REDI-ROCK MSE-PC DESIGN GUIDE (ASD)

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Introduction

In the following pages you will find all the inputs you need to design with the Redi-Rock Positive Connection (PC) System, including:

• An overview of the system
• A description of the basic components of the system
• A review of the connection between the facing blocks and the geogrid reinforcement
• Recommended design values for analysis
• Screenshots of the input screens for the Redi-Rock Proprietary computer software program, RRWall+

Designing with the Redi-Rock Positive Connection (PC) System is straightforward, though it requires familiarity with mechanically stabilized earth retaining wall design where partial reinforcement coverage is used. A solid understanding of the National Concrete Masonry Association (NCMA) - now the Concrete Masonry and Hardscapes Association (CMHA) - Design Manual for Segmental Retaining Walls (3rd Edition) - is also highly recommended. The design of Allowable Stress Design (ASD) PC System walls closely aligns with the methodology outlined in this manual.

Overview - What is the PC System?

The Redi-Rock Positive Connection (PC) System is a powerful mechanically stabilized earth (MSE) retaining wall system that consists of precast concrete modular blocks and 12 in (305 mm) wide strips of PVC coated polyester geogrid. The heart and soul of the PC System is its superior connection strength. Unlike friction connections featured in other geosynthetic reinforced wall systems, there is virtually no chance of a pullout connection failure with the PC System because the grid wraps through the block (Figure 1).

Figure 1 – Redi-Rock PC System Facing Block with 12 in (305 mm) Wide Strip of Solmax Miragrid XT Geogrid Soil Reinforcement.

The length of each geogrid strip is determined based on wall height, soil shear strength parameters, and loading conditions consistent with standard MSE retaining wall design principles. The result is a weight-independent connection whose strength is directly proportional to the strength of the geogrid. A significant benefit of the Redi-Rock PC System is the use of strips, rather than full sheets, of geogrid reinforcement. Although using partial reinforcement is not covered in the NCMA Design Manual, this approach of MSE wall design is discussed in Section 3.5.1.3 of FHWA-HIF-24-002 (2023) and is permitted by Section 11.10.6.4.1-2 of AASHTO (2024). Similar to MSE systems that utilize strips of steel reinforcement, which have been used for decades, the partial coverage available with the Redi-Rock PC System enables design and installation efficiencies by providing reinforcement only where it is needed in the wall. Geogrid reinforcement strips are usually installed through each facing block and are normally installed perpendicular to the alignment of the retaining wall block facing units. When a geogrid reinforcement strip is installed in every block, the top and bottom layers of geogrid reinforcement in the wall consist of a 12 in (305 mm) width of geogrid placed at 46 in (1170 mm) on center, developing roughly 25 percent coverage, as shown in Figure 2.

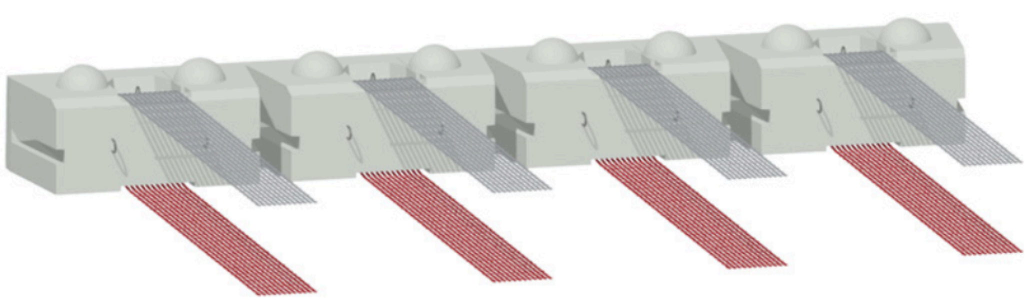

Figure 2 – Rear View Schematic Showing 25% Coverage on the Bottom Layer of Geogrid

Percent Coverage Explained

When subsequent block courses are installed in a running bond configuration, reinforcement is provided on the top block of the first course and the bottom of the block on the next course, as shown in Figure 3. The result is all intermediate layers of geogrid reinforcement in the wall consist of a 12 in (305 mm) width of geogrid placed at 23 in (584 mm) on center for roughly 50 percent coverage. A section of wall with multiple courses is shown in Figure 4.

Length of Redi-Rock Block = 46.125 in (1.17 m)

Length of Geogrid Strip = 12 in (305 mm)

One Row, Percent Coverage = 12/46.125 (305/1170) ≈ 25%

Multiple Rows, Running Bond Percent Coverage =
(12 from bottom block + 12 from top block)/46.125 ((305 + 305)/1170) ≈ 50%

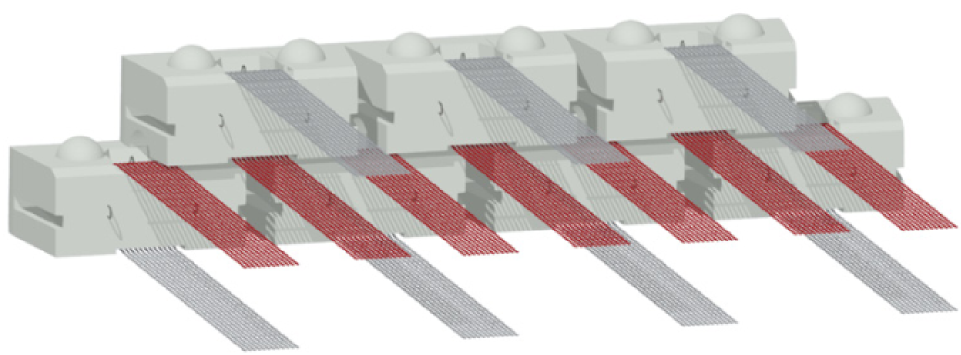

Figure 3 – Rear View Schematic Showing 50% Coverage on an Intermediate Layer of Geogrid

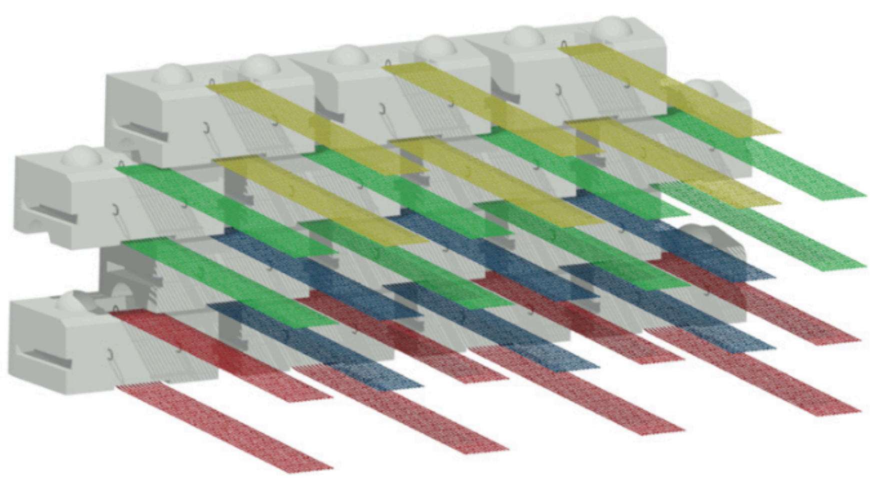

Figure 4 – Rear View Schematic of a Redi-Rock PC System MSE Wall with Multiple Courses of Blocks and Geogrid Reinforcement

Geogrid reinforcement strips may also be designed for installation in every block in every other row, or in every other block in the same row. This yields 25 percent reinforcement coverage throughout the entire wall, providing an opportunity to optimize the design or account for obstructions in the reinforced soil zone.

PC System Components

The Blocks

Dimensions, Weights, and Setbacks

Redi-Rock PC System facing blocks are machine-placed, wet cast concrete, precast modular block units. The dimensions of the standard block facing blocks are 46 1/8 inches (1172 mm) long by 18 in (457 mm) high, and either 28 in (711 mm) or 40 1/2 in (1030 mm) wide. The face area of a PC block facing unit is approximately 5.77 sq ft (0.54 sq m). The average weight of a 28 in (710 mm) wide and a 40 1/2 in (1030 mm) wide block is 1,520 lb (690 kg) and 2,170 lb (985 kg), respectively, and will vary slightly depending on the face texture chosen. Redi-Rock PC System middle blocks are shown in Figure 5. The block-facing units interlock with each other through shear knobs on the top of the block, which index into a continuous groove in the bottom of the block course above. Successive block courses are installed with a running bond configuration in which the upper block course is placed such that each block is centered above the vertical joint between adjacent blocks on the course immediately beneath.

Middle - 28 in (710 mm) PC Block

Average Volume = 10.6 ft^2 (0.30 m^2)

Average Weight = 1,520 lb (690 kg)

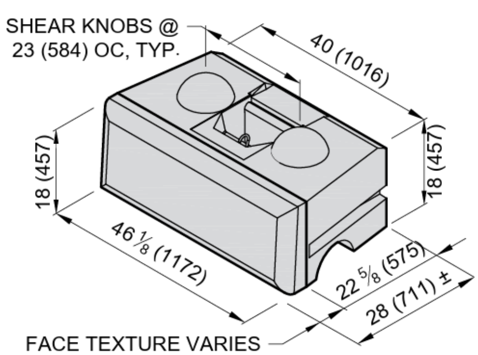

Figure 5 – PC System Facing Blocks

Setback Options

Redi-Rock PC System blocks can be manufactured with three different size shear knobs. The different-sized shear knobs produce different setbacks on subsequent courses of blocks, resulting in wall face batters of 5 degrees, 1 degree, and 0 degrees with respect to vertical, as shown in Figure 6. Blocks manufactured with 10 in (254 mm) diameter knobs that produce a 5 degree face batter are standard. Walls requiring either a 1 degree or vertical face batter typically require custom blocks cast specifically for the project.

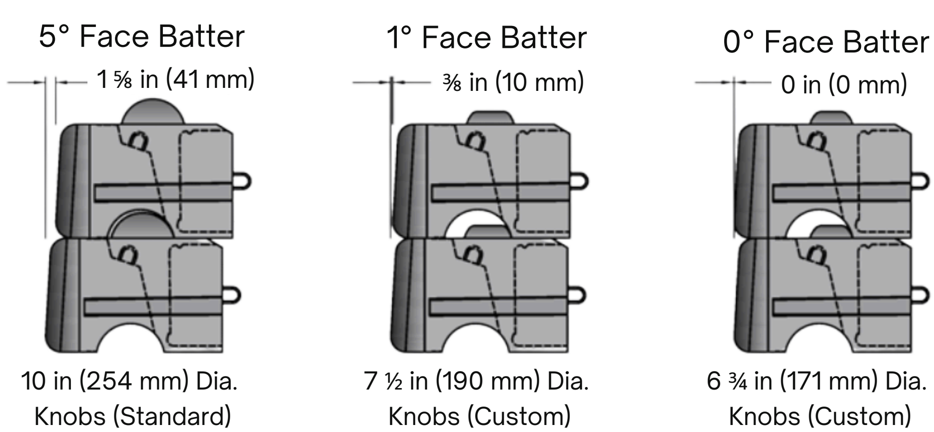

Figure 6 – Block Setback Options

PC System Components

The Blocks

Block-to-Block Interface Shear

Full-scale interface shear testing in accordance with ASTM D6916 and NCMA SRWU-2 test methods have been conducted on the Redi-Rock PC System blocks with both the standard 10 in (254 mm) diameter shear knobs and the 7 1/2 in (190 mm) and 6 3/4 in (171 mm) diameter shear knobs. Recommended interface shear parameters for the different shear knob sizes are summarized in Table 1 below, based on a minimum 28-day concrete compressive strength of 4,000 psi (27.58 mPa). Copies of the complete laboratory testing reports are available at www.redi-rock.com/testing.

Shear Knob Diameter	Peak Interface Shear	Service State Shear
10 in (254 mm)	S_p = 6,061 (88.47) + (N x Tan 44°) S_p(max) = 11,276 lbs/ft (164.57 kN/m)	S_{ss} = 3,390 (49.47) + (N x Tan 51°) $S_{ss(max)}$ = 11,276 lbs/ft (164.56 kN/m)
7-½ in (190 mm) & 6-¾ in (171 mm)	S_p = 1,178 (17.19) + (N x Tan 54°) $S_{p(max)}$ = 10,970 lbs/ft (160.10 kN/m)	S_{ss} = 616 (8.99) + (N x Tan 52°) $S_{ss(max)}$ = 10,970 lbs/ft (160.10 kN/m)

Table 1 – Block-to-Block Interface Shear @ 4,000 psi (27.58 mPa)

The Geogrid Reinforcement

Geogrid reinforcement used with the Redi-Rock PC System consists of 12 in (305 mm) wide strips of Solmax Miragrid XT, which are composed of high molecular weight, high tenacity polyester multifilament yarns woven in tension and finished with a PVC coating. The strips are manufactured in 200 ft (61 m) long rolls. Three rolls are placed on a single cardboard tube as shown in Figure 7. Depending on the weight and thickness of the geogrid, 9 to 20 tubes of geogrid are packaged on a pallet for shipment to the job site, as shown in Figure 8. Strips of Solmax Miragrid 5XT, 8XT, 10XT, 20XT, and 24XT are available.

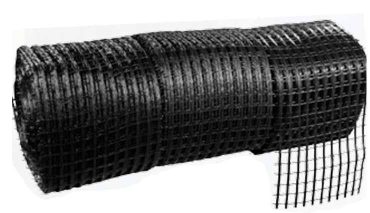

Figure 7 – Geogrid Rolls

It is essential to only use **Factory Cut and Certified Geogrid** for your project. Field cutting standard geogrid rolls almost always results in damage to one or more of the main longitudinal load-carrying strands in the geogrid, significantly reducing the available strength of the reinforcement. Don't let your design be compromised! Contact your local Redi-Rock Manufacturer for certified rolls of geogrid.

Figure 8 – Geogrid Shipping Pallet

PC System Components

The Geogrid Reinforcement (Continued)

Solmax Miragrid geogrids have been extensively tested and documented by AASHTO's National Transportation Product Evaluation Program. Table 2 summarizes the ultimate tensile strength and long-term reduction factors of the Miragrid XT products recommended for use with the Redi-Rock PC System.

Properties	5XT	8XT	10XT	20XT	24XT
Ultimate Tensile Strength, T_{ult} (lb / ft)	4,700	7,600	10,200	16,000	28,000
Ultimate Tensile Strength, T_{ult} (kN / m)*	68.59	110.91	148.86	233.50	408.63
Creep Reduction Factor (20°C)					
75-Year Design, $RF_{CR(75)}$	1.44	1.44	1.44	1.44	1.44
100-Year Design, $RF_{CR(100)}$	1.45	1.45	1.45	1.45	1.45
Installation Damage Reduction Factor, RF_{ID}					
Soil Type 1: Coarse Aggregate (GP, ϕ=34°) 3/4 in (19 mm) < D50 ≤ 1-1/2 in (38 mm)	1.25	1.25	1.25	1.25	1.25
Soil Type 2: Sandy Gravel/Coarse Sand (GP or SP, ϕ=34°) D50 ≤ 3/4 in (19 mm)	1.10	1.10	1.10	1.10	1.10
Durability Reduction Factor, RF_D					
5.0 < pH < 8	1.10	1.10	1.10	1.10	1.10
4.5 ≤ pH ≤ 5 and 8 ≤ pH ≤ 9	1.15	1.15	1.15	1.15	1.15

Table 2 - Solmax Miragrid® XT PET Geogrid Design Strength Properties

*For projects utilizing grid materials sold outside of North America, these values may vary. Refer to manufacturer information for project-specific products.

PC System Components

The Concrete

Material

Redi-Rock PC System blocks are manufactured from first-purpose, non-reconstituted structural grade concrete mixes in accordance with ASTM C94 or ASTM C685. The blocks exhibit excellent resistance to freeze-thaw cycling, de-icing chemical exposure, and submerged conditions in both freshwater and saltwater applications. Concrete mix properties are generally in accordance with ACI 318 for durability and ACI 201 for mitigating alkali-aggregate reactivity. The minimum 28-day compressive strength of Redi Rock PC System blocks is 4,000 psi (27.58 MPa).

Face Textures and Colors

Redi-Rock PC System blocks can be manufactured with different face textures and colors. Currently, there are four face textures available: Cobblestone, Limestone, Ledgestone, and Kingstone, as shown in Figures 9, 10, 11, and 12. In addition to the face textures, Redi-Rock PC System blocks are available in several stock and custom color combinations. Each local Redi-Rock manufacturer will have sample colors available, which are specifically chosen to match the surrounding geographic region. It is essential to note that not all colors and textures are available in every region. Refer to www.redi-rock.com to locate the manufacturer nearest to your project site and verify product availability.

Figure 9: COBBLLESTONE

Figure 10: LIMESTONE

Figure 11: LEDGESTONE

Figure 12: KINGSTONE

PC System Components

Additional Components

Infill Stone

Durable crushed stone is placed in the vertical core slots and triangular spaces between adjacent block facing units as shown in Figure 13. The stone provides a free-draining zone and fills void spaces in the vertical core slot and between the PC block facing units. Additionally, the crushed stone may be placed immediately behind the block facing units to a minimum depth of 12 in (305 mm). The crushed stone behind the block- facing units provides an extra free-draining zone behind the units. It also provides a consistent, high shear strength, easily consolidated material immediately behind the PC block-facing units. Recommended particle size distribution requirements for the infill stone is provided in Table 3. Material meeting the size requirements of AASHTO M 43 or ASTM 27 gradation specifications will meet these recommendations. The stone is intended to be consolidated, but the actual amount of compaction effort will vary depending on the location of the stone infill. To prevent damage to the geogrid reinforcement strips, hand tamping is used to consolidate the stone in the vertical core slot. Hand tamping is also used to consolidate the stone in the triangular-shaped void area between adjacent blocks and in the ends of the shear groove on the bottom of the blocks. A walk-behind, vibrating plate compactor should be used to consolidate the stone behind the blocks.

Non-Woven Geotextile Fabric

Nonwoven geotextile can be used as both a filter and a separator at three possible locations behind the PC block facing unit, depending on the specific installation detail used. These locations include:

- The vertical joint between adjacent PC block facing units to prevent the loss of unit fill stone through the joint.
- Between the drain stone and the reinforced backfill, when the two materials differ in their gradation.
- Between the reinforced backfill and the retained fill, when two materials differ in their gradation, such that natural filter criteria are not met, and separation is required.

Sieve Size (Imperial)	Sieve Size (Metric)	Percent Passing
1-½ inch	37.5 mm	100
1 inch	25.0 mm	95 - 100
¾ inch	19.0 mm	90 - 100
½ inch	12.5 mm	20 - 100
3/8 inch	9.5 mm	0 - 70
No. 4	4.75 mm	0 - 25
No. 8	2.36 mm	0 - 10
No. 16	1.18 mm	0 - 5

Table 3 - Recommended Infill Stone Gradation Requirements

Figure 13 - Infill Stone and Geogrid Layers Shown During Installation

PC System Components

Additional Components

Non-Woven Geotextile Fabric Continued

A nonwoven geotextile fabric that meets the physical properties for Class 3 Construction Survivability in accordance with AASHTO M 288 (or an equivalent international standard) will typically meet the minimum performance requirements for the above applications. The values in Table 4 represent the minimum requirement for typical applications of geotextile used with the PC System.

Mechanical Property	Test Method	Unit	Minimum Average Roll Value (MARV) MD	Minimum Average Roll Value (MARV) CD
Grab Tensile	ASTM D4632	lbs. (kN)	115 (0.512)	115 (0.512)
Puncture Resistance	ASTM D4833	lbs. (kN)	45 (0.200)	45 (0.200)
Trapezoid Tear Strength	ASTM D4533	lbs. (kN)	45 (0.200)	45 (0.200)
Apparent Opening Size	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
Flow Rate	ASTM D4491	gal./min./ft^2 (L/min./m^2)	120 (4,890)	

Table 4 - Non-Woven Geotextile Physical Properties

Reinforced Fill Soil

One of the biggest challenges facing a wall design engineer is what type of soil to specify for the reinforced fill zone. Often, on-site soils are preferred because they are readily available; however, they may not be the best choice for long-term performance of the wall. A significant amount of research has been done over the last several decades on the impact of using different types of soil in the reinforced soil zone, and it can be shown that the use of soils with a significant portion of fine-grained particles (passing a No. 200 or 0.075 mm sieve) does not work well in this application. Recommended soil gradation requirements for soil used in the reinforced fill zone are provided in several sources, including the earlier-referenced National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls, 3rd Edition, FHWA-HIF-24-002 Design and Construction of Mechanically Stabilized Earth (MSE) Walls (2023), or the equivalent international standard for a given region. Redi-Rock International recommends designers follow the gradation limits outlined in one of these documents when specifying soil requirements for a particular project. Specifically, extremely coarse particles should be limited to a maximum diameter between 1 in (25 mm) and 4 in (100 mm), and the maximum percentage of fine-grained particles (passing a No. 200 or 0.075 mm sieve) should be between 15% and 35%. In all cases, Redi-Rock International recommends that the wall designer pay careful attention to both internal and external drainage.

PC System Components

Additional Components

Leveling Pad

The leveling pad can be either crushed stone or unreinforced concrete, depending on the specific design requirements, as shown in Figure 14. A crushed stone leveling pad is the most common leveling pad used with Redi-Rock walls. Specific gradation requirements of the stone will depend on whether or not the wall drain can outlet below the elevation of the leveling pad. If there is adequate drainage, a coarse stone with a small percentage of fine materials (passing through the 200 or 0.075 mm sieve) is typically used to ensure that any water can easily drain away. If the drainage outlet is above the elevation of the leveling pad, a dense graded stone is typically used to prevent water from ponding in the leveling pad material. For some projects, an unreinforced concrete leveling pad is used. A concrete leveling pad typically has a 28-day compressive strength of 2,500 psi (17.24 MPa). The leveling pad should extend at least 6 in (150 mm) in front and 12 in (305 mm) behind the PC block facing units. Of course, the leveling pad is to be smooth and level. If proper care is taken in the early stages to prepare the subgrade, place the leveling pad, and place the bottom course of blocks, then the speed and ease of installation of the entire wall will be greatly improved.

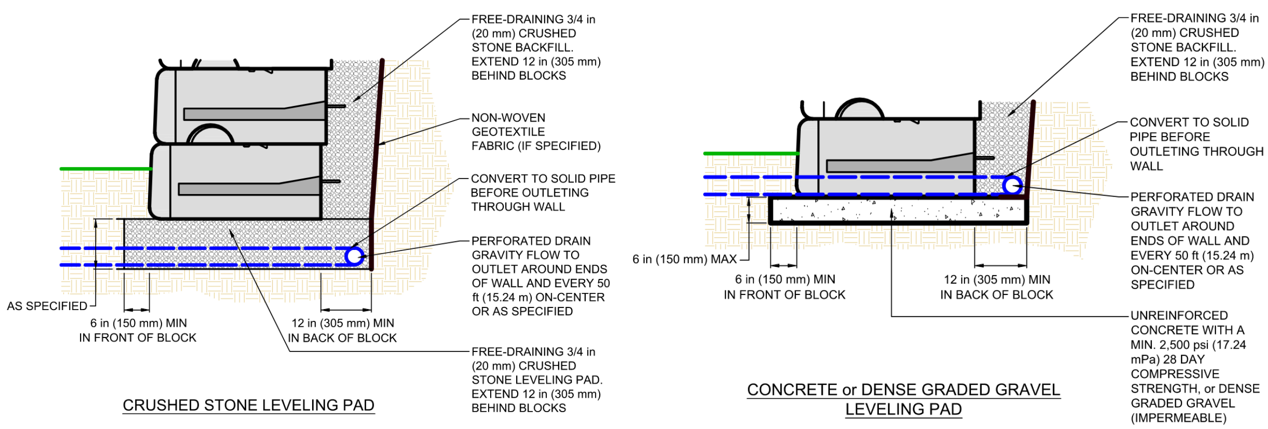

Figure 14 – Leveling Pad Options for Retaining Wall Blocks

Drain

Drainage collection pipe is typically a 4 in (100 mm) diameter, perforated, HDPE pipe with a minimum pipe stiffness of at least 22 psi (152 kPa) (ASTM D2412). In some cases, the pipe may be surrounded by infill stone.

Connection Test Data

The following connection tests show that connection strength is not dependent on the normal load on the connection (Figure 15).

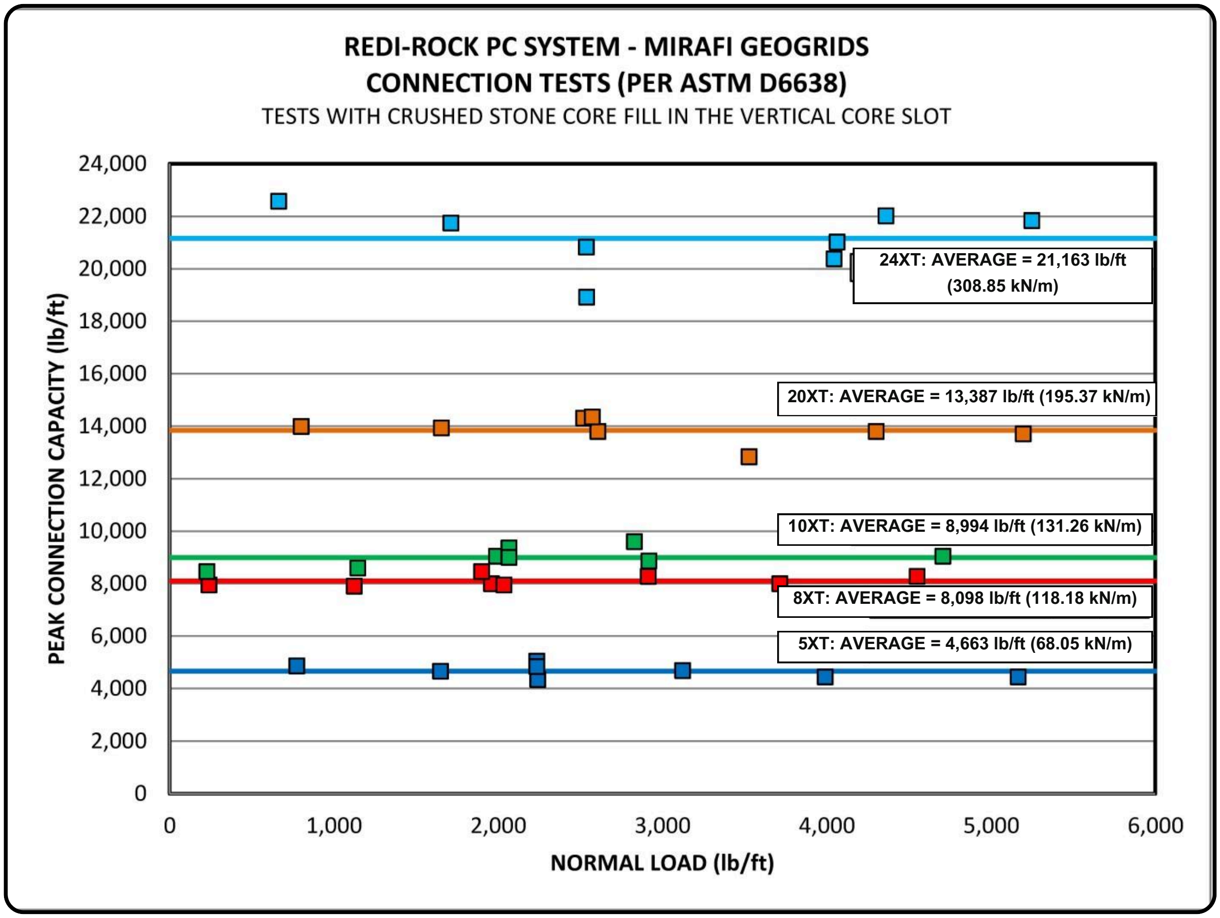

Figure 15 – Connection Test Results for Redi-Rock PC System Blocks and Solmax Miragrid Geogrids

The implication for design is significant. Simply put, the connection between the facing blocks and the soil reinforcement retains its capacity regardless of the decrease in normal loads. The Redi-Rock PC System makes it much easier for engineers to design MSE walls with high live loads, tiered wall sections, seismic loads, water applications, and other design situations where high connection strengths are required near the top of the walls. The connection strength remains the same from top to bottom of the wall. Redi-Rock has performed extensive, full-scale connection testing between Redi-Rock PC System blocks and Solmax Miragrid geogrids. **Copies of the complete laboratory testing reports are available under the "Engineering" tab at https://www.redi-rock.com/**.

Connection Test Data

Connection Design Parameter (Imperial)	5XT	8XT	10XT	20XT	24XT
Ultimate Tensile Strength (MARV), T_{ult} (lb / ft)	4,700	7,600	10,200	16,000	28,000
Ultimate Connection Strength (Mean), $T_{ultconn}$ (lb / ft)	4,460	7,928	8,681	13,447	20,199
Ultimate Tensile Strength of Geosynthetic Test Sample, T_{lot} (lb / ft)	5,334	8,055	10,635	16,397	29,130
Short-term Ultimate Connection Strength Reduction Factor, CR_u (1)	0.84	0.84	0.82	0.80	0.69
Creep Reduction Factor (20°C)					
75-Year Design, $RF_{CR(75)}$	1.44	1.44	1.44	1.44	1.44
100-Year Design, $RF_{CR(100)}$	1.45	1.45	1.45	1.45	1.45
Durability Reduction Factor, RF_D (2)	1.10	1.10	1.10	1.10	1.10
Long-term Connection Strength Reduction Factor					
75-Year Design, CR_{cr}	0.58	0.58	0.57	0.56	0.48
100-Year Design, CR_{cr}	0.58	0.58	0.57	0.55	0.48
Nominal Long-term Geosynthetic Connection Strength					
75-Year Design, $T_{ac(75)}$ (lb / ft)	2,478	4,007	5,285	8,145	12,218
100-Year Design, $T_{ac(100)}$ (lb / ft)	2,478	4,007	5,285	8,000	12,218

Connection Design Parameter (Metric)	5XT	8XT	10XT	20XT	24XT
Ultimate Tensile Strength (MARV), T_{ult} (kN/m)	68.59	110.91	148.86	233.50	408.63
Ultimate Connection Strength (Mean), $T_{ultconn}$ (kN/m)	65.09	115.70	126.69	196.24	294.78
Ultimate Tensile Strength of Geosynthetic Test Sample, T_{lot} (kN/m)	77.84	117.55	155.21	239.30	425.12
Short-term Ultimate Connection Strength Reduction Factor, CR_u (1)	0.84	0.84	0.82	0.80	0.69
Creep Reduction Factor (20°C)					
75-Year Design, $RF_{CR(75)}$	1.44	1.44	1.44	1.44	1.44
100-Year Design, $RF_{CR(100)}$	1.45	1.45	1.45	1.45	1.45
Durability Reduction Factor, RF_D (2)	1.10	1.10	1.10	1.10	1.10
Long-term Connection Strength Reduction Factor					
75-Year Design, CR_{cr}	0.58	0.58	0.57	0.56	0.48
100-Year Design, CR_{cr}	0.58	0.58	0.57	0.55	0.48
Nominal Long-term Geosynthetic Connection Strength					
75-Year Design, $T_{ac(75)}$ (kN/m)	36.16	58.48	77.13	118.87	178.31
100-Year Design, $T_{ac(100)}$ (kN/m)	36.16	58.48	77.13	116.75	178.31

Table 5 – Redi-Rock PC System - Solmax Miragrid Long-term Connection Design Parameters

The nominal long-term connection strength has been determined according to the protocol defined in Section 2.5.2.1 in the NCMA Design Manual. This section also references Section “4.4.9.8.2.1 CRcr Defined with Long-Term Testing” (FHWA-HIF-24-002 2023) and Section 11.10.6.4.4b of AASHTO (2024), which follows the same method for calculation of long-term connection design capacity. The following limitations exist for the application of these connection strength parameters.

- These connection strength values are based on the installation of crushed limestone core fill meeting the requirements of AASHTO 57 per M43 in the vertical core slot using compaction effort to consolidate the crushed stone consistent with Redi-Rock’s installation recommendations. Other core fill materials or levels of compaction should be evaluated using an in-block installation damage test.
- Splayed installation of the reinforcement strips. Occasionally, it will be necessary to splay the reinforcement strips to accommodate obstructions in the reinforced zone. Any vertical or horizontal splay angle in excess of 15° or an approximate 4:1 ratio with respect to true level or perpendicular placement should not be permitted.
- Incorrect installation of the Solmax Miragrid strip in the vertical core slot or failure to secure the Solmax Miragrid strip in a taut condition prior to placement and compaction of the reinforced backfill. Installation procedures published by Redi-Rock International should be followed to ensure proper performance of the PC System.
- Substitution of a weaker geogrid style than that required (i.e.: substitution of a 5XT strip in place of a required 10XT strip). Although substitution of a stronger geogrid style than that required is generally acceptable. No substitution of any Solmax Miragrid style should be made without the written consent of the wall design engineer of record.

Design Flow Chart

Steps for a Successful Design:

- Compile Geotechnical and Project Site Information
- Determine Project Design Requirements and Methods (LRFD vs ASD)
- Find Potential Sections using Preliminary Wall Section Tool
- Input Preliminary Sections into RRWall+ Software and Adjust to Match Site Specifications
- Analyze Section and Adjust Design Inputs to Optimize the Cross Section

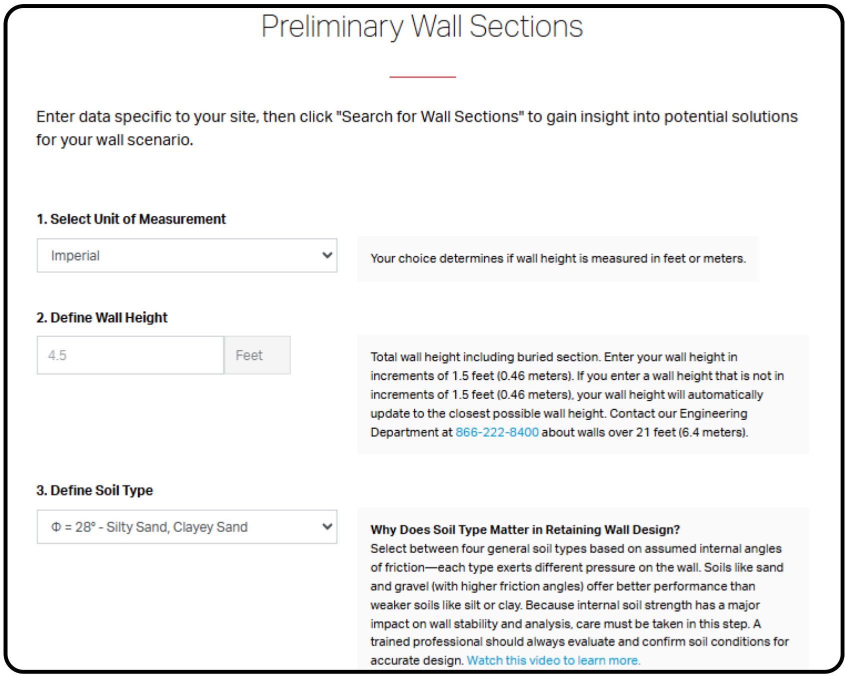

Figure 16 – Redi-Rock Preliminary Wall Section Tool Inputs for Units, Wall Height, and Soil Type

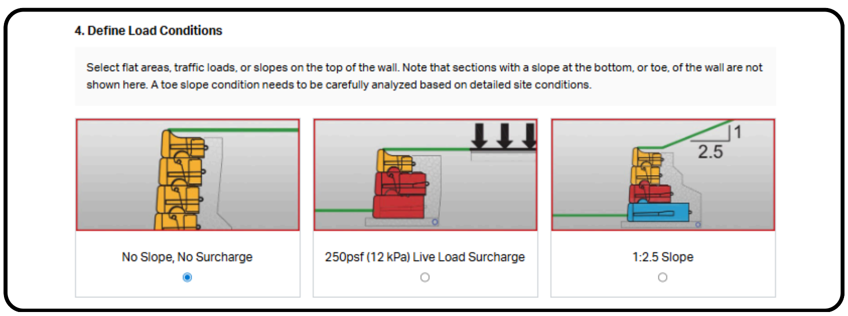

Figure 17 – Redi-Rock Preliminary Wall Section Tool Inputs for Load Conditions Including Surcharge and Backslope

Based on the GEO5 platform of geotechnical engineering software, with RRWall+ you'll be able to:

- Select specific design standards like ASD, LRFD (US), Eurocodes, and many other international standards, or custom standards
- Model various site conditions including soil layers, load types & locations, water conditions, and seismic
- Analyze for slope stability and bearing capacity

Figure 18 – RRWall+ Software Provided by GEO5 can be Used to Analyze and Edit Preliminary Cross Sections

RRWall+ Inputs

TThe following pages provide step-by-step setup instructions for designing a Redi-Rock PC ASD Wall using the free RRwall+ Software. The example wall shown is 15 ft (4.57 m) tall, 28° soil, with no backslope and no surcharge. The link to download this software and additional video tutorials can be found under the “Engineering” tab at **https://www.redi-rock.com/**. The following analysis is for the static design situation; however, the software also allows users to analyze for seismic and other extreme situations. Contact the Redi-Rock Engineering Team at (866) 222-8400 (Option 2) for guidance on designing for these extreme cases.

Step 1: Select Project Settings Consistent with Project Requirements (ASD, LRFD, or Specified International Standard)

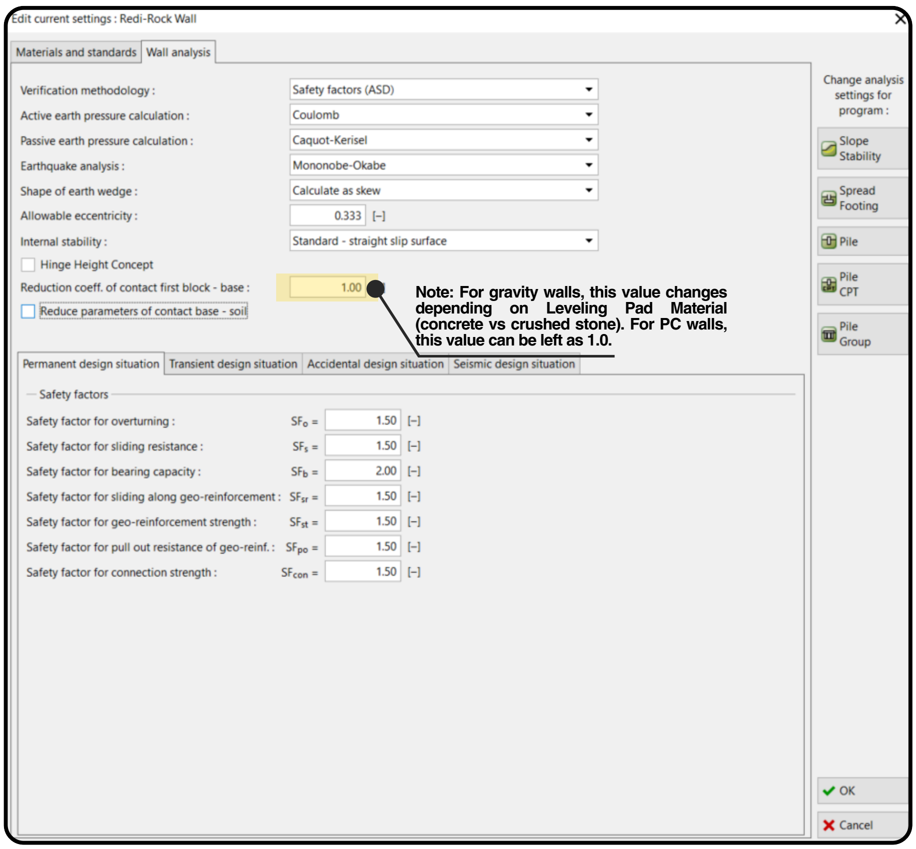

Figure 19: Project Settings and Factors of Safety for each Design Check.

Step 2: Select Block 28 PC (28 PC Middle Block) for MSE Design

No.	Description	Color	Block height h [in]	Block width w [in]	Unit weight γ [pcf]	Shear bearing capacity of joint F_{min} [lbf/ft]	Max. shear strength F_{max} [lbf/ft]	Block friction f [°]
1	Top block 24 straight		18.00	24.00	108.00	6061.00	11276.00	44.00
2	Block 28 PC		18.00	28.00	120.00	6061.00	11276.00	44.00
3	Block 41 PC		18.00	40.50	120.00	6061.00	11276.00	44.00
4	Top block 28		18.00	28.00	120.00	6061.00	11276.00	44.00
5	Top block 41		18.00	41.00	120.00	6061.00	11276.00	44.00
6	Top block 24 straight		18.00	24.00	80.00	6061.00	11276.00	44.00

Figure 20: Block Settings Options.

RRWall+ Inputs

Step 3: Input Wall Geometry

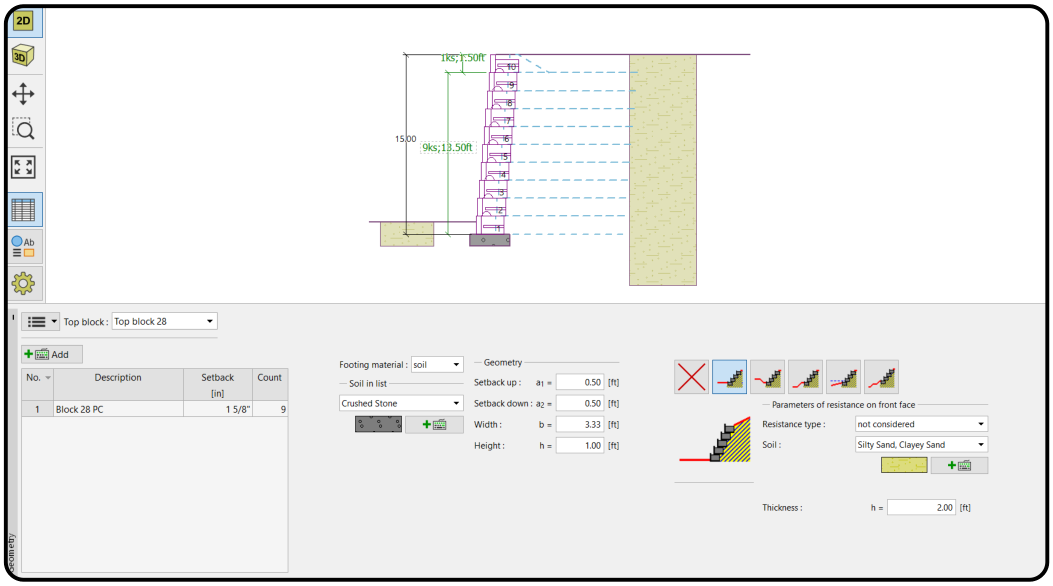

Figure 21: Wall Height and Embedment Depth. Resistance at Toe of Wall can be Determined in this Step. In Most Cases, this Value is Disregarded Unless Embedment Depth is Large Enough to Develop Passive Resistance. (Note: multiple settings combined in photo above)

Step 4: Establish and Assign Soil Parameters and Profile

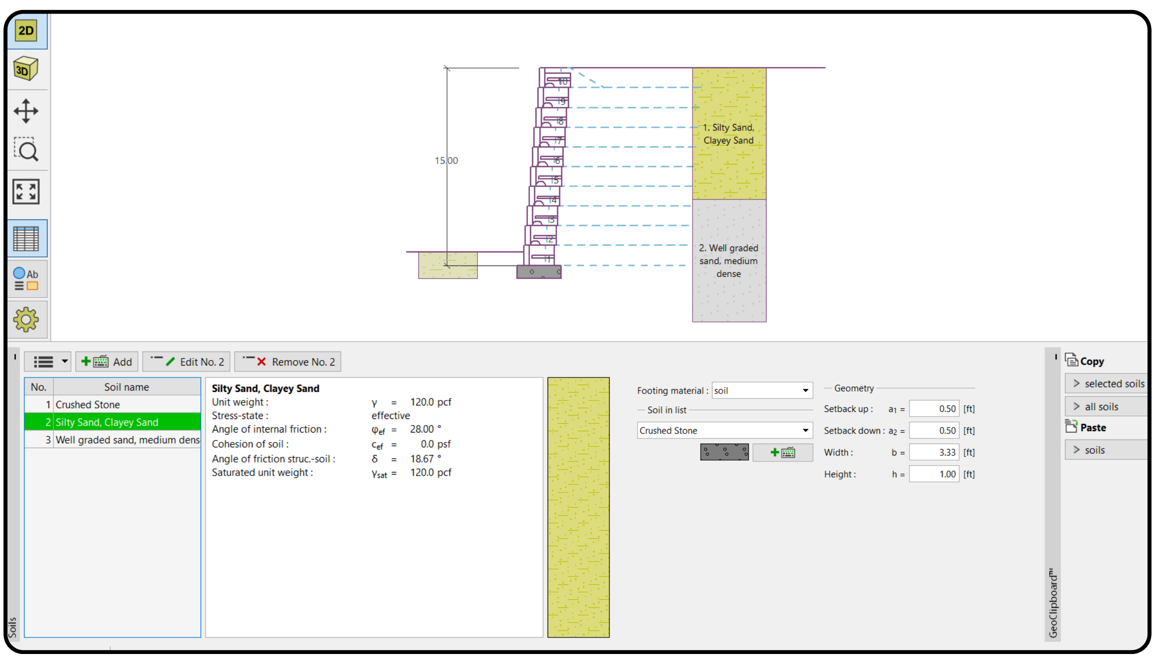

Figure 22: Soil Parameter Inputs, Profile Layers, Leveling Pad Input (Note: multiple settings combined in photo above).

RRWall+ Inputs

Step 5: Use Redi-Rock Preliminary Wall Section Tool to Establish Preliminary Grid Layout.

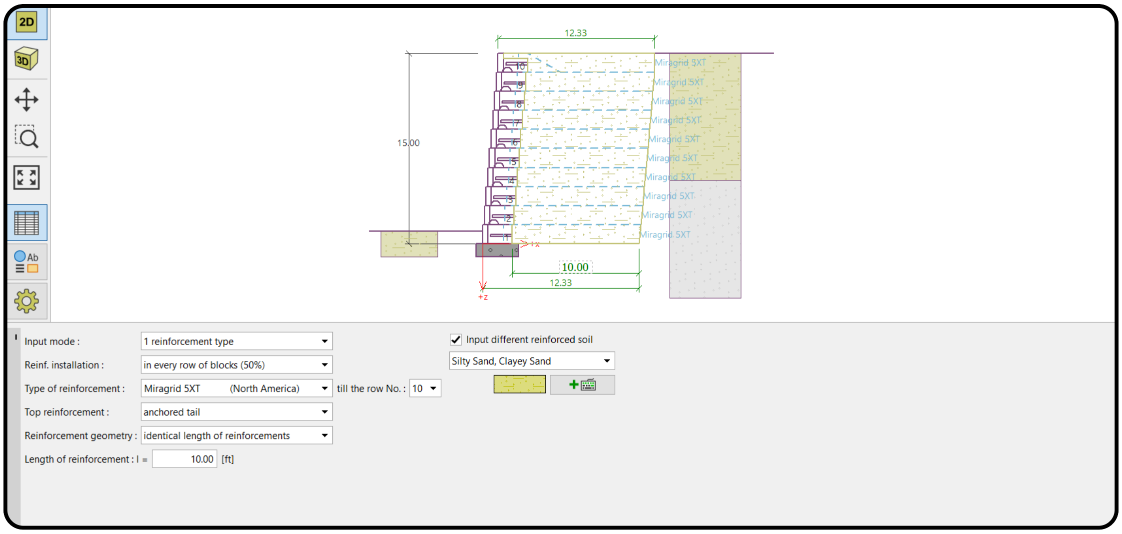

Figure 23: Grid Layout Settings. A Different Reinforced Soil can Also be Input at this Step.

Step 6: Check Design Verification for External Stability Taken Around the Bottom of the Blocks - Overturning and Sliding

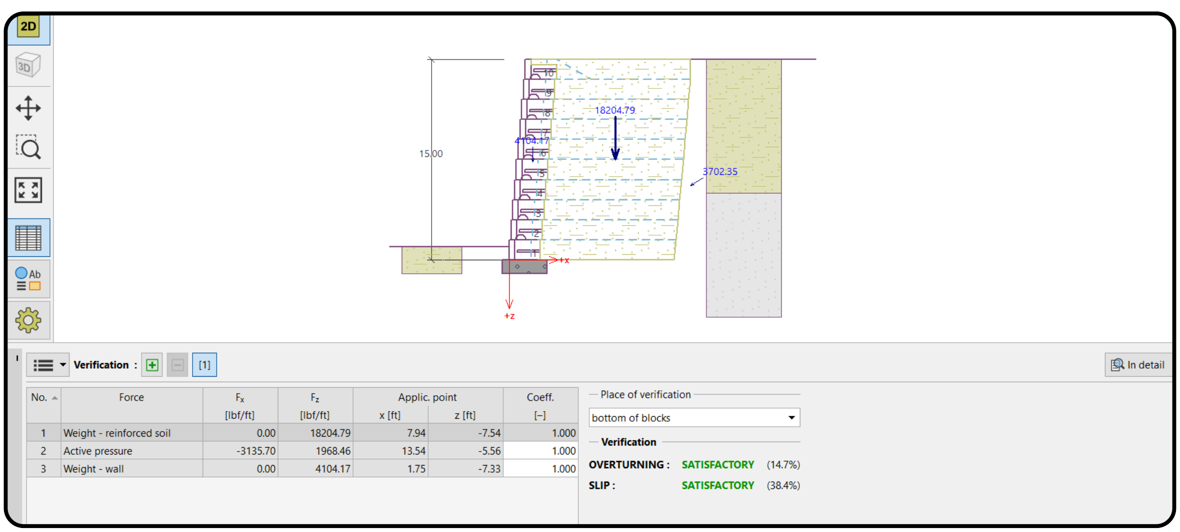

Figure 24: External Stability Pressures and Verification.

RRWall+ Inputs

Step 7: Check Design Verification Bearing Capacity and Eccentricity

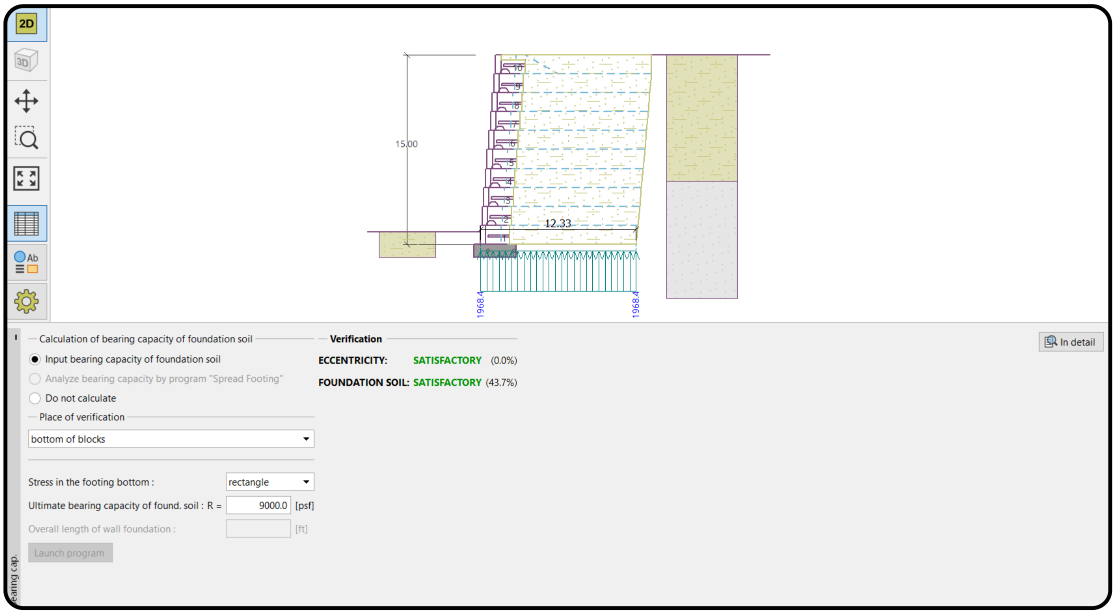

Figure 25: Bearing Capacity Inputs Should Be Calculated and Checked at Bottom of Blocks.

Step 8: Check Design Verification for Internal Stability - Sliding on Reinforcement

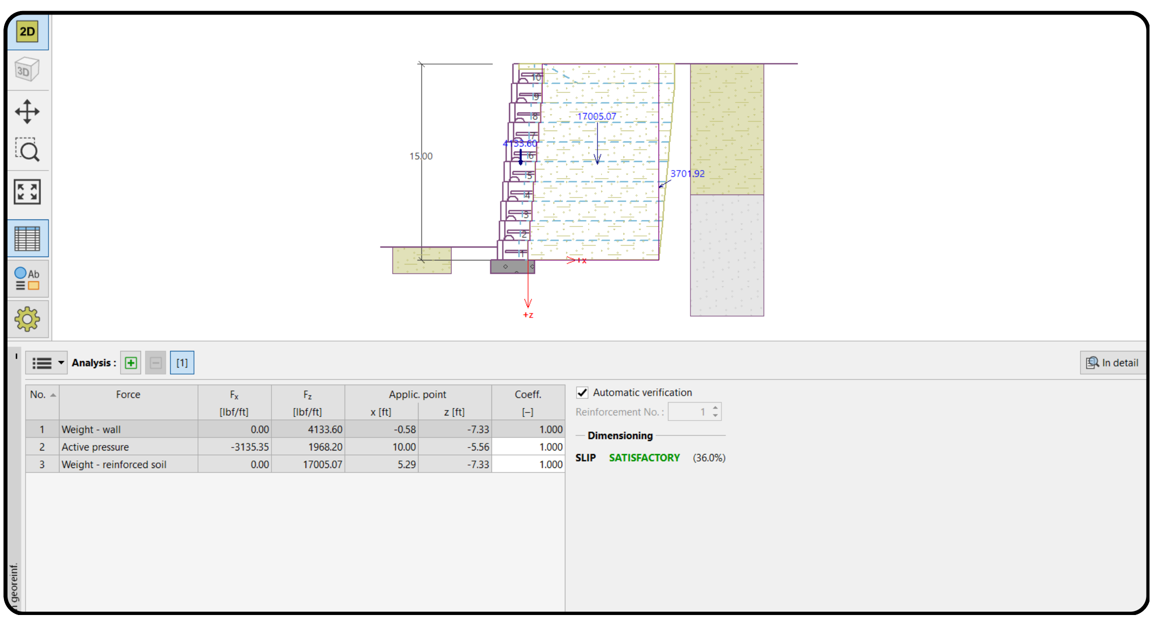

Figure 26: Internal Vertical Pressures and Verification of Internal Sliding on Reinforcement

RRWall+ Inputs

Step 9: Check Design Verification for Internal Stability - Strength, Pullout, Connection of Geogrid

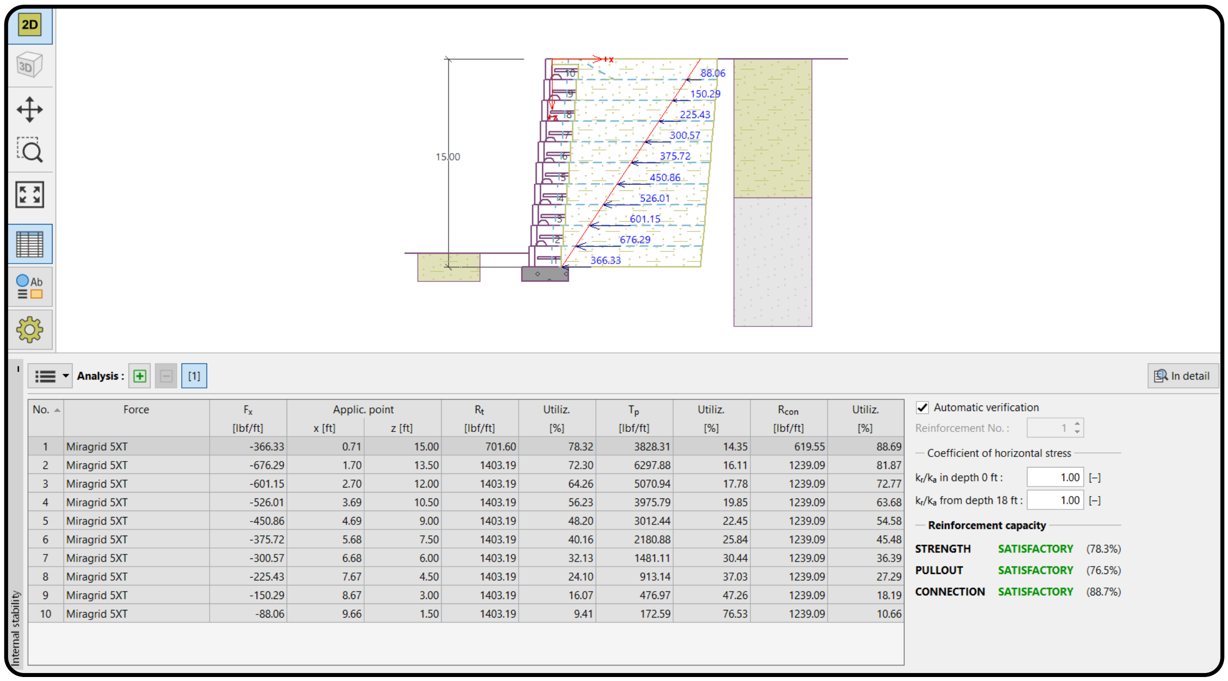

Figure 27: Internal Horizontal Pressures and Verification of Internal Reinforcement Strength, Pullout, Connection

Step 10: Use Built-In Global Stability Software Within RRWall+ to Check Global Stability of Wall

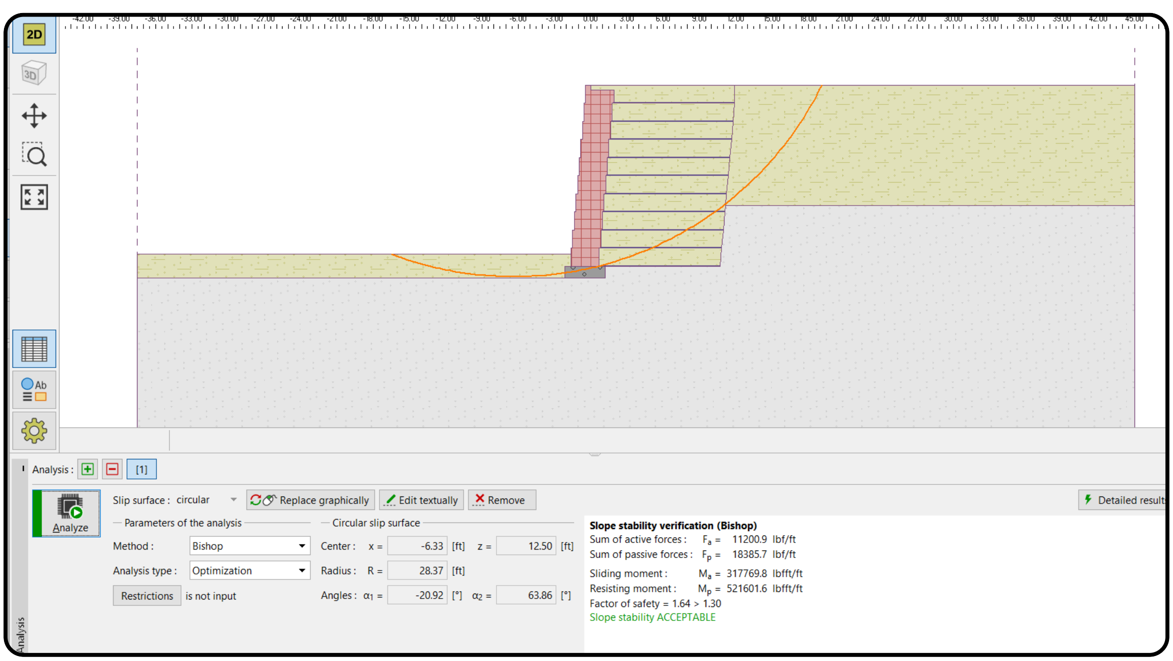

Figure 28: Built-In Stability Software Within RRWall+

Applications

By pairing large, wet cast concrete facing blocks with 12 in (305 mm) strips of PVC-coated PET geogrid that wrap through the block's center core slot, the PC System eliminates friction-only connections. It delivers a high-capacity connection independent of weight from the top to the bottom of the wall. This allows for the system to be implemented in a variety of environments, such as:

- Tall grade separations (road, rail, industrial)
  - Design heights of 50 ft+ (15 m+) are achievable since wall height is governed by geogrid strength, instead of block weight
- Heavy surcharge loads near the wall (traffic, rail, storage yards)
  - Looping the grid strips allows for a stronger top-block connection by utilizing a straight or anchored tail connection
- Tight sites or limited staging area construction sites
  - The precast blocks arrive ready on site and require minimal labor or equipment to install
  - The strip-grid layout enables partial reinforcement coverage (25–50%) to work around obstructions and optimize material

Figure 29 – PC Traffic Application

Figure 30 – PC Industrial Application (Quarry)

Figure 31 – Pipe Penetration Shown Through Wall

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