



Raffinato

Segmental Retaining Wall
Design Chart (Canada)



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Preface

This document contains the design charts for the RAFFINATO segmental retaining wall system with or without the use of geogrid reinforcement. The charts help to determine under specific conditions the maximum possible wall height without geogrid and for higher walls the necessary geogrid length and positioning.

First, evaluate the proposed conditions for the retaining wall project. It is important to determine the soil type, the load or surcharge and the backslope/toeslope conditions that most closely represent the final constructed wall. Second, select the chart case number and setback position (near vertical or 4.4° batter) that most closely resembles the final project conditions. Finally, select the wall height (including embedment) that will best fit the project wall profile.

This document has been prepared for the following cases:

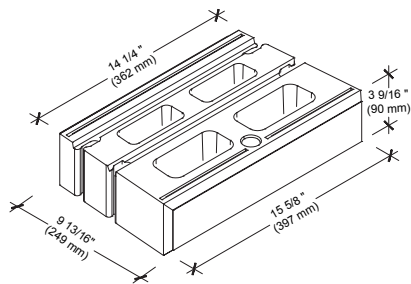
	SOIL	SURCHARGE	BACKSLOPE	TOESLOPE
CASE N° 1	Gravel / sand & gravel mixes	No	No	No
CASE N° 2	Gravel / sand & gravel mixes	6 kPa Surcharge (offset distance as shown)	No	No
CASE N° 3	Gravel / sand & gravel mixes	12 kPa Surcharge (offset distance as shown)	No	No
CASE N° 4	Gravel / sand & gravel mixes	No	1V : 3H	No
CASE N° 5	Clean Sand	No	No	No
CASE N° 6	Clean Sand	6 kPa Surcharge (offset distance as shown)	No	No
CASE N° 7	Clean Sand	12 kPa Surcharge (offset distance as shown)	No	No
CASE N° 8	Clean Sand	No	1V : 3H	No

The information contained in this document is supplied for information purposes only and as such should only be used for preliminary design use only. A qualified engineer should be consulted for the final design to be used for construction. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers can not under any circumstances be held liable for the incorrect use of information contained in the design charts.

Product Overview

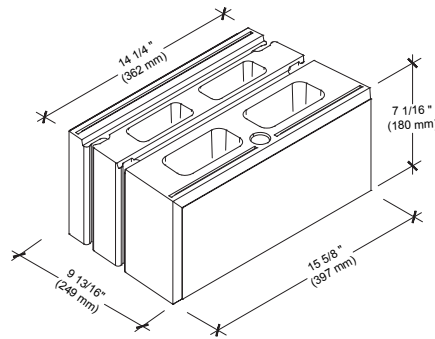
90 mm*

Approx. weight:
18.5 kg (39.7 lbs)



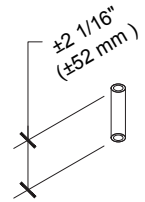
180 mm*

Approx. weight:
37.0 kg (81.6 lbs)



HDPE VERTICAL KEY

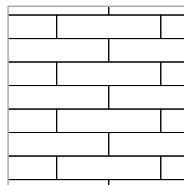
(alignment pin)



*Block depth is 248 mm (9 3/4 in.) for the polished finish texture.

PATTERNS

90 mm LINEAR PATTERN

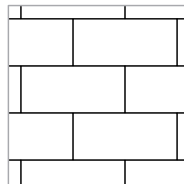


1-ROW PATTERN (90 mm + 180 mm)

2.400 m (7.87') long x 180 mm (7 1/16") high
2 different combinations* 50% Raffinato 90 mm
50% Raffinato 180 mm

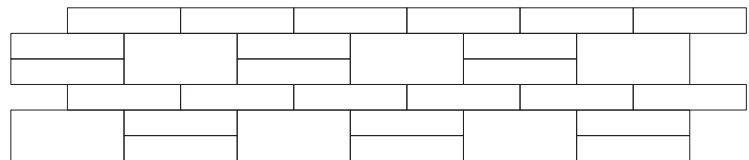


180 mm LINEAR PATTERN



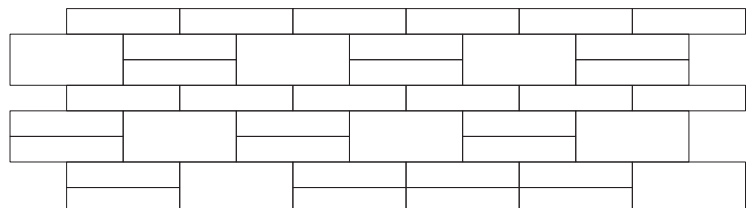
3-ROW PATTERN (90 mm + 180 mm)

2.400 m (7.87') long x 540 mm (21 1/4") high
67% Raffinato 90 mm / 33% Raffinato 180 mm



4-ROW PATTERN (90 mm + 180 mm)

2.400 m (7.87') long x 720 mm (28 3/8") high
2 different combinations* 67% Raffinato 90 mm
33% Raffinato 180 mm



Technical Specifications

PHYSICAL CHARACTERISTICS	
Compressive Strength	35 MPa (5050 psi)
Water Absorption (max.)	144 kg/m ³ (9 lb/ft ³)
Freeze-Thaw	1.0% max. loss of mass after 100 cycles; or 1.5% max. loss of mass after 150 cycles
Dimensional Tolerances	Height: ± 1.5 mm [$\frac{1}{16}$ in] Length & Width: ± 3 mm [$\frac{1}{8}$ in]

Note: Meets and exceeds the requirements of the ASTM C 1372 Standard Specification for Dry-Cast Segmental Retaining Wall Units.

DESIGN DATA	90 mm	180 mm
Horizontal Setback	7 mm ($\frac{9}{32}$ in)	14 mm ($\frac{9}{16}$ in)
Infilled Unit Weight	18.82 kN/m ³ (120 pcf)	
Infilled center of gravity (measured from the face of the unit)	125 mm (4 $\frac{15}{16}$ in)	
Block Shear Strength (ASTM D 6916)	$V_{ub}[kN/m] = 10.54 + N \cdot \tan(29.7) \leq 19.70$ $V_{ub}[lb/ft] = 722 + N \cdot \tan(29.7) \leq 1350$	
Block - Geogrid Shear Strength (Miragrid 3XT) (ASTM D 6916)	$V_{ug}[kN/m] = 4.64 + N \cdot \tan(38.30) \leq 17.41$ $V_{ug}[lb/ft] = 318 + N \cdot \tan(38.30) \leq 1193$	
Block - Geogrid Connection Strength (Miragrid 3XT) (ASTM D 6638)	$T_c[kN/m] = 10.86 + N \cdot \tan(26.6) \leq 18.86$ $T_c[lb/ft] = 744 + N \cdot \tan(26.6) \leq 1292$	

Notes: The infilled unit weight shown here is based on an assumed aggregate unit weight of 1550 kg/m³ (96.8 lb/ft³) used to fill the core cavity of the block and the space between adjacent blocks.

Design Charts

Notes and Assumptions

This preliminary guide has been prepared for two different reinforced soil types to approximate a good soil condition (Gravel or Sand & Gravel mixes) and a medium condition (Clean sand). Moreover, the retained/foundation soil is considered as a poor soil condition (Low Plasticity Silts and Clays). The description of the soil is provided for information purposes; it is the actual shear strength parameter that will govern the design.

Additionally, the following four different load conditions were considered:

- I. A horizontal surface above the wall with no surcharge to account for lawn or similar load conditions.
- II. A horizontal surface above the wall with a uniform surcharge of 6 kPa (125 psf) to account for paved surfaces and/or parking or alleys for car and light vehicles traffic.
- III. A horizontal surface above the wall with a uniform surcharge of 12 kPa (250 psf) to account for heavy vehicle traffic or fire lanes.
- IV. A 1V:3H slope above the wall (backslope).

Furthermore, each case contains two setback alternatives: one for a wall with 4.4° batter and one for a near vertical wall. Near vertical walls have a slight positive batter (1.7°) achieved by tilting the top surface of the leveling pad from front to back.

Surcharges are applied to a certain distance (as shown in the charts) behind the tail of the units and No slope below the wall (Toeslope) conditions were considered. The design parameters and additional assumptions are shown in each chart.

The design charts show the number, position, and length of the geogrids for a Techo-Bloc Raffinato wall, based on the height of the wall, the soil type and the load conditions. The wall height varies approximately from 0.36 m (1.18 ft) to 2.7 m (8.86 ft), gradually increasing in height increments of 0.18-0.54 m (0.59-1.77 ft). The wall height shown does not include the thickness of the cap.

First drawing of each case shows maximum height without geogrid under the specific conditions shown. Minimum reinforcement lengths were set to 1.30 m (4'-3") and a 70% reinforcement length to wall height ratio. All geogrid lengths shown are the actual lengths of geogrid required as measured from the front wall face to the end of the geogrid. The charts assume the use of geogrid Miragrid 3XT (by TenCate) with $T_{ult} = 51.1 \text{ kN/m}$ (3500 plf).

The geogrid and block positioning are shown with reference to Raffinato 180 mm units installed in a linear pattern. Any other pattern choice must respect geogrid elevation positions. For walls with Raffinato 90 mm units, simply stack two Raffinato 90 mm units for every block shown in the chart. For walls combining Raffinato 90 mm and 180 mm units, the 1-row pattern or 3-row pattern are recommended for ease of geogrid positioning.

Unless shown otherwise in the charts: top layers of geogrid shall never be more than 2 units from the top of the wall; and bottom layers of geogrid shall never be more than 2 units from the top of the leveling pad.

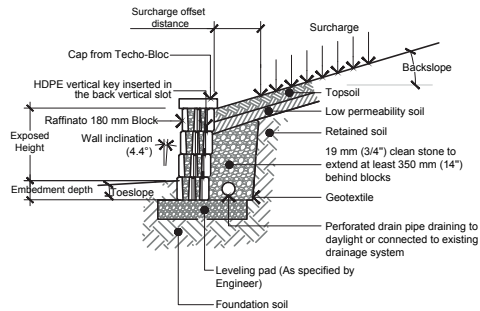
The design charts contained herein have been compiled and prepared by Techo-Bloc and to the best of its knowledge. Final determination of the suitability for the use of this document is the sole responsibility of the user. Structural design and analysis for construction purposes shall be performed, using the actual conditions of the proposed site, by a registered Professional Engineer. For further information, please contact our technical service department.

Wall

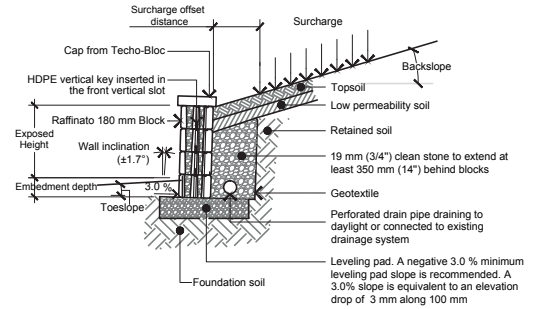
Typical cross section detail

GRAVITY WALL DETAIL

(4.4° BATTER)

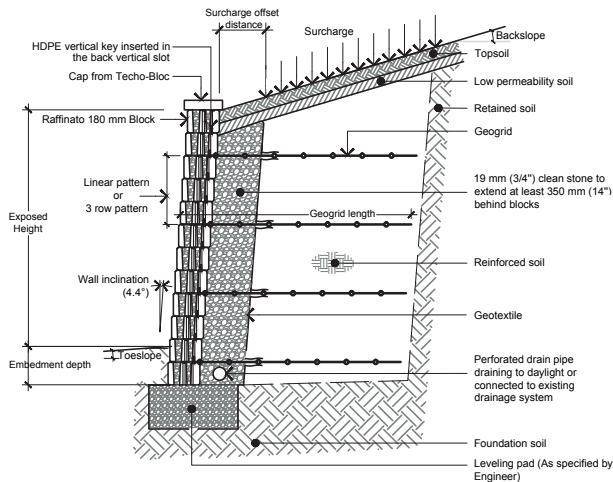


(NEAR VERTICAL)

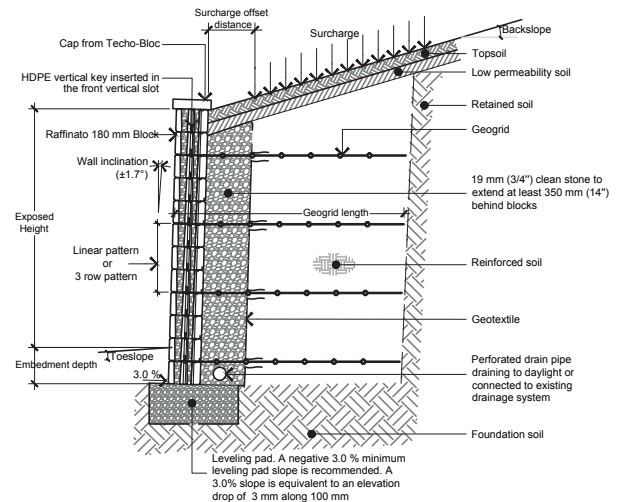


REINFORCED WALL DETAIL

(4.4° BATTER)

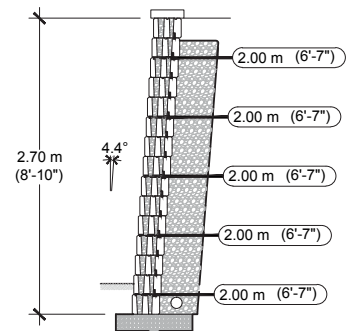
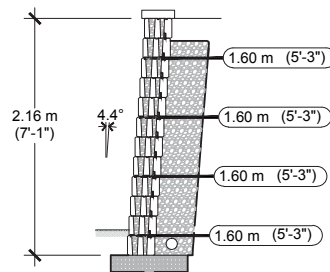
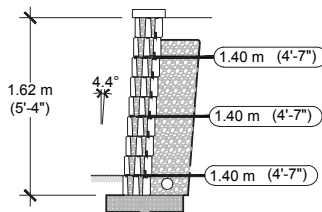
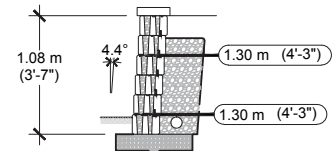
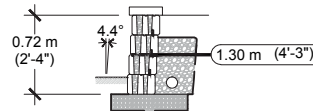
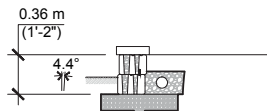


(NEAR VERTICAL)



REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

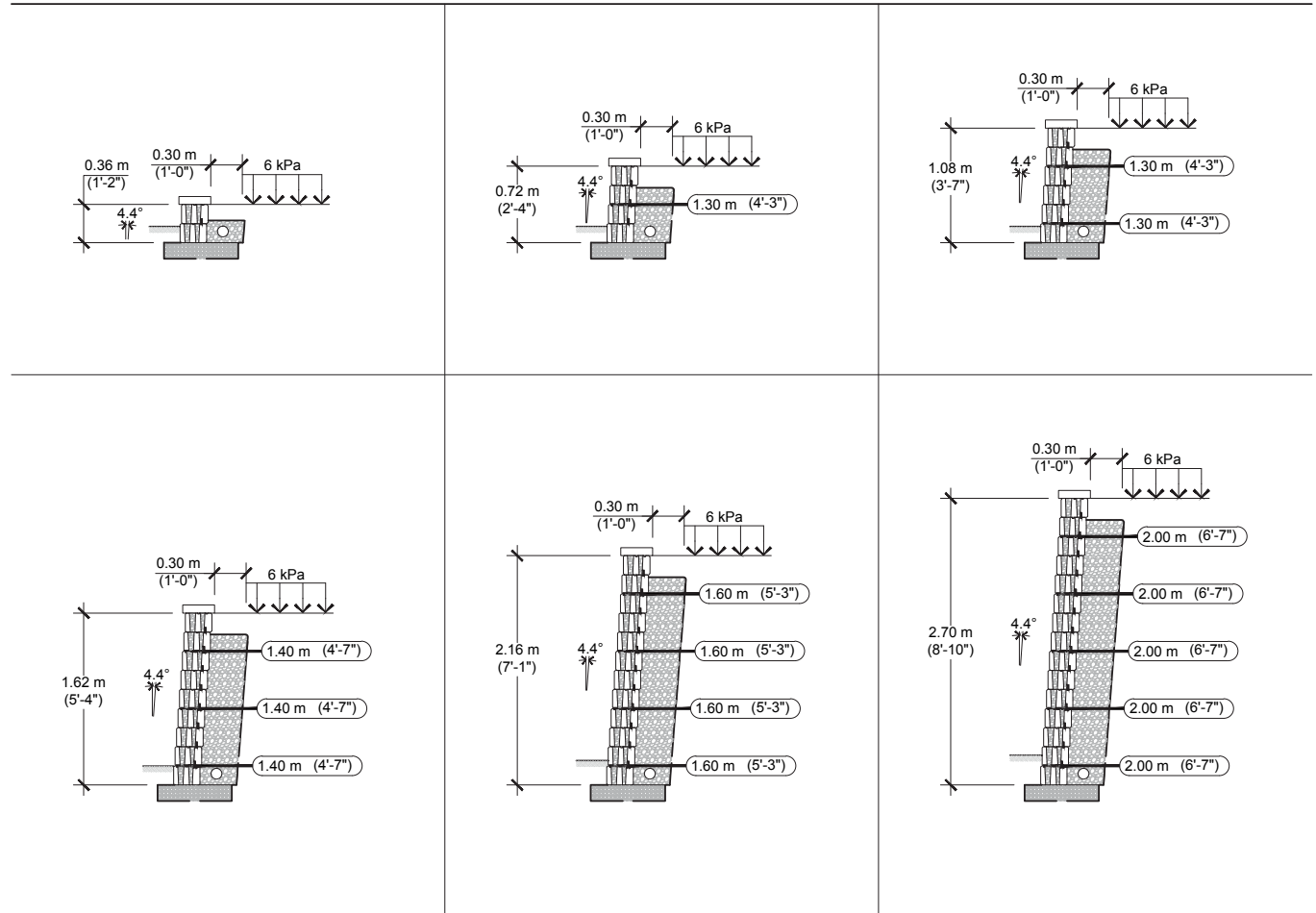
CASE N° 1 :
No Surcharge
No Backslope
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 35^\circ$, $\gamma = 22 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$).
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

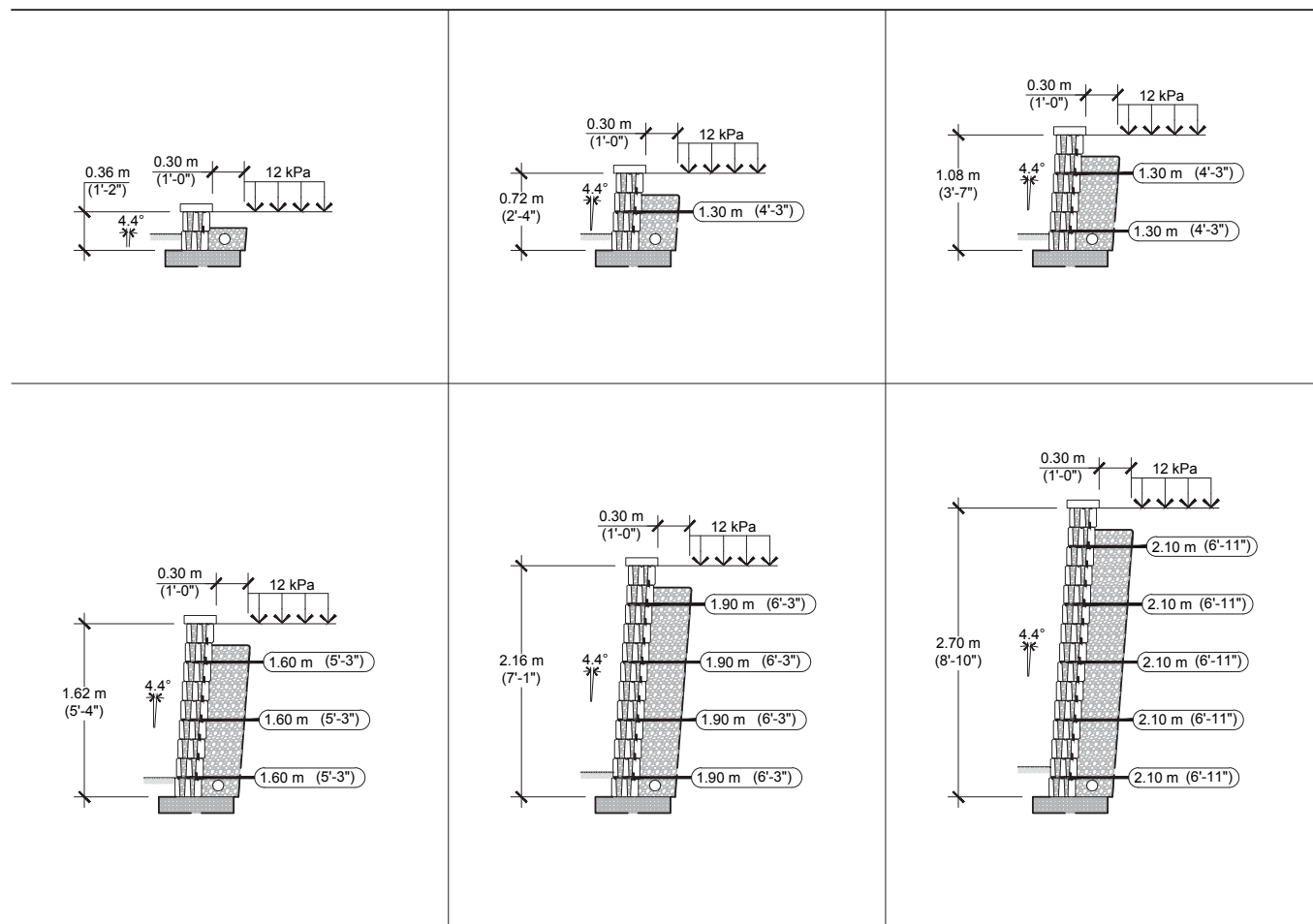
CASE N° 2 :
6 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



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GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

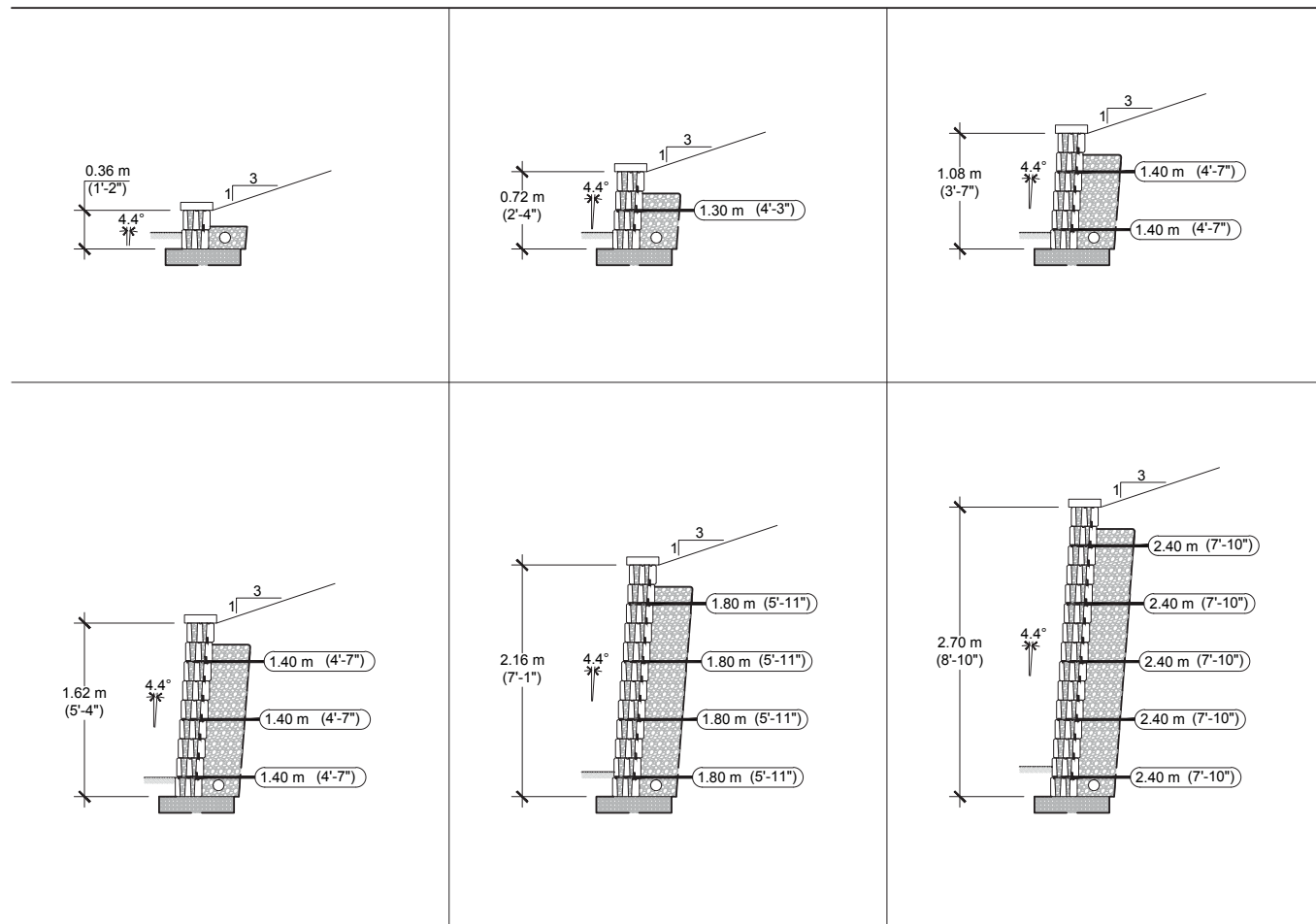
CASE N° 3 :
12 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



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GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

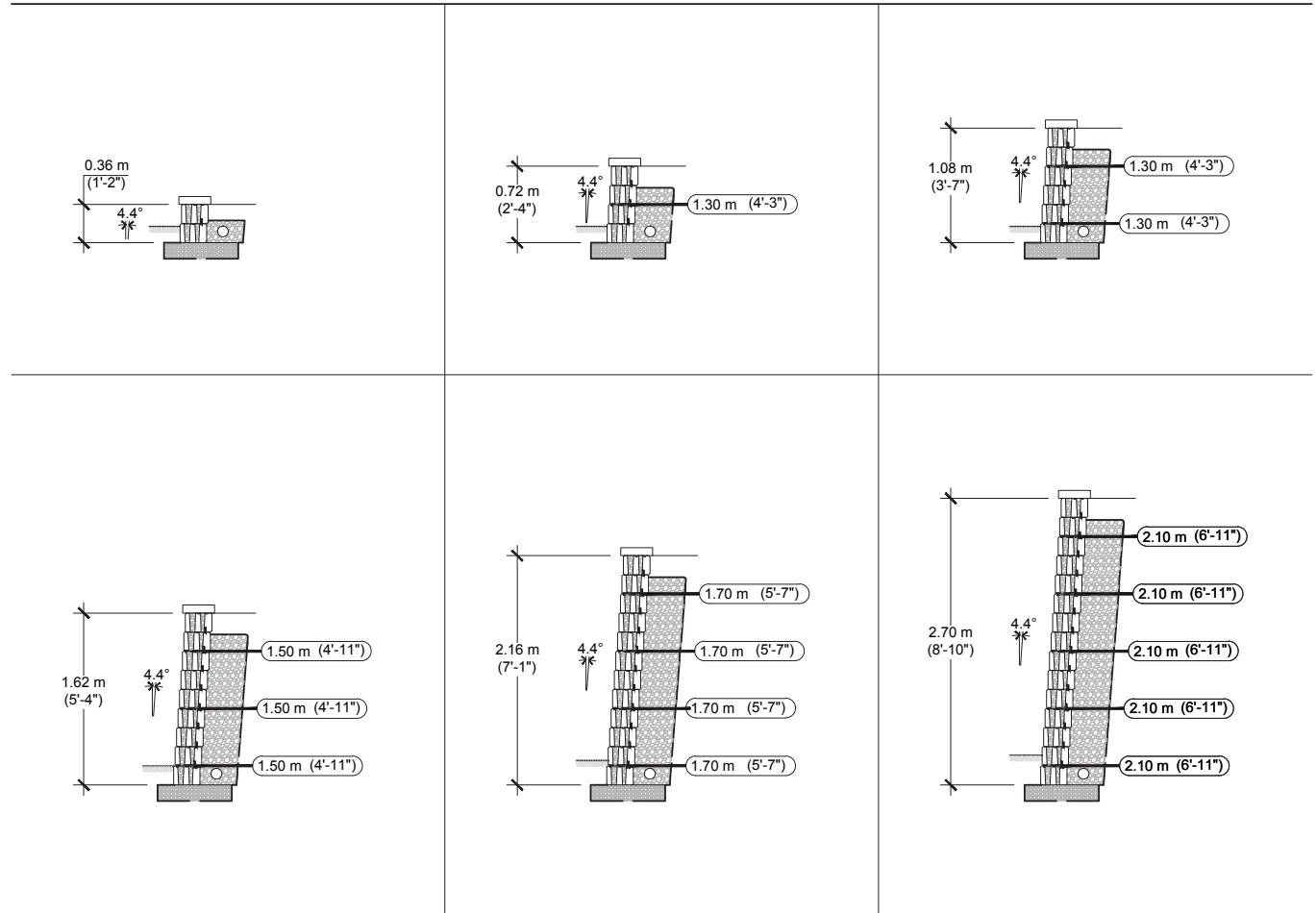
CASE N° 4 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



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REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

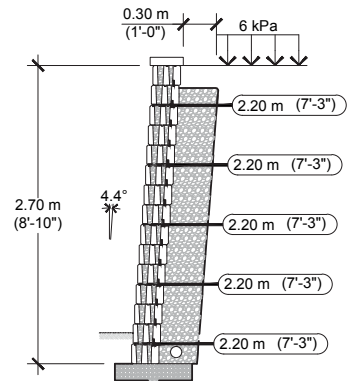
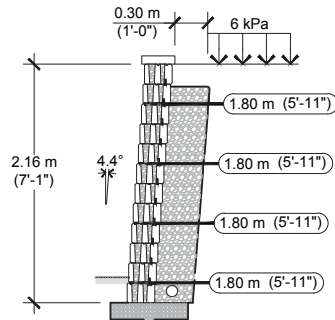
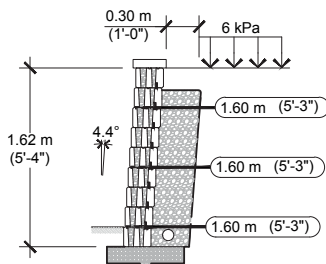
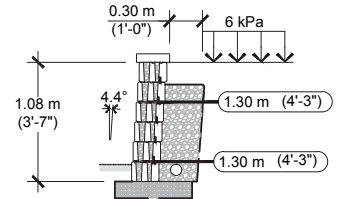
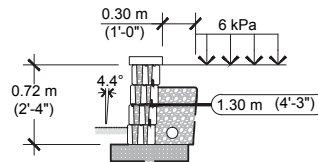
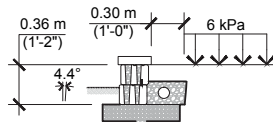
CASE N° 5 :
No Surcharge
No Backslope
No Toe Slope



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7. The design charts do not apply to tiered walls.
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9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
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13. For further information, please contact our technical service department.

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

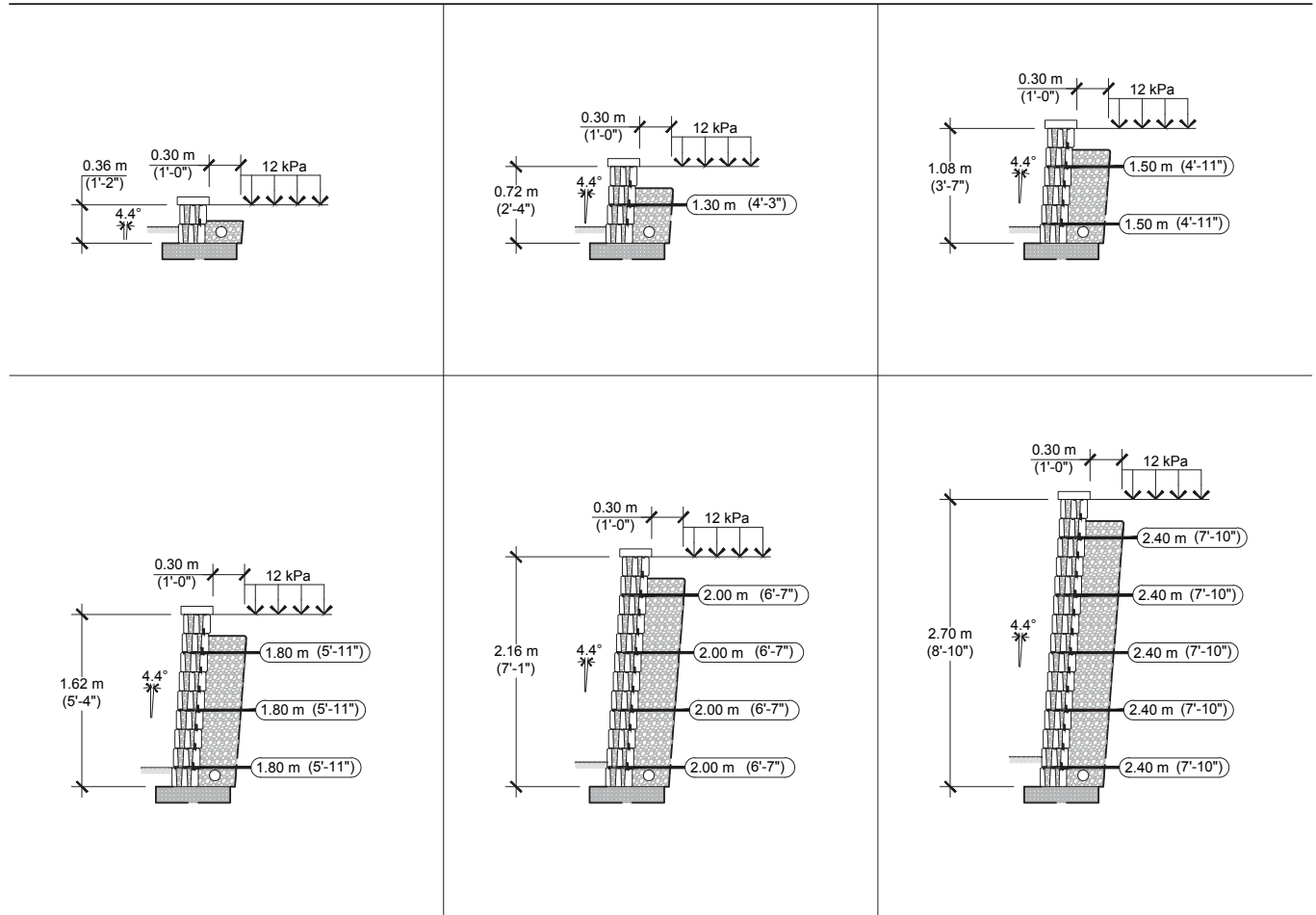
CASE N° 6 :
6 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



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13. For further information, please contact our technical service department.

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

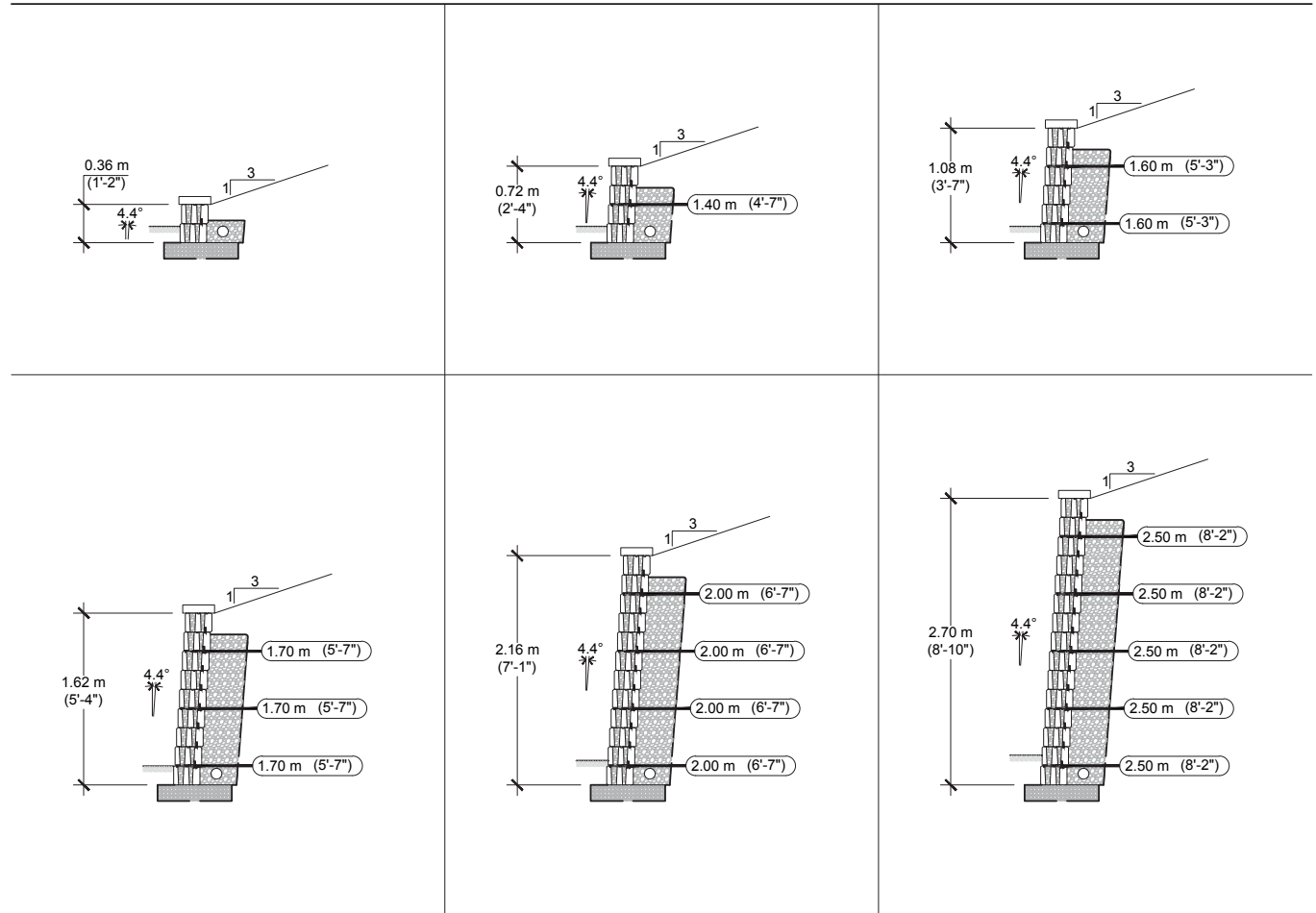
CASE N° 7 :
12 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

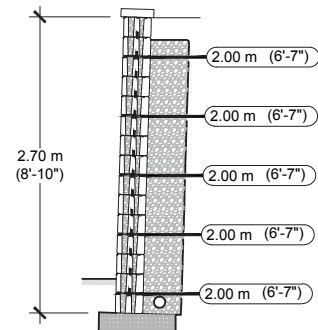
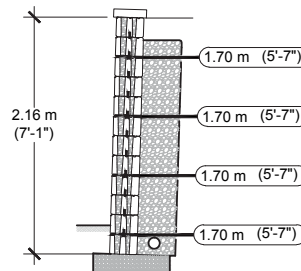
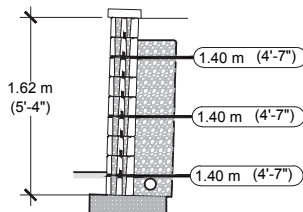
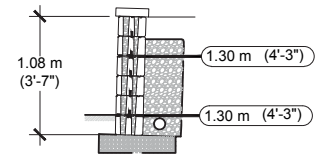
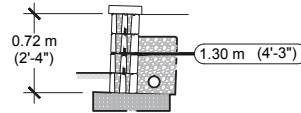
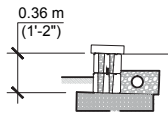
CASE N° 8 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



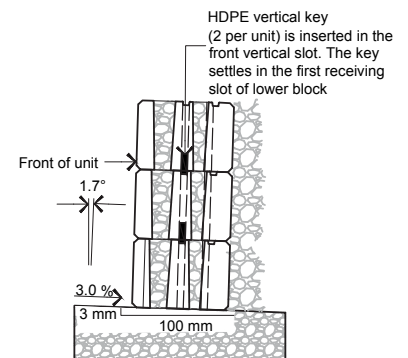
1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 1 :
No Surcharge
No Backslope
No Toe Slope



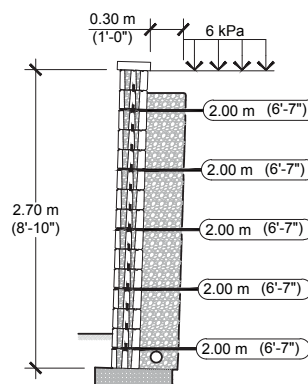
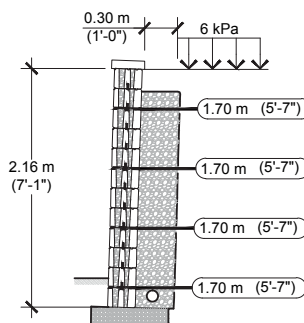
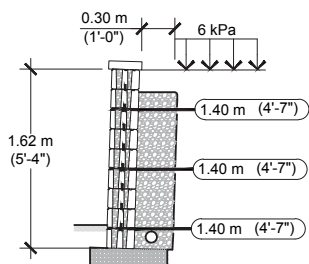
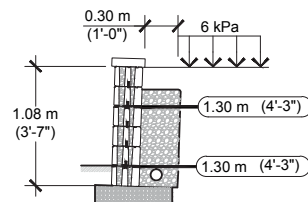
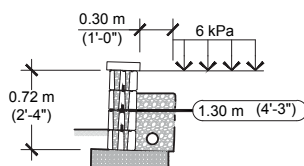
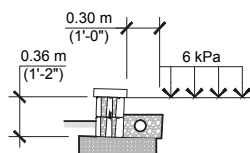
- The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
- The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
- Soil parameters: reinforced soil ($\phi = 35^\circ$, $\gamma = 22 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$).
- A qualified engineer should be consulted for the final design to be used for construction.
- The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
- The seismic analysis is not included.
- The design charts do not apply to tiered walls.
- The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
- The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
- The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
- Engineering judgement should be used when interpolating between heights.
- Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
- For further information, please contact our technical service department.



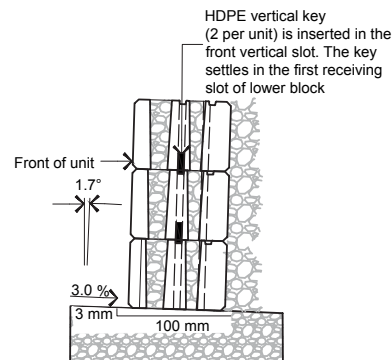
Note:
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 2 :
6 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 35^\circ$, $\gamma = 22 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$).
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

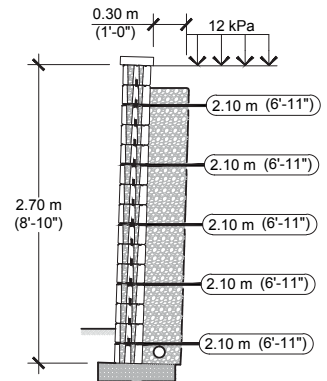
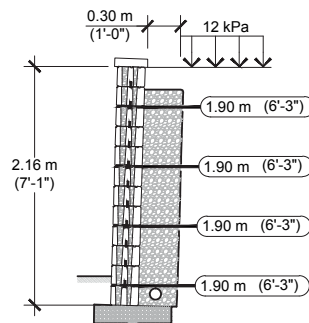
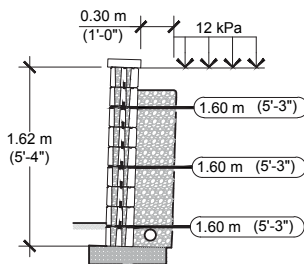
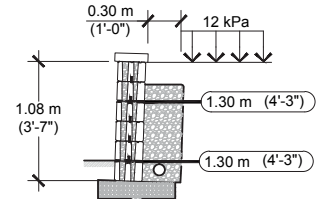
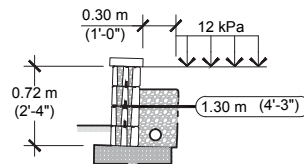
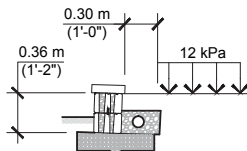


Note:
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

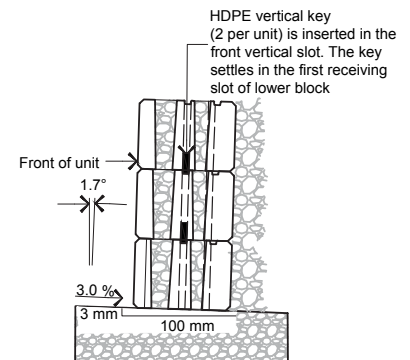
REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 3 :

12 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 35^\circ$, $\gamma = 22 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$).
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

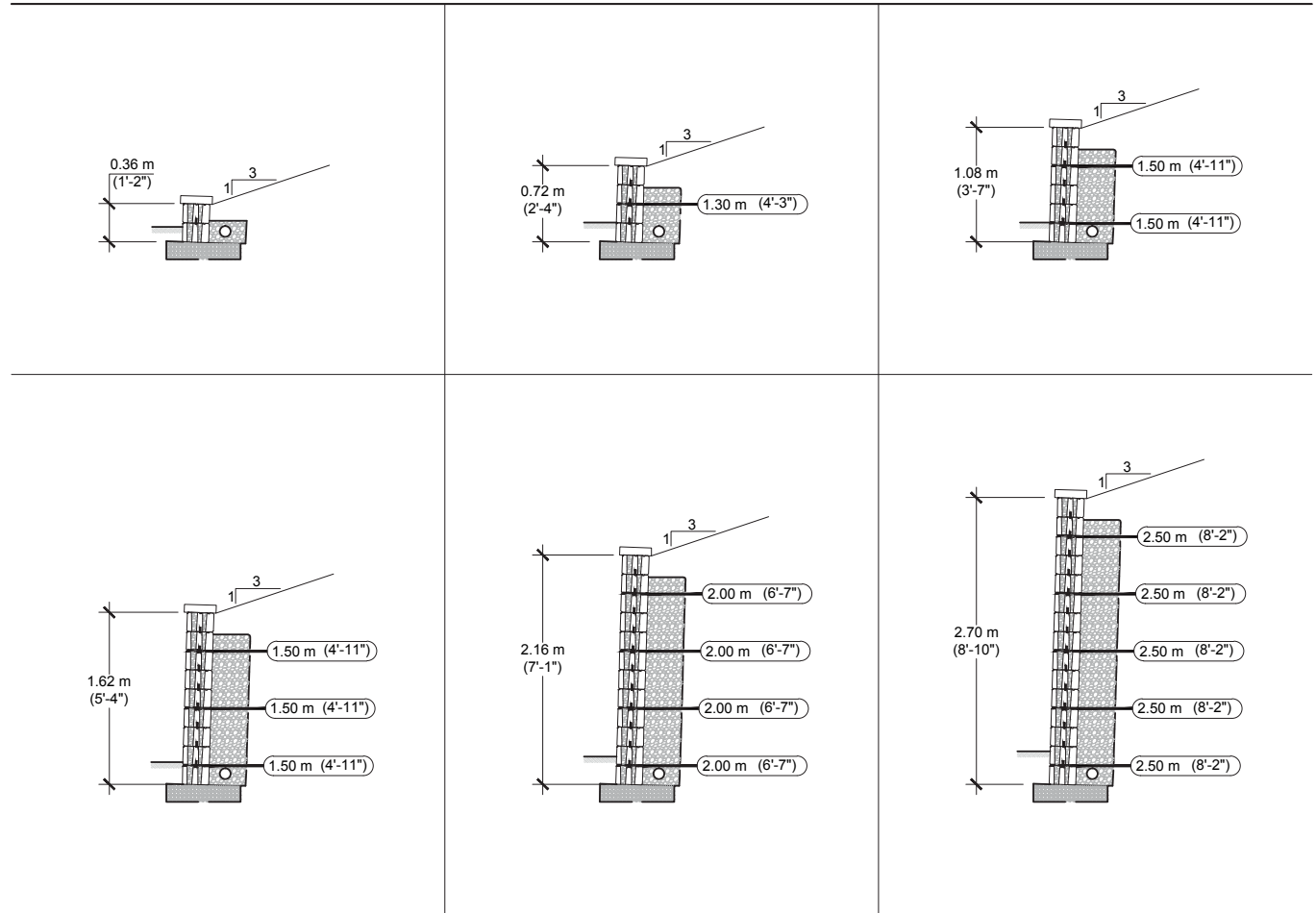


Note:

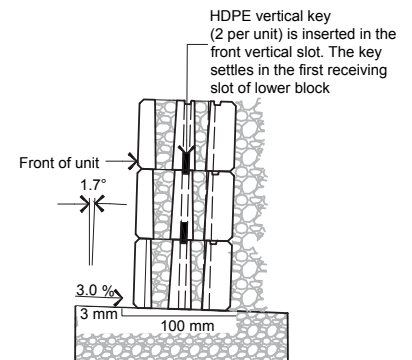
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: GRAVEL/ SAND AND GRAVEL MIXES ($\phi=35^\circ$, $\gamma = 22 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 4 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 35^\circ$, $\gamma = 22 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

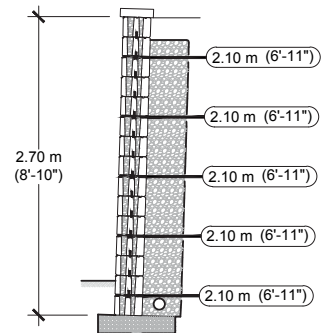
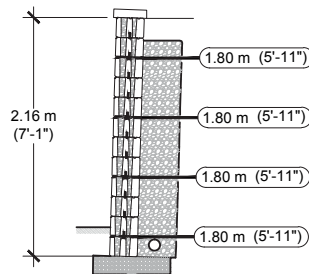
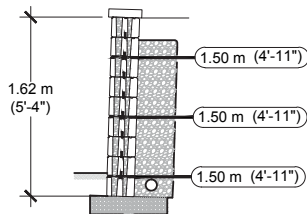
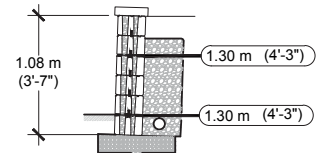
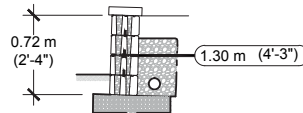
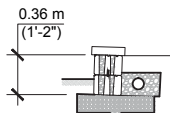


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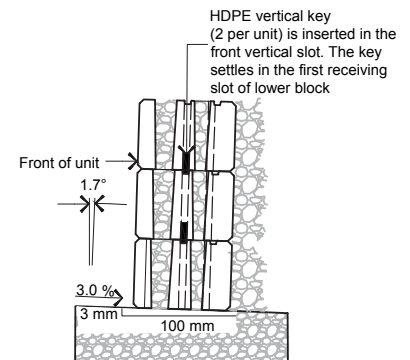
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 5 :
No Surcharge
No Backslope
No Toe Slope



1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
4. A qualified engineer should be consulted for the final design to be used for construction.
5. The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
6. The seismic analysis is not included.
7. The design charts do not apply to tiered walls.
8. The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
9. The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
10. The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
12. Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

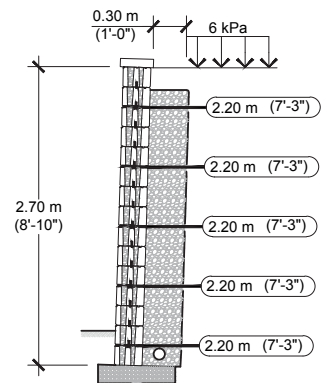
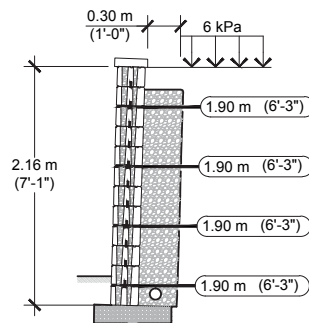
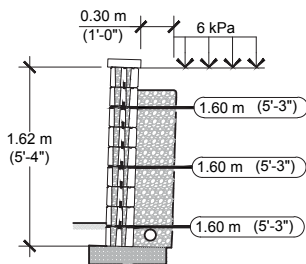
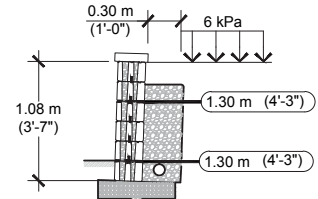
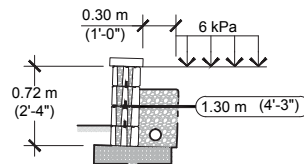
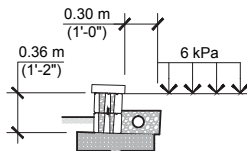


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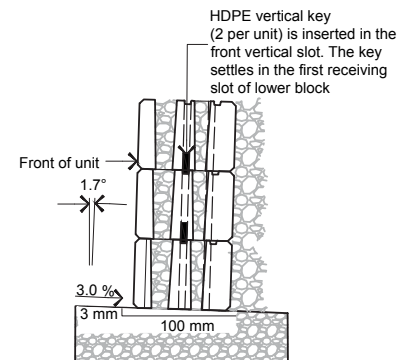
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 6 :
6 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



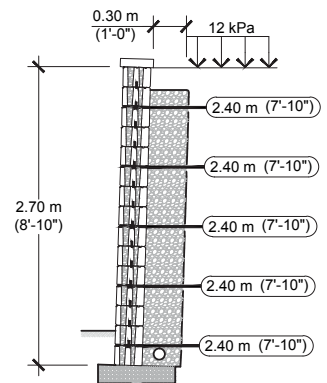
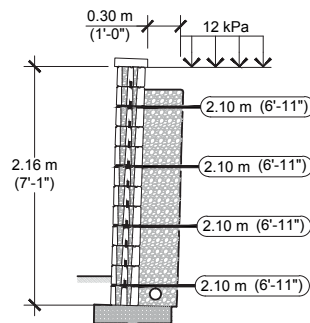
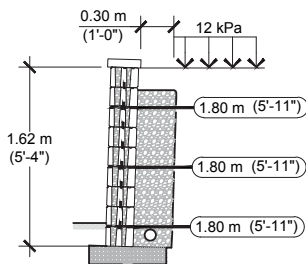
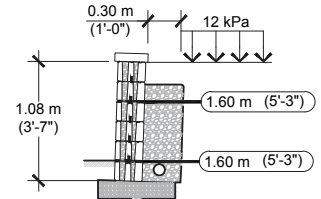
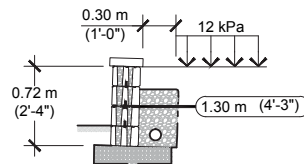
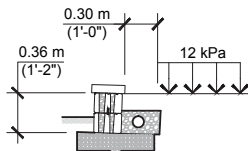
- The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
- The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
- Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$).
- A qualified engineer should be consulted for the final design to be used for construction.
- The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
- The seismic analysis is not included.
- The design charts do not apply to tiered walls.
- The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
- The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
- The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
- Engineering judgement should be used when interpolating between heights.
- Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
- For further information, please contact our technical service department.



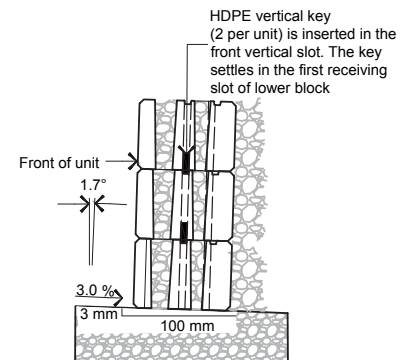
Note:
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 7 :
12 kPa Surcharge (offset distance as shown)
No Backslope
No Toe Slope



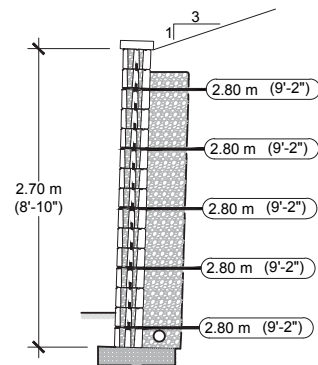
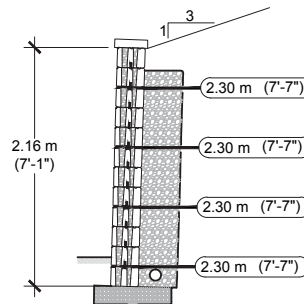
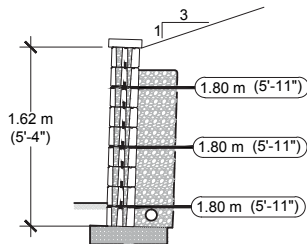
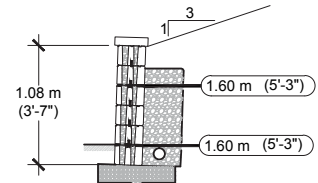
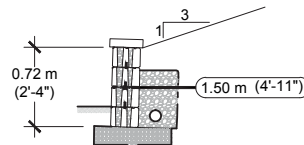
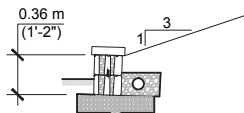
- The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
- The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
- Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
- A qualified engineer should be consulted for the final design to be used for construction.
- The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
- The seismic analysis is not included.
- The design charts do not apply to tiered walls.
- The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
- The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
- The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
- Engineering judgement should be used when interpolating between heights.
- Techo-Bloc and its predecessors, successors, beneficiaries, employees, associates, administrators and insurers accepts no liability for the incorrect use of information contained in the design charts.
- For further information, please contact our technical service department.



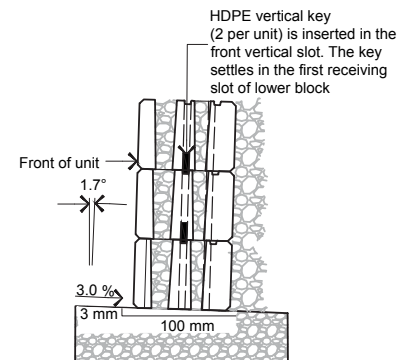
Note:
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm

REINFORCED SOIL: CLEAN SAND ($\phi=32^\circ$, $\gamma = 20 \text{ kN/m}^3$)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 8 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



- The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
- The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
- Soil parameters: reinforced soil ($\phi = 32^\circ$, $\gamma = 20 \text{ kN/m}^3$); retained soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$); foundation soil ($\phi = 26^\circ$, $\gamma = 20 \text{ kN/m}^3$)
- A qualified engineer should be consulted for the final design to be used for construction.
- The foundation soil must be able to support the wall system. The bearing capacity of the foundation soil, settlement, and global stability must be verified and validated by a qualified geotechnical engineer.
- The seismic analysis is not included.
- The design charts do not apply to tiered walls.
- The charts assume that the walls are constructed in accordance with Techo-Bloc specifications, good construction practice and an adequate drainage system.
- The geogrid layout has been optimized to satisfy the design requirements of the NCMA's Design Manual for Segmental Retaining Walls, 3rd Edition.
- The minimum burial depth must be 150 mm (6 in) or 10% of the exposed height, whichever is greater.
- Engineering judgement should be used when interpolating between heights.
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Note:

Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3 mm along 100 mm



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