1) 48" & (2) 60" bottom rows	--	--	--	--	--	--	--	--	--	--	--	--
36" w/ (2) 48" & (5) 60" bottom rows	--	--	--	--	--	--	15	1	1	--	--	--
36" w/ (1) 48" & (6) 60" bottom rows	--	--	--	--	--	--	--	--	--	17	1	1

The above chart was prepared by Verti-Crete, LLC for estimating and conceptual design purposes only. All information in 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. 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



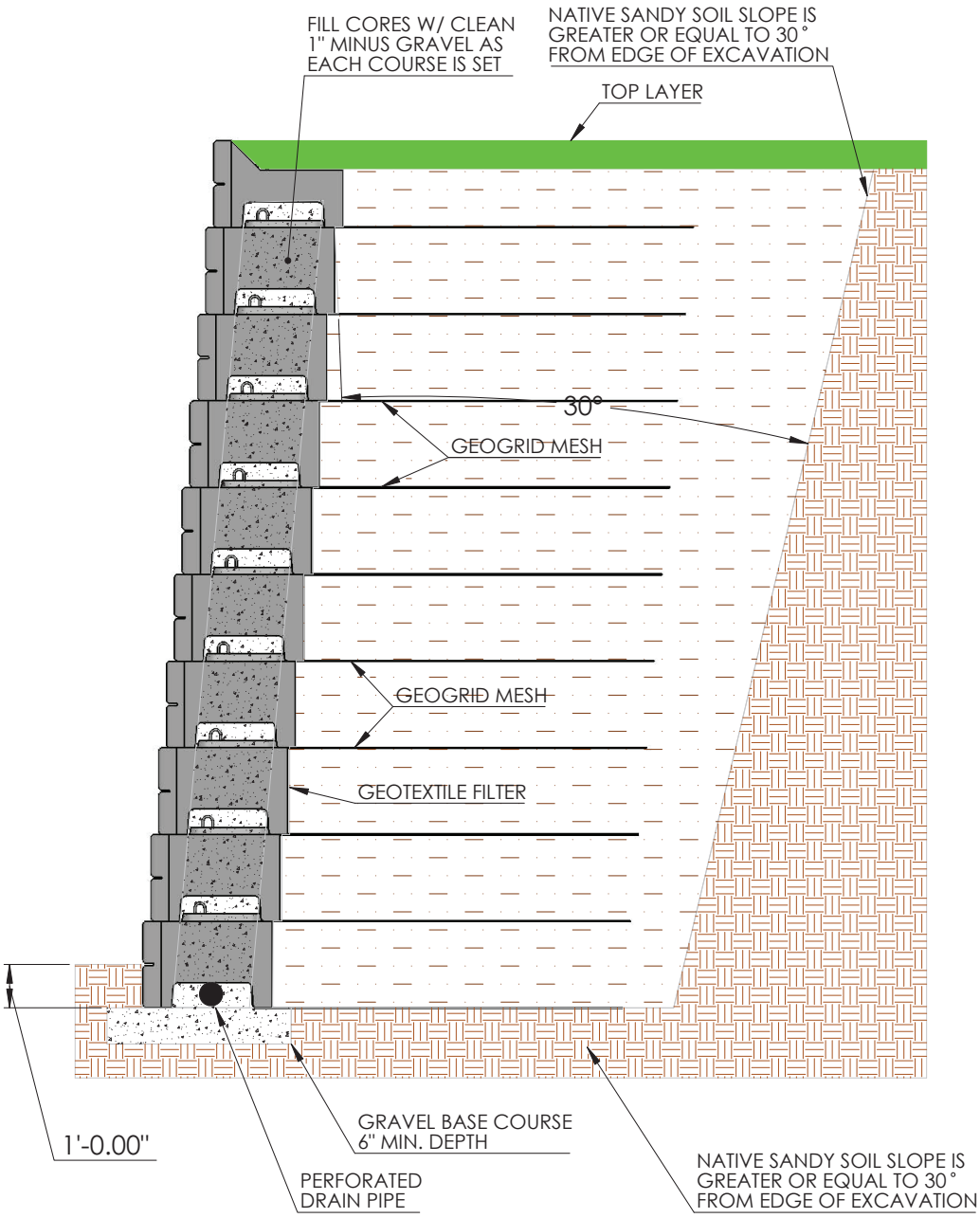
DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	20' FRICTION DETAIL

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

DWG NO. M-03

SCALE: 1: 42 | SHEET 1 OF 1

20' GEOGRID POSITIVE CONNECTION



DRAWN BY	DATE	TITLE:
R FONTANESI	3/8/2016	20' LOOP THRU POSITIVE CONNECTION

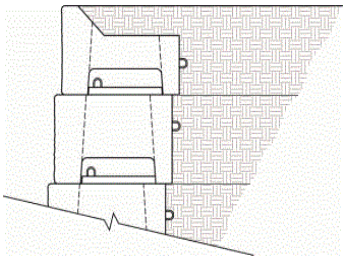
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO. WD-36

SCALE: 1: 30 | SHEET 1 OF 1

Reinforced Wall Matrix

Soil Type	Silty Soil
Load Condition	Level Backfill / No Surcharge
Internal Angle of Friction	≥ 28°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
8′	0.5′	0.5′	VP GT L	None										
10′	0.5′	0.5′	VP GT L	None										
12′	0.57′	0.5′	VP GT L	2 200 8.5	4 200 8.5	6 200 8.5								
14′	0.67′	0.5′	VP GT L	2 500 9.8	4 500 9.8	6 500 9.8	8 500 9.8							
16′	0.76′	0.5′	VP GT L	2 500 11.1	4 500 11.1	6 500 11.1	8 500 11.1	10 500 11.1						
18′	0.86′	0.5′	VP GT L	2 500 12.3	4 500 12.3	6 500 12.3	8 500 12.3	10 500 12.3	12 500 12.3					
20′	0.95′	0.5′	VP GT L	2 500 13.6	4 500 13.6	6 500 13.6	8 500 13.6	10 500 13.6	12 500 13.6	14 500 13.6				
22′	1′	0.5′	VP GT L	2 600 14.9	4 600 14.9	6 600 14.9	8 600 14.9	10 600 14.9	12 600 14.9	14 600 14.9	16 600 14.9			
24′	1.14′	0.5′	VP GT L	2 600 16.2	4 600 16.2	6 600 16.2	8 600 16.2	10 600 16.2	12 600 16.2	14 600 16.2	16 600 16.2	18 600 16.2		
26′	1.24′	0.5′	VP GT L	2 600 17.4	4 600 17.4	6 600 17.4	8 600 17.4	10 600 17.4	12 600 17.4	14 600 17.4	16 600 17.4	18 600 17.4	20 600 17.4	
28′	1.33′	0.5′	VP GT L	2 600 18.7	4 600 18.7	6 600 18.7	8 600 18.7	10 600 18.7	12 600 18.7	14 600 18.7	16 600 18.7	18 600 18.7	20 600 18.7	22 600 18.7
30′	1.43′	0.5′	VP GT L	2 600 20	4 600 20	6 600 20	8 600 20	10 600 20	12 600 20	14 600 20	16 600 20	18 600 20	20 600 20	22 600 20

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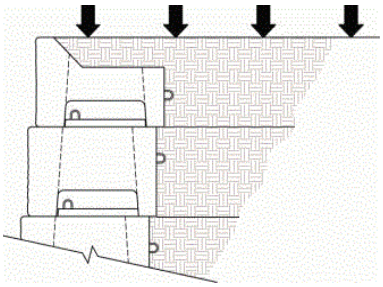
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Silty Soil
Load Condition	Level Backfill / 250 psf Surcharge
Internal Angle of Friction	≥ 30°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
6′	0.5′	0.5′	VP GT L	None										
8′	0.5′	0.5′	VP GT L	2 200 7.9	4 200 7.9									
10′	0.5′	0.5′	VP GT L	2 200 9.2	4 200 9.2	6 200 9.2								
12′	0.57′	0.5′	VP GT L	2 500 9.5	4 500 9.5	6 500 9.5								
14′	0.67′	0.5′	VP GT L	2 500 10.8	4 500 10.8	6 500 10.8	8 500 10.8							
16′	0.76′	0.5′	VP GT L	2 500 12.1	4 500 12.1	6 500 12.1	8 500 12.1	10 500 12.1						
18′	0.86′	0.5′	VP GT L	2 500 13.3	4 500 13.3	6 500 13.3	8 500 13.3	10 500 13.3	12 500 13.3					
20′	0.95′	0.5′	VP GT L	2 600 14.6	4 600 14.6	6 600 14.6	8 600 14.6	10 600 14.6	12 600 14.6	14 600 14.6				
22′	1.05′	0.5′	VP GT L	2 600 15.9	4 600 15.9	6 600 15.9	8 600 15.9	10 600 15.9	12 600 15.9	14 600 15.9	16 600 15.9			
24′	1.14′	0.5′	VP GT L	2 600 17.1	4 600 17.1	6 600 17.1	8 600 17.1	10 600 17.1	12 600 17.1	14 600 17.1	16 600 17.1	18 600 17.1		
26′	1.24′	0.5′	VP GT L	2 600 18.4	4 600 18.4	6 600 18.4	8 600 18.4	10 600 18.4	12 600 18.4	14 600 18.4	16 600 18.4	18 600 18.4	20 600 18.4	
28′	1.33′	0.5′	VP GT L	2 600 19.7	4 600 19.7	6 600 19.7	8 600 19.7	10 600 19.7	12 600 19.7	14 600 19.7	16 600 19.7	18 600 19.7	20 600 19.7	22 600 19.7

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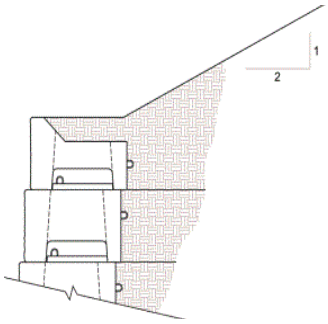
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Silty Soil
Load Condition	2:1 Sloping Backfill / No Surcharge
Internal Angle of Friction	≥ 30°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*										
6′	0.5′	0.5′	VP GT L	None									
8′	0.5′	0.5′	VP GT L	2 200 8.6	4 200 8.6								
10′	0.5′	0.5′	VP GT L	2 500 9.5	4 500 9.5								
12′	0.6′	0.5′	VP GT L	2 500 11.1	4 500 11.1	6 500 11.1							
14′	0.6′	0.5′	VP GT L	2 500 13.0	4 500 13.0	6 500 13.0	8 500 13.0						
16′	0.6′	0.5′	VP GT L	2 500 15.0	4 500 15.0	6 500 15.0	8 500 15.0	10 500 15.0					
18′	0.6′	0.5′	VP GT L	2 500 17.0	4 500 17.0	6 500 17.0	8 500 17.0	10 500 17.0	12 500 17.0				
20′	0.6′	0.5′	VP GT L	2 600 19.0	4 600 19.0	6 600 19.0	8 600 19.0	10 600 19.0	12 600 19.0	14 600 19.0			
22′	0.6′	0.5′	VP GT L	2 600 21.0	4 600 21.0	6 600 21.0	8 600 21.0	10 600 21.0	12 600 21.0	14 600 21.0	16 600 21.0		
24′	0.6′	0.5′	VP GT L	2 600 23.0	4 600 23.0	6 600 23.0	8 600 23.0	10 600 23.0	12 600 23.0	14 600 23.0	16 600 23.0	18 600 23.0	

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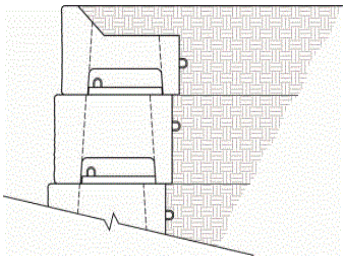
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Silty Soil
Load Condition	Level Backfill / No Surcharge
Internal Angle of Friction	≥ 30°
Suggested Geogrid	Stratagrid®

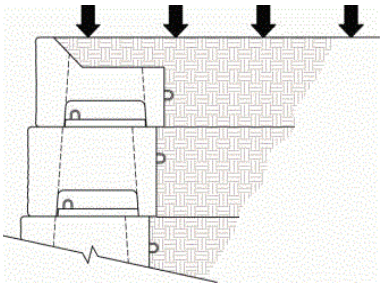


Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
8′	0.5′	0.5′	VP GT L	None										
10′	0.5′	0.5′	VP GT L	None										
12′	0.57′	0.5′	VP GT L	2 200 8.5	4 200 8.5	6 200 8.5								
14′	0.67′	0.5′	VP GT L	2 500 9.8	4 500 9.8	6 500 9.8	8 500 9.8							
16′	0.76′	0.5′	VP GT L	2 500 11.1	4 500 11.1	6 500 11.1	8 500 11.1	10 500 11.1						
18′	0.86′	0.5′	VP GT L	2 500 12.3	4 500 12.3	6 500 12.3	8 500 12.3	10 500 12.3	12 500 12.3					
20′	0.95′	0.5′	VP GT L	2 500 13.6	4 500 13.6	6 500 13.6	8 500 13.6	10 500 13.6	12 500 13.6	14 500 13.6				
22′	1′	0.5′	VP GT L	2 600 14.9	4 600 14.9	6 600 14.9	8 600 14.9	10 600 14.9	12 600 14.9	14 600 14.9	16 600 14.9			
24′	1.14′	0.5′	VP GT L	2 600 16.2	4 600 16.2	6 600 16.2	8 600 16.2	10 600 16.2	12 600 16.2	14 600 16.2	16 600 16.2	18 600 16.2		
26′	1.24′	0.5′	VP GT L	2 600 17.4	4 600 17.4	6 600 17.4	8 600 17.4	10 600 17.4	12 600 17.4	14 600 17.4	16 600 17.4	18 600 17.4	20 600 17.4	
28′	1.33′	0.5′	VP GT L	2 600 18.7	4 600 18.7	6 600 18.7	8 600 18.7	10 600 18.7	12 600 18.7	14 600 18.7	16 600 18.7	18 600 18.7	20 600 18.7	22 600 18.7
30′	1.43′	0.5′	VP GT L	2 600 20	4 600 20	6 600 20	8 600 20	10 600 20	12 600 20	14 600 20	16 600 20	18 600 20	20 600 20	22 600 20

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

Soil Type	Silty Soil
Load Condition	Level Backfill / 250 psf Surcharge
Internal Angle of Friction	≥ 30°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
6′	0.5′	0.5′	VP GT L	None										
8′	0.5′	0.5′	VP GT L	2 200 7.9	4 200 7.9									
10′	0.5′	0.5′	VP GT L	2 200 9.2	4 200 9.2	6 200 9.2								
12′	0.57′	0.5′	VP GT L	2 500 9.5	4 500 9.5	6 500 9.5								
14′	0.67′	0.5′	VP GT L	2 500 10.8	4 500 10.8	6 500 10.8	8 500 10.8							
16′	0.76′	0.5′	VP GT L	2 500 12.1	4 500 12.1	6 500 12.1	8 500 12.1	10 500 12.1						
18′	0.86′	0.5′	VP GT L	2 500 13.3	4 500 13.3	6 500 13.3	8 500 13.3	10 500 13.3	12 500 13.3					
20′	0.95′	0.5′	VP GT L	2 600 14.6	4 600 14.6	6 600 14.6	8 600 14.6	10 600 14.6	12 600 14.6	14 600 14.6				
22′	1.05′	0.5′	VP GT L	2 600 15.9	4 600 15.9	6 600 15.9	8 600 15.9	10 600 15.9	12 600 15.9	14 600 15.9	16 600 15.9			
24′	1.14′	0.5′	VP GT L	2 600 17.1	4 600 17.1	6 600 17.1	8 600 17.1	10 600 17.1	12 600 17.1	14 600 17.1	16 600 17.1	18 600 17.1		
26′	1.24′	0.5′	VP GT L	2 600 18.4	4 600 18.4	6 600 18.4	8 600 18.4	10 600 18.4	12 600 18.4	14 600 18.4	16 600 18.4	18 600 18.4	20 600 18.4	
28′	1.33′	0.5′	VP GT L	2 600 19.7	4 600 19.7	6 600 19.7	8 600 19.7	10 600 19.7	12 600 19.7	14 600 19.7	16 600 19.7	18 600 19.7	20 600 19.7	22 600 19.7

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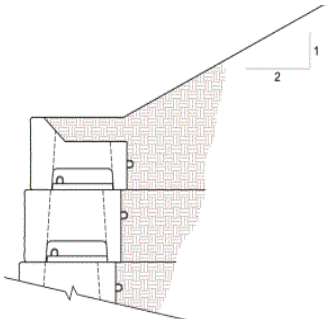
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Silty Soil
Load Condition	2:1 Sloping Backfill / No Surcharge
Internal Angle of Friction	≥ 30°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	**Dimensions measured in feet from face of block** **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*										
6′	0.5′	0.5′	**VP** **GT** **L**	None									
8′	0.5′	0.5′	**VP** **GT** **L**	2 200 8.6	4 200 8.6								
10′	0.5′	0.5′	**VP** **GT** **L**	2 500 9.5	4 500 9.5								
12′	0.6′	0.5′	**VP** **GT** **L**	2 500 11.1	4 500 11.1	6 500 11.1							
14′	0.6′	0.5′	**VP** **GT** **L**	2 500 13.0	4 500 13.0	6 500 13.0	8 500 13.0						
16′	0.6′	0.5′	**VP** **GT** **L**	2 500 15.0	4 500 15.0	6 500 15.0	8 500 15.0	10 500 15.0					
18′	0.6′	0.5′	**VP** **GT** **L**	2 500 17.0	4 500 17.0	6 500 17.0	8 500 17.0	10 500 17.0	12 500 17.0				
20′	0.6′	0.5′	**VP** **GT** **L**	2 600 19.0	4 600 19.0	6 600 19.0	8 600 19.0	10 600 19.0	12 600 19.0	14 600 19.0			
22′	0.6′	0.5′	**VP** **GT** **L**	2 600 21.0	4 600 21.0	6 600 21.0	8 600 21.0	10 600 21.0	12 600 21.0	14 600 21.0	16 600 21.0		
24′	0.6′	0.5′	**VP** **GT** **L**	2 600 23.0	4 600 23.0	6 600 23.0	8 600 23.0	10 600 23.0	12 600 23.0	14 600 23.0	16 600 23.0	18 600 23.0	

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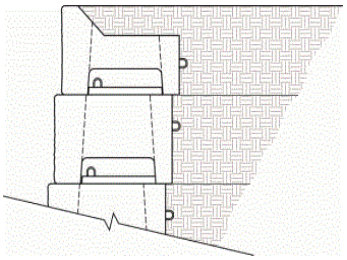
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Sandy Soil
Load Condition	Level Backfill / No Surcharge
Internal Angle of Friction	≥ 35°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
10′	0.5′	0.5′	VP GT L	None										
12′	0.5′	0.5'	VP GT L	None										
14′	0.67'	0.5'	VP GT L	2 200 8.4	4 200 8.4	6 200 8.4								
16'	0.76'	0.5'	VP GT L	2 500 9.8	4 500 9.8	6 500 9.8								
18'	0.86'	0.5'	VP GT L	2 500 10.8	4 500 10.8	6 500 10.8	8 500 10.8							
20'	0.95'	0.5'	VP GT L	2 500 12	4 500 12	6 500 12	8 500 12	10 500 12						
22'	1.05'	0.5'	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					
24'	1.14'	0.5'	VP GT L	2 500 14.5	4 500 14.5	6 500 14.5	8 500 14.5	10 500 14.5	12 500 14.5	14 500 14.5				
26'	1.24'	0.5'	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			
28'	1.33'	0.5'	VP GT L	2 500 16.8	4 500 16.8	6 500 16.8	8 500 16.8	10 500 16.8	12 500 16.8	14 500 16.8	16 500 16.8	18 500 16.8		
30'	1.4'	0.5'	VP GT L	2 600 18	4 600 18	6 600 18	8 600 18	10 600 18	12 600 18	14 600 18	16 600 18	18 600 18	20 600 18	
30' +			VP GT L	Heights above 30 feet are achievable. Please contact your Verti-Block dealer for more details										

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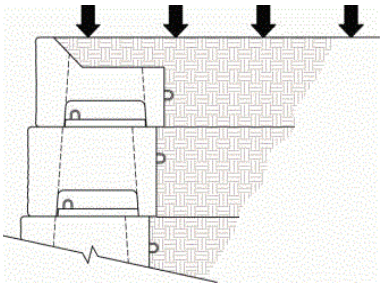
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Sandy Soil
Load Condition	Level Backfill / 250 psf Surcharge
Internal Angle of Friction	≥ 35°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
8'	0.5'	0.5'	VP GT L	None										
10'	0.5'	0.5'	VP GT L	2 200 6.8	4 200 6.8									
12'	0.57'	0.5'	VP GT L	2 200 7.9	4 200 7.9	6 200 7.9								
14'	0.67'	0.5'	VP GT L	2 500 9	4 500 9	6 500 9	8 500 9							
16'	0.76'	0.5'	VP GT L	2 500 9.6	4 500 9.6	6 500 9.6	8 500 9.6							
18'	0.86'	0.5'	VP GT L	2 500 10.8	4 500 10.8	6 500 10.8	8 500 10.8	10 500 10.8						
20'	0.95'	0.5'	VP GT L	2 500 12	4 500 12	6 500 12	8 500 12	10 500 12	12 500 12					
22'	1.05'	0.5'	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	14 500 13.2				
24'	1.14'	0.5'	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	16 500 14.4			
26'	1.25'	0.5'	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	18 500 15.6		
28'	1.33'	0.5'	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	18 600 16.8	20 600 16.8	
30' +			VP GT L	Heights above 30 feet are achievable. Please contact your Verti-Block dealer for more details										

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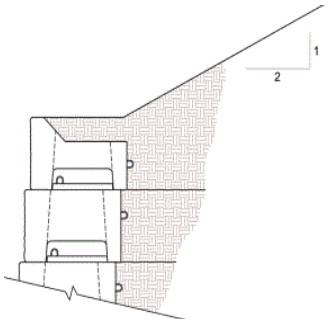
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Sandy Soil
Load Condition	2:1 Sloping Backfill / No Surcharge
Internal Angle of Friction	≥ 35°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
8'	0.5'	0.5'	VP GT L	None										
10'	0.5'	0.5'	VP GT L	None										
10'	0.5'	0.5'	VP GT L	2 200 7.4	4 200 7.4									
12'	0.57'	0.5'	VP GT L	2 500 7.8	4 500 7.8									
14'	0.67'	0.5'	VP GT L	2 500 9.2	4 500 9.2	6 500 9.2								
16'	0.76'	0.5'	VP GT L	2 500 10.6	4 500 10.6	6 500 10.6	8 500 10.6							
18'	0.86'	0.5'	VP GT L	2 500 12	4 500 12	6 500 12	8 500 12	10 500 12						
20'	0.95'	0.5'	VP GT L	2 600 13.5	4 600 13.5	6 600 13.5	8 600 13.5	10 600 13.5	12 600 13.5					
22'	1.05'	0.5'	VP GT L	2 600 14.9	4 600 14.9	6 600 14.9	8 600 14.9	10 600 14.9	12 600 14.9	14 600 14.9				
24'	1.14'	0.5'	VP GT L	2 600 16.4	4 600 16.4	6 600 16.4	8 600 16.4	10 600 16.4	12 600 16.4	14 600 16.4	16 600 16.4			

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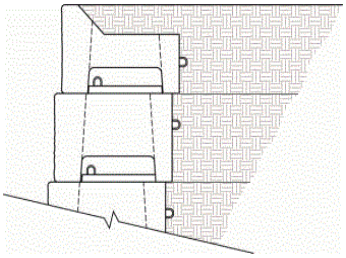
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Gravelly Soil
Load Condition	Level Backfill / No Surcharge
Internal Angle of Friction	≥ 40°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
14'	0.5'	0.5'	VP GT L	None										
16'	0.76'	0.5'	VP GT L	2 200 9.6	4 200 9.6	6 200 9.6	8 200 9.6							
18'	0.86'	0.5'	VP GT L	2 200 10.8	4 200 10.8	6 200 10.8	8 200 10.8	10 200 10.8						
20'	0.95'	0.5'	VP GT L	2 200 12	4 200 12	6 200 12	8 200 12	10 200 12	12 200 12					
22'	1.05'	0.5'	VP GT L	2 500 13.2	4 500 13.2	6 500 13.2	8 500 13.2	10 500 13.2						
24'	1.14'	0.5'	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					
26'	1.24'	0.5'	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				
28'	1.33'	0.5'	VP GT L	2 500 16.8	4 500 16.8	6 500 16.8	8 500 16.8	10 500 16.8	12 500 16.8	14 500 16.8	16 500 16.8			
30'	1.43'	0.5'	VP GT L	2 500 18	4 500 18	6 500 18	8 500 18	10 500 18	12 500 18	14 500 18	16 500 18	18 500 18		
32'	1.52'	0.5'	VP GT L	2 500 19.2	4 500 19.2	6 500 19.2	8 500 19.2	10 500 19.2	12 500 19.2	14 500 19.2	16 500 19.2	18 500 19.2	20 500 19.2	
34'	1.62'	0.5'	VP GT L	2 500 20.4	4 500 20.4	6 500 20.4	8 500 20.4	10 500 20.4	12 500 20.4	14 500 20.4	16 500 20.4	18 500 20.4	20 500 20.4	22 500 20.4
34' +			VP GT L	Heights above 34 feet are achievable. Please contact your Verti-Block dealer for more details										

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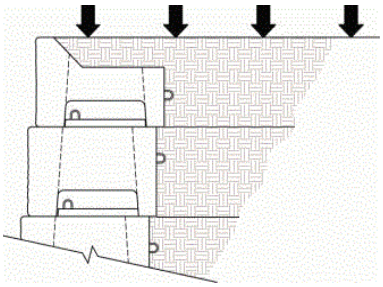
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Gravelly Soil
Load Condition	Level Backfill / 250 psf Surcharge
Internal Angle of Friction	≥ 40°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
10'	0.5'	0.5'	VP GT L	None										
12'	0.57'	0.5'	VP GT L	2 200 7.2	4 200 7.2	6 200 7.2								
14'	0.67'	0.5'	VP GT L	2 200 8.4	4 200 8.4	6 200 8.4	8 200 8.4							
16'	0.76'	0.5'	VP GT L	2 200 9.6	4 200 9.6	6 200 9.6	8 200 9.6	10 200 9.6						
18'	0.86'	0.5'	VP GT L	2 200 10.8	4 200 10.8	6 200 10.8	8 200 10.8	10 200 10.8	12 200 10.8					
20'	0.95'	0.5'	VP GT L	2 500 12	4 500 12	6 500 12	8 500 12	10 500 12	12 500 12					
22'	1.05'	0.5'	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	14 500 13.2				
24'	1.14'	0.5'	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	16 500 14.4			
26'	1.24'	0.5'	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	18 500 15.6		
28'	1.33'	0.5'	VP GT L	2 500 16.8	4 500 16.8	6 500 16.8	8 500 16.8	10 500 16.8	12 500 16.8	14 500 16.8	16 500 16.8	18 500 16.8	20 500 16.8	
30'	1.43'	0.5'	VP GT L	2 500 18	4 500 18	6 500 18	8 500 18	10 500 18	12 500 18	14 500 18	16 500 18	18 500 18	20 500 20.4	22 500 20.4
30' +			VP GT L	Heights above 30 feet are achievable. Please contact your Verti-Block dealer for more details										

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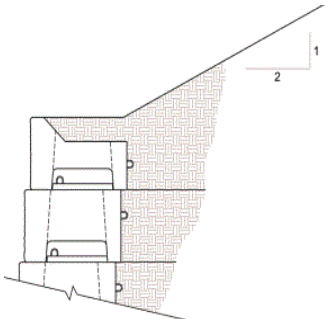
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

Reinforced Wall Matrix

Soil Type	Gravelly Soil
Load Condition	2:1 Sloping Backfill / No Surcharge
Internal Angle of Friction	≥ 40°
Suggested Geogrid	Stratagrid®



Wall Height	Bury Depth	Level Pad	Dimensions measured in feet from face of block **VP** – *Geogrid Verticle Placement* **GT** – *Geogrid Type (Strata 200, 500, 600)* **L** – *Geogrid Length in Feet*											
12'	0.5'	0.5'	**VP** **GT** **L**	None										
14'	0.67'	0.5'	**VP** **GT** **L**	2 200 8.9	4 200 8.9	6 200 8.9	8 200 8.9							
16'	0.76'	0.5'	**VP** **GT** **L**	2 500 9.6	4 500 9.6	6 500 9.6								
18'	0.86'	0.5'	**VP** **GT** **L**	2 500 10.8	4 500 10.8	6 500 10.8	8 500 10.8							
20'	0.95'	0.5'	**VP** **GT** **L**	2 200 12	4 200 12	6 200 12	8 200 12	10 200 12						
22'	1.05'	0.5'	**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					
24'	1.14'	0.5'	**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				
26'	1.25'	0.5'	**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			
28'	1.33'	0.5'	**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	18 600 16.8		
30'	1.43'	0.5'	**VP** **GT** **L**	2 600 18	4 600 18	6 600 18	8 600 18	10 600 18	12 600 18	14 600 18	16 600 18	18 600 18	20 600 20.4	
32'	1.52'	0.5'	**VP** **GT** **L**	2 600 19.2	4 600 19.2	6 600 19.2	8 600 19.2	10 600 19.2	12 600 19.2	14 600 19.2	16 600 19.2	18 600 19.2	20 600 19.2	22 600 19.2
34'	1.62'	0.5'	**VP** **GT** **L**	2 600 20.4	4 600 20.4	6 600 20.4	8 600 20.4	10 600 20.4	12 600 20.4	14 600 20.4	16 600 20.4	18 600 20.4	20 600 20.4	22 600 20.4	24 600 20.4

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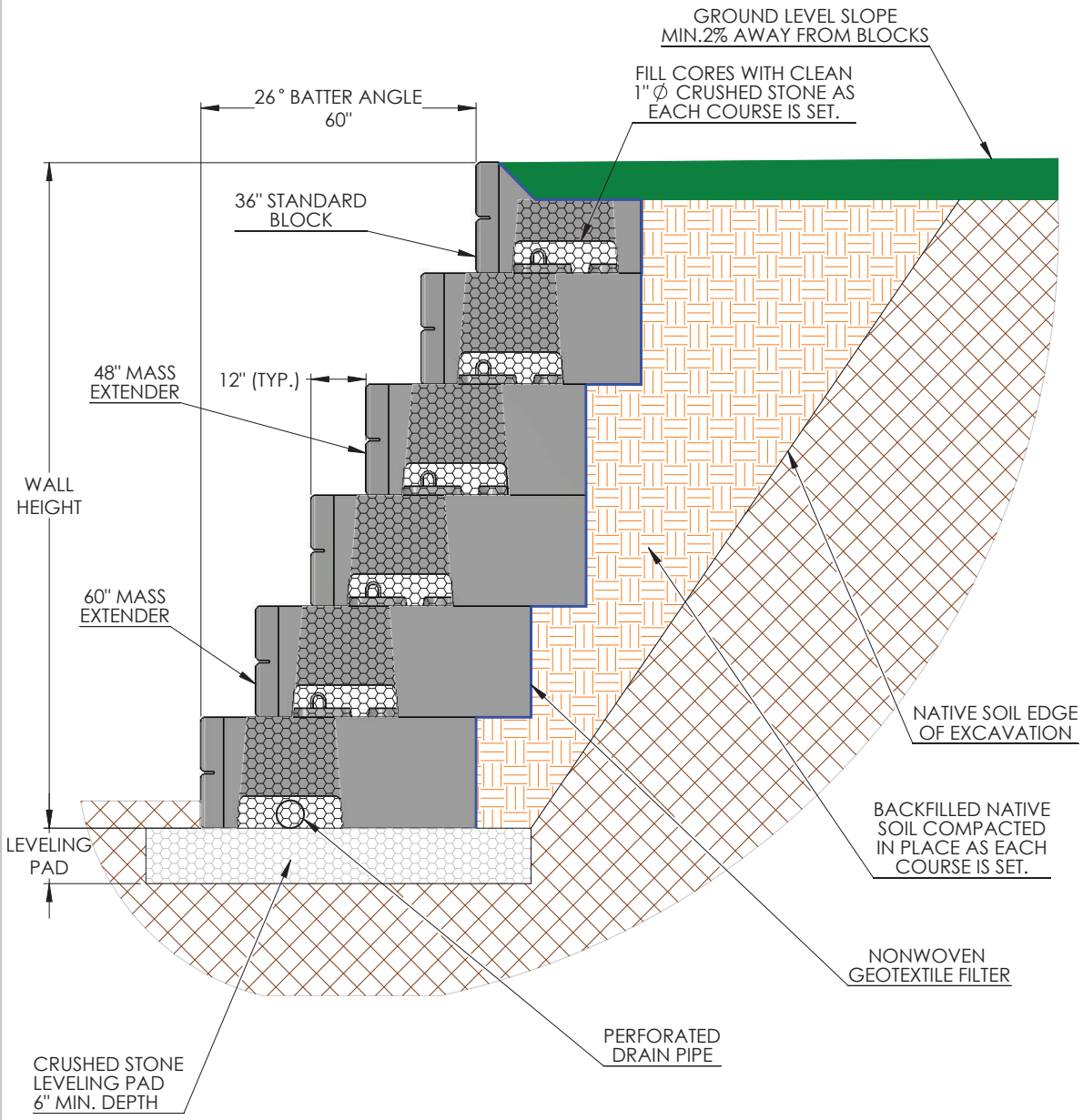
Notes: Unit weight of soil is 120 psf. Minimum factors of safety are sliding: 1.5, overturning: 1.5, and bearing: 2.0. Wall design shall address both internal and external drainage and shall be evaluated by the professional engineer responsible for final design. Backfill material to be compacted to 95%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

TYPICAL GRAVITY WALL WITH 12" SETBACK



DRAWN BY	DATE	TITLE:
R FONTANESI	1/6/2016	12' GRAVITY WALL W/ 12" SETBACK

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

DWG NO. WD-34

SCALE: 1: 30 | SHEET 1 OF 1

Gravity Wall Matrix with Mass Extenders and 12" Batter

Soil Type	Silty *Internal Angle of Friction ≥ 28°*			Sandy *Internal Angle of Friction ≥ 30°*			Gravely Sand *Internal Angle of Friction ≥ 35°*			Gravely *Internal Angle of Friction ≥ 40°*		
Load Condition	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad	Exposed Wall Height	Min. Bury Depth	Leveling Pad
Level Backfill / No Surcharge												
36" Blocks Only	5.5	0.5	0.5	5.5	0.5	0.5	7.5	0.5	0.5	11	1	0.5
36" Blocks Only	7.5	0.5	0.5	7.5	0.5	0.5	9.5	0.5	0.5	13	1	0.5
36" Blocks Only	9	1	1	9	1	1	11	1	1	15	1	1
36" Blocks Only	10.5	1.5	1	10.5	1.5	1	13	1	1	17	1	1
36" w/ (1) 48" bottom row	12.5	1.5	1	12.5	1.5	1	15	1	1	19	1	1
36" w/ (1) 48" bottom row	--	--	--	--	--	--	17	1	1	20.5	1.5	1
36" w/ (1) 60" bottom rows	14	2	1	14	2	1	19	1	1	22.5	1.5	1
36" w/ (1) 48" & (1) 60" bottom rows	--	--	--	16	2	1	--	--	--	24.5	1.5	1
Level Backfill / 250 psf Surcharge												
36" Blocks Only	3.5	0.5	0.5	3.5	0.5	0.5	5.5	0.5	0.5	9.5	0.5	0.5
36" Blocks Only	5.5	0.5	0.5	5.5	0.5	0.5	7.5	0.5	0.5	11	1	0.5
36" Blocks Only	7	1	0.5	7	1	0.5	9	1	0.5	13	1	1
36" Blocks Only	8.5	1.5	1	8.5	1.5	1	11	1	1	15	1	1
36" w/ (1) 48" bottom row	--	--	--	10.5	1.5	1	13	1	1	17	1	1
36" w/ (1) 48" bottom rows	--	--	--	12	2	1	--	--	--	19	1	1
36" w/ (1) 60" bottom rows	--	--	--	--	--	--	15	1	1	--	--	--
36" w/ (1) 48" & (1) 60" bottom rows	10.5	1.5	1	--	--	--	17	1	1	21	1	1
36" w/ (2) 48" & (1) 60" bottom rows	--	--	--	--	--	--	--	--	--	23	1	1
36" w/ (1) 48" & (2) 60" bottom rows	--	--	--	14	2	1	--	--	--	--	--	--
36" w/ (3) 48" & (3) 60" bottom rows	--	--	--	--	--	--	19	1	1	--	--	--
2:1 Sloping Backfill / No Surcharge												
36" Blocks Only	3.5	0.5	0.5	5.5	0.5	0.5	7.5	0.5	0.5	11	1	0.5
36" Blocks Only	5.5	0.5	0.5	7	1	0.5	9.5	0.5	0.5	13	1	0.5
36" Blocks Only	7	1	1	8.5	1.5	1	11	1	1	15	1	1
36" w/ (1) 48" bottom row	--	--	--	--	--	--	13	1	1	17	1	1
36" w/ (1) 60" bottom rows	--	--	--	--	--	--	15	1	1	18.5	1.5	1
36" w/ (1) 48" & (1) 60" bottom rows	--	--	--	--	--	--	16.5	1.5	1	20.5	1.5	1
36" w/ (2) 48" & (2) 60" bottom rows	--	--	--	10.5	1.5	1	--	--	--	--	--	--
36" w/ (3) 60" bottom rows	8.5	1.5	1	--	--	--	--	--	--	--	--	--
36" w/ (2) 48" & (4) 60" bottom rows	--	--	--	12	2	1	--	--	--	22.5	1.5	1

Version 2.1

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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

U.S. Version
Release 3.0

Installation

Section 4

VERTI BLOCK®

www.verti-block.com

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

Item	Quantity	Description
	Per Project Requirements	Skid Steer / Excavator / Mini Excavator

Block Handling Equipment

Item	Quantity	Description
	Per Project Requirements	Skid Steer / Excavator / Mini Excavator
	Per Project Requirements	Telehandler / Crane

* Always follow safe use and rigging procedures when handling the blocks for Verti-Block forms

Tools and Equipment

Item	Quantity	Description
	1	Laser Level
	1 of Each	10 Foot Level / 4 Foot Level
	Various	Shovels
	1	Compactor
	Various	Brooms
	2 Sets	Block Lifting Chains

Tools and Equipment

Item	Quantity	Description
	1	Burke Pry Bar
	Various	Marking Paint
	1	Concrete Saw (if required)
	Various	Personal Protective Equipment

MATERIALS

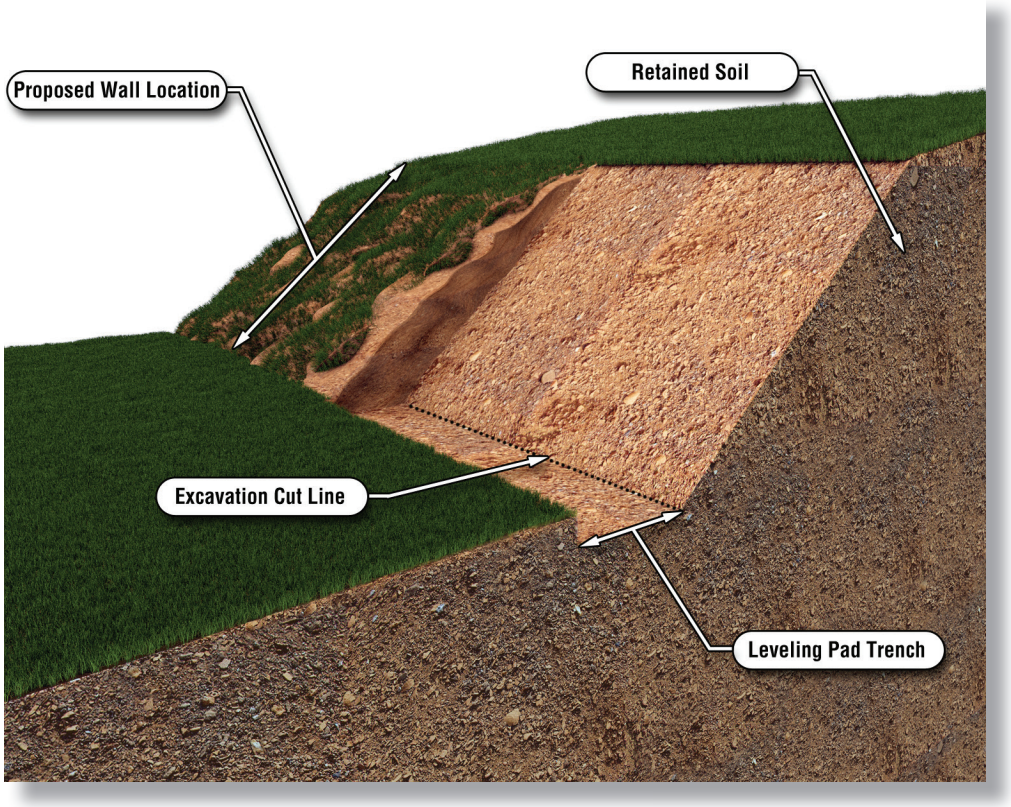
- Wall Base Material (Crushed Stone)
- Unit Fill Material (Crushed Stone)
- Perforated Drain Pipe
- Geotextile Filter Fabric (if required)
- Hand Rail (if required)

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

Excavation

Step 1

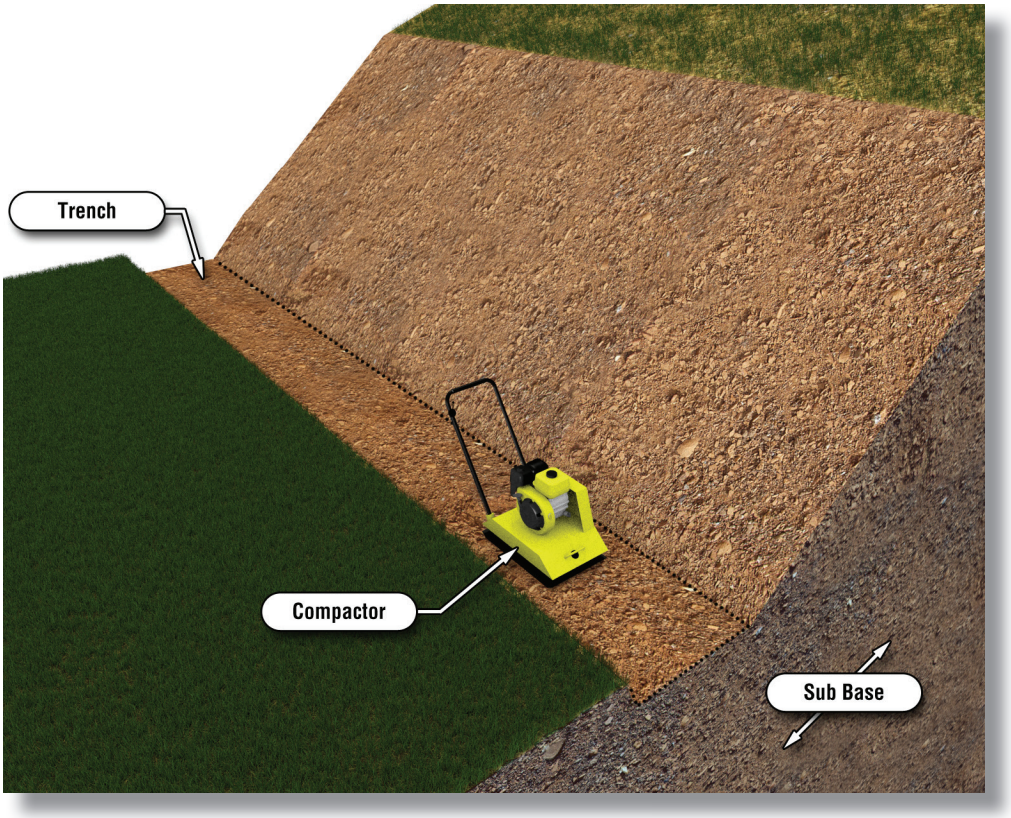


- Excavate and prepare leveling pad trench 6" (or 12" if necessary) below the first course
- Normal trench burial depth is 6" to 12"

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.

Foundation Preparation

Step 2



- 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 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.

Leveling Pad Construction

Step 3

- Compact crushed stone leveling pad to 95% Standard Proctor Density or greater
- Ensure pad is level and smooth to allow proper placement of blocks

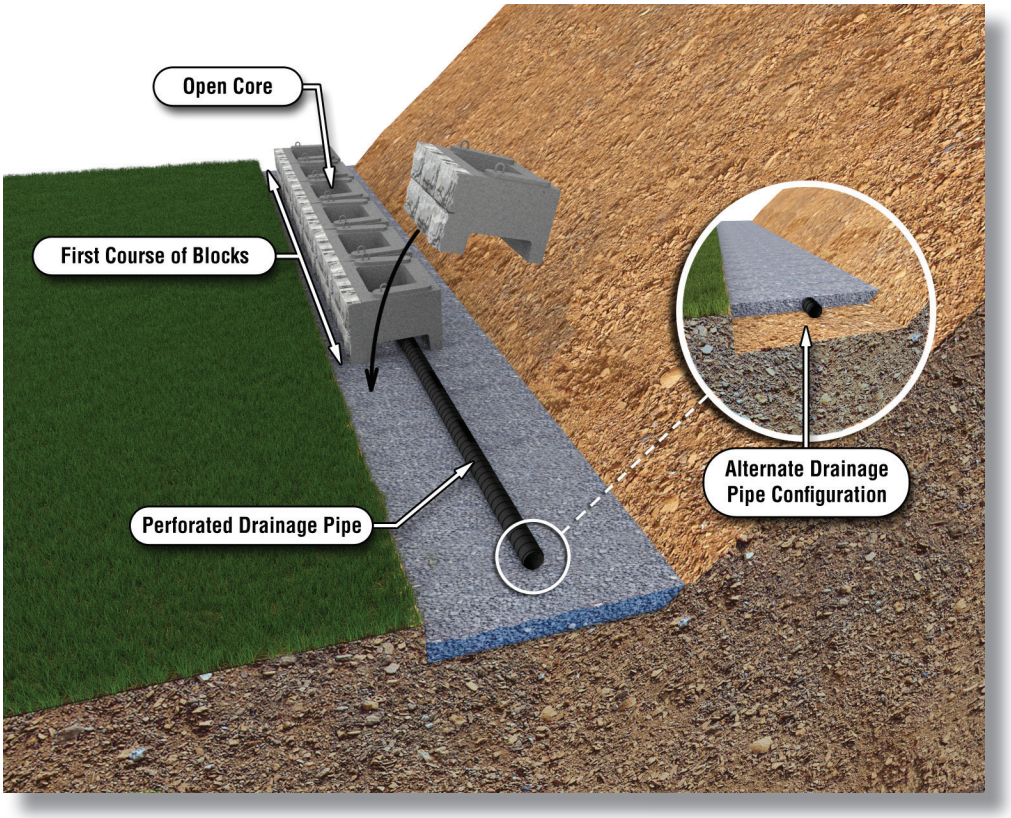
Construct the wall base to the lines and grades shown on the plans. The base is most often constructed using crushed stone. However, you may construct the base from concrete if desired. The choice of which type of leveling pad to use is made by the wall designer and depends on several factors including 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.

Wall Unit Installation

Step 4



First Course Procedure

- Lay perforated drain pipe in center of leveling pad
- Place first course of block directly on leveling pad over the drain pipe

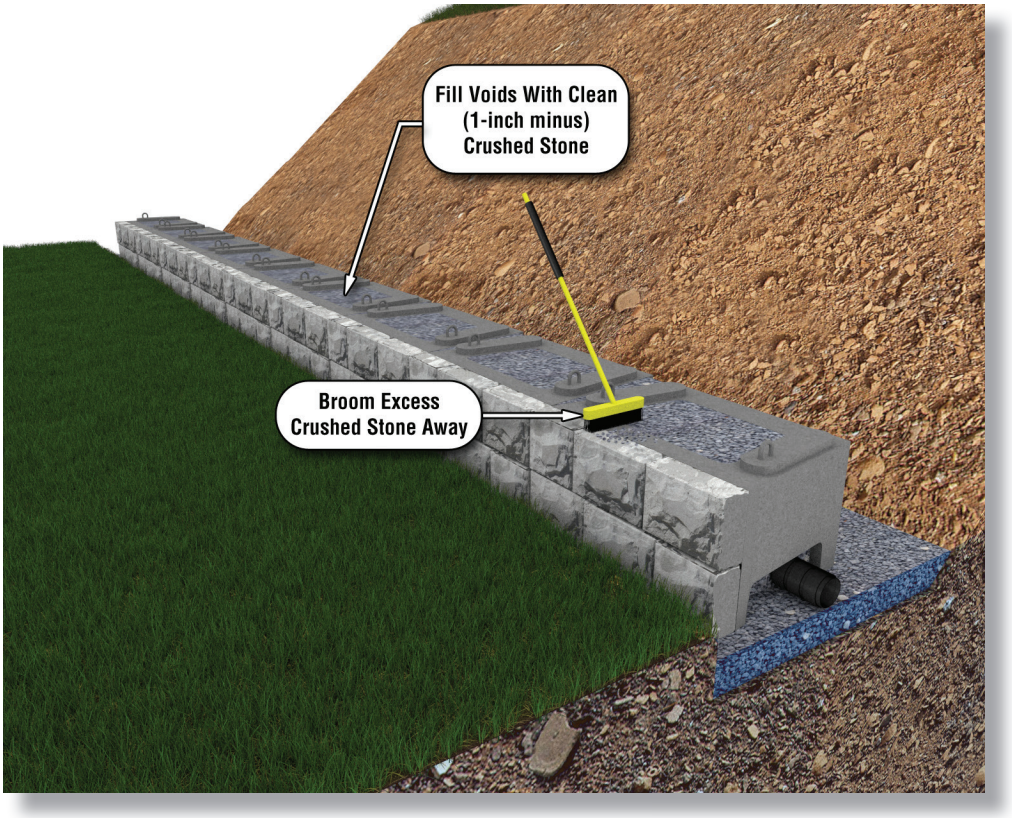
Lay the perforated drain pipe in the center of the leveling pad so the blocks can be placed on top of the pipe.

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.

Wall Unit Installation

Step 5



- Fill all voids with clean crushed stone
- Sweep off excess crushed stone in preparation for next course

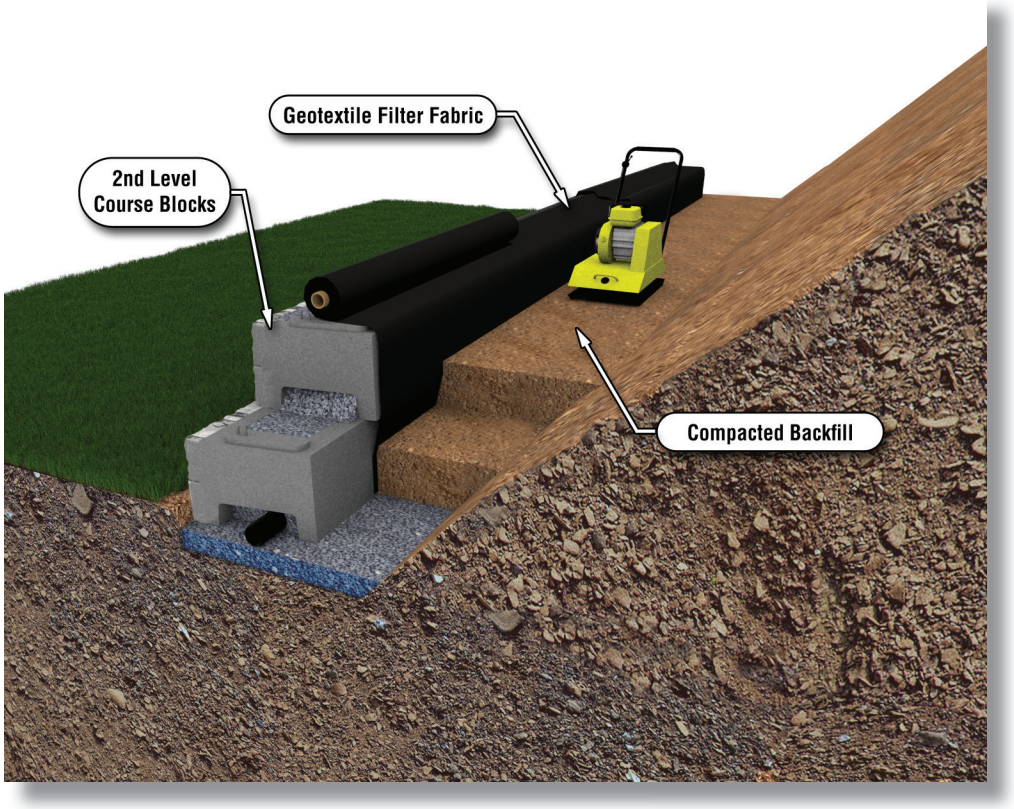
Fill all voids between and within the unit with crushed stone. Unit fill shall consist of a screened crushed stone. A minimum of 75% of coarse material shall have 2 or more fractured faces.

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.

Geotextile Placement

Step 6



- 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

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 reinfocement go to step 7, otherwise skip to step 9.

Geogrid Reinforcement Installation

Step 7

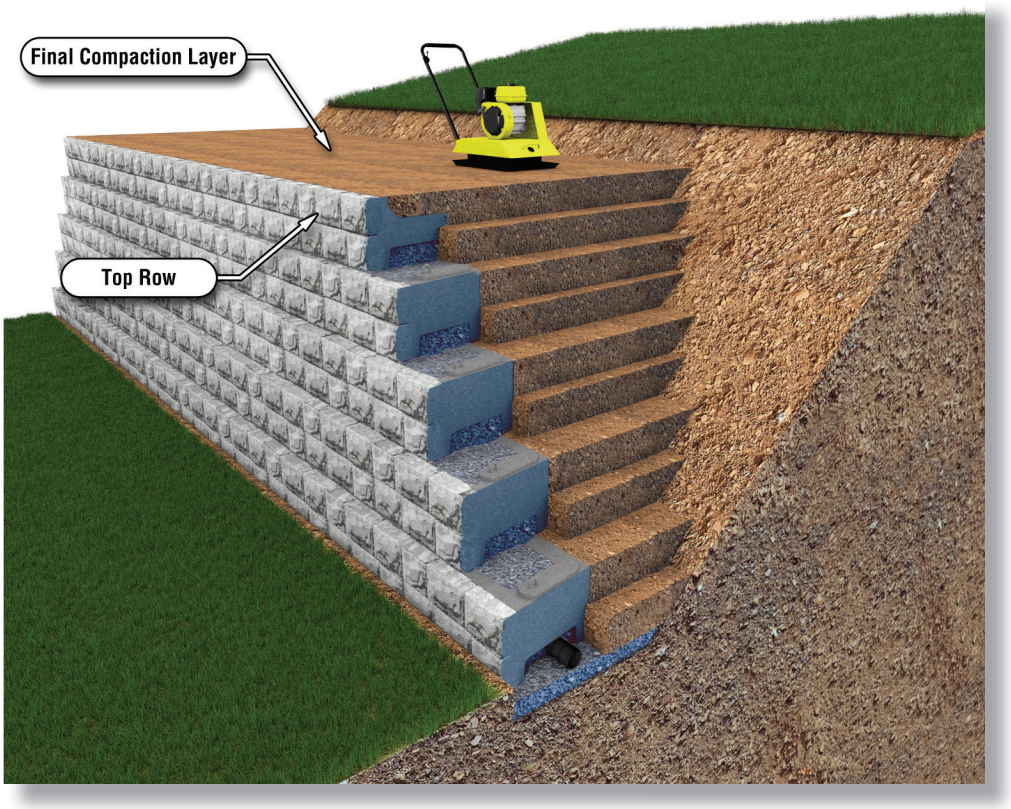
- Lay geogrid strips over top of each course of blocks
- Overlap adjacent cources ~2 inches.

After each course is completed, tops are cleaned, and backfill is compacted geogrid can be placed. Obtain adequate quanitity of geogrid type specified for the job. Cut geogrid strips to length specified by design engineer. Required geogrid type and length are a function of wall height, soil conditions, and loading.

Lay first strip of geogrid perpendicular to face of wall. The end of the strip should be 2"-3" from the front of the block. Continue laying sheets of geogrid overlapping ~2" until the entire course is covered with geogrid. Cut holes in geogrid to allow pickpoints to protrude through. Repeat this process for remaining courses adjusting the geogrid type and length per design.

Backfill Placement and Compaction

Step 8



- Continue compacting backfill material in lifts every 12" as subsequent block courses are placed
- Continue to lay block courses until the top row is completed

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.

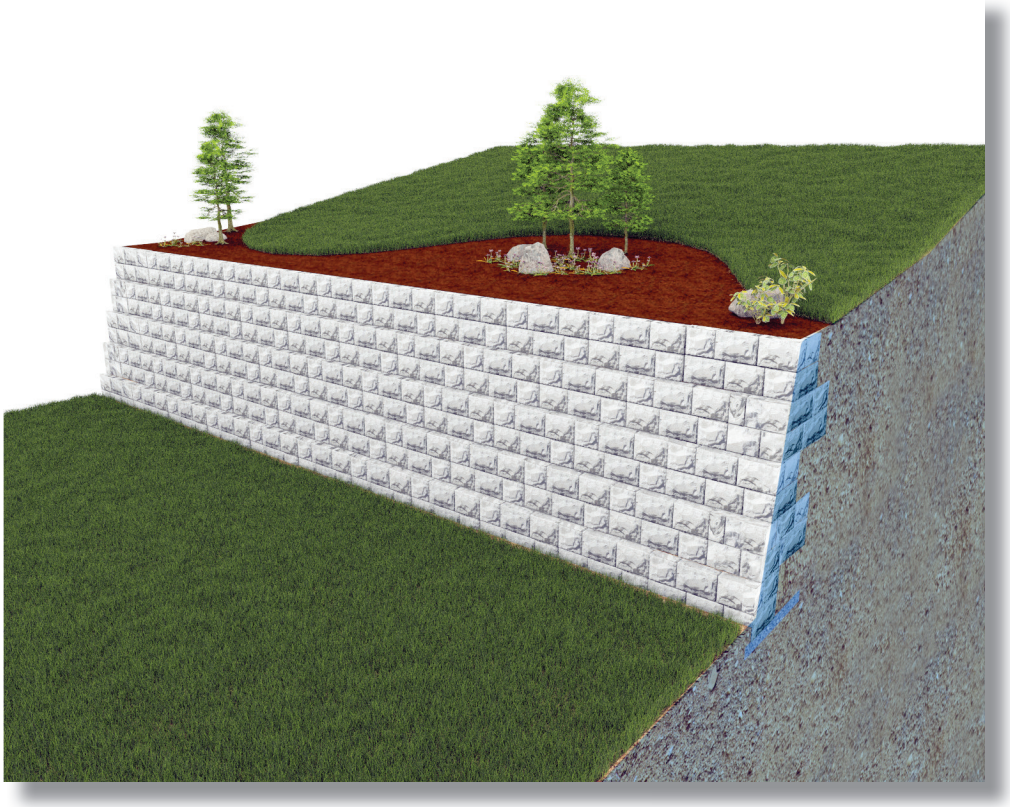
Compact all backfill to a minimum of 95 percent of the maximum dry density (ASTM D 698, Standard Proctor). For cohesive soils, the moisture content at the time of compaction should be adjusted to within -3 and +4 percent of optimum. Place backfill in successive lifts until level with the top of the facing 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.

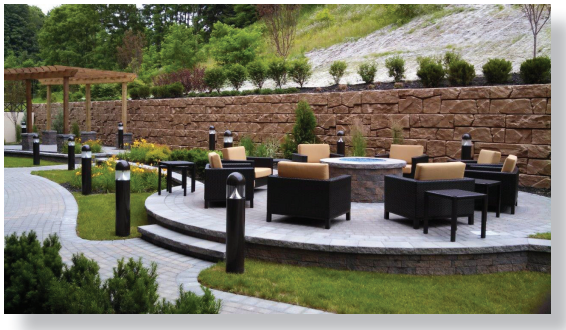
Final Grade and Landscape

Step 9



- 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

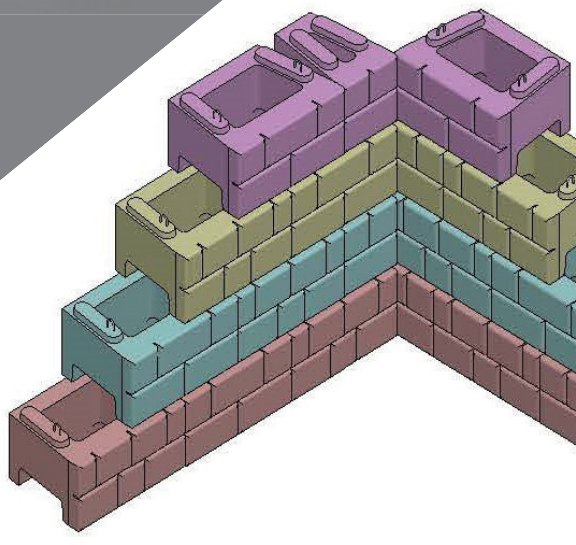
Once the final grade is completed both above and below the wall, landscaping should be installed to complete the aesthetic look to compliment the wall design and appearance. It is important to take precautions to protect planting soils from erosion that may occur during heavy rains or surface run off.



U.S. Version
Release 3.0

Construction Drawings

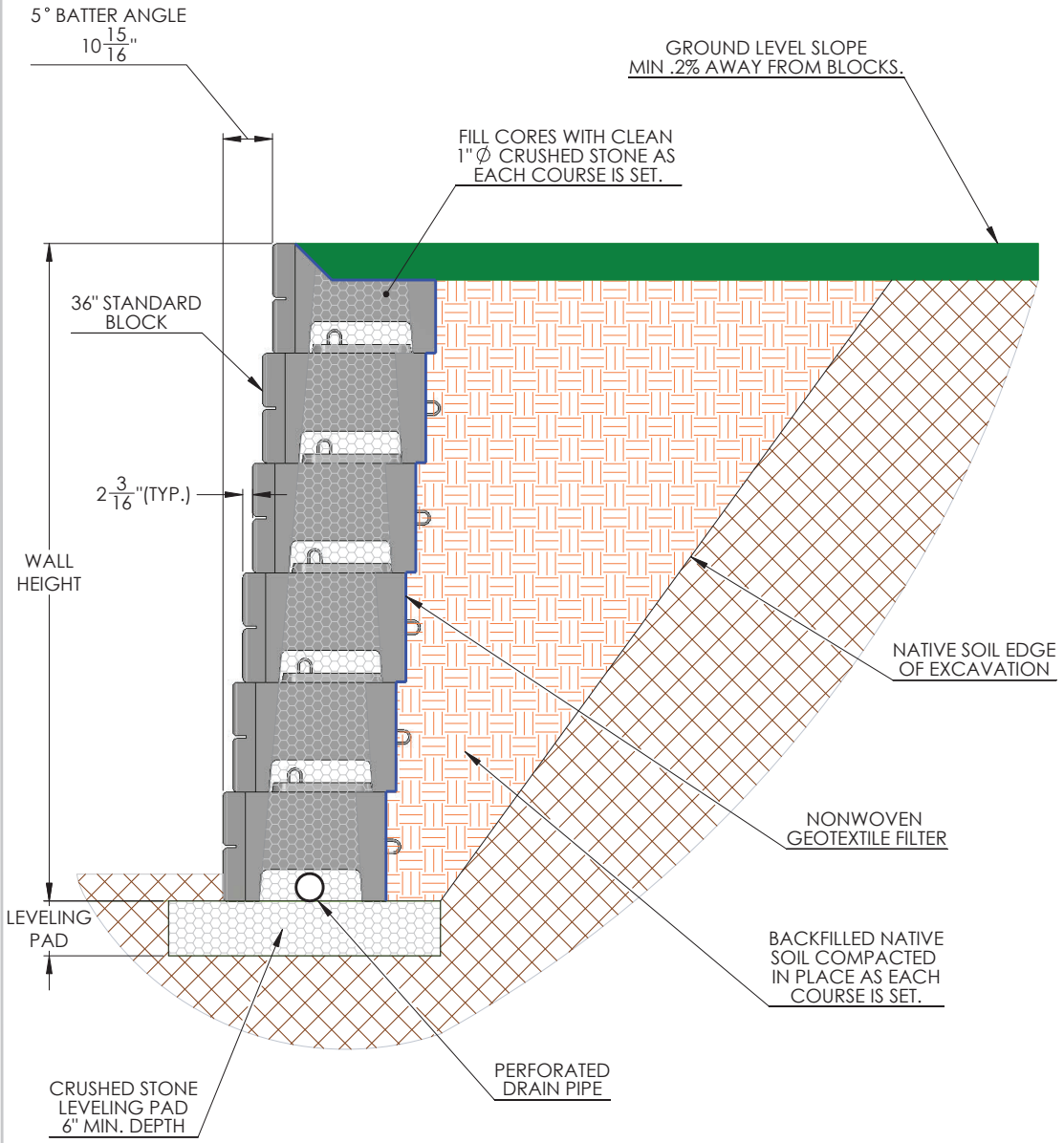
Section 5



VERTI BLOCK®

www.verti-block.com

TYPICAL GRAVITY WALL WITH 36" VERTI-BLOCK



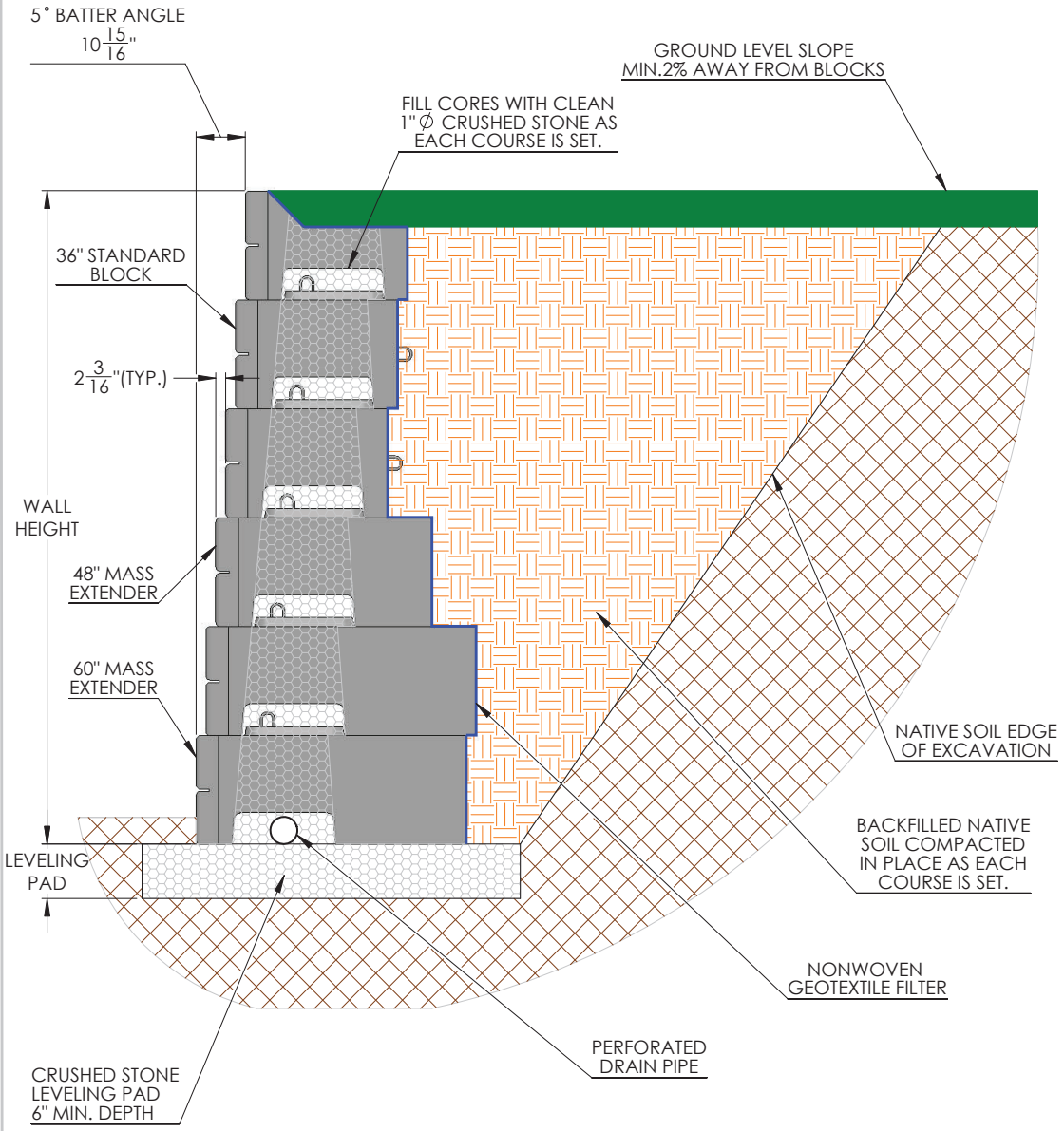
DRAWN BY	DATE	TITLE:
DAN BALLING	12/30/2013	12' RETAINING SECTION

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

DWG NO. WD-14

SCALE: 1: 30 | SHEET 1 OF 1

TYPICAL GRAVITY WALL WITH VERTI-BLOCK MASS EXTENDERS



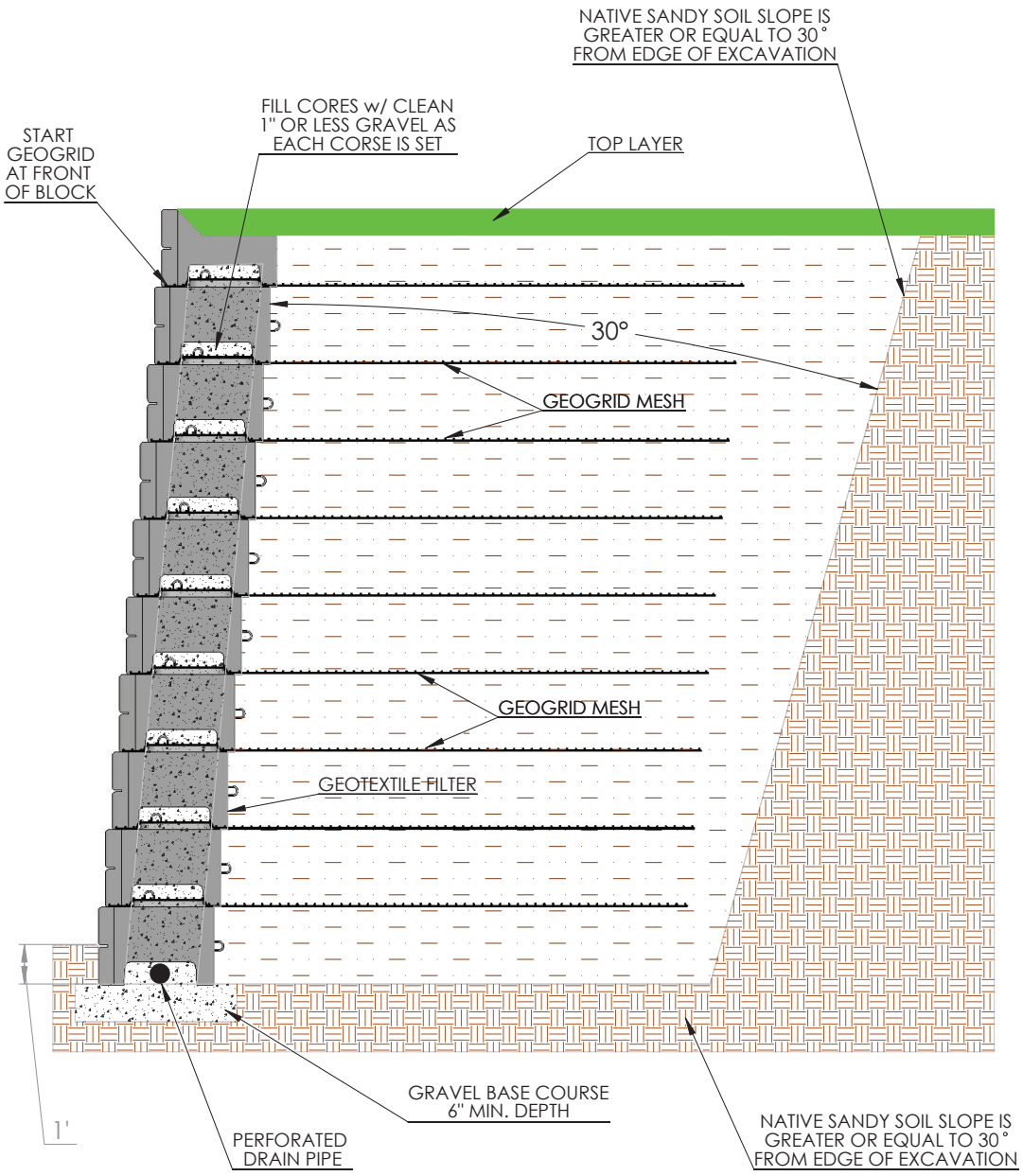
DRAWN BY	DATE	TITLE:
DAN BALLING	12/30/2013	12' SECTION W/ MASS EXTENDERS

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

DWG NO. WD-15

SCALE: 1: 30 | SHEET 1 OF 1

20' GEOGRID FRICTION CONNECTION



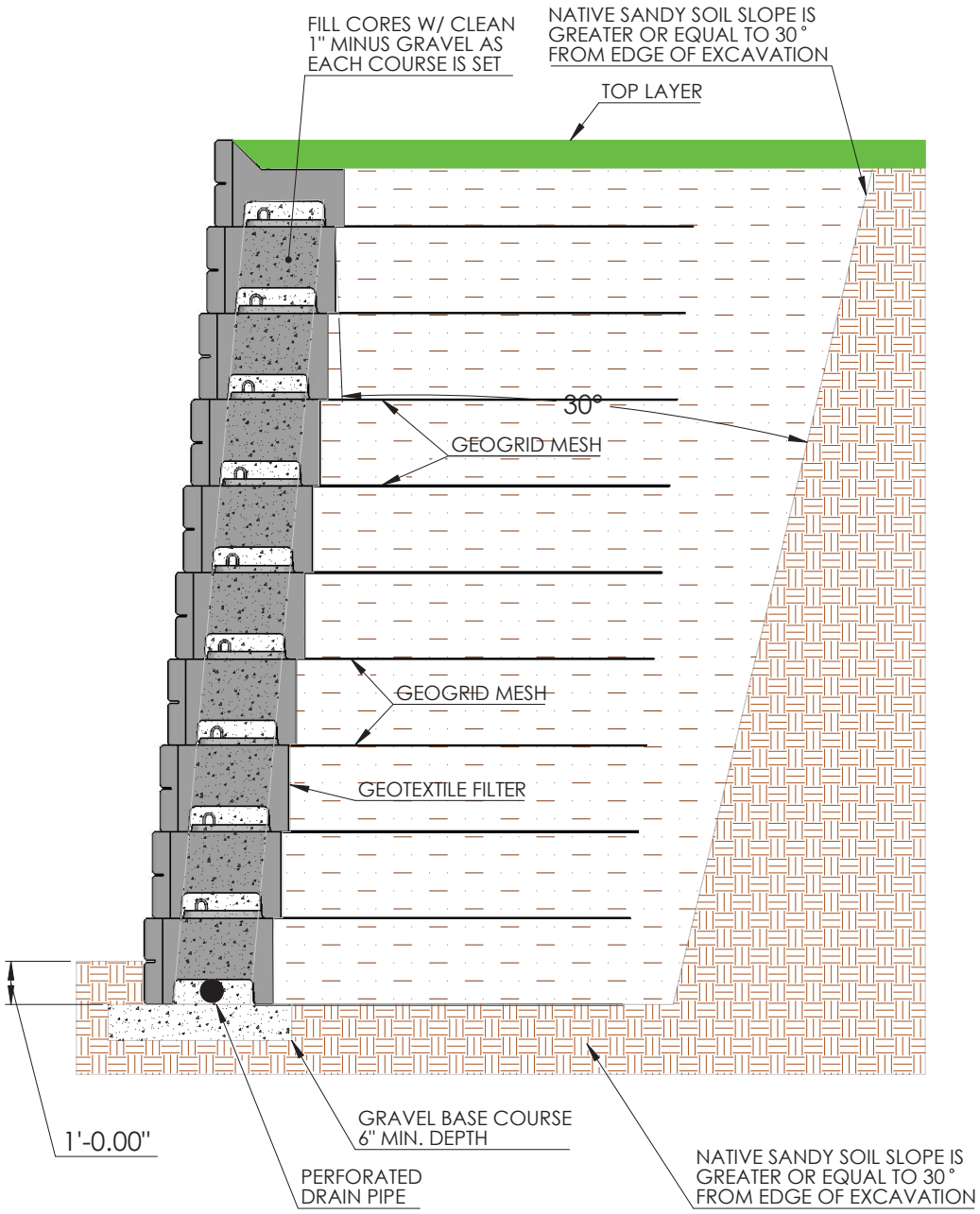
DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	20' FRICTION DETAIL

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

DWG NO. M-03

SCALE: 1: 42 | SHEET 1 OF 1

20' GEOGRID POSITIVE CONNECTION

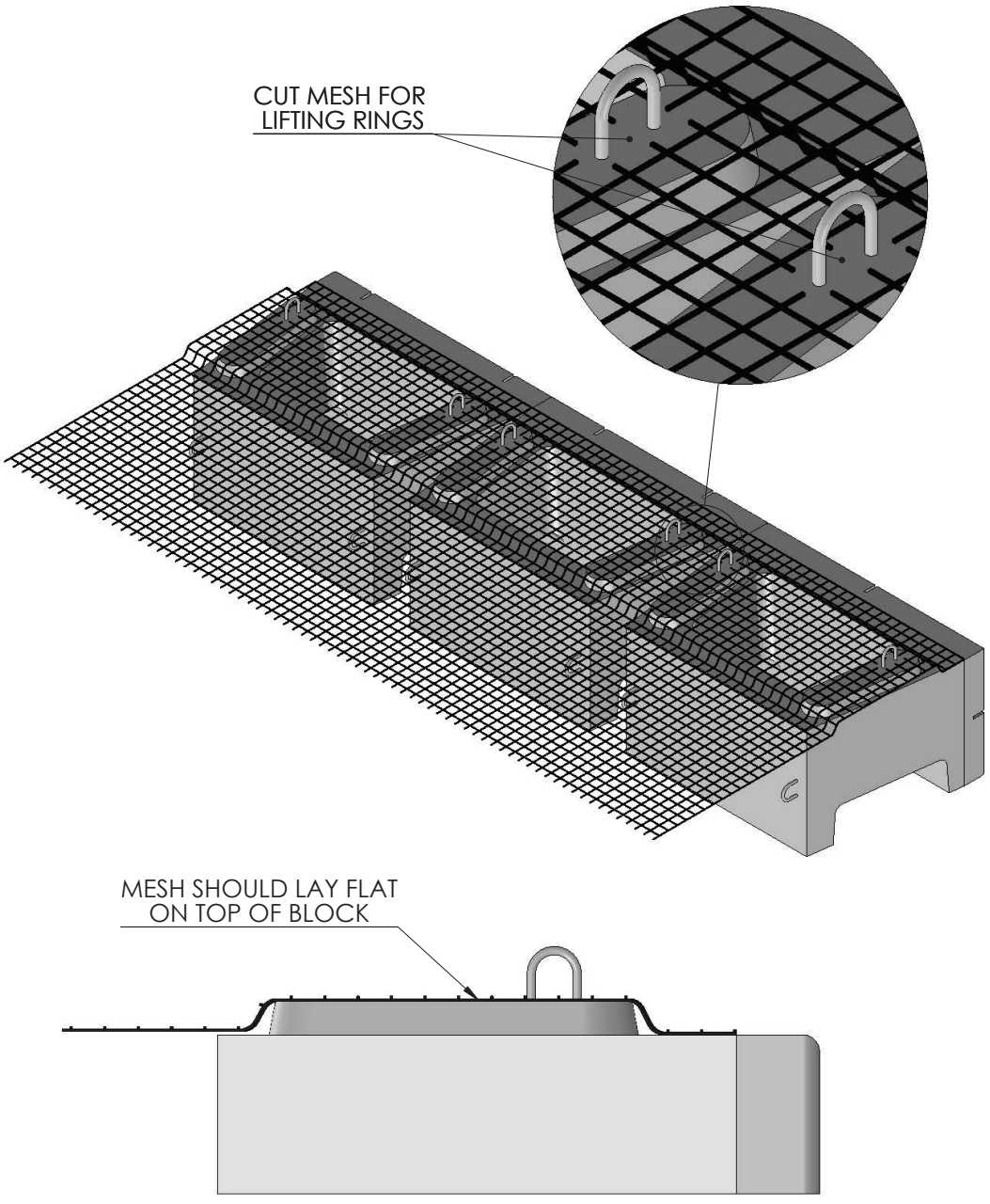


DRAWN BY	DATE	TITLE:
R FONTANESI	3/8/2016	20' LOOP THRU POSITIVE CONNECTION

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

DWG NO. WD-36

SCALE: 1: 30 | SHEET 1 OF 1



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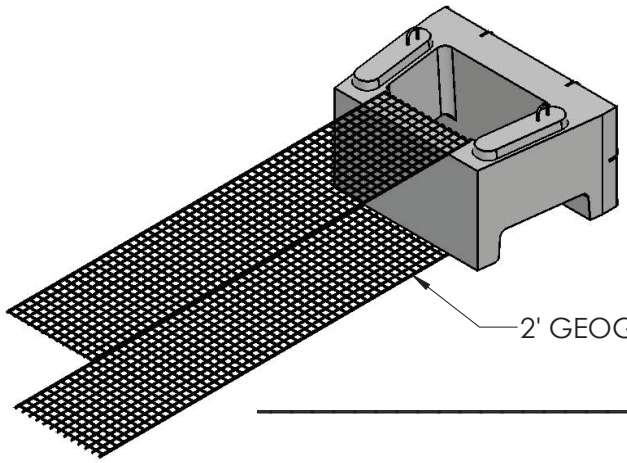
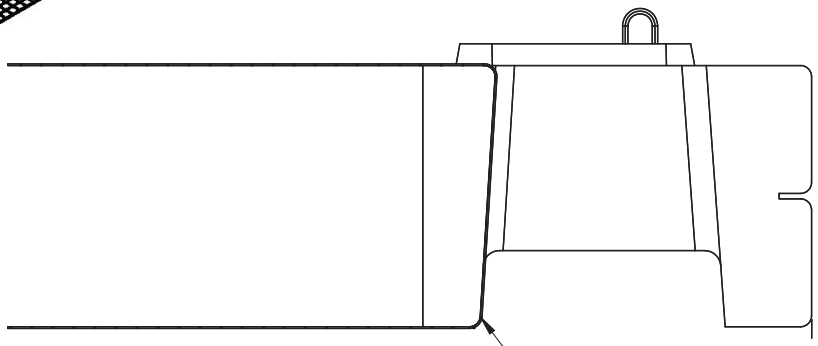
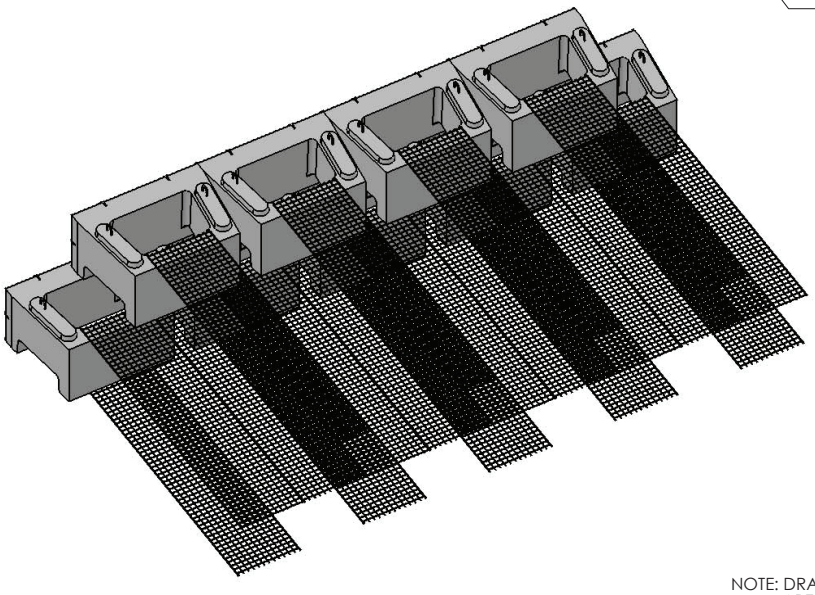
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. M-01
		SCALE: 1: 7 / SHEET 1 OF 1







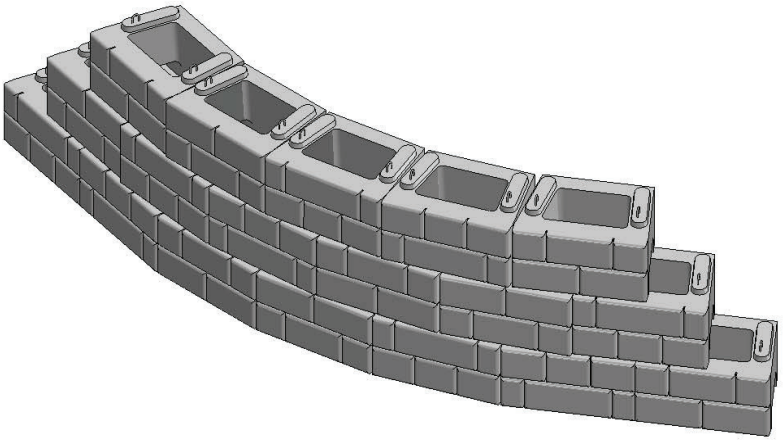
NOTE: DRAWINGS PROVIDED BY VERTI-CRETE ARE FOR REFERENCE ONLY. CONSULT LICENSED ENGINEER FOR FINAL DESIGN.

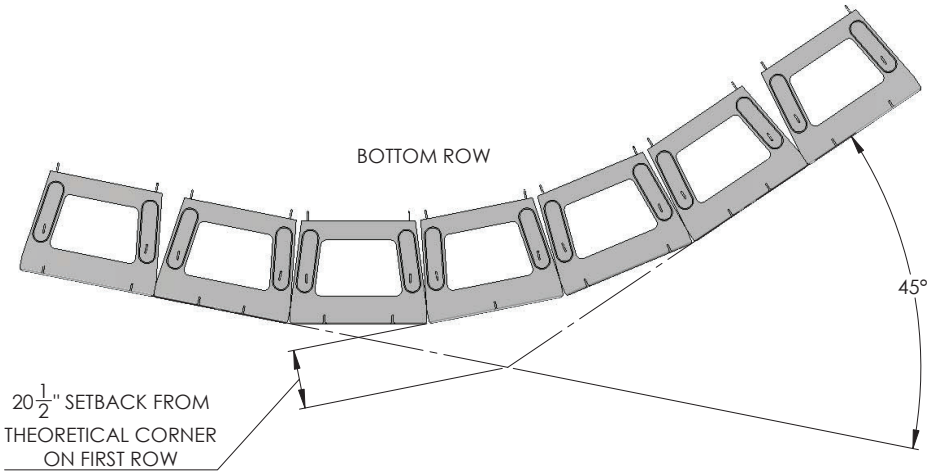
DRAWN BY	DATE	TITLE:
R FONTANESI	3/8/2016	POSITIVE CONNECTION

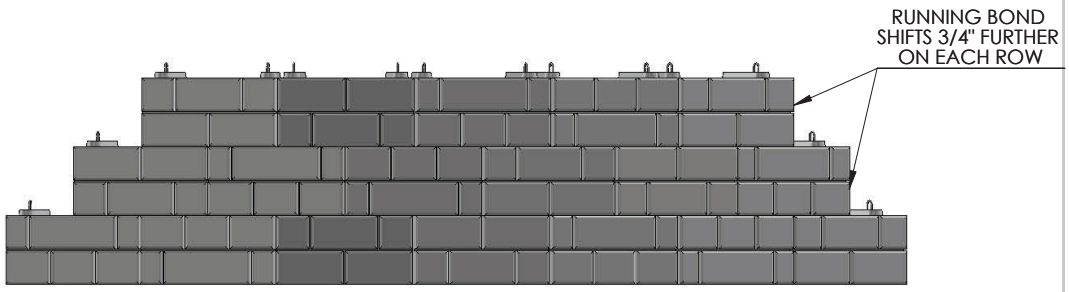
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

DWG NO. WD-35

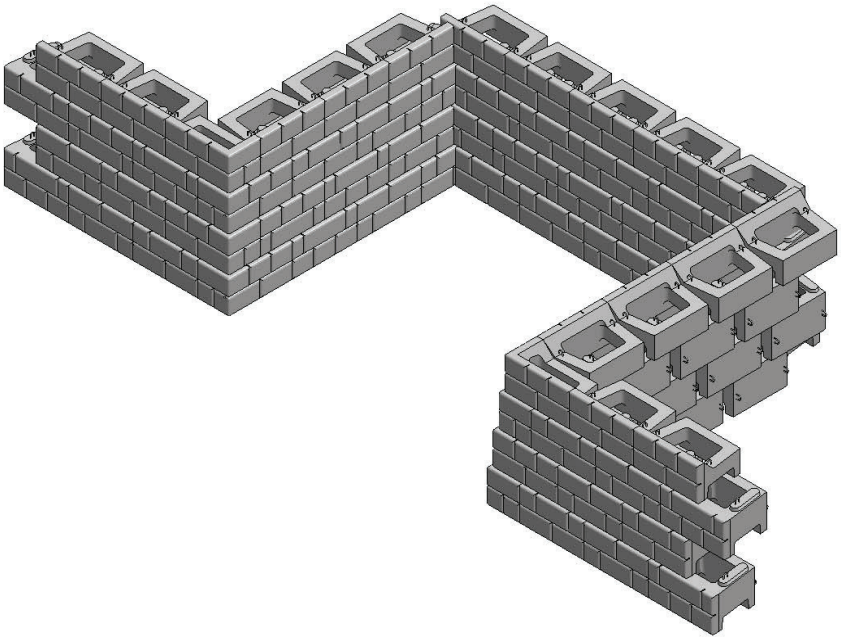
SCALE: 1: 30 | SHEET 1 OF 1

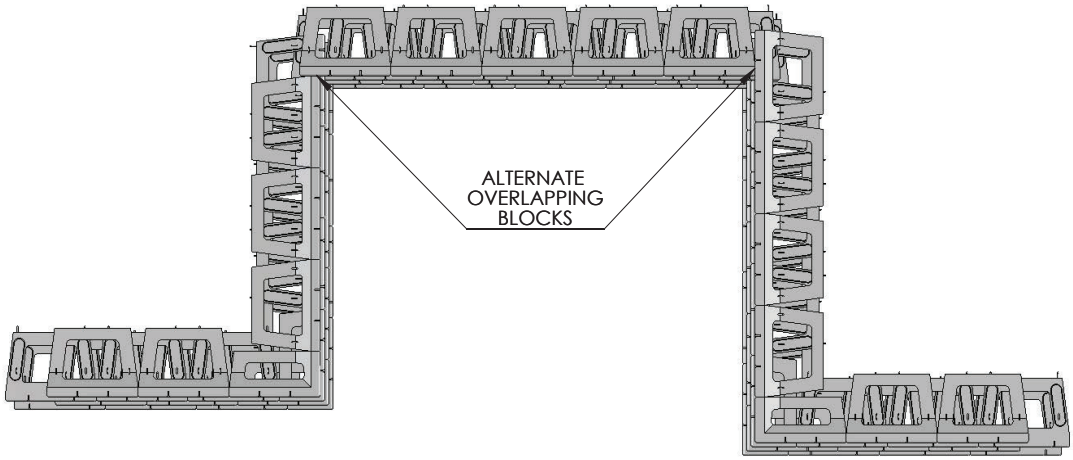




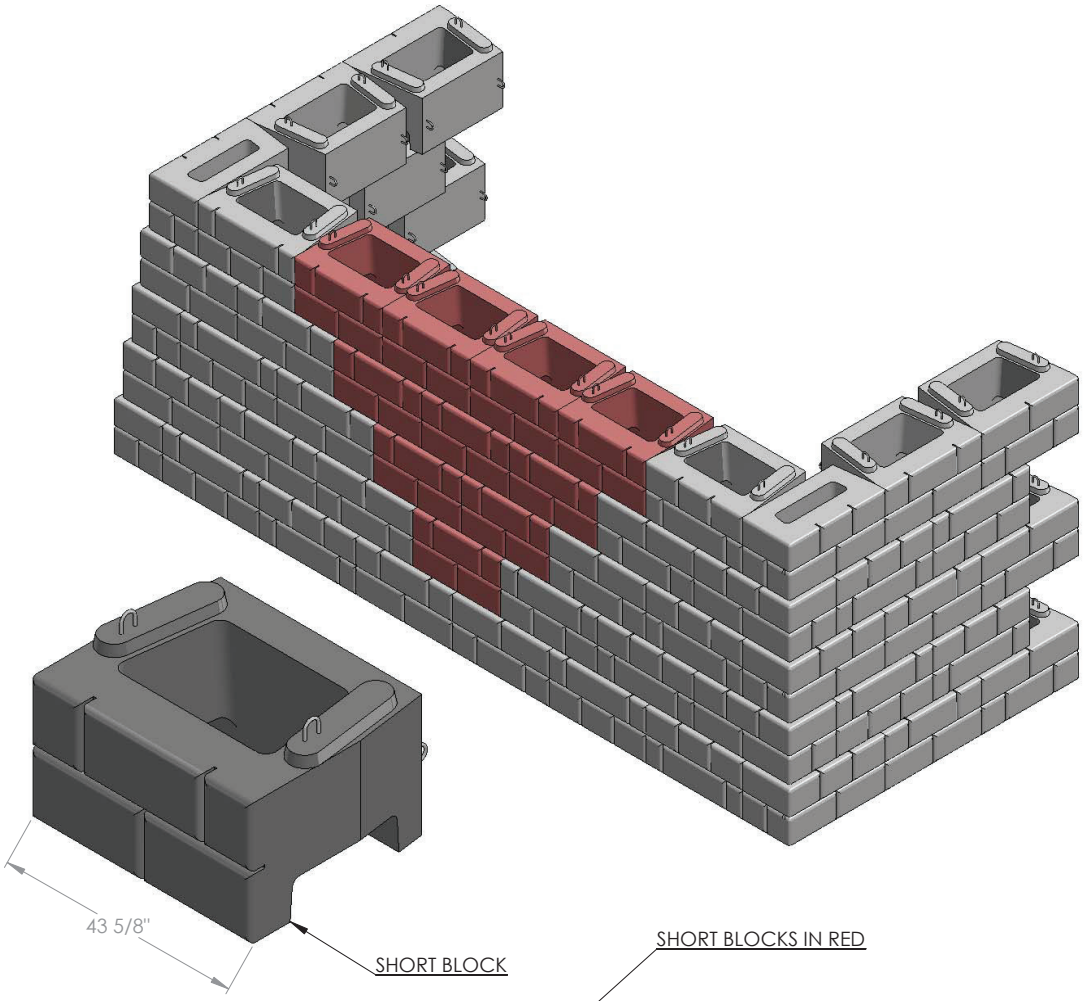


DRAWN BY: DAN BALLING	DATE: 12/12/2013	TITLE: 45° OUTSIDE CORNER
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. C-01
		SCALE: 1: 50 — SHEET 1 OF 1

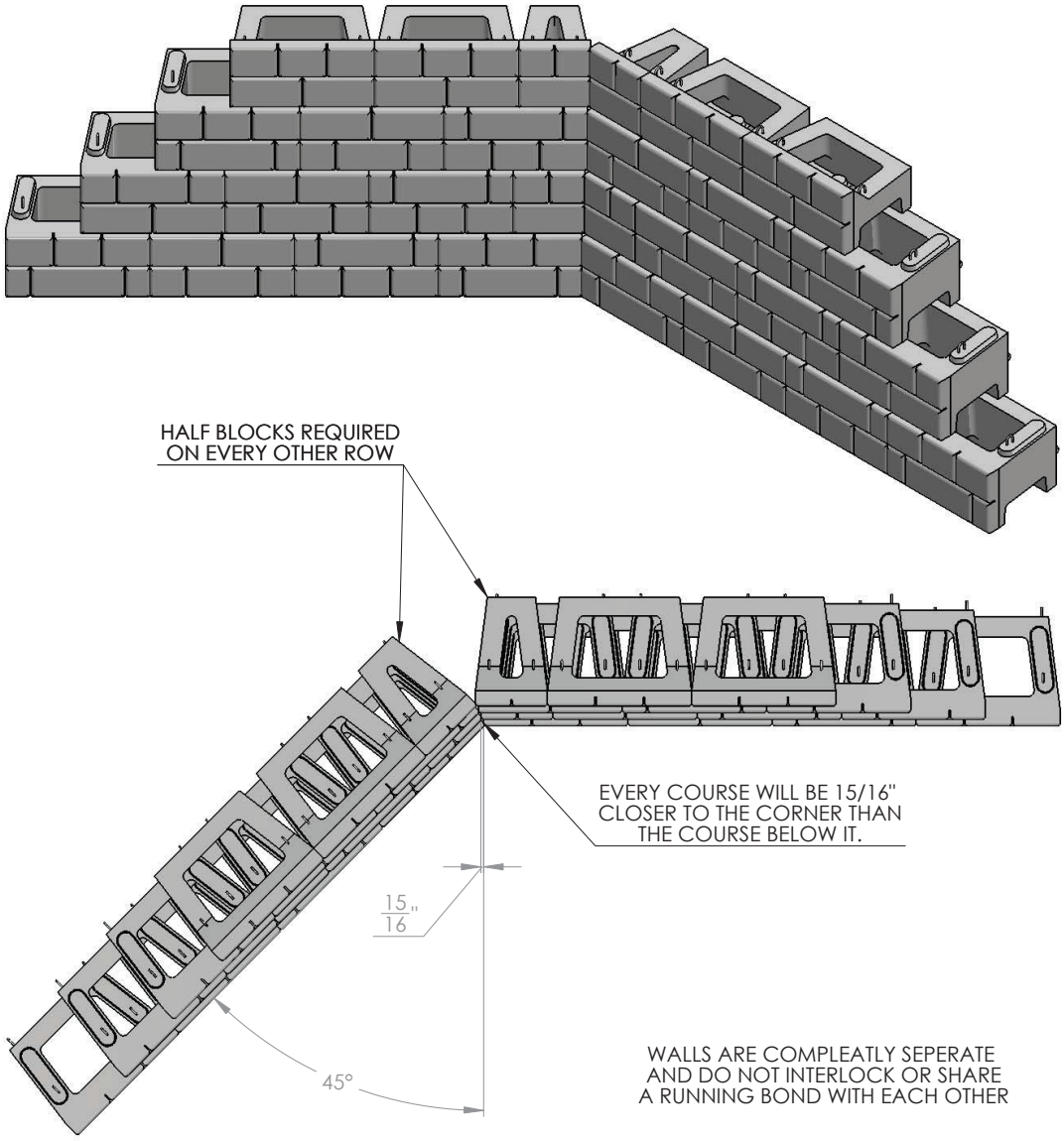




DRAWN BY: DAN BALLING	DATE: 12/12/2013	TITLE: DOUBLE 90° INSIDE CORNER
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. C-02
		SCALE: 1: 50 / SHEET 1 OF 1



DRAWN BY: DAN BALLING	DATE: 12/12/2013	TITLE: DOUBLE 90° OUTSIDE CORNER
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. C-03
		SCALE: 1: 50 — SHEET 1 OF 1



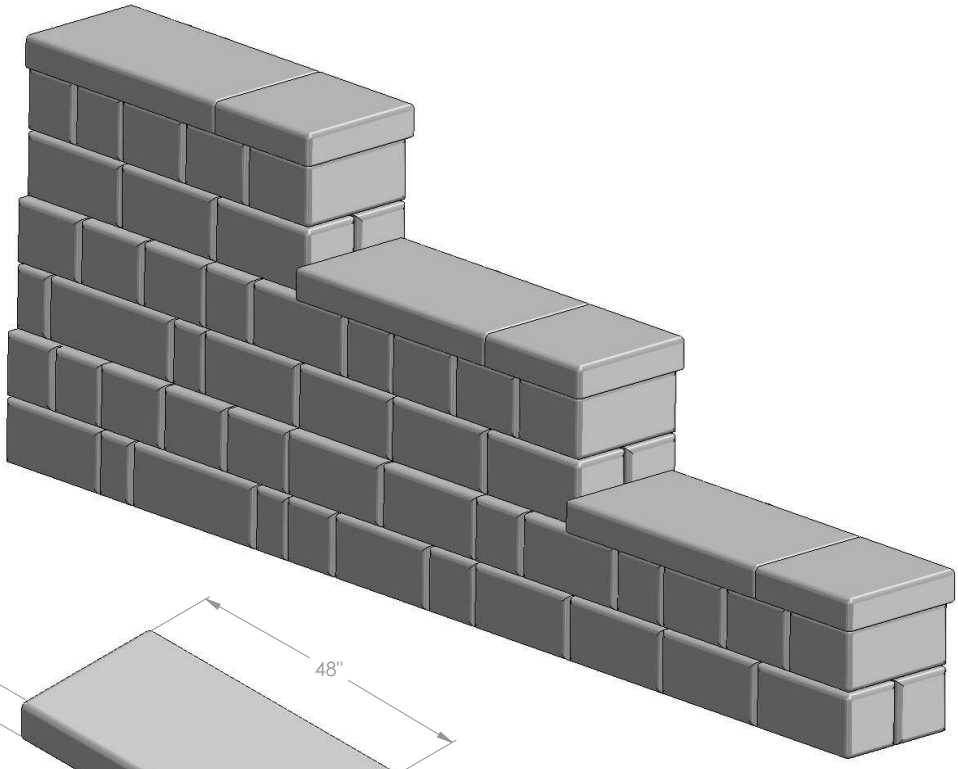
DRAWN BY	DATE	TITLE:
DAN BALLING	2/4/2014	45° SEPARATE WALLS

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

DWG NO. C-04

SCALE: 1 : 50 | SHEET 1 OF 1

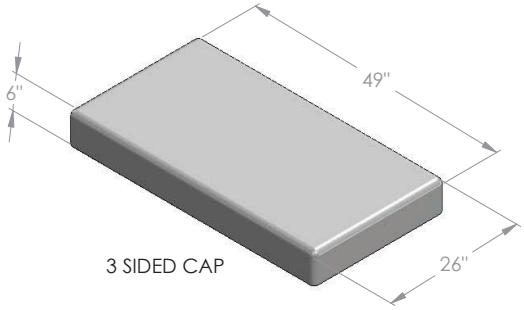
6 INCH CAP STEP-DOWN



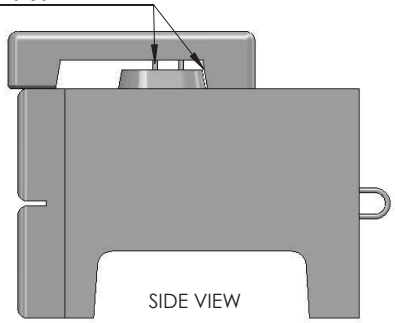
2 SIDED CAP

CAP BLOCK WEIGHT = 478 LBS

CONFLICTING AREA WILL REQUIRE THE USE OF
A 13" NUB BLOCKOUT OR SAW CUT AND REMOVAL
OF PICK POINT WHEN CAP IS USED



3 SIDED CAP



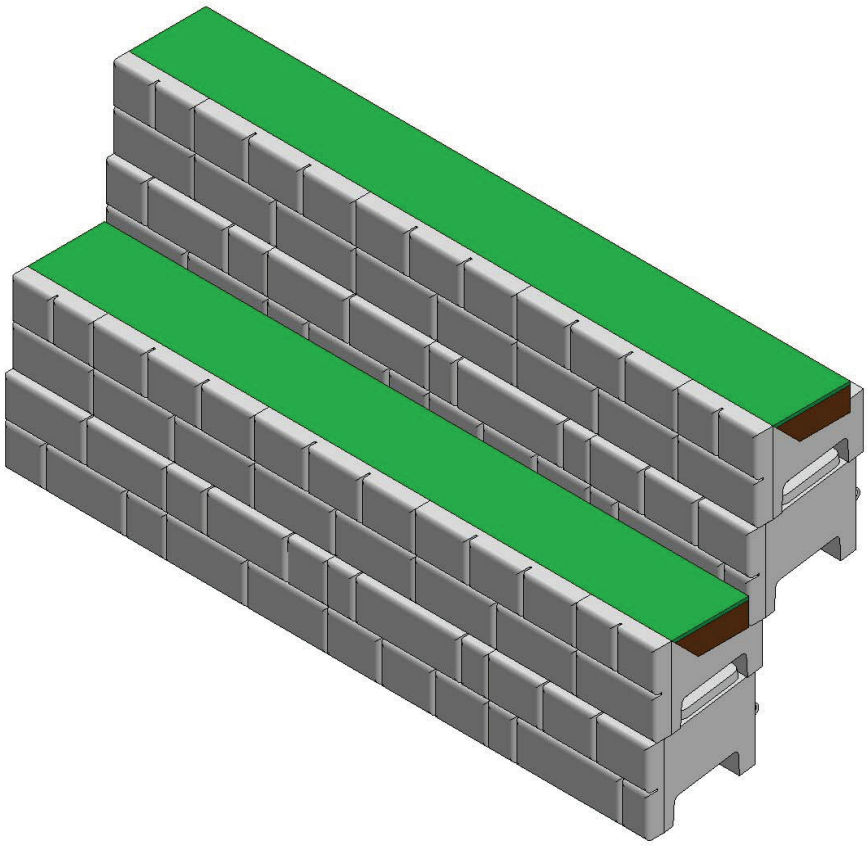
SIDE VIEW

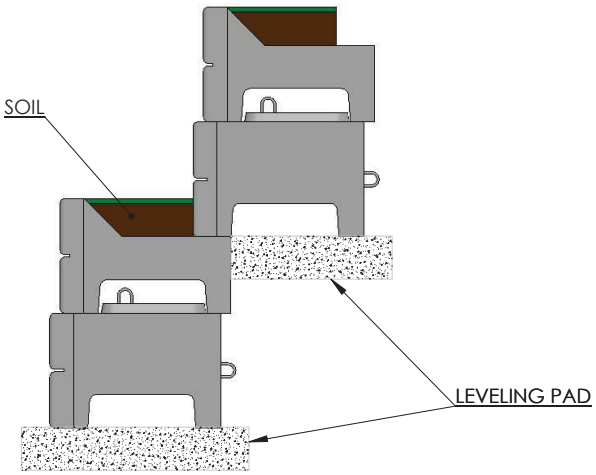
DRAWN BY	DATE	TITLE:
DAN BALLING	12/18/2013	6" CAP BLOCK SCENARIO

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

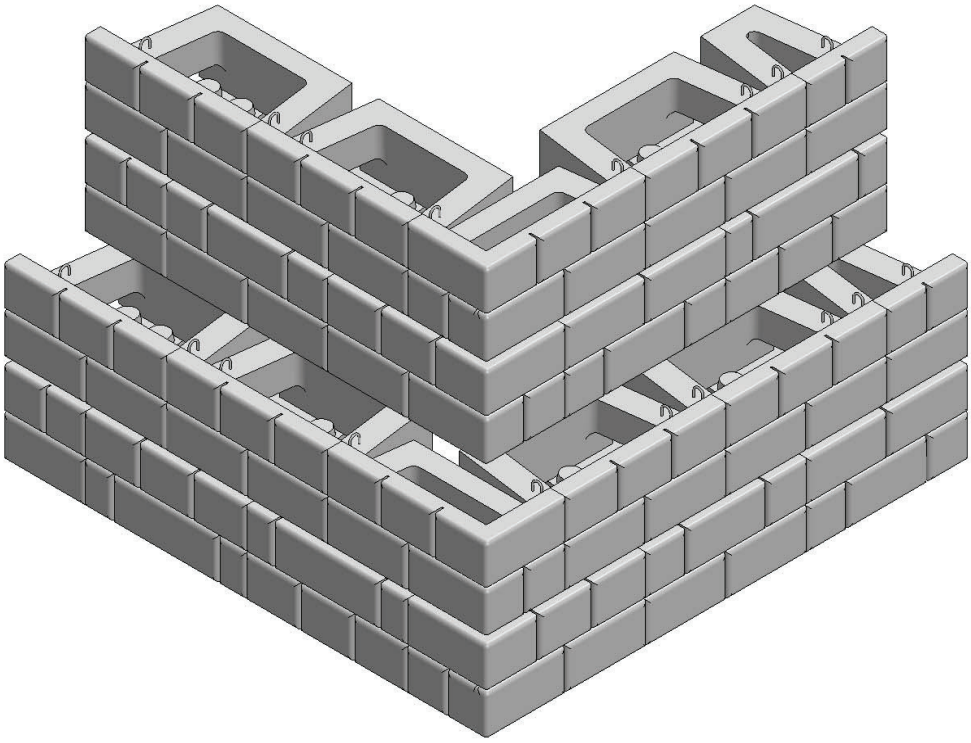
DWG NO. CB-01

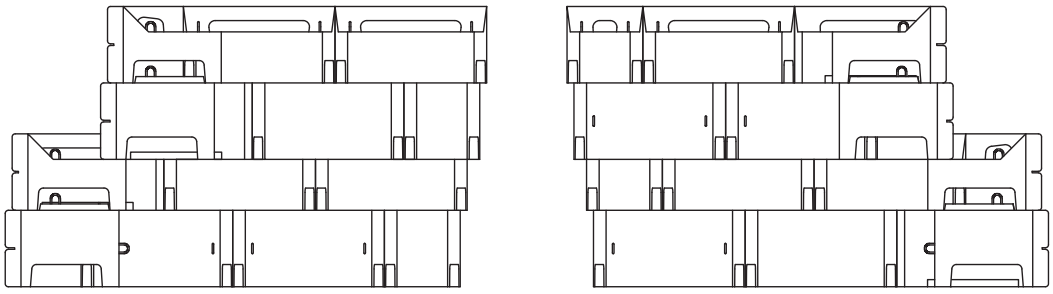
SCALE: 1: 4 | SHEET 1 OF 1





VERTI BLOCK	DRAWN BY	DATE	TITLE: PLANTER ROW WALL
	DAN BALLING	12/12/2013	
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. PR-01
			SCALE: 1: 4 — SHEET 1 OF 1





BACK SIDE VIEWS

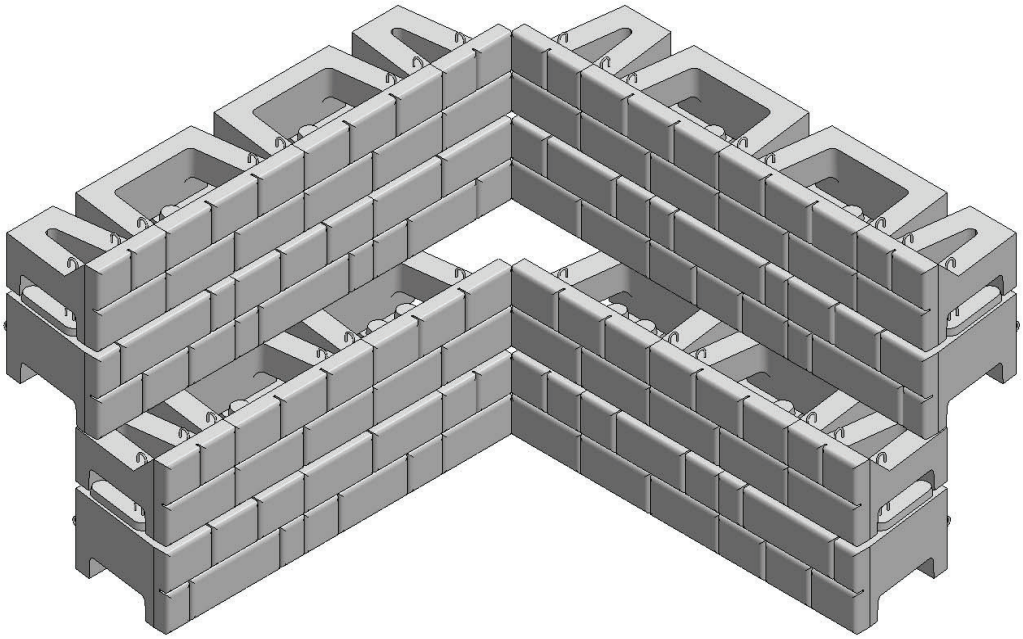
NOTE:
REFERENCE OUTSIDE CORNER DETAIL ON NUB BLOCKOUT

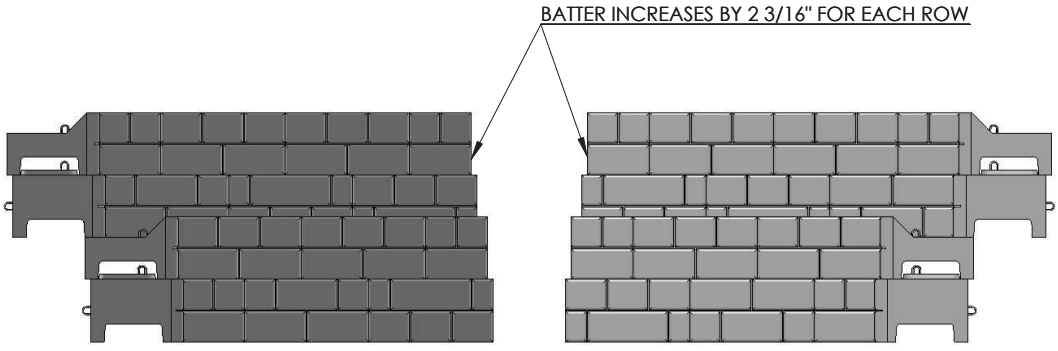
DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	PLANTER ROW OUTSIDE CORNER

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

DWG NO. PR-02

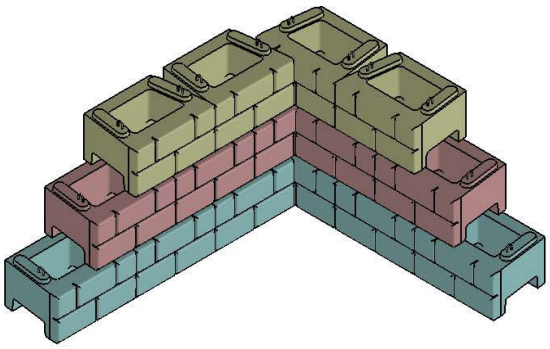
SCALE: 1: 4 | SHEET 1 OF 1

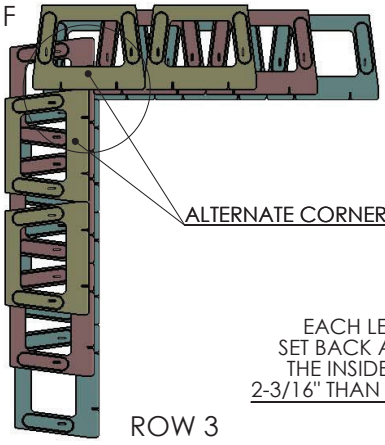


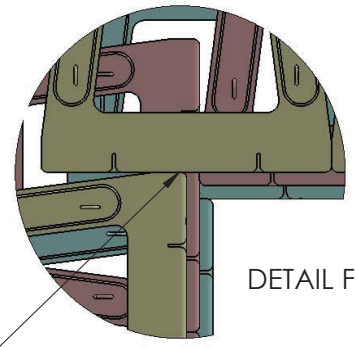


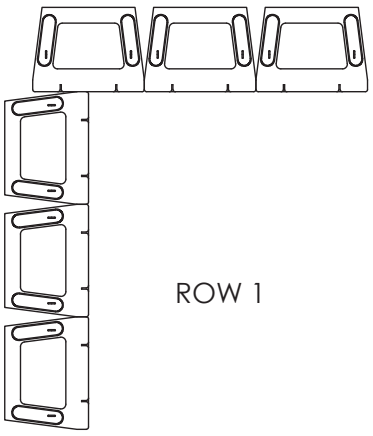
DRAWN BY: DAN BALLING	DATE: 12/12/2013	TITLE: PLANTER ROW INSIDE CORNER
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. PR-03
		SCALE: 1: 4 / SHEET 1 OF 1

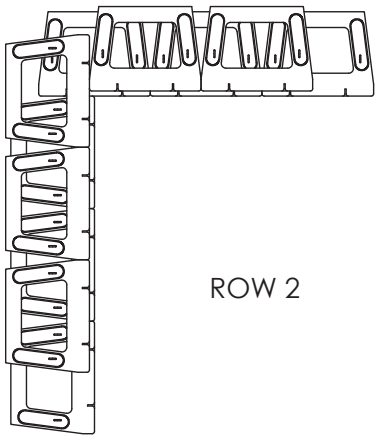
INTERLACED INSIDE CORNER DETAIL





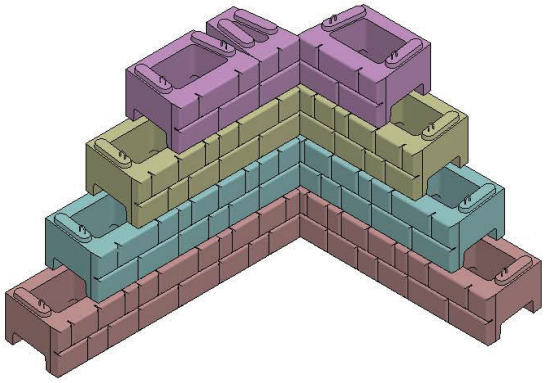


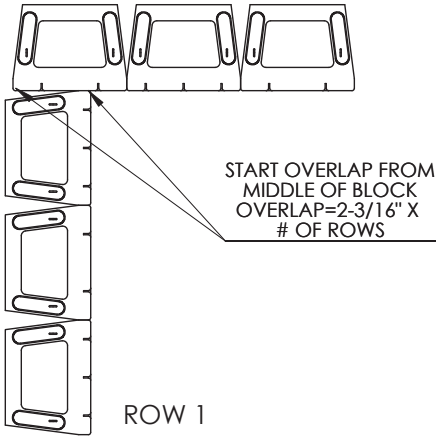


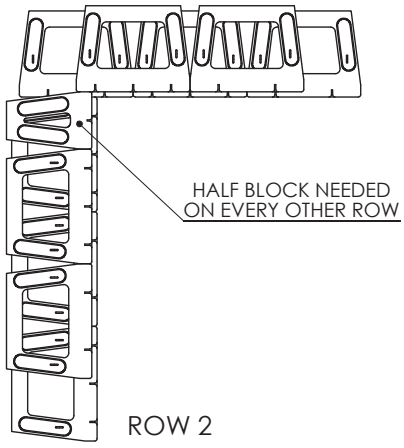


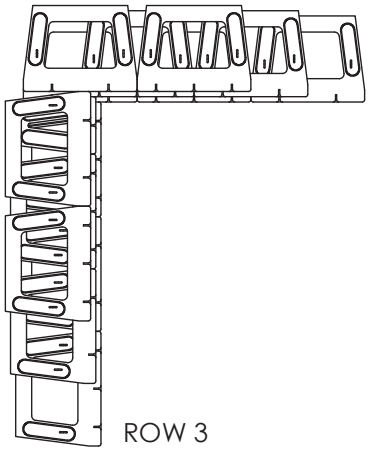
VERTI BLOCK	DRAWN BY: DAN BALLING	DATE: 12/12/2013
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028	TITLE: INTERLACED INSIDE CORNER	
	DWG NO.: WD-1	
	SCALE: 1: 60	SHEET 1 OF 1

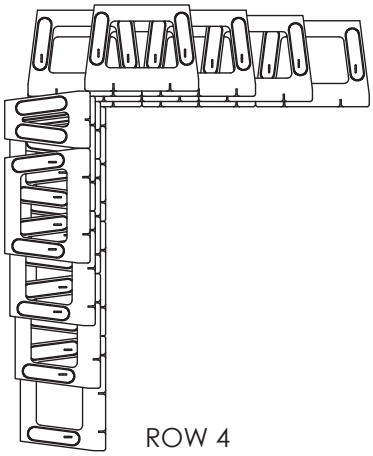
BUTT-JOINT INSIDE CORNER DETAIL





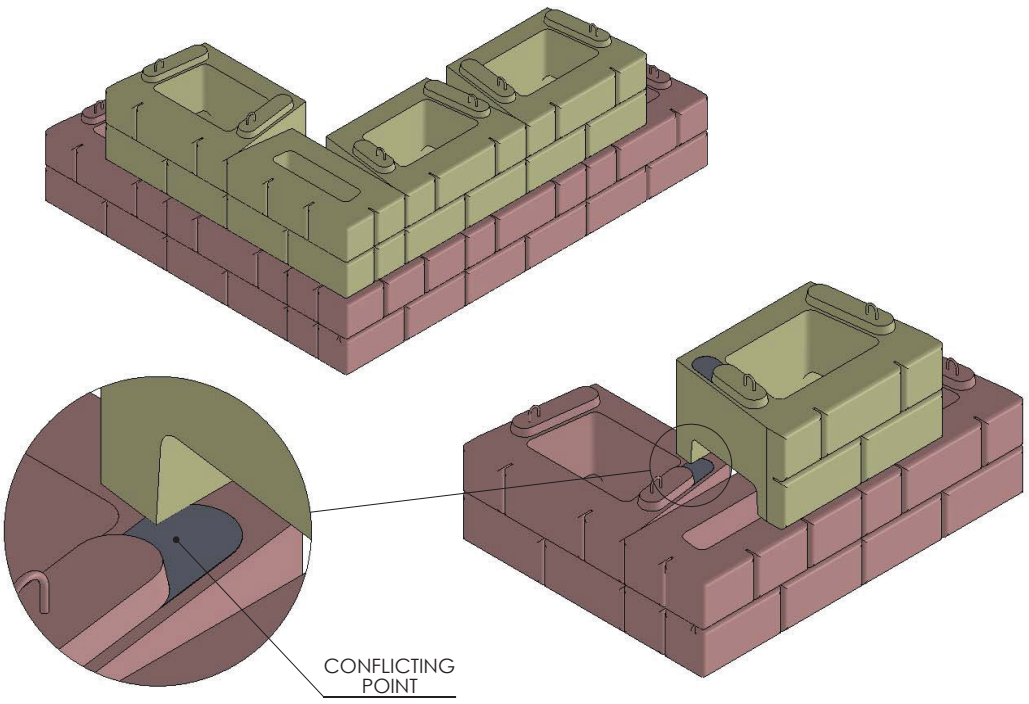


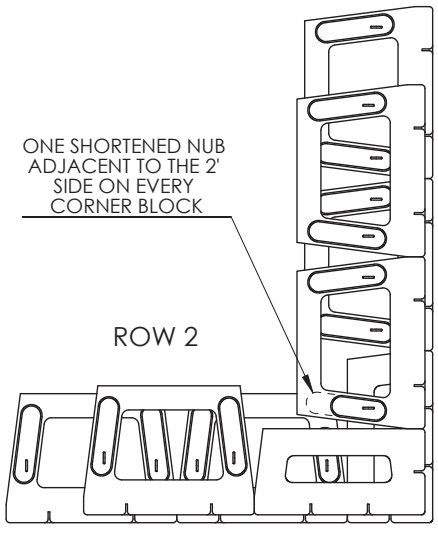


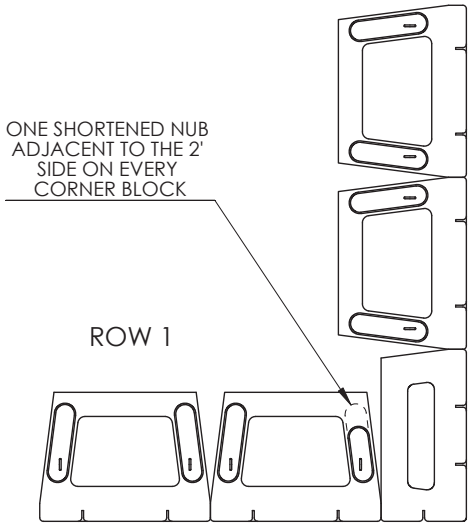


DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	BUTT-JOINT INSIDE CORNER
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-2
		SCALE: 1: 60 / SHEET 1 OF 1

OUTSIDE CORNER DETAIL

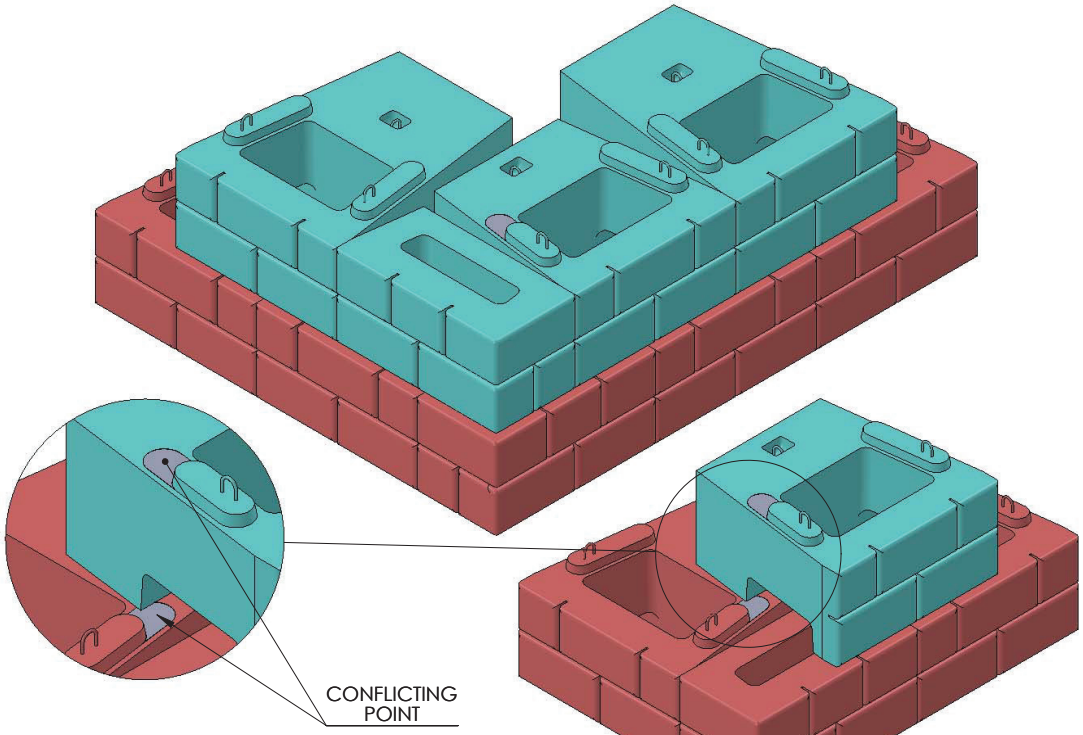


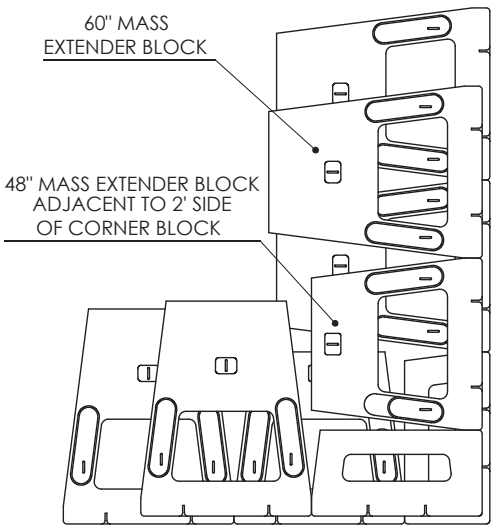




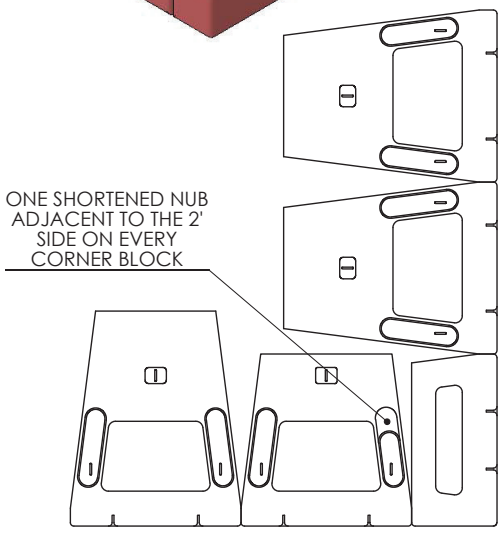
VERTI BLOCK	DRAWN BY	DATE	TITLE: OUTSIDE CORNER
	DAN BALLING	12/12/2013	
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-3
			SCALE: 1: 40 — SHEET 1 OF 1

OUTSIDE CORNER WITH MASS EXTENDERS DETAIL





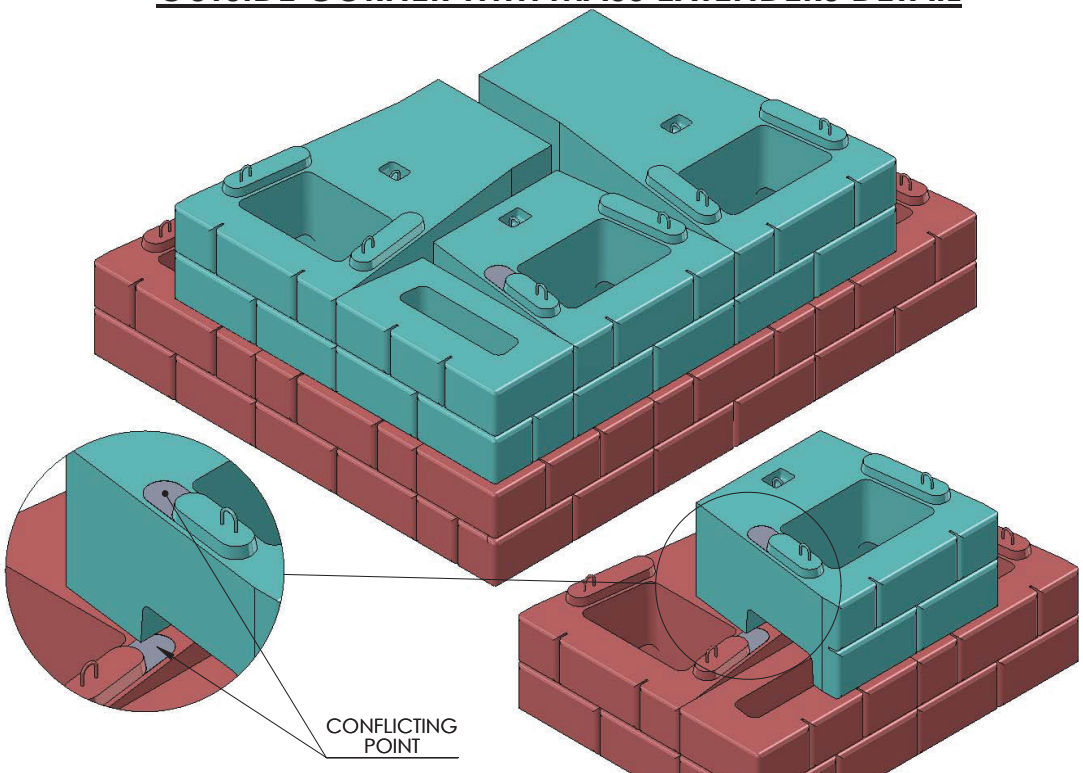
ROW 2

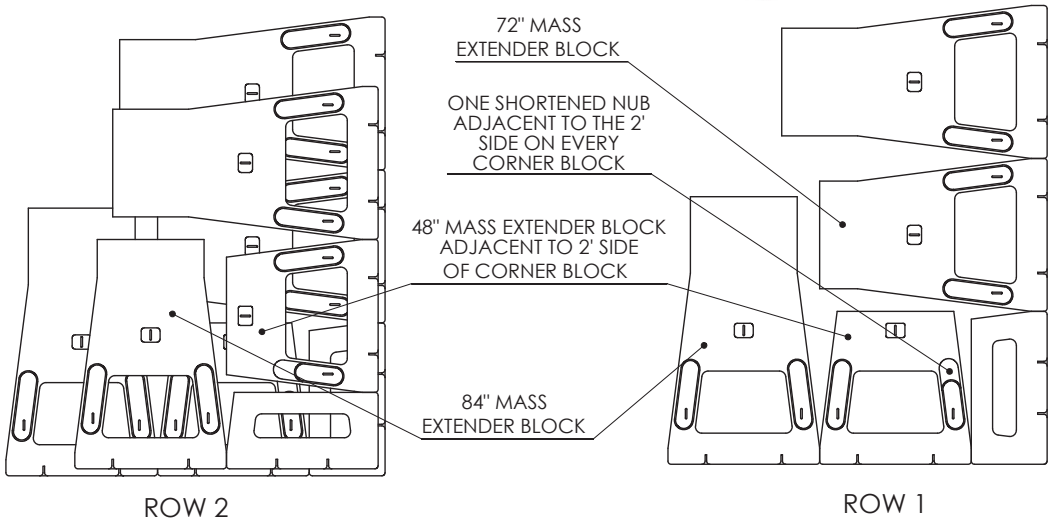


ROW 1

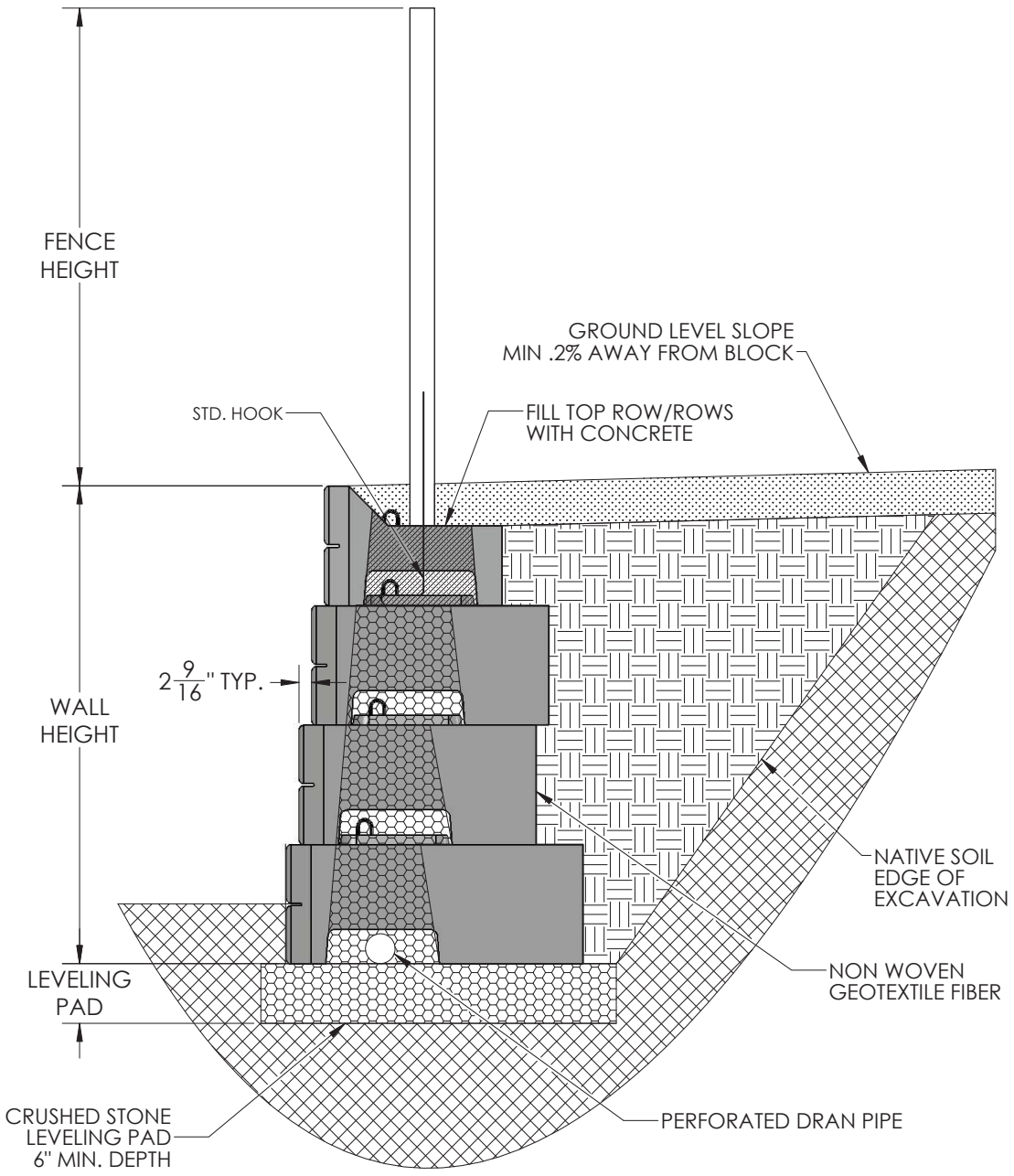
DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	OUTSIDE CORNER w/ ME
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-5
		SCALE: 1: 40 / SHEET 1 OF 1

OUTSIDE CORNER WITH MASS EXTENDERS DETAIL





DRAWN BY: R FONTANESI	DATE: 6/5/2015	TITLE: OUTSIDE CORNER w/ 84" ME
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-22
		SCALE: N/A — SHEET 1 OF 1



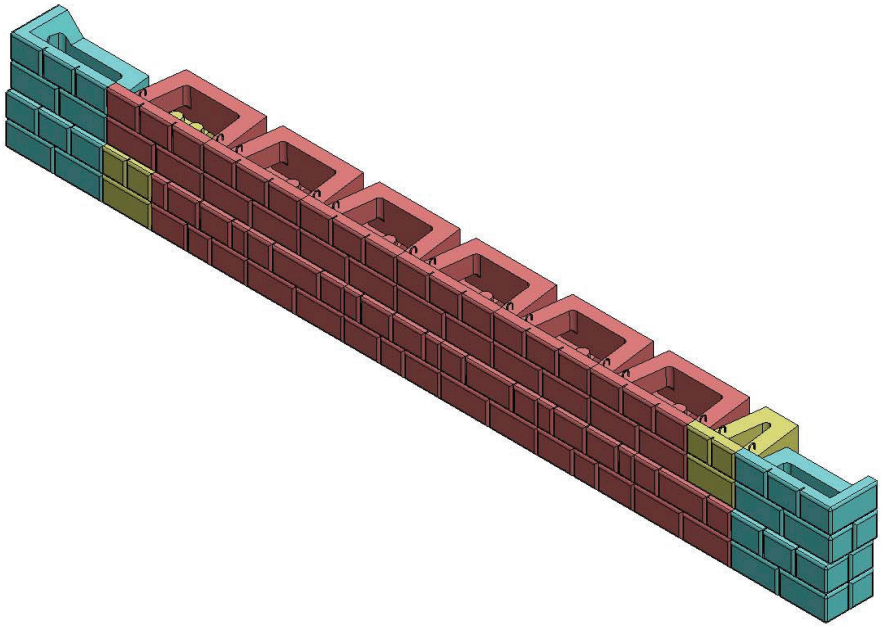
DRAWN BY	DATE	TITLE:
R FONTANESI	3/4/2016	GRAVITY WALL W/ FENCE

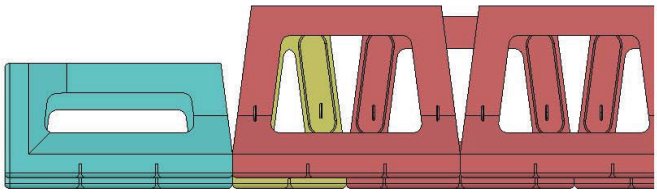
16500 SOUTH 500 WEST
BLUFFDALE, UTAH 84065
PHONE: (801) 571-2028

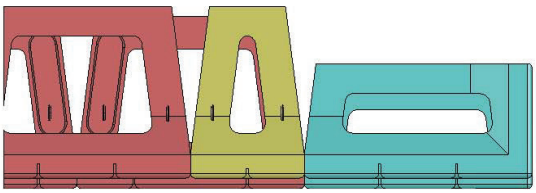
DWG NO. WD-33

SCALE: 1: 30 | SHEET 1 OF 1

STRAIGHT FACE WITH SIMPLE 2' RETURNS

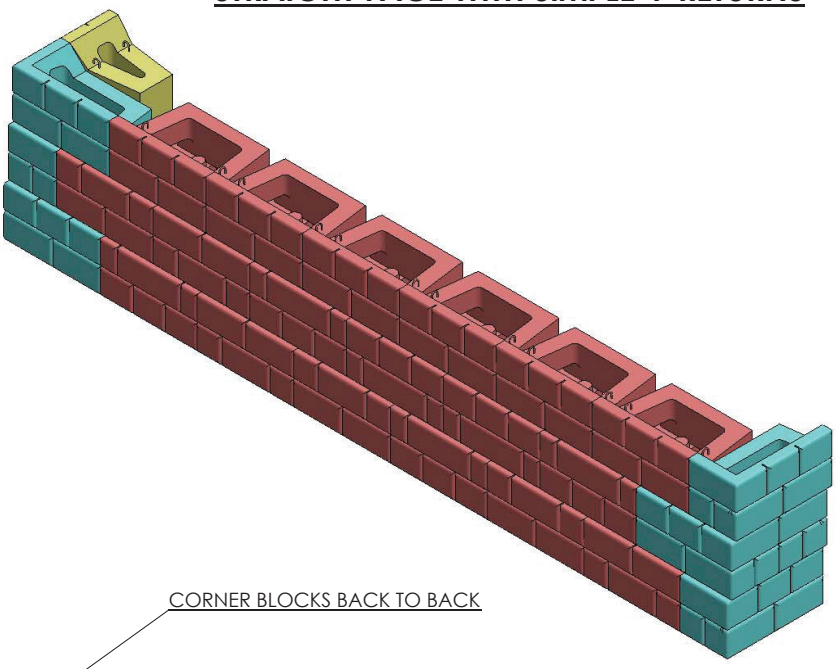


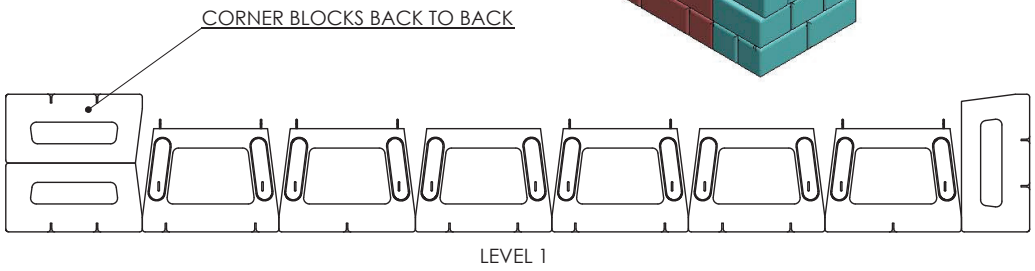




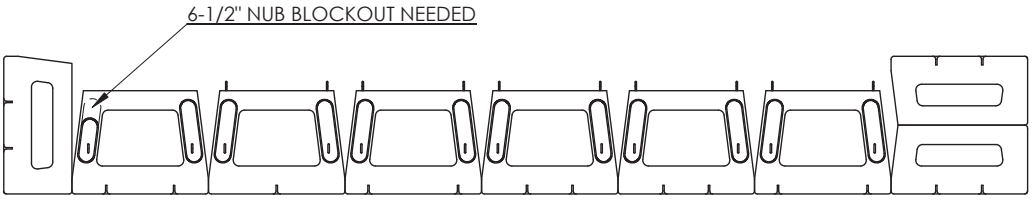
VERTI BLOCK	DRAWN BY	DATE	TITLE: 2' RETURN
	DAN BALLING	12/12/2013	
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028			DWG NO. WD-4
			SCALE: 1: 40 — SHEET 1 OF 1

STRAIGHT FACE WITH SIMPLE 4' RETURNS

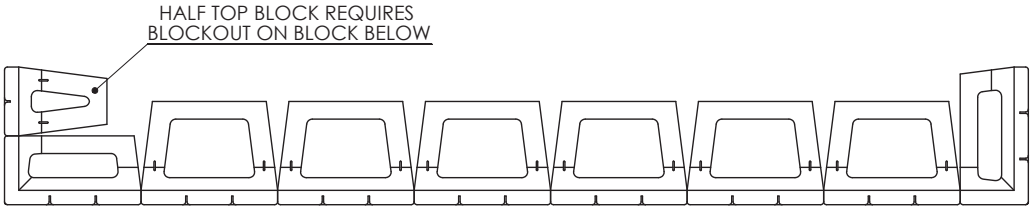




LEVEL 1



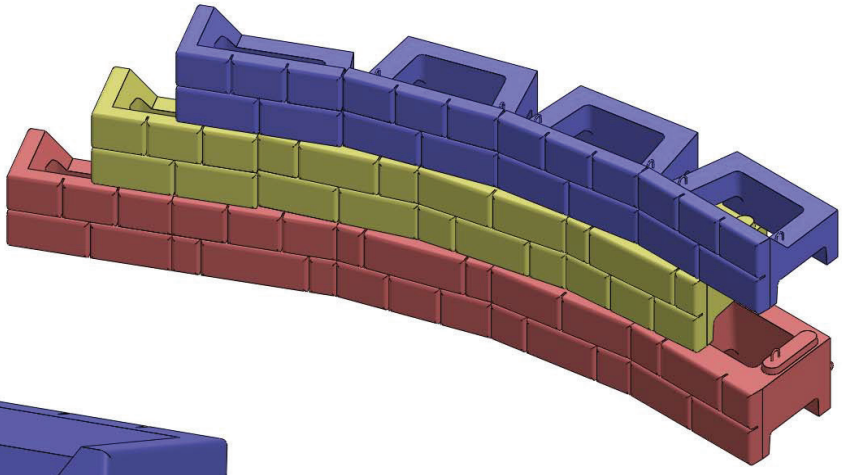
LEVEL 2

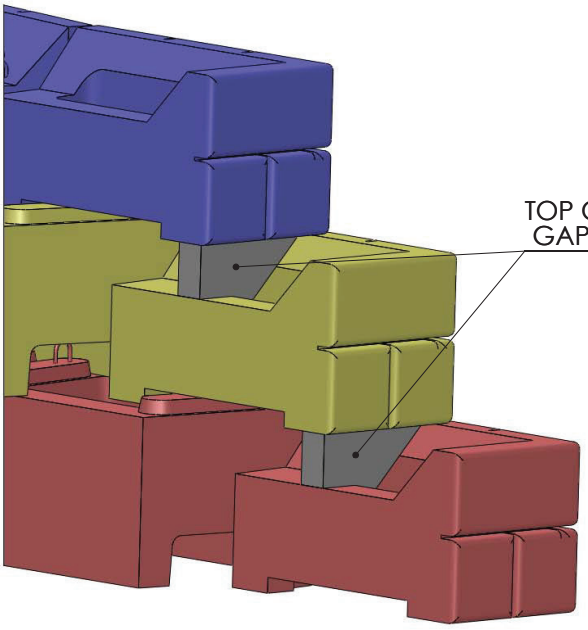


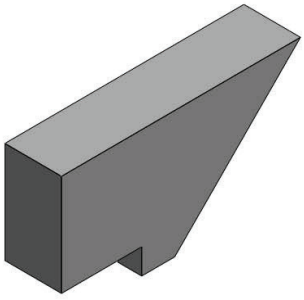
LEVEL 3

DRAWN BY	DATE	TITLE:	4' RETURN
DAN BALLING	12/12/2013		
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO.	WD-07
		SCALE: 1: 4	SHEET 1 OF 1

2' STEP DOWN WITH TOP CORNER GAP INSERTS



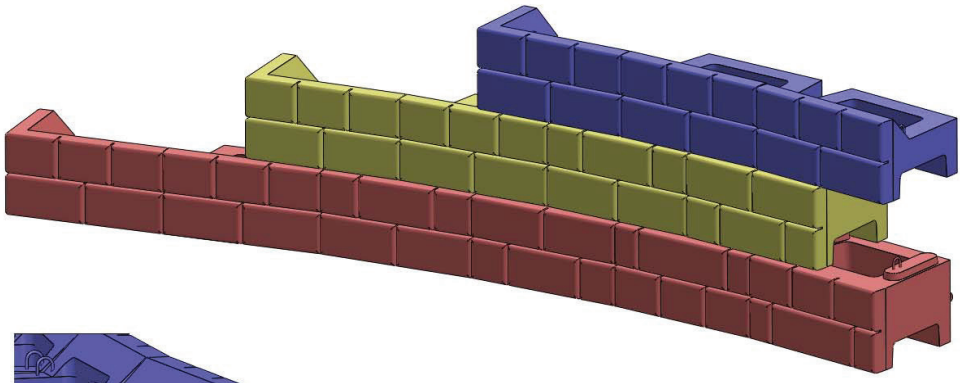


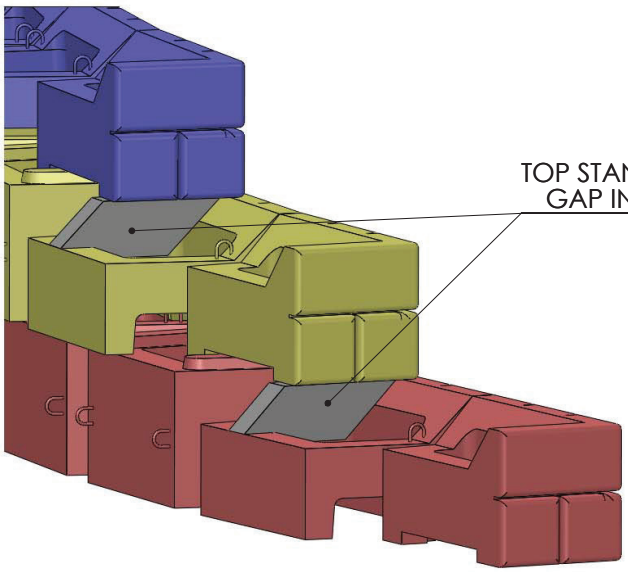


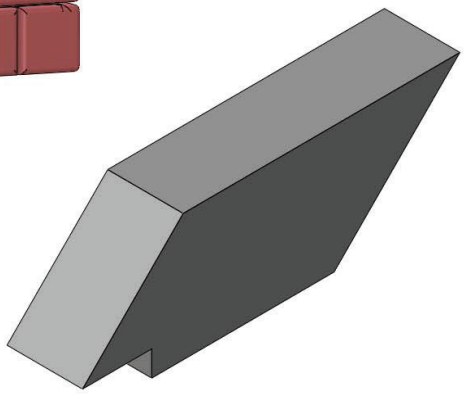
TOP CORNER GAP INSERT

DRAWN BY	DATE	TITLE:	2' STEP DOWN
DAN BALLING	12/12/2013		
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO.	WD-8
		SCALE: 1: 40	SHEET 1 OF 1

6' STEP DOWN WITH TOP STANDARD GAP INSERT



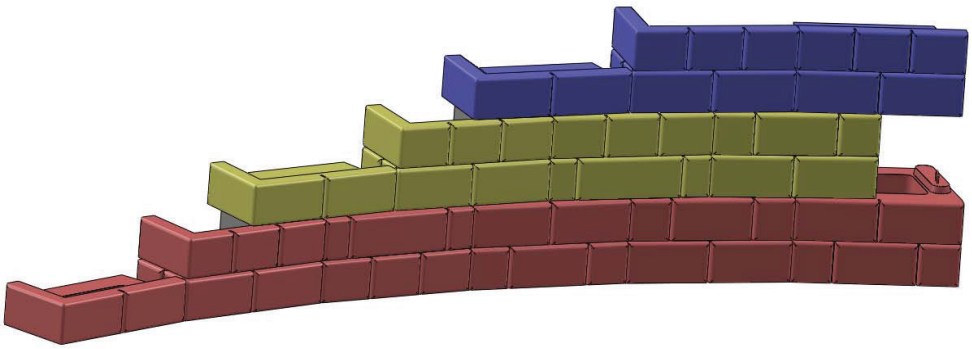


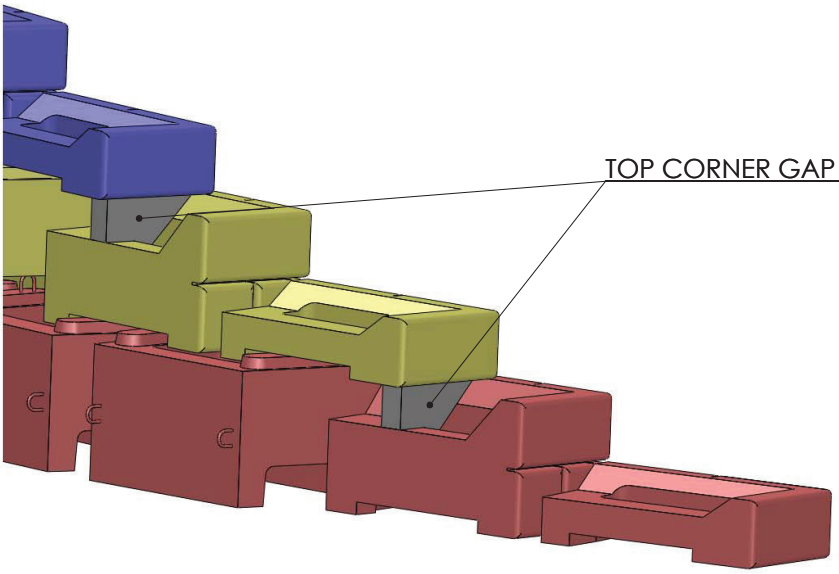


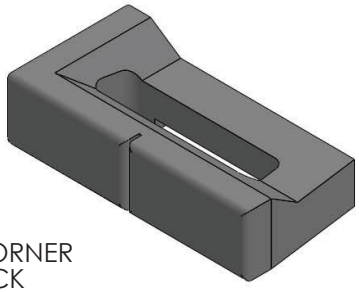
TOP STANDARD GAP INSERT

VERTI BLOCK	DRAWN BY	DATE	TITLE: 6' STEP DOWN
	DAN BALLING	12/12/2013	
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-9
			SCALE: 1: 40 — SHEET 1 OF 1

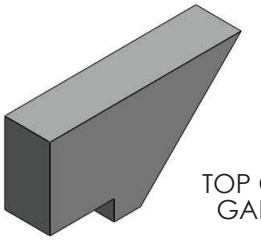
6' STEP DOWN WITH HALF-STEP BLOCK AND TOP CORNER GAP INSERT







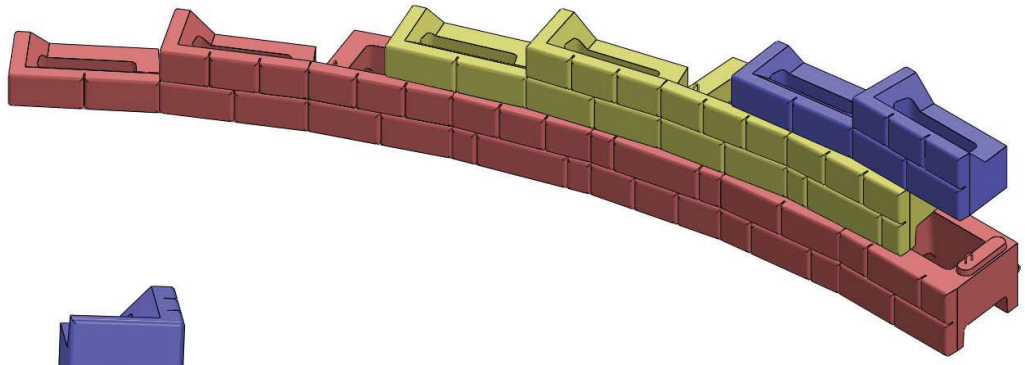
HALF-STEP CORNER TOP BLOCK

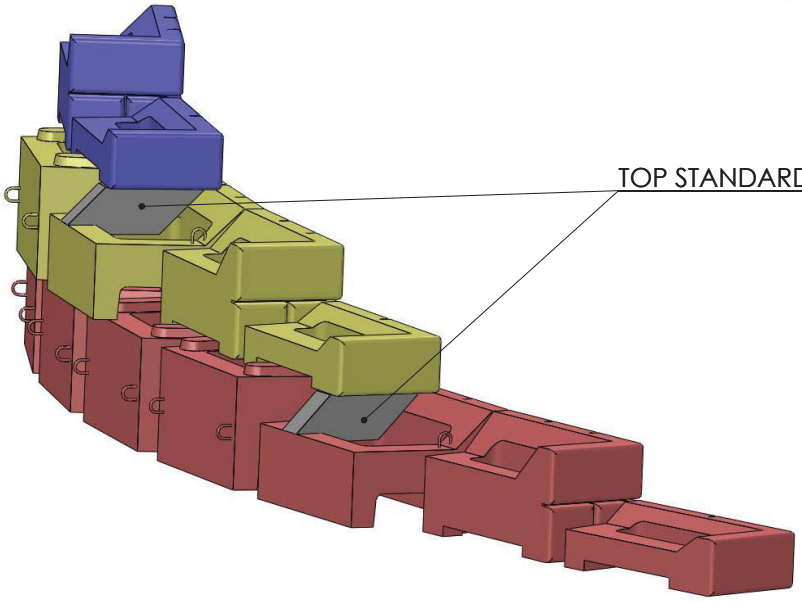


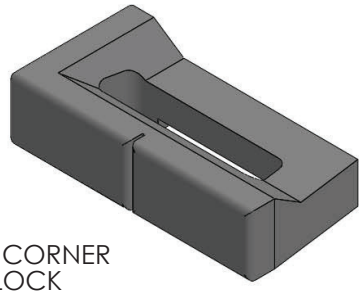
TOP CORNER GAP INSERT

DRAWN BY: DAN BALLING	DATE: 12/12/2013	TITLE: 6' STEP W/ HALF STEP BLOCK
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-10
		SCALE: 1: 40 — SHEET 1 OF 1

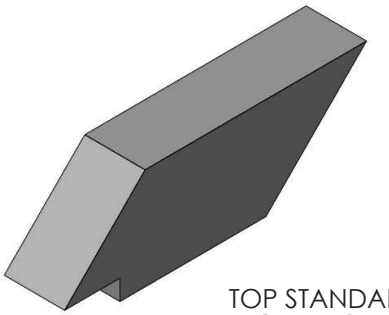
10' STEP DOWN WITH HALF-STEP BLOCK AND TOP STANDARD GAP INSERT







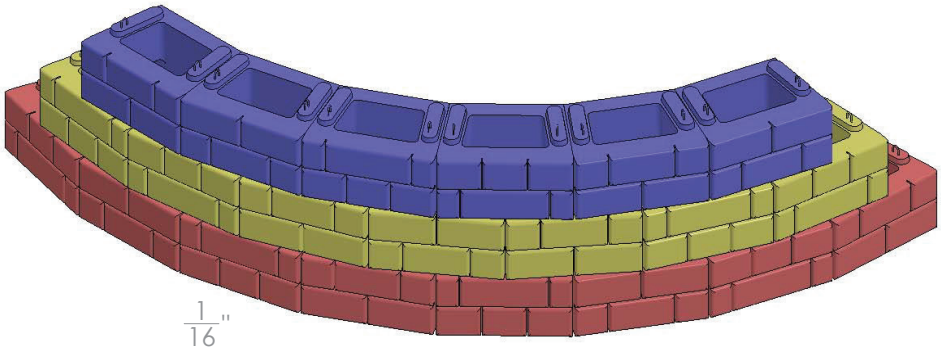
HALF-STEP CORNER TOP BLOCK

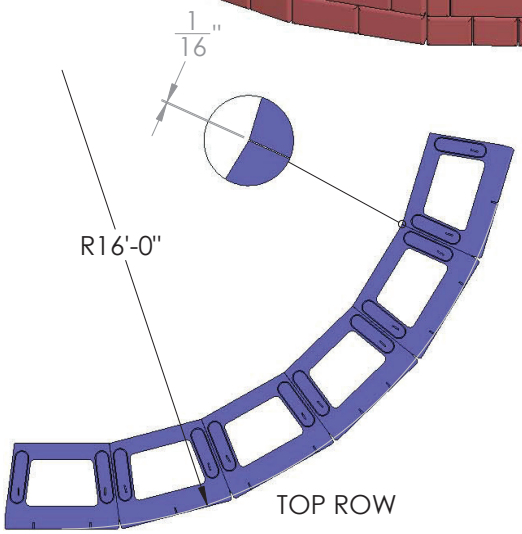


TOP STANDARD GAP INSERT

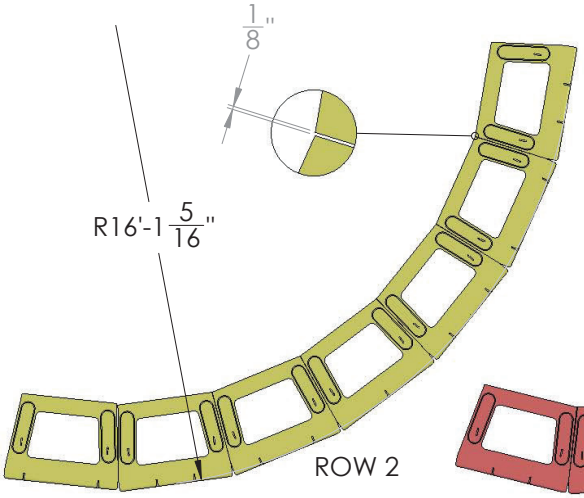
VERTI BLOCK®	DRAWN BY	DATE	TITLE: 10' STEP W/ HALF STEP BLOCK
	DAN BALLING	12/12/2013	
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-11
			SCALE: 1: 40 / SHEET 1 OF 1

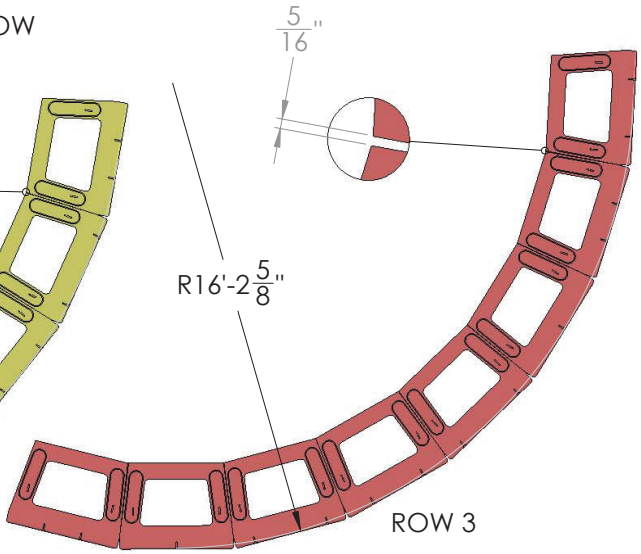
OUTSIDE CURVE DETAIL





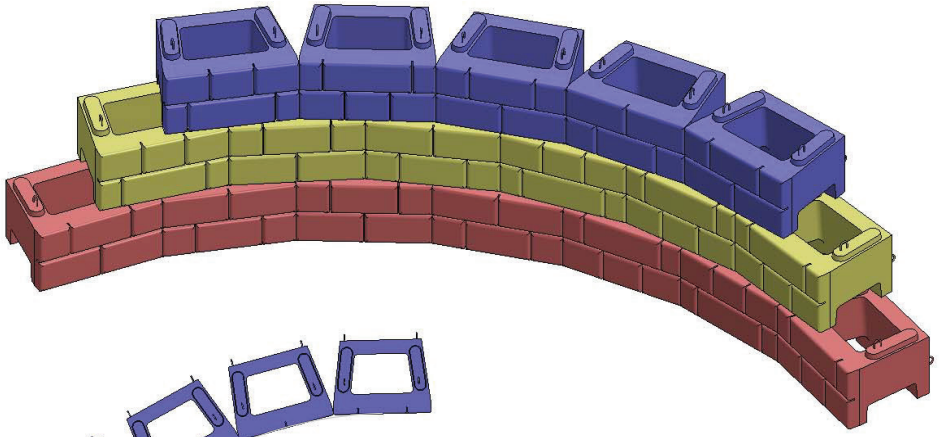
NOTE:
TOP ROW MINIMUM RADIUS IS 16'. SETBACK IS 1 5/16" AND EACH ROW WILL INCREASE THE RADIUS BY 1 5/16" MORE THAN THE ROW ABOVE IT.

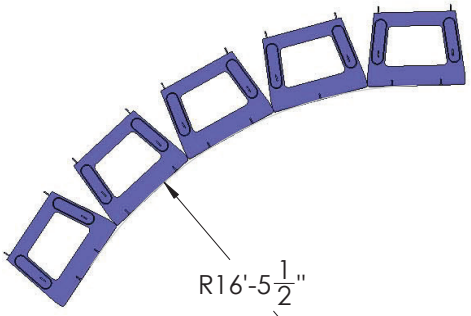




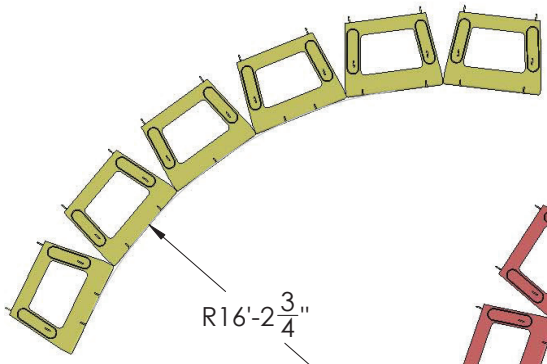
VERTI BLOCK	DRAWN BY	DATE	TITLE: OUTSIDE CURVE
	DAN BALLING	12/12/2013	
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-6
			SCALE: 1: 40 — SHEET 1 OF 1

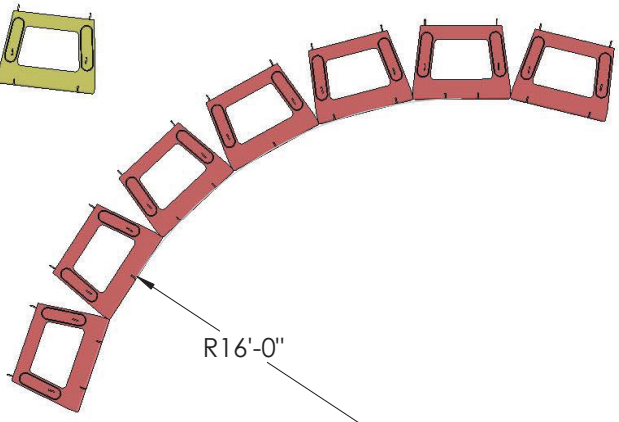
INSIDE CURVE DETAIL





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.





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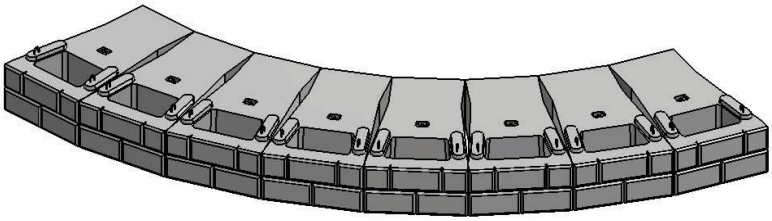
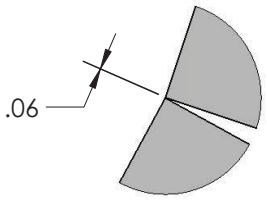
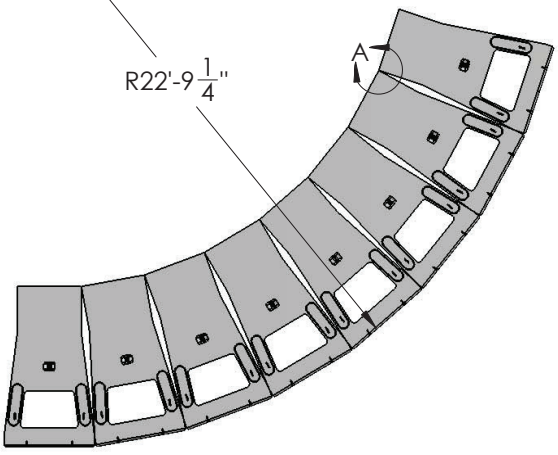
		SCALE: 1: 40	SHEET 1 OF 1





DETAIL A

R22'-9 1/4"



VERTI BLOCK	DRAWN BY: R FONTANESI	DATE: 4/14/2015	TITLE: OUTSIDE CURVE W/ 84" ME
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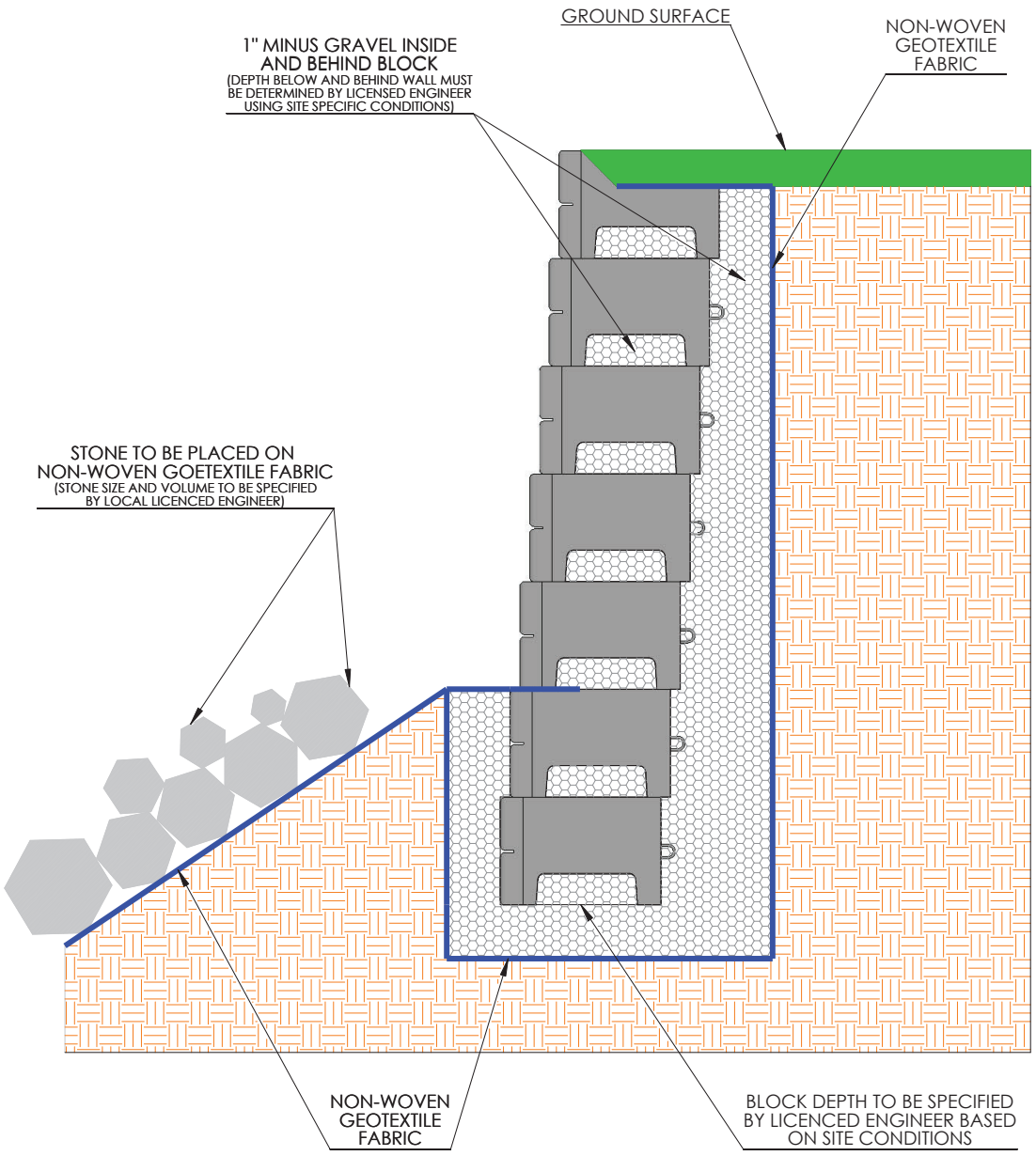
		SCALE: NA	REVISION: 01 / SHEET 1 OF 1



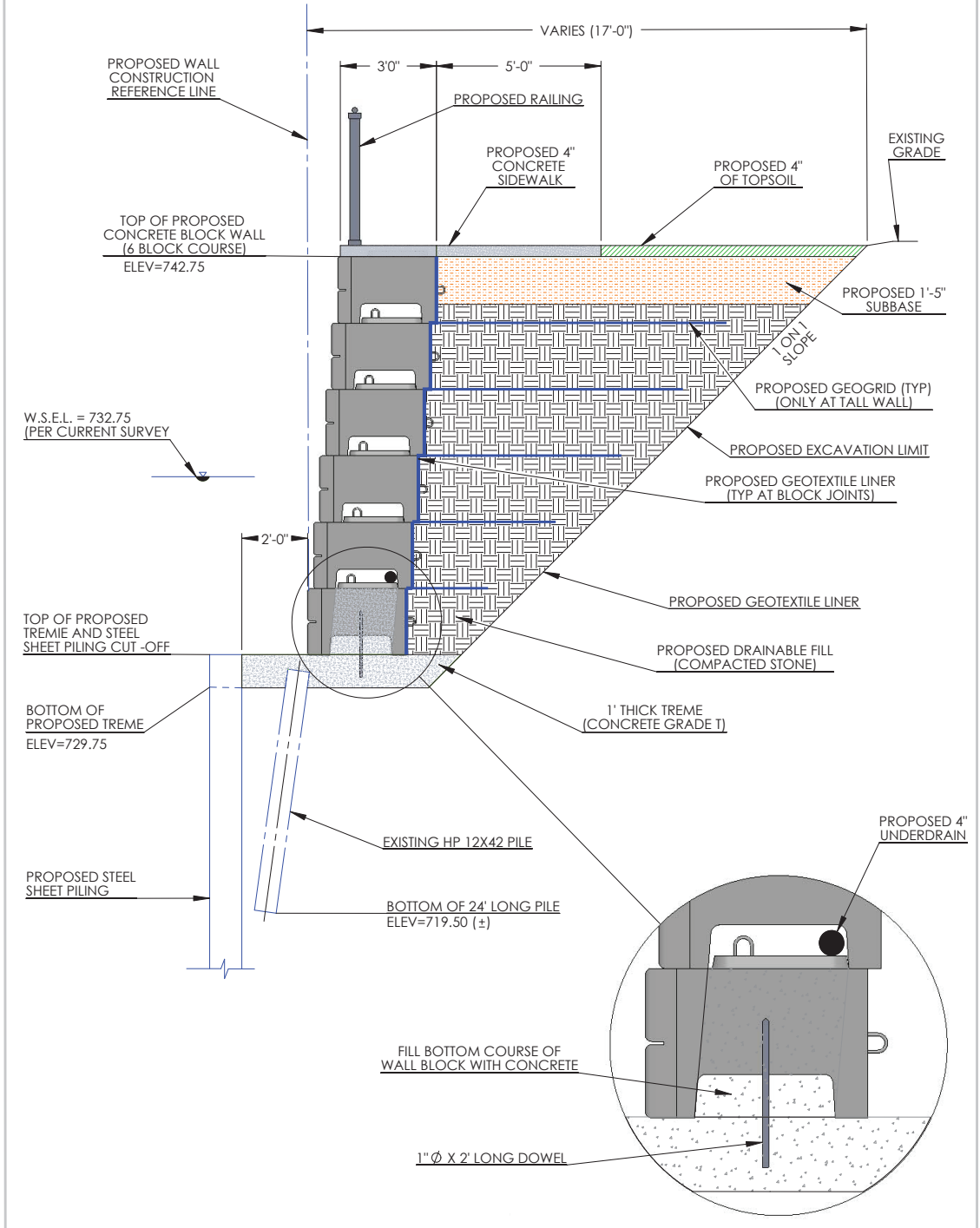
NOTE:
SEA WALLS MUST BE DESIGNED AND CHECKED BY LICENSED PROFESSIONAL ENGINEER DUE TO THE HIGH VARIETY OF VARIABLES FOR ANY GIVEN APPLICATION.

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

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

DWG NO. WD-13

SCALE: 1: 4 | SHEET 1 OF 1



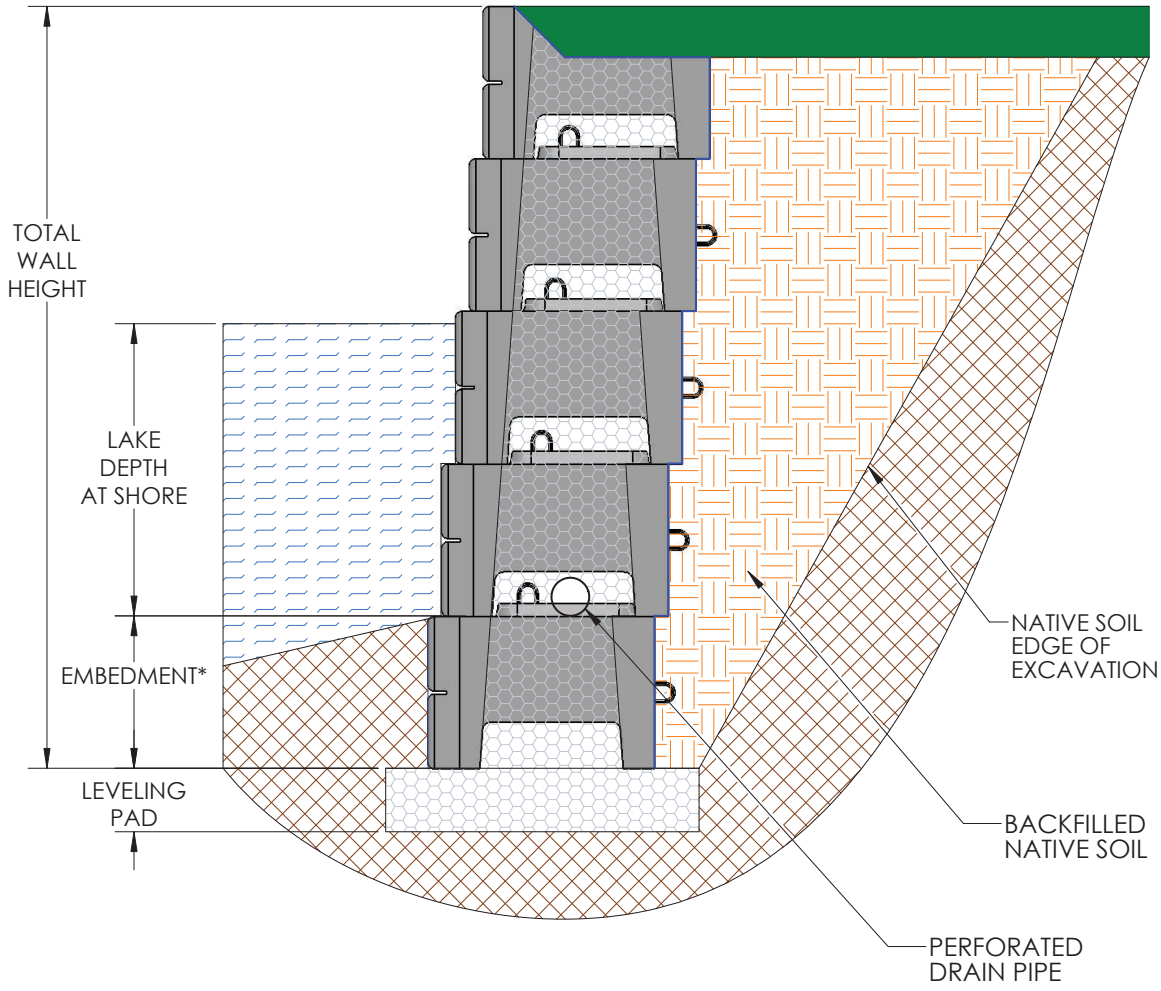
DRAWN BY	DATE	TITLE:
D BALLING	9/30/2013	RIVER DETAIL

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

DWG NO. WD-19

SCALE: 1: 45 | SHEET 1 OF 1

LAKESHORE WALL DETAIL



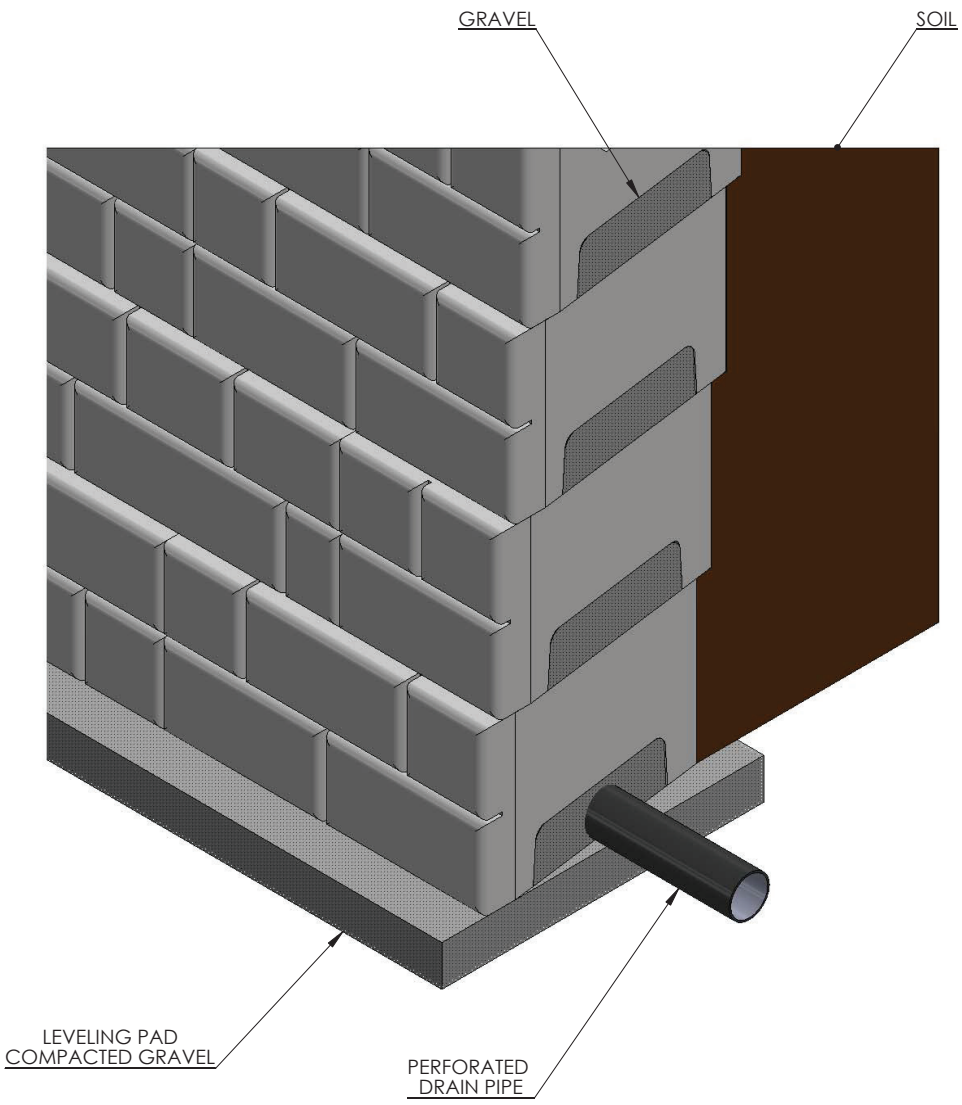
*EMBEDMENT MUST BE DEEP ENOUGH FOR LEVELING PAD TO BE BELOW SCOUR LINE

DRAWN BY	DATE	TITLE:
R FONTANESI	11/16/2016	LAKESHORE WALL

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

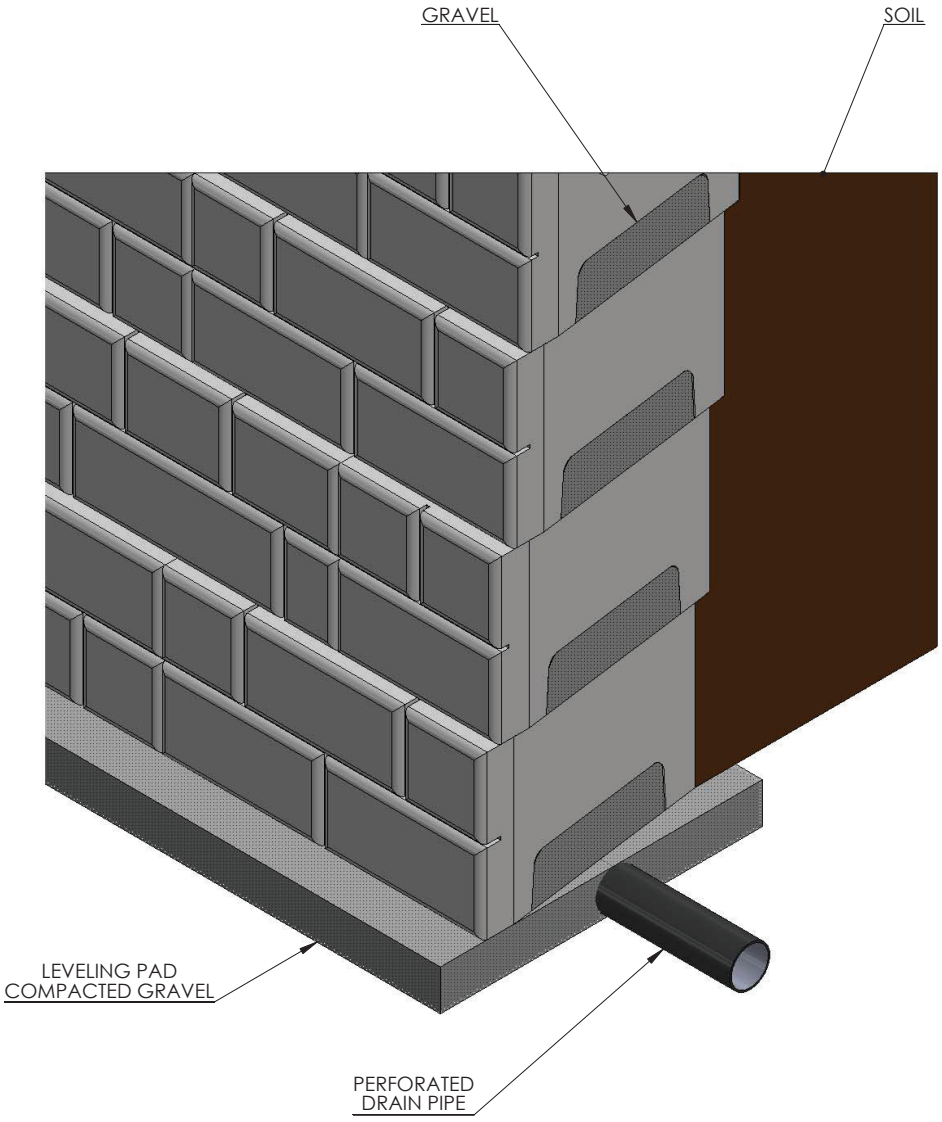
DWG NO. WD-42

SCALE: 1: 30 | SHEET 1 OF 1



DRAIN PIPE IS PLACED INSIDE GAP AT THE BOTTOM OF THE BLOCK
AND ON TOP OF THE LEVLING PAD THEN COVERED WITH GRAVEL.

DRAWN BY	DATE	TITLE:
DAN BALLING	12/18/2013	DRAIN PLACEMENT-OPTION #1
16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-16
		SCALE: 1: 20 / SHEET 1 OF 1



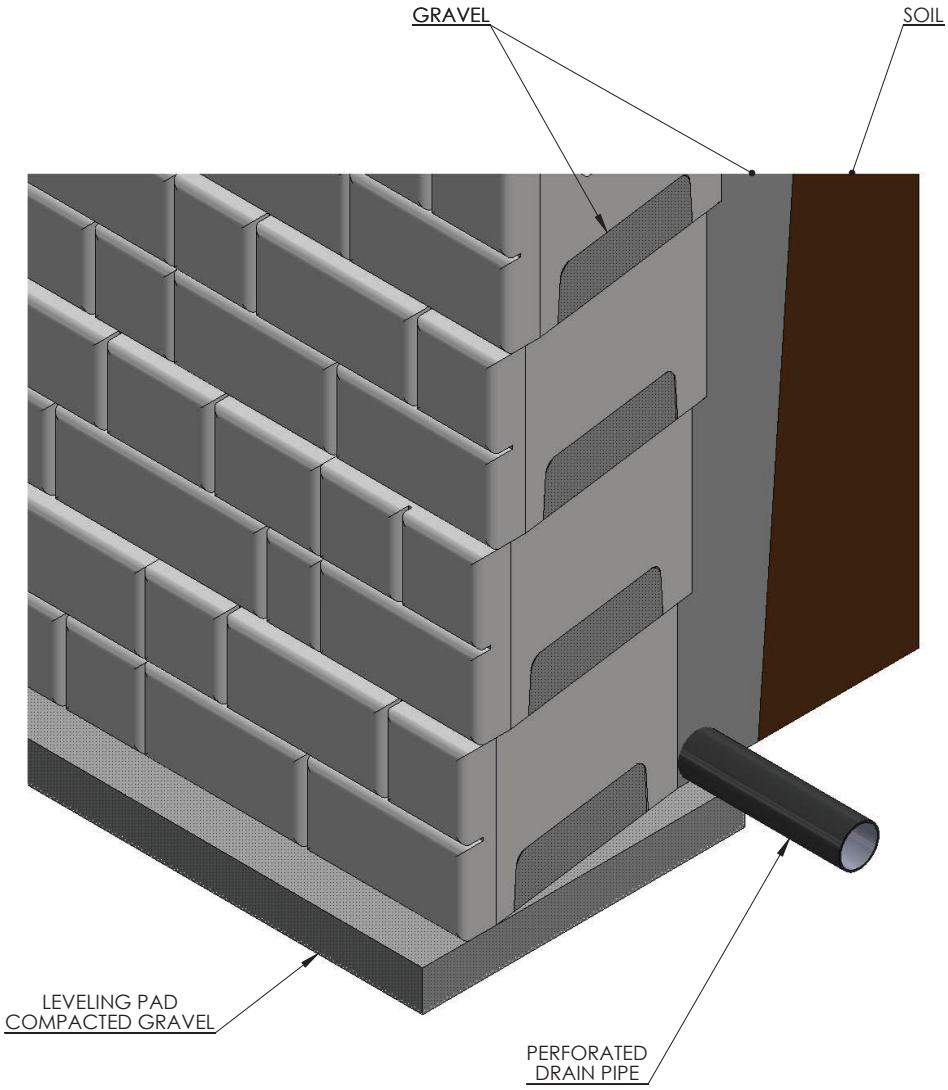
DRAIN PIPE IS PLACED INSIDE
THE COMPACTED GRAVEL
OF THE LEVELING PAD

DRAWN BY	DATE	TITLE:
DAN BALLING	12/12/2013	DRAIN PLACEMENT-OPTION #2

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

DWG NO. WD-17

SCALE: 1: 20 | SHEET 1 OF 1



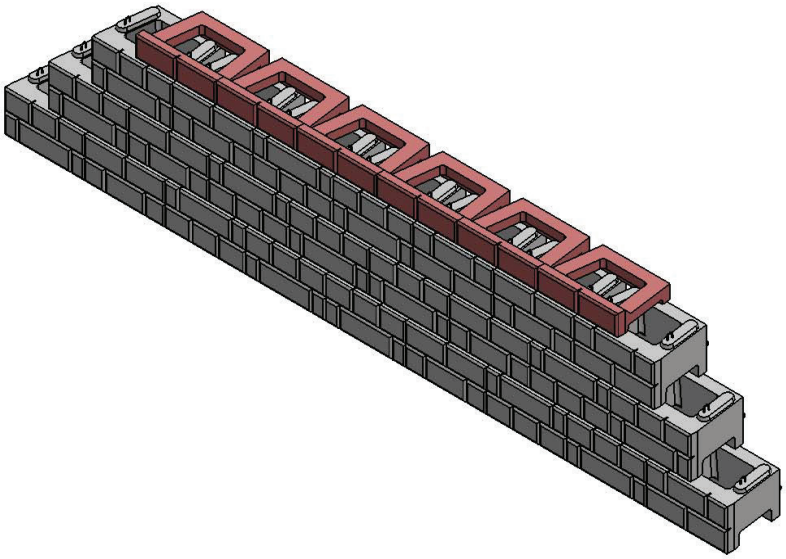
DRAIN PIPE IS PLACED BEHIND THE BLOCK AND ON TOP OF THE LEVENING PAD.
THIS OPTION REQUIRES 1' OF LOOSE GRAVEL BEHIND THE WALL.
IF DRAINAGE IS A MAJOR CONCERN FOR AN APLICATION THIS OPTION
MAY BE USED ALONG WITH OPTION 1 OR 2

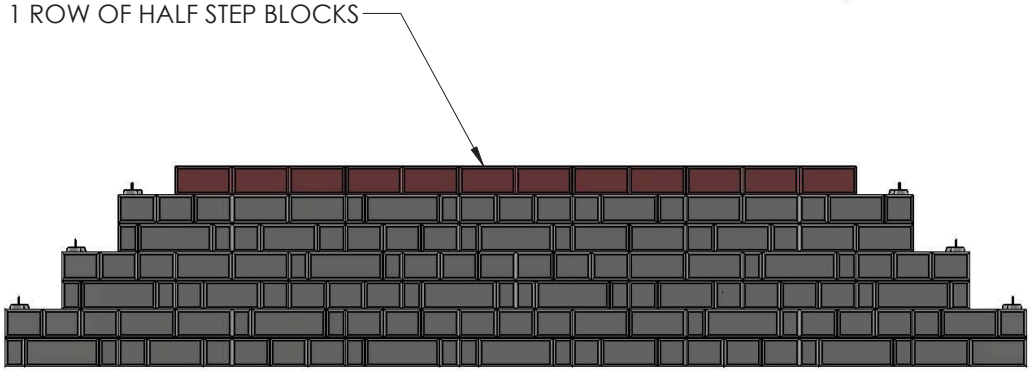
DRAWN BY	DATE	TITLE:
DAN BALLING	12/18/2013	DRAIN PLACEMENT-OPTION #3

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

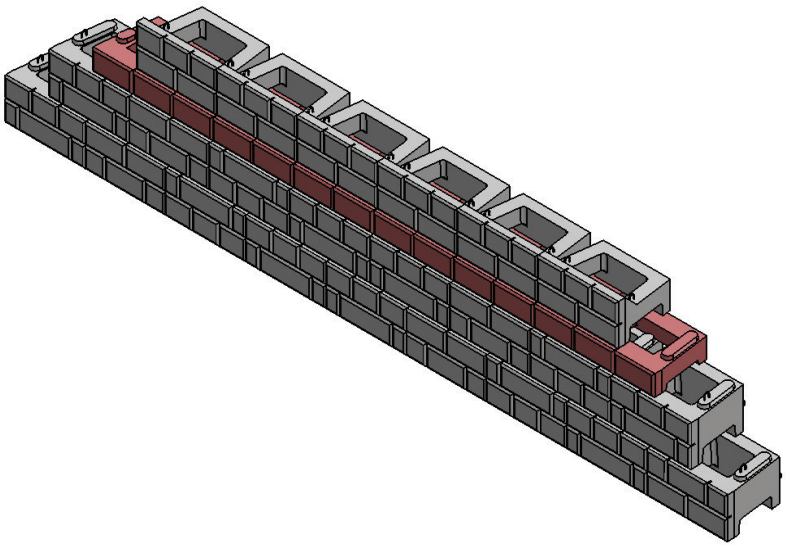
DWG NO. WD-18

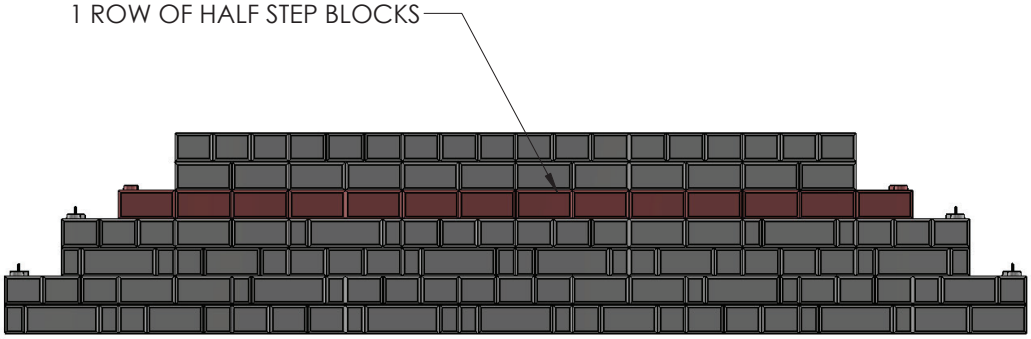
SCALE: 1: 20 | SHEET 1 OF 1





VERTI BLOCK	DRAWN BY: R FONTANESI	DATE: 10/23/2015	TITLE: HALF STEP TOP ROW
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-23
		SCALE: 1: 30	SHEET 1 OF 1



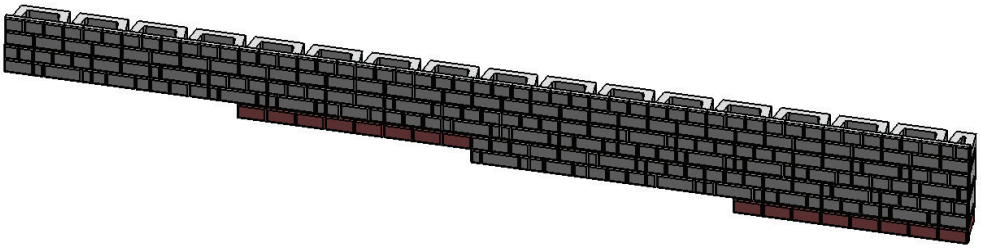


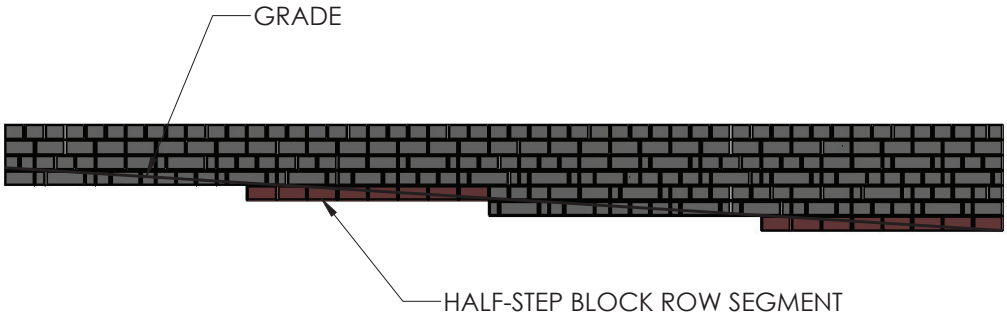
DRAWN BY	DATE	TITLE:
R FONTANESI	6/15/2015	HALF STEP 2ND ROW

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

DWG NO. WD-24

SCALE: 1: 30 | SHEET 1 OF 1





VERTI BLOCK	DRAWN BY: R FONTANESI	DATE: 6/16/2015	TITLE: BOTTOM ROW HALF STEP
	16500 SOUTH 500 WEST BLUFFDALE, UTAH 84065 PHONE: (801) 571-2028		DWG NO. WD-25
		SCALE: 1: 30	SHEET 1 OF 1

U.S. Version
Release 3.0

Verti-Block Material Spec

Section 6

www.verti-block.com

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-BlockTM 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 C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- 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-BlockTM 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-BlockTM units shall have a minimum 28 days compressive of equal to 4.0 ksi (or greater if specified).

2.1.2 Color for the Verti-BlockTM units shall be _____.

2.1.3 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.

2.1.4 The Verti-BlockTM 2-4 units shall have a face area of 8 sq ft (.75 sq m) and Verti-BlockTM 1-4 units

2.1.5 The Verti-BlockTM unit weight is approximately +/-1400 lbs with a combined unit/gravel infill of +/-450 lbs.

2.1.6 The Verti-BlockTM 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.

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

2.1.8 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-BlockTM 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-BlockTM 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-BlockTM 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-BlockTM 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 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 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-BlockTM 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-BlockTM 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-BlockTM 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-BlockTM full size cap units should be placed in the same installation procedures as the regular Verti-BlockTM 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-BlockTM 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-BlockTM 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.

SPECIFICATION FOR VERTI-BLOCKTM
Gravity Wall
Segmental Retaining Wall (SRW) SYSTEM

1 GENERAL

1.1 Description

The work consists of supplying and installing all aspects of the Verti-BlockTM 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 C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- 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

- 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 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-BlockTM 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-BlockTM units shall have a minimum 28 days compressive of equal to 4.0 ksi (or greater if specified).

2.1.2 Color for the Verti-BlockTM units shall be _____.

2.1.3 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.

2.1.4 The Verti-BlockTM 2-4 units shall have a face area of 8 sq ft (.75 sq m) and Verti-BlockTM 1-4 units shall have a face area of 4 sq ft (.37.5 sq m)

2.1.5 The Verti-BlockTM unit weight is approximately +/-1400 lbs with a combined unit/gravel infill of +/-450 lbs.

2.1.6 The Verti-BlockTM 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.

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

2.1.8 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-BlockTM 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 d footing 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-BlockTM 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-BlockTM 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-BlockTM 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-BlockTM full size cap units should be placed in the same installation procedures as the regular Verti-BlockTM units.

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