

Semma Segmental Retaining Wall



Design Chart (USA)

TECHO—BLOC

Table of contents

PREFACE..... 3

PRODUCT OVERVIEW & TECHNICAL SPECIFICATIONS 4

DESIGN CHARTS: NOTES AND ASSUMPTIONS..... 6

TYPICAL CROSS SECTION DETAILS 7

INCLINED POSITION

CLEAN SAND / GRAVEL / SAND & GRAVEL MIXES

Case N° 1: No surcharge, No backslope, No Toe Slope.....8

Case N° 2: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope.....9

Case N° 3: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope..... 10

Case N° 4: No surcharge, 1V:3H backslope, No Toe Slope..... 11

FINE SANDS & SILTY SANDS

Case N° 5: No surcharge, No backslope, No Toe Slope..... 12

Case N° 6: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope..... 13

Case N° 7: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope..... 14

Case N° 8: No surcharge, 1V:3H backslope, No Toe Slope..... 15

LOW PLASTICITY SILTS AND CLAYS

Case N° 9: No surcharge, No backslope, No Toe Slope..... 16

Case N° 10: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope 17

Case N° 11: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope 18

Case N° 12: No surcharge, 1V:3H backslope, No Toe Slope 19

NEAR VERTICAL

GRAVEL / SAND & GRAVEL MIXES

Case N° 1: No surcharge, No backslope, No Toe Slope.....20

Case N° 2: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope.....21

Case N° 3: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope.....22

Case N° 4: No surcharge, 1V:3H backslope, No Toe Slope.....23

CLEAN SAND

Case N° 5: No surcharge, No backslope, No Toe Slope.....24

Case N° 6: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope.....25

Case N° 7: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope.....26

Case N° 8: No surcharge, 1V:3H backslope, No Toe Slope.....27

LOW PLASTICITY SILTS AND CLAYS

Case N° 9: No surcharge, No backslope, No Toe Slope.....28

Case N° 10: 100 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope29

Case N° 11: 250 psf Surcharge (1 ft behind wall), No backslope, No Toe Slope30

Case N° 12: No surcharge, 1V:3H backslope, No Toe Slope31

Preface

This document contains the design charts for the SEMMA 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 7.6° 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:

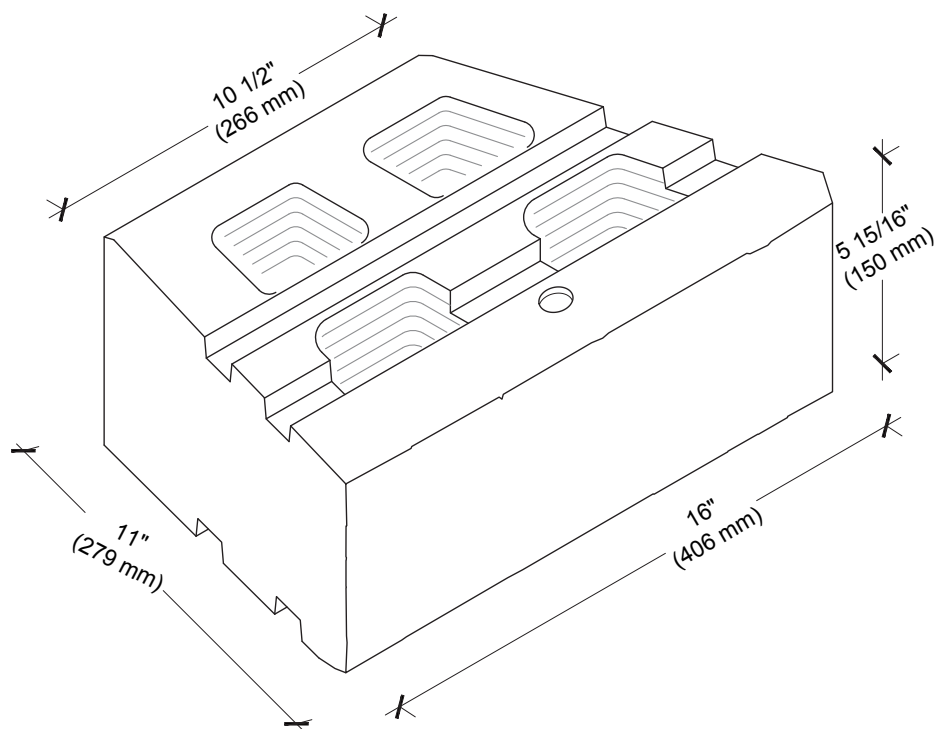
	SOIL	SURCHARGE	BACKSLOPE	TOESLOPE
CASE N° 1	Clean sand / gravel / sand & gravel mixes	No	No	No
CASE N° 2	Clean sand / gravel / sand & gravel mixes	100 psf (1 ft behind the wall)	No	No
CASE N° 3	Clean sand / gravel / sand & gravel mixes	250 psf (1 ft behind the wall)	No	No
CASE N° 4	Clean sand / gravel / sand & gravel mixes	No	1V : 3H	No
CASE N° 5	Fine Sands & Silty Sands	No	No	No
CASE N° 6	Fine Sands & Silty Sands	100 psf (1 ft behind the wall)	No	No
CASE N° 7	Fine Sands & Silty Sands	250 psf (1 ft behind the wall)	No	No
CASE N° 8	Fine Sands & Silty Sands	No	1V : 3H	No
CASE N° 9	Low Plasticity Silts and Clays	No	No	No
CASE N° 10	Low Plasticity Silts and Clays	100 psf (1 ft behind the wall)	No	No
CASE N° 11	Low Plasticity Silts and Clays	250 psf (1 ft behind the wall)	No	No
CASE N° 12	Low Plasticity Silts and Clays	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

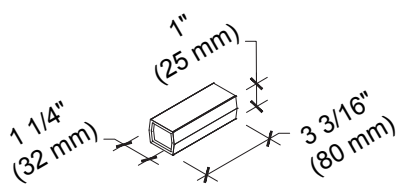
REGULAR UNITS

Approx. weight:
57.2 lbs (25.95 kg)



HDPE HORIZONTAL KEY

(alignment pin)



Technical Specifications

PHYSICAL CHARACTERISTICS

Compressive Strength	5050 psi (35 MPa)
Water Absorption (max.)	9 lb/ft ³ (144 kg/m 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: + $\frac{1}{16}$ in. [1.5 mm] Length & Width: + $\frac{1}{8}$ in. [3 mm]

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

DESIGN DATA

Horizontal Setback	$\frac{13}{16}$ in. (20mm)
Infilled Unit Weight	121 pcf (19.07 kN/m ³)
Infilled center of gravity (measured from the face of the unit)	5 $\frac{1}{2}$ in. (140 mm)
Block Shear Strength (ASTM D 6916)	$V_{ub}[\text{lb/ft}] = 845.6 + N \cdot \tan(32.5) \leq 2921$ $V_{ub}[\text{kN/m}] = 12.3 + N \cdot \tan(32.5) \leq 42.63$
Block - Geogrid Shear Strength (Miragrid 3XT) (ASTM D 6916)	$V_{ug}[\text{lb/ft}] = 982 + N \cdot \tan(36.20) \leq 3363$ $V_{ug}[\text{kN/m}] = 14.3 + N \cdot \tan(36.2) \leq 49.08$
Block - Geogrid Connection Strength (Miragrid 3XT) (ASTM D 6638)	$T_c[\text{lb/ft}] = 727 + N \cdot \tan(24.3) \leq 2446$ $T_c[\text{kN/m}] = 10.61 + N \cdot \tan(24.3) \leq 35.7$

Notes: The infilled unit weight shown here is based on an assumed aggregate unit weight of 96.8 lb/ft³ (1550 kg/m³) 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 three different soil types to approximate good (Clean sand / gravel / sand & gravel mixes), medium (Fine Sands & Silty Sands) and poor (Low Plasticity Silts and Clays) soil conditions to cover the typical design range. 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 100 psf (4.8 kPa) 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 250 psf (12 kPa) 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 7.6° 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.

All surcharges are applied at least 12 inches 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 Semma wall, based on the height of the wall, the soil type and the load conditions. The wall height varies approximately from 1 ft (0.30 m) to 10.83 ft (3.30 m), gradually increasing in height increments of 0.50-1.48 ft (0.15-0.45 m). 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 4 feet (1.22 m) 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 $T_{ult}=3500$ plf (51.1 kN/m).

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.

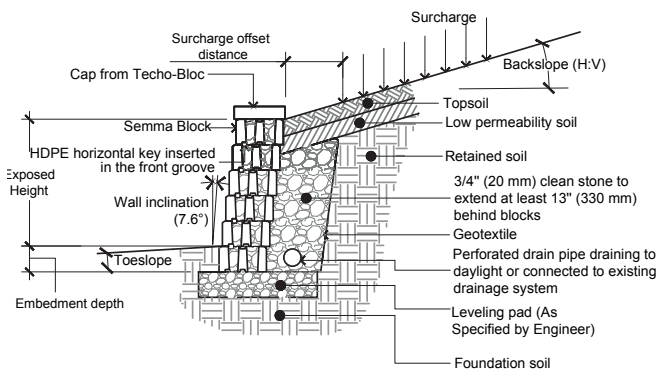
The design charts contained herein have been compiled and prepared by Techo-Bloc and to the best of its knowledge. Final determination of the suitability for the use of this document is the sole responsibility of the user. Structural design and analysis for construction purposes shall be performed, using 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

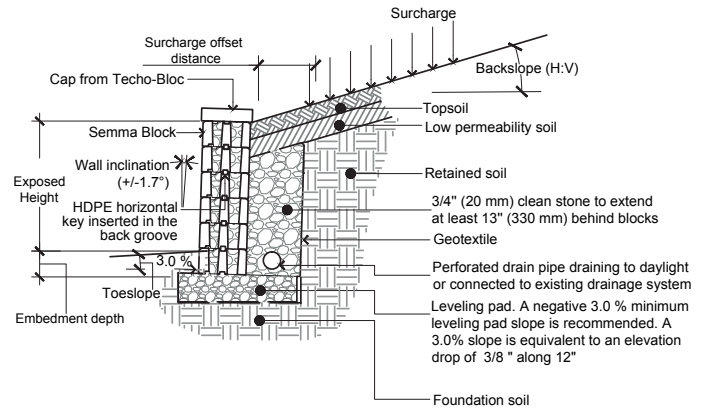
Gravity Wall Detail

(7.6° BATTER)

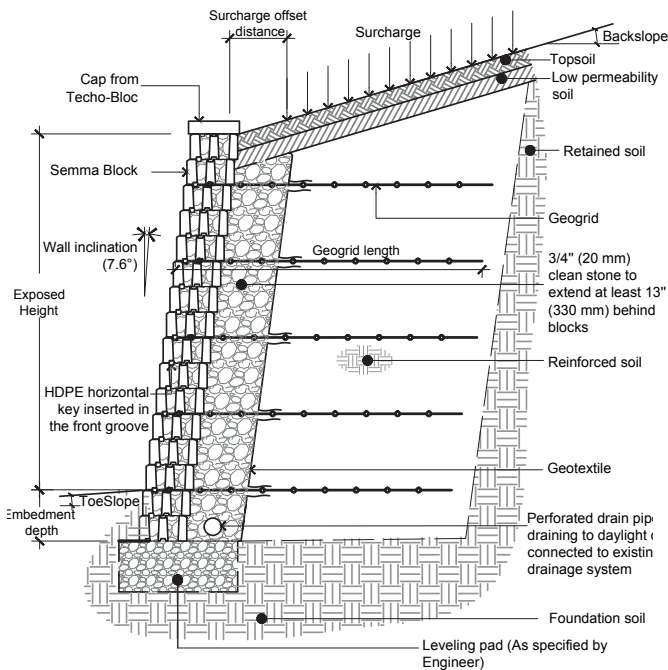


Reinforced Wall Detail

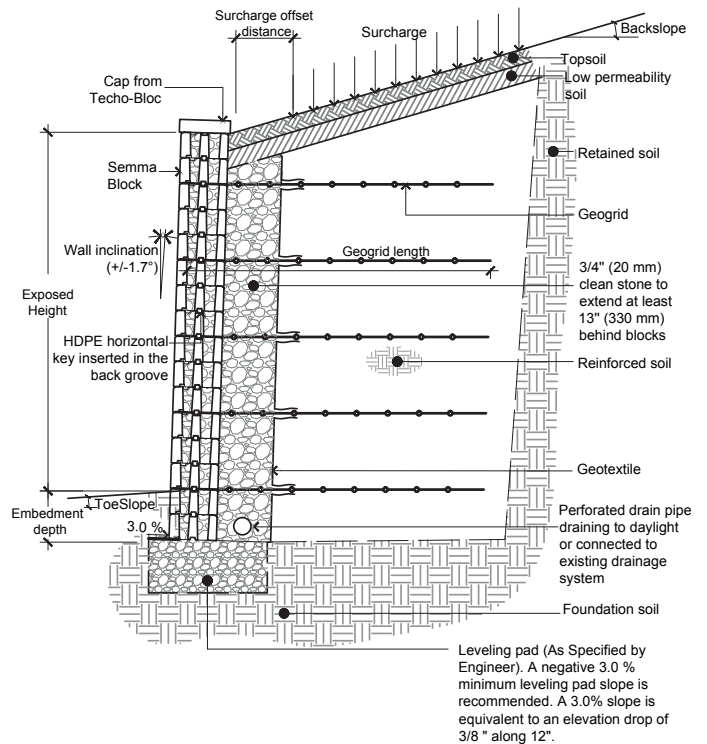
(NEAR VERTICAL)



(7.6° BATTER)

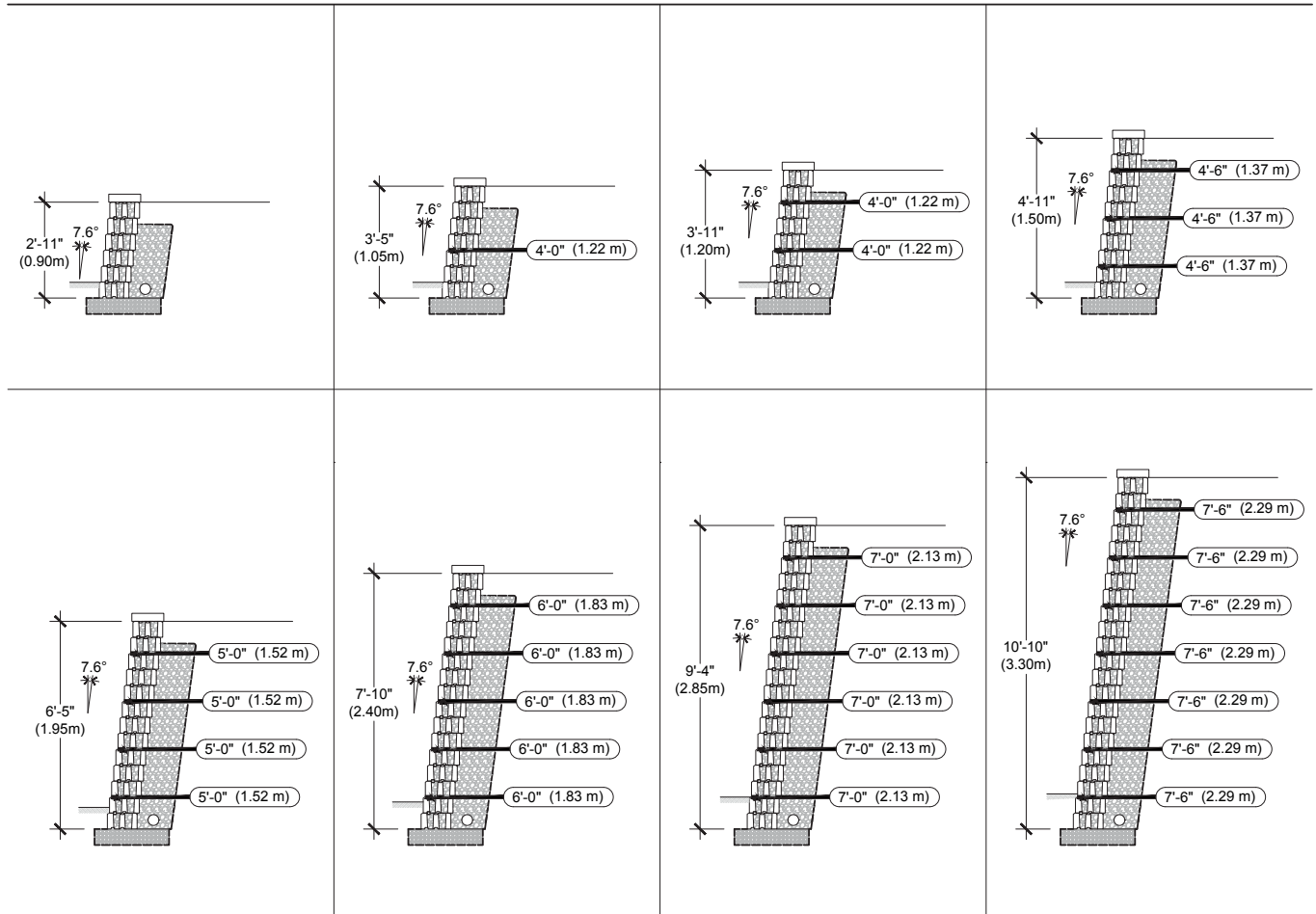


(NEAR VERTICAL)



CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

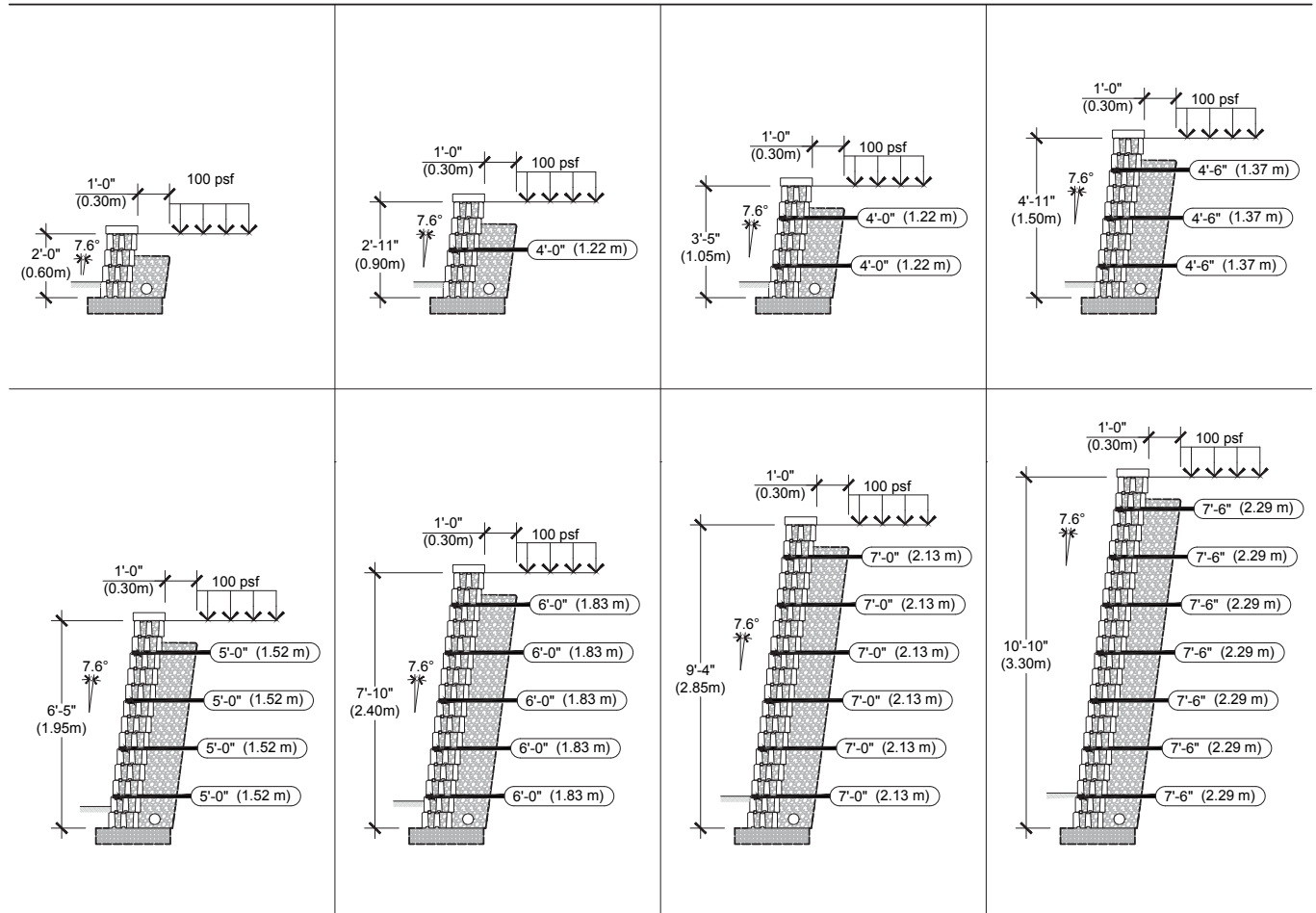
CASE N° 1 :
No Surcharge
No Backslope
No Toe Slope



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 ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

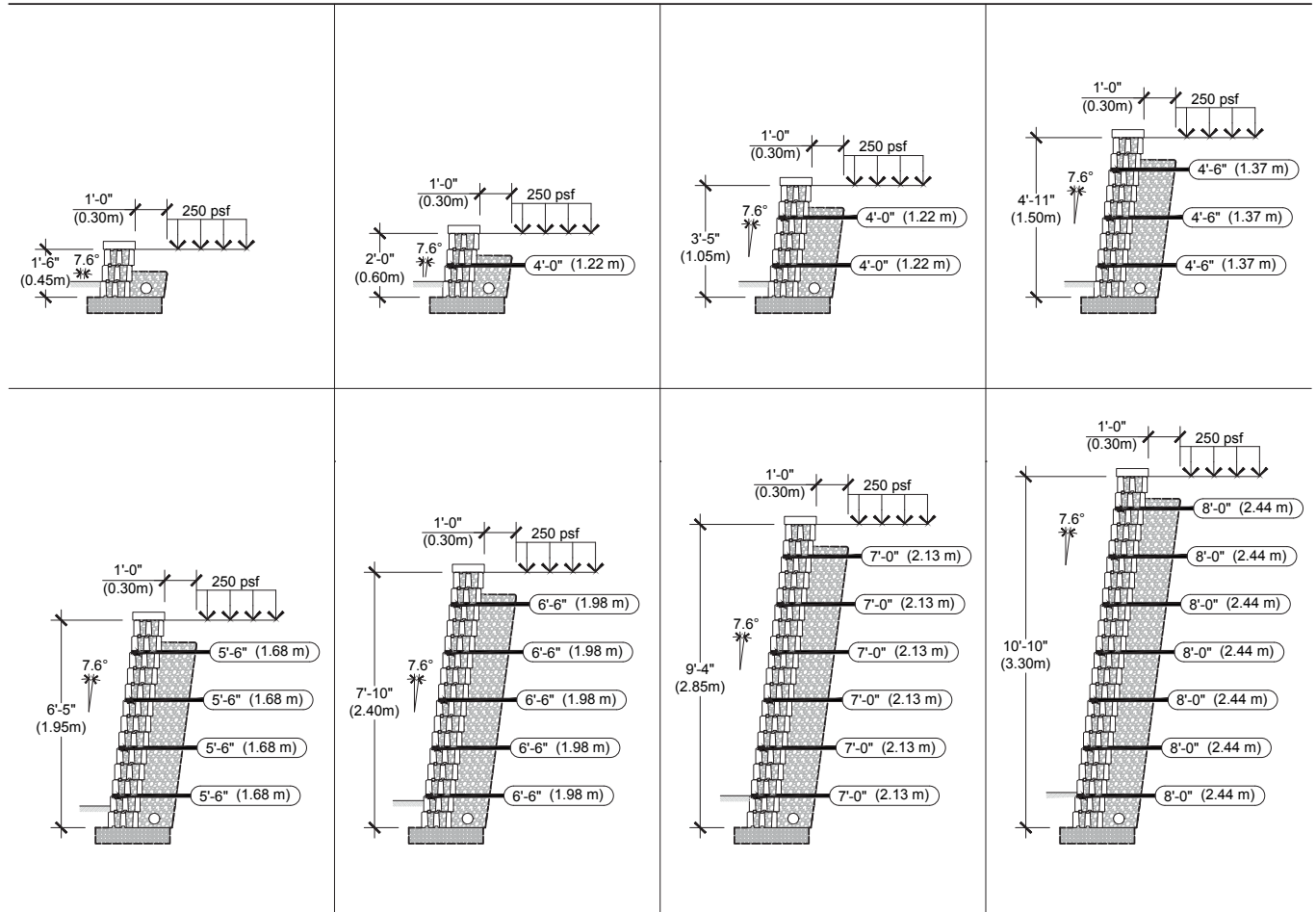
CASE N° 2 :
100 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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- Soil parameters: reinforced soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
- 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.
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CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

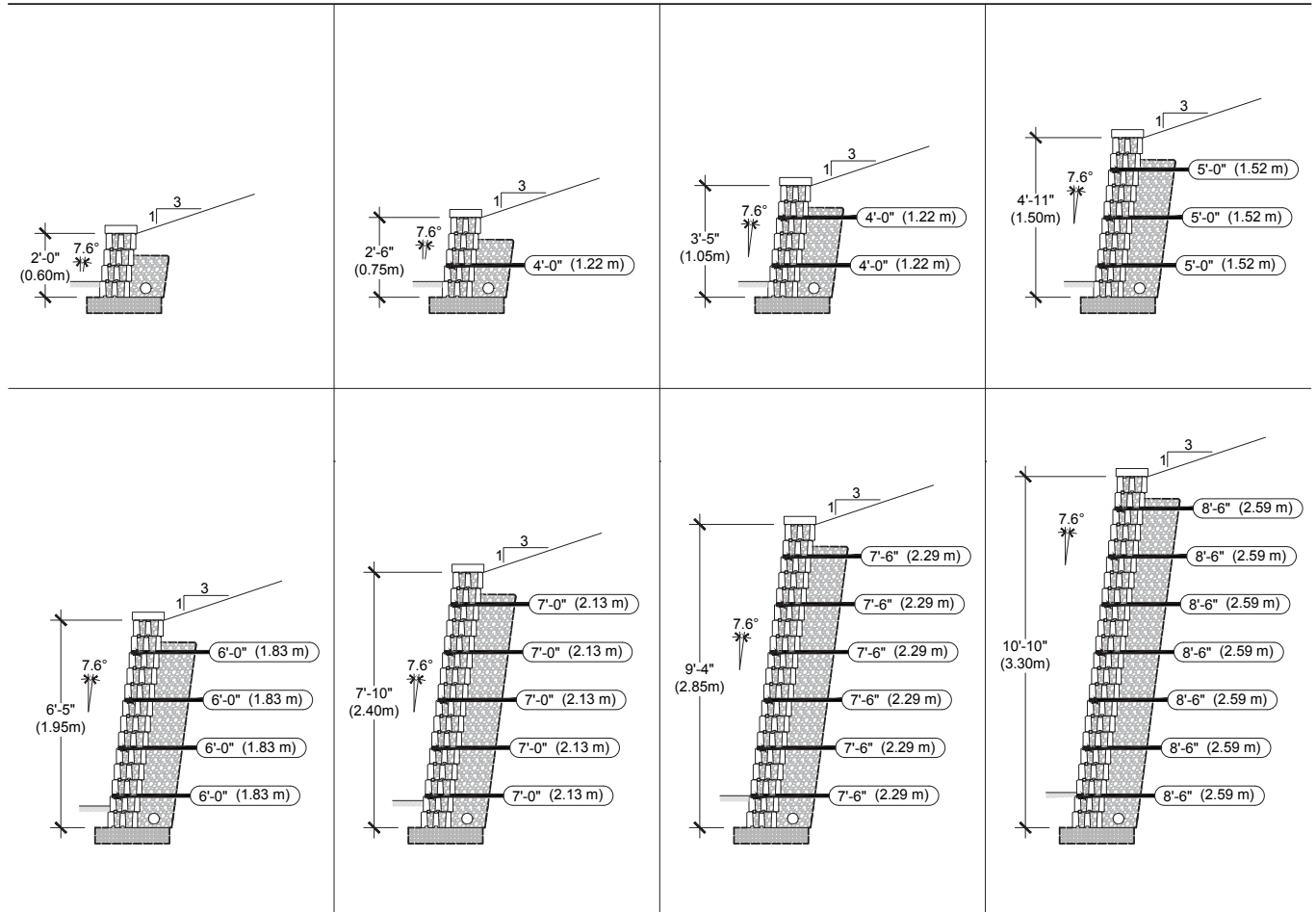
CASE N° 3 :
250 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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3. Soil parameters: reinforced soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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10. The minimum burial depth must be 6 in (150 mm) or 10% of the exposed height, whichever is greater.
11. Engineering judgement should be used when interpolating between heights.
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CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

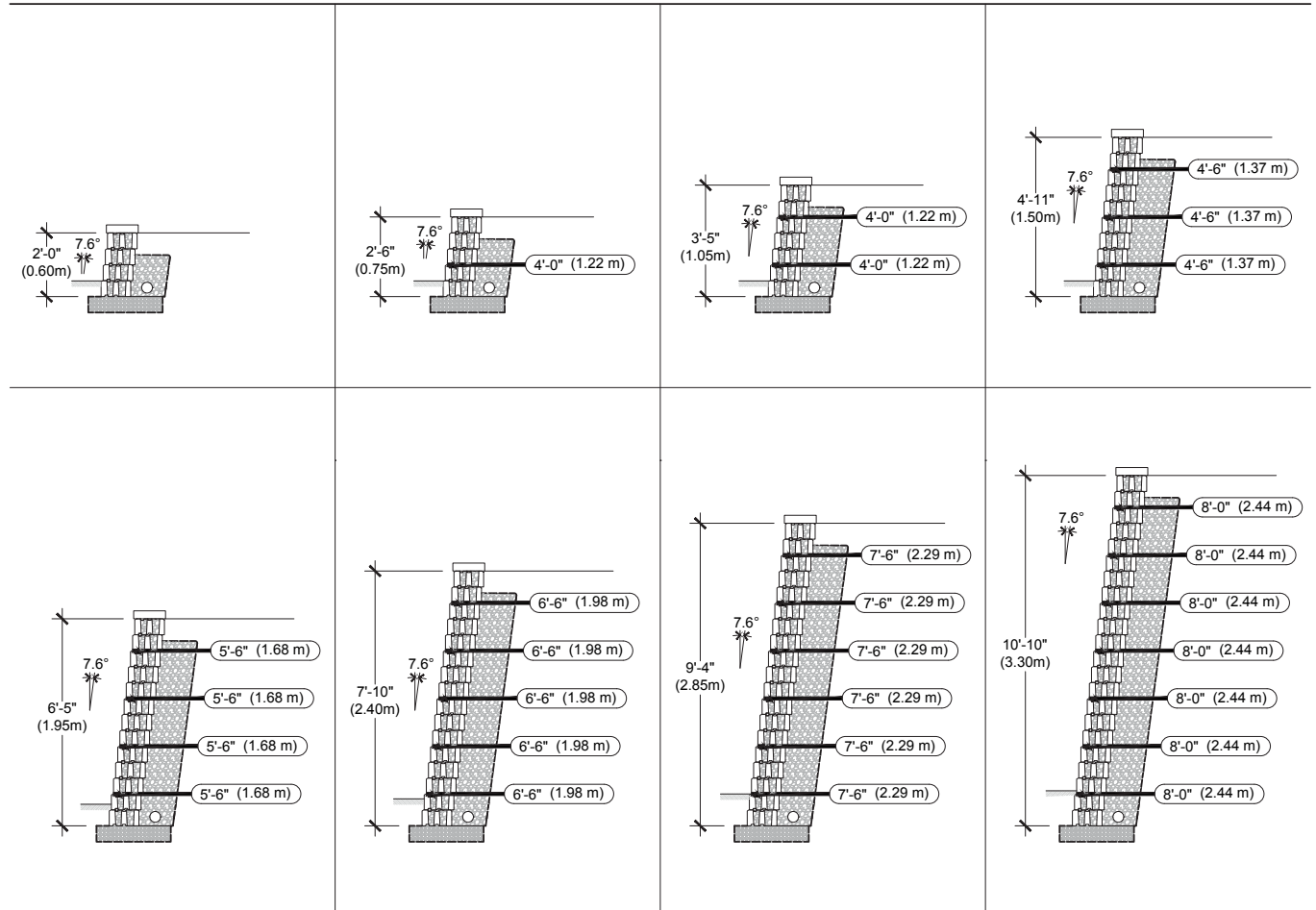
CASE N° 4 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



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FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

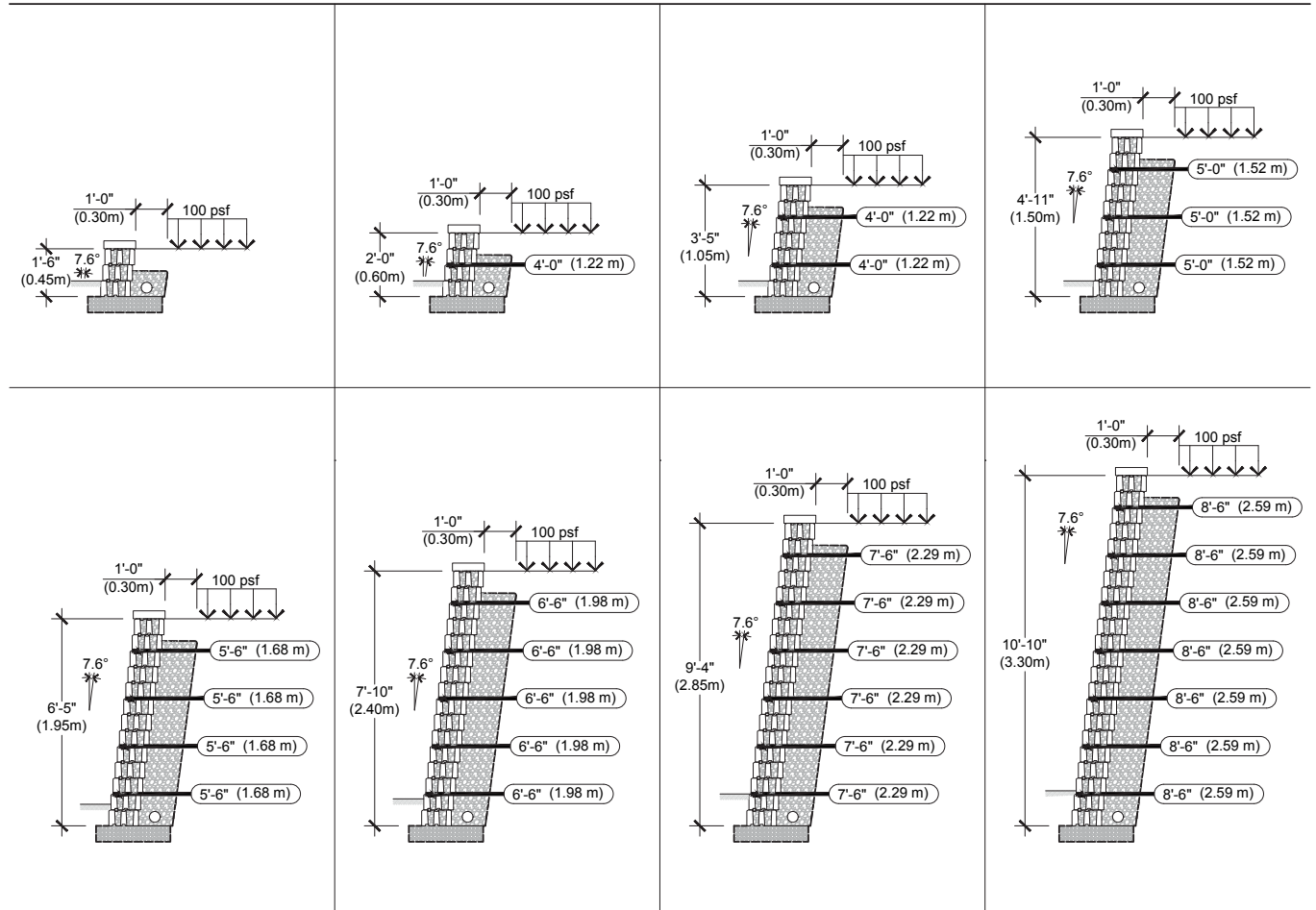
CASE N° 5 :
No Surcharge
No Backslope
No Toe Slope



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3. Soil parameters: reinforced soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 30^\circ$, $\gamma = 120$ pcf)
4. A qualified engineer should be consulted for the final design to be used for construction.
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FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

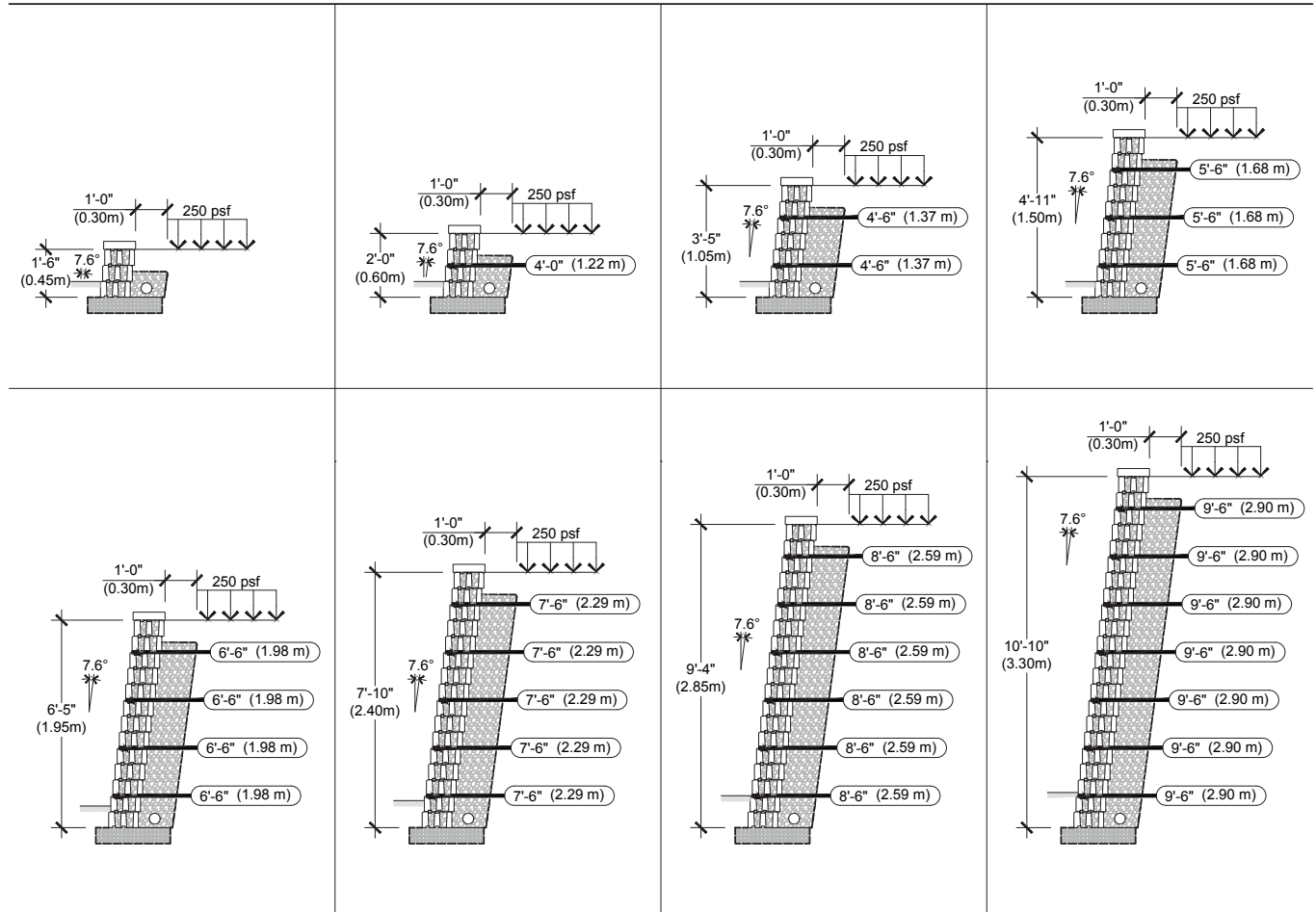
CASE N° 6 :
100 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

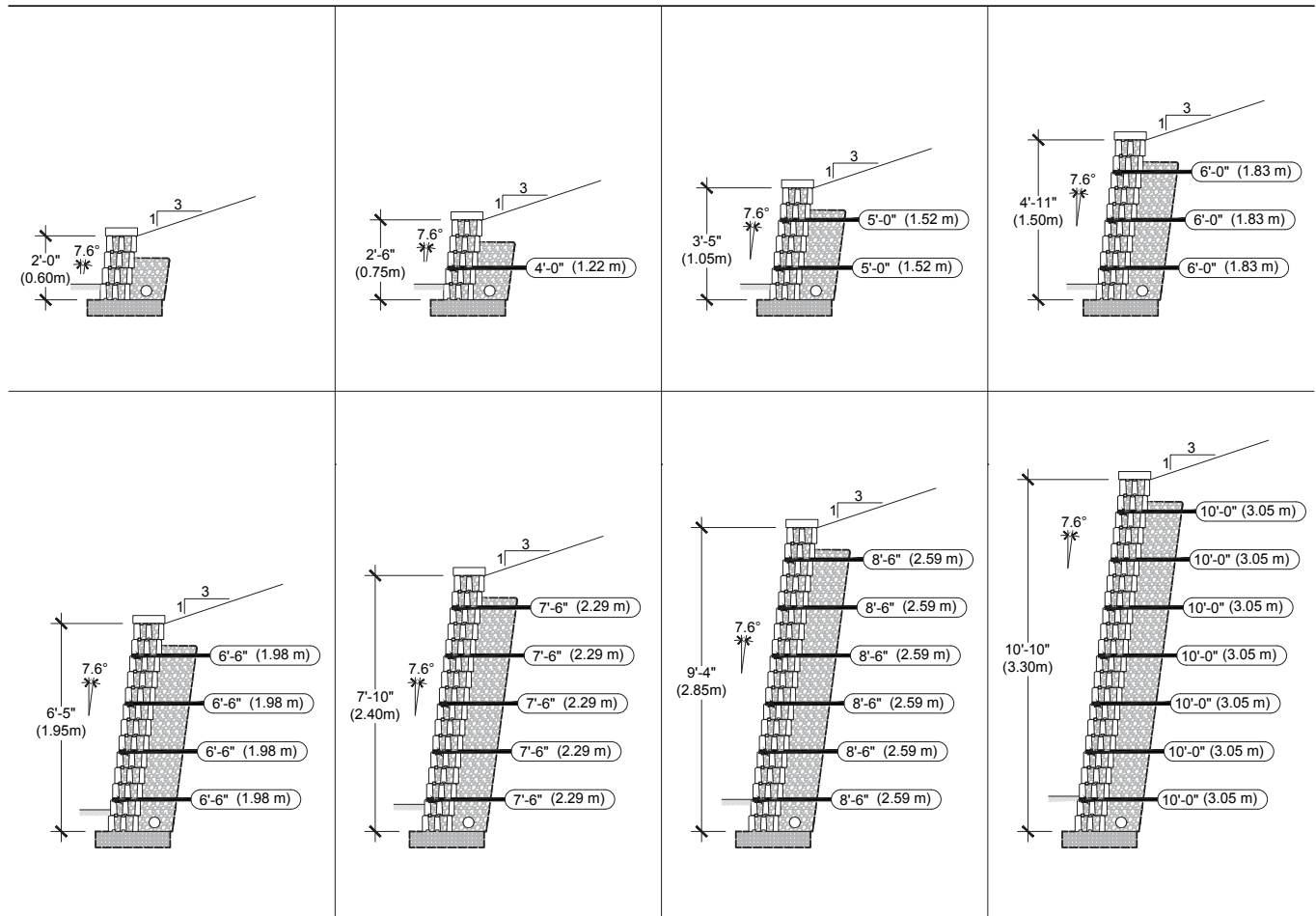
CASE N° 7 :
250 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

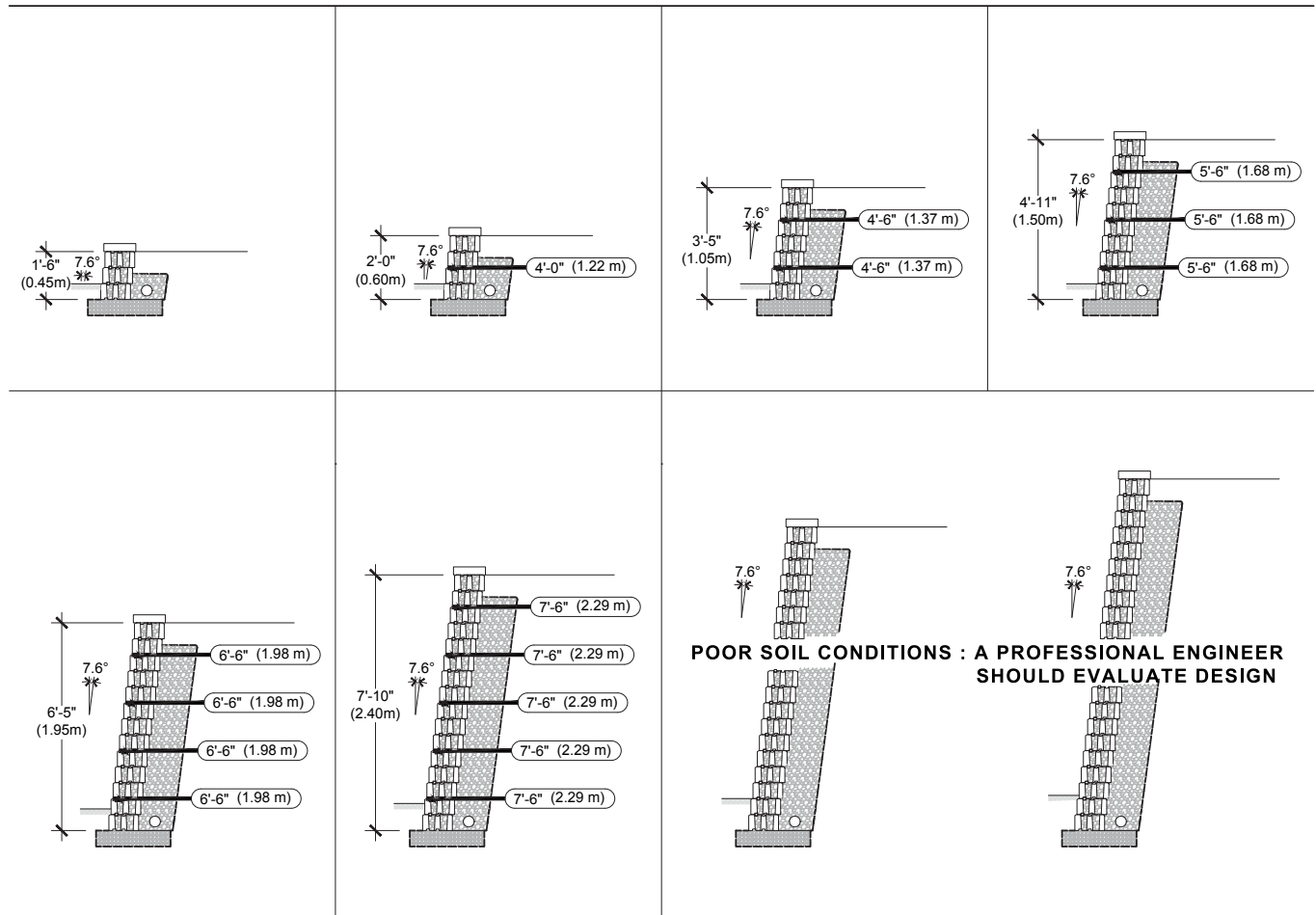
CASE N° 8 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



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LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

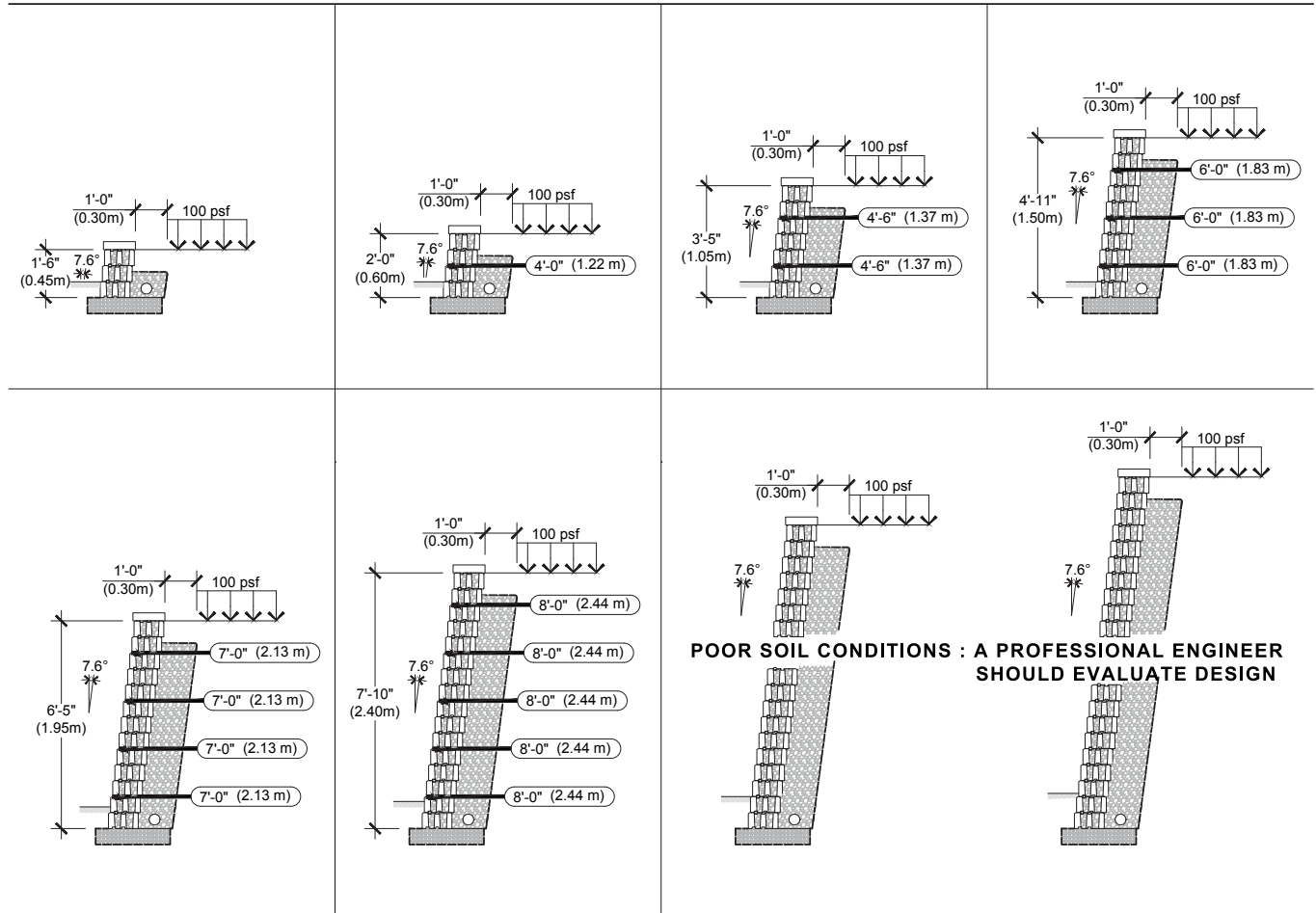
CASE N° 9 :
No Surcharge
No Backslope
No Toe Slope



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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

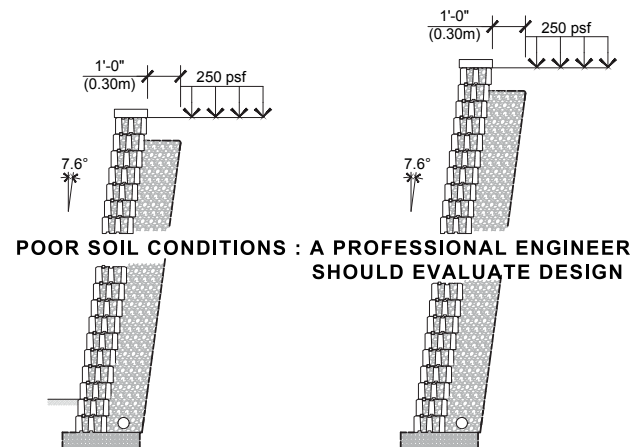
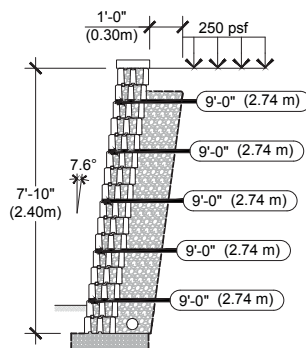
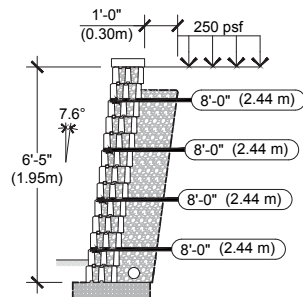
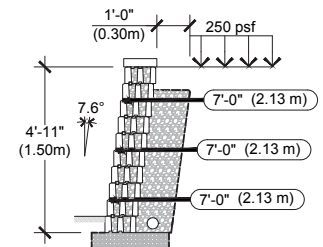
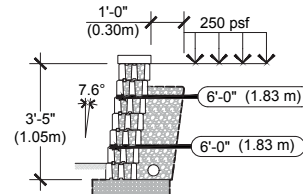
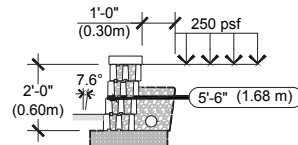
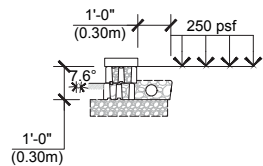
CASE N° 10 :
100 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

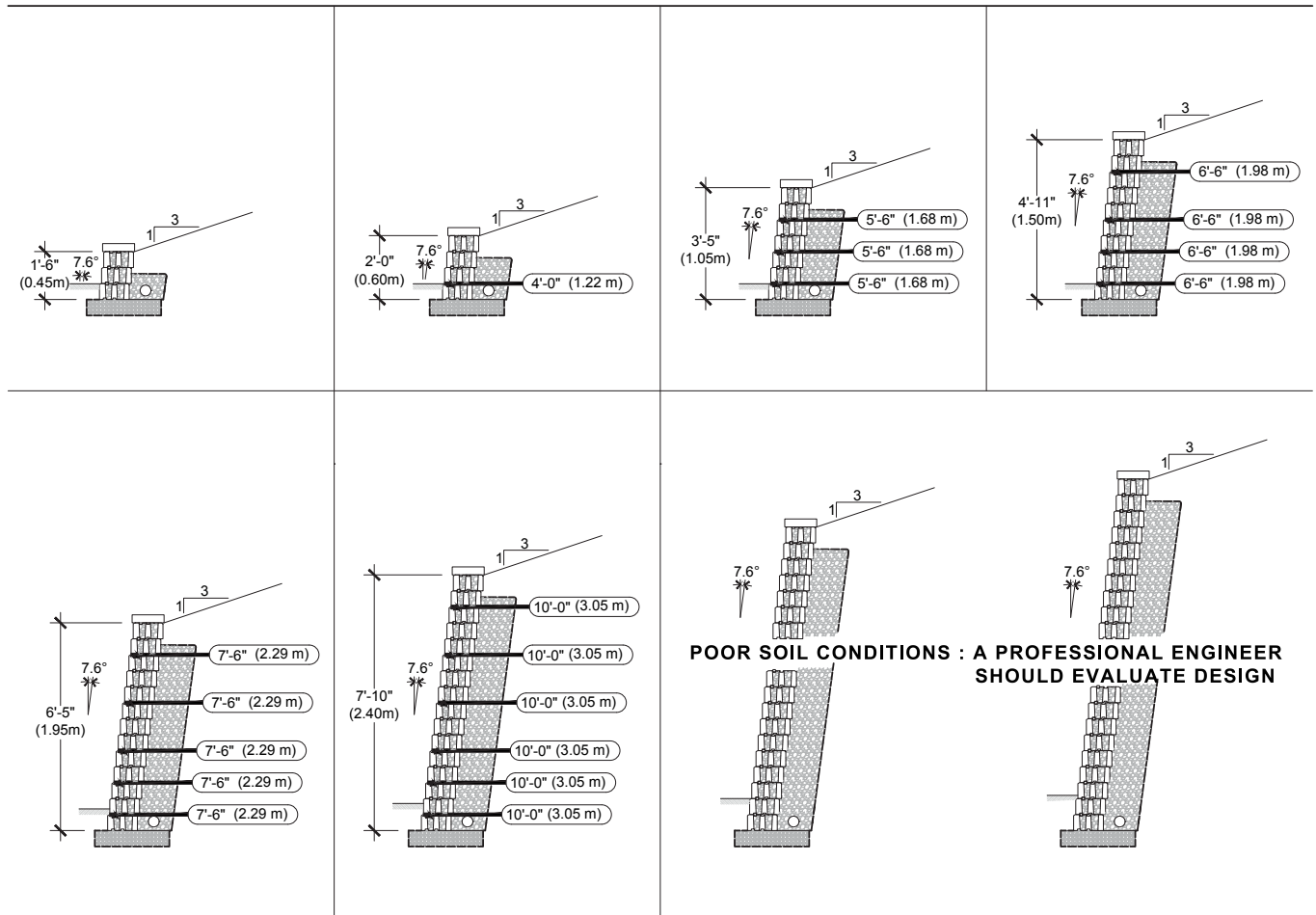
CASE N° 11 :
250 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

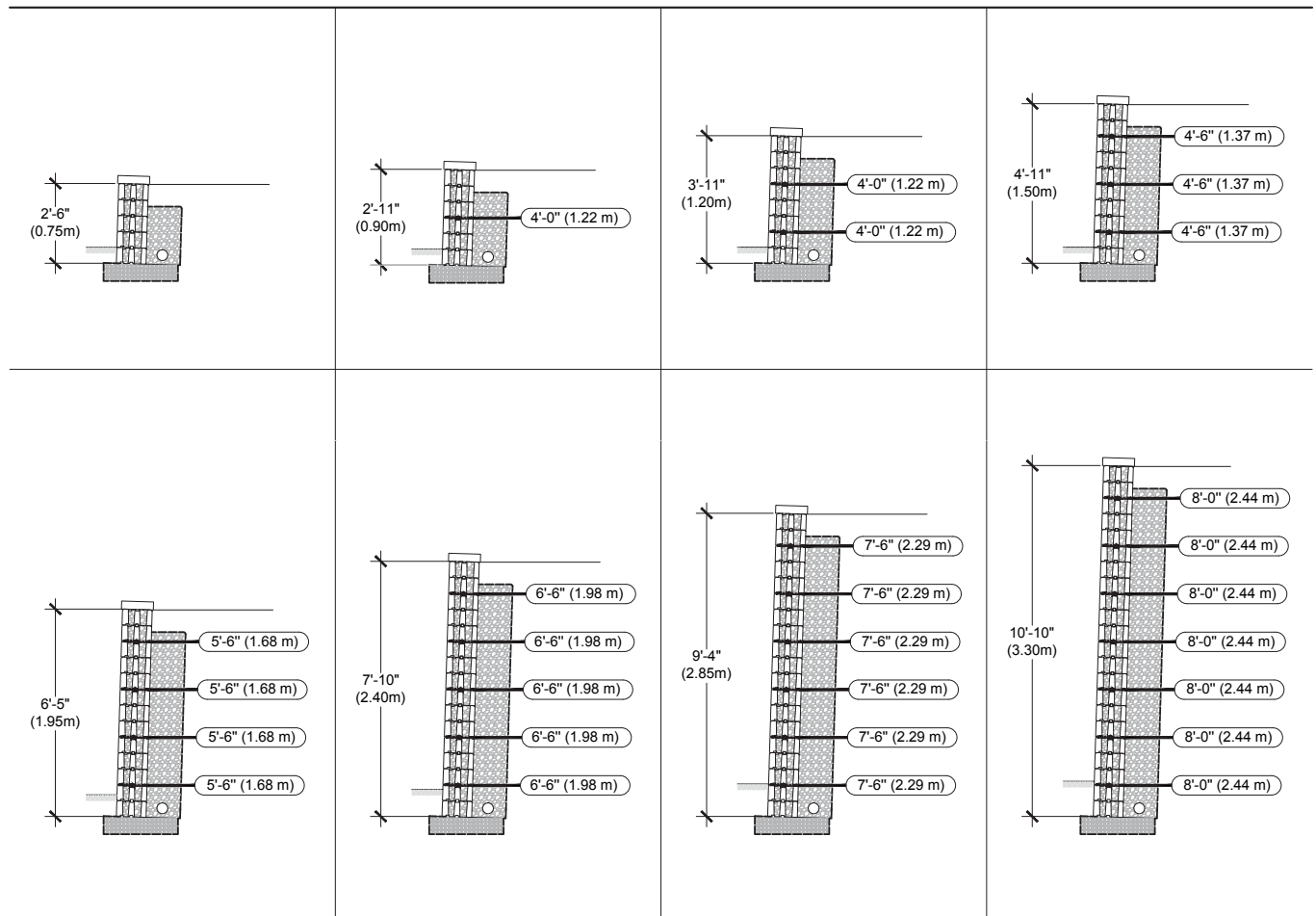
CASE N° 12 :
No Surcharge
Backslope 1V : 3H
No Toe Slope



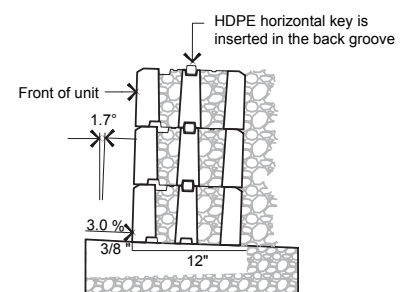
1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
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 ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

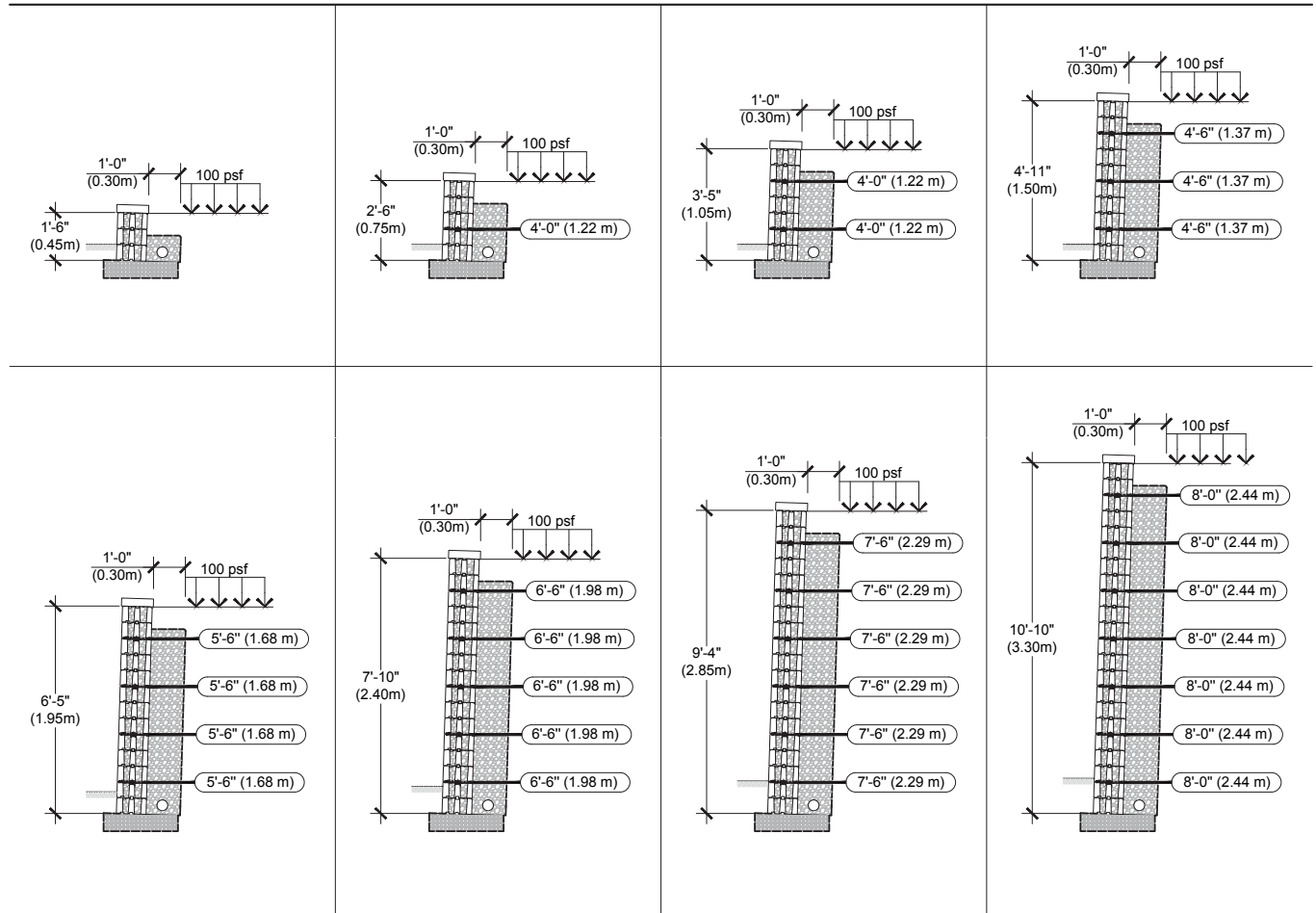


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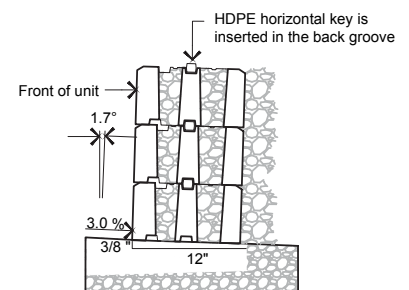
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 2 :
100 psf Surcharge (1 ft behind the wall)
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 ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

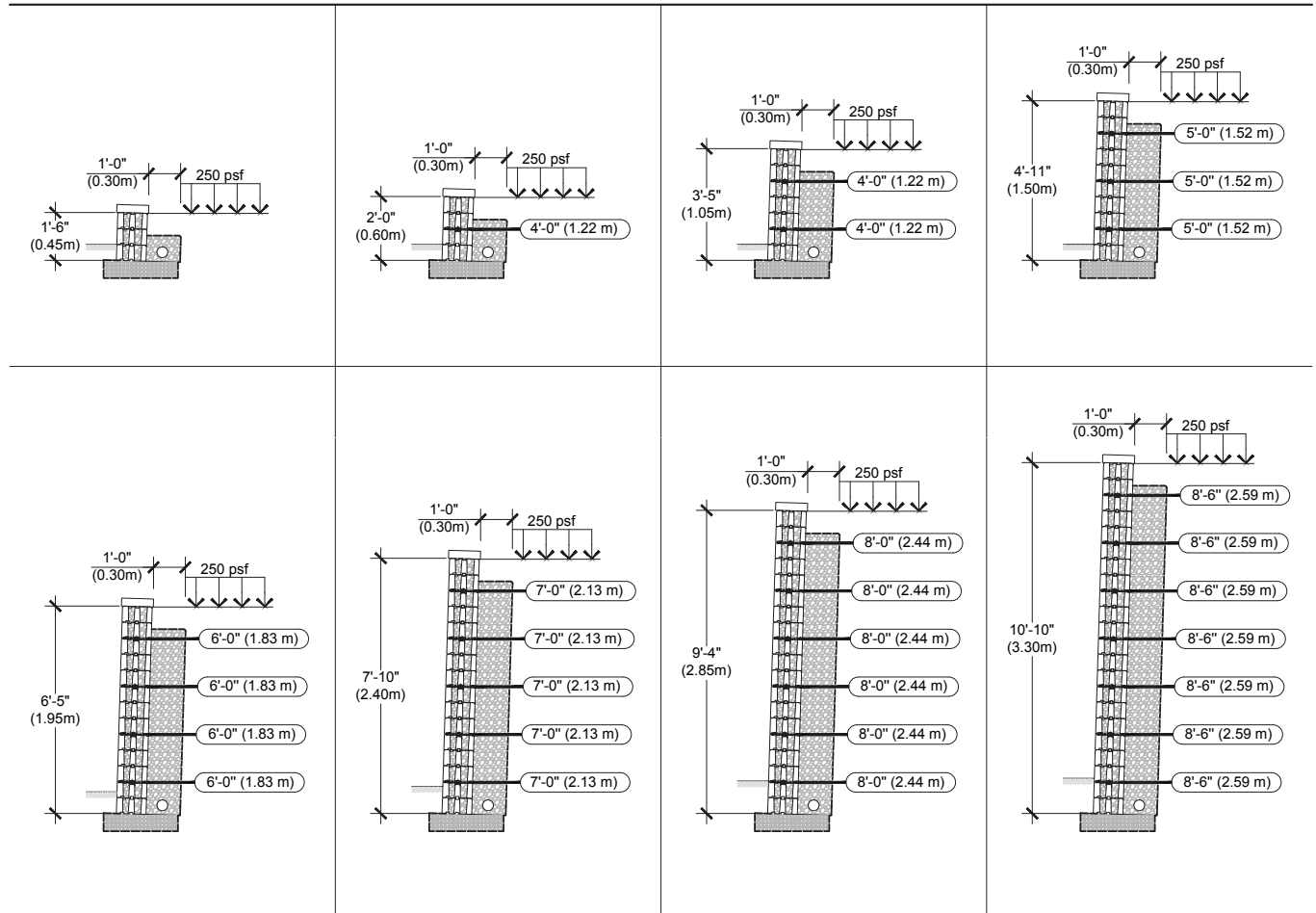


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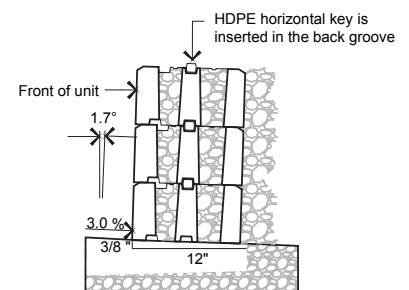
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.25, Cds=0.9, Ci=0.9)

CASE N° 3 :
250 psf Surcharge (1 ft behind the wall)
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 ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

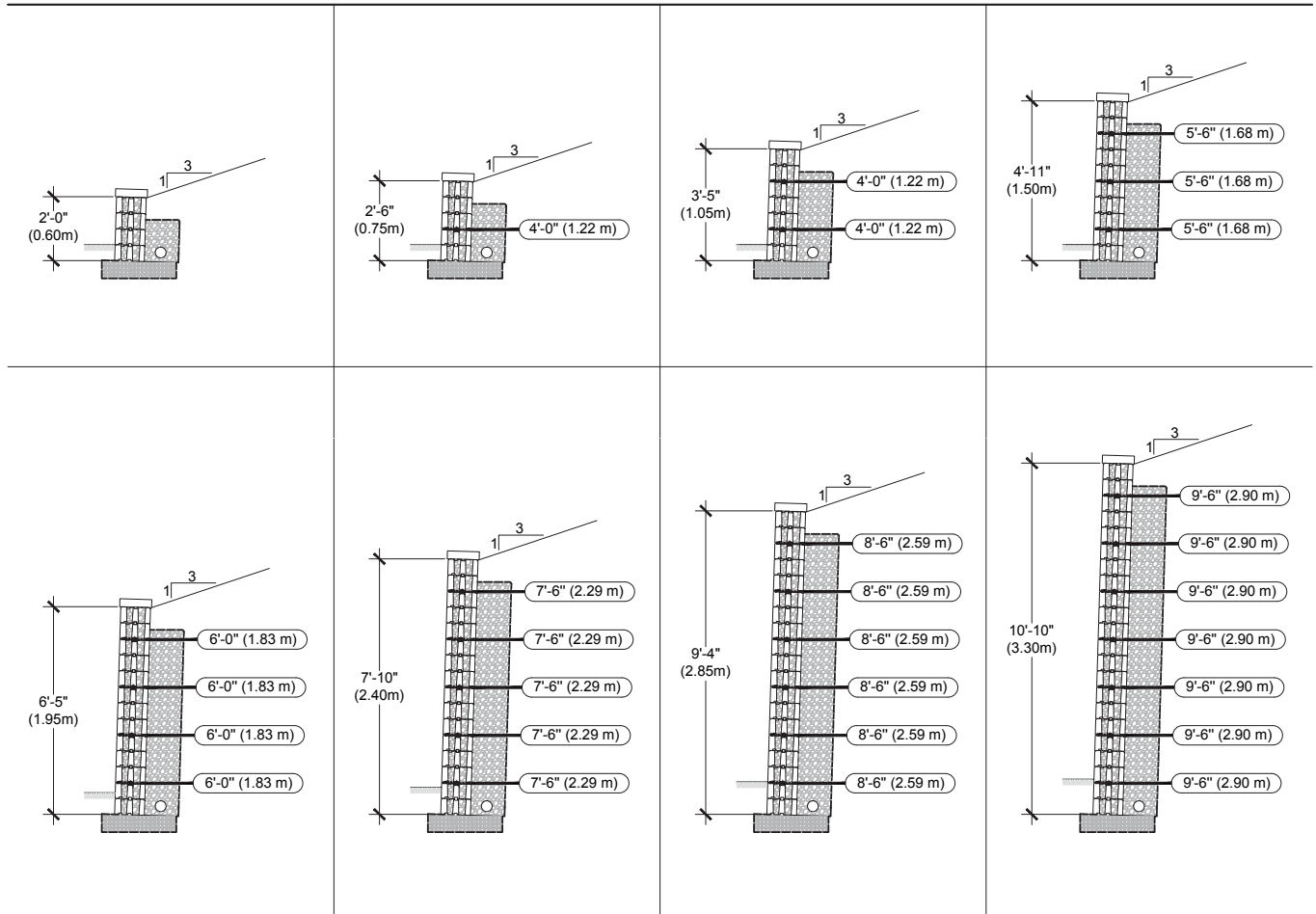


Note:

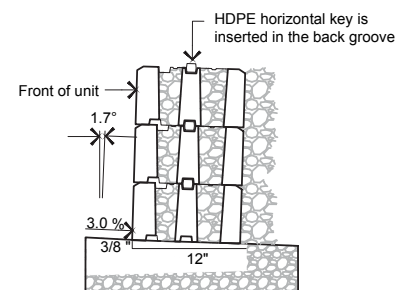
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

CLEAN SAND/GRAVEL/ SAND AND GRAVEL MIXES ($\phi=34^\circ$, $\gamma = 120$ pcf)
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 ($\phi = 34^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 34^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 34^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

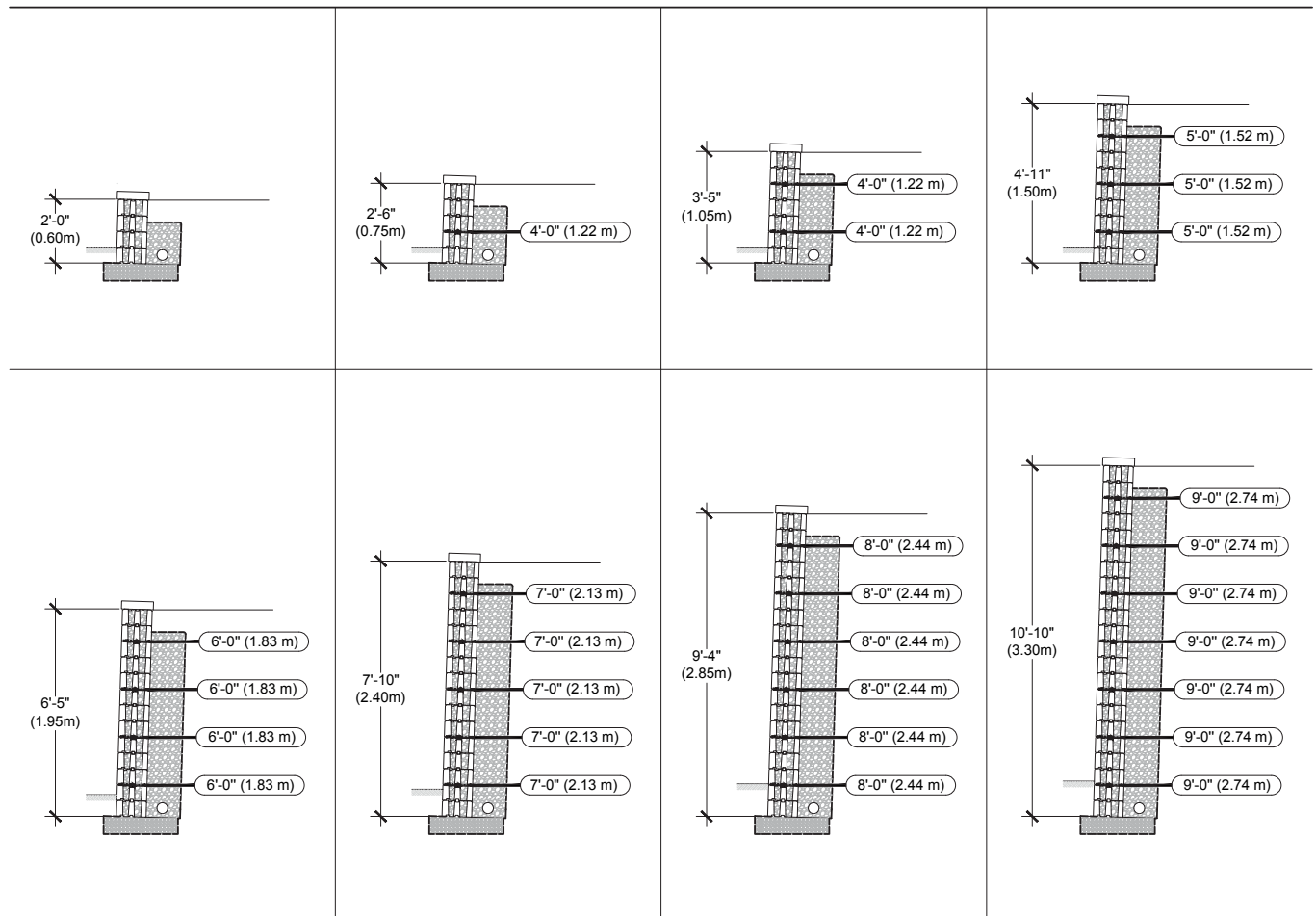


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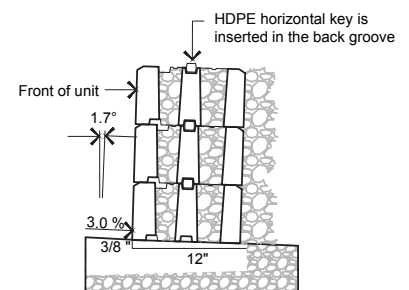
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8 " along 12"

FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
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 ($\phi = 30^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 30^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

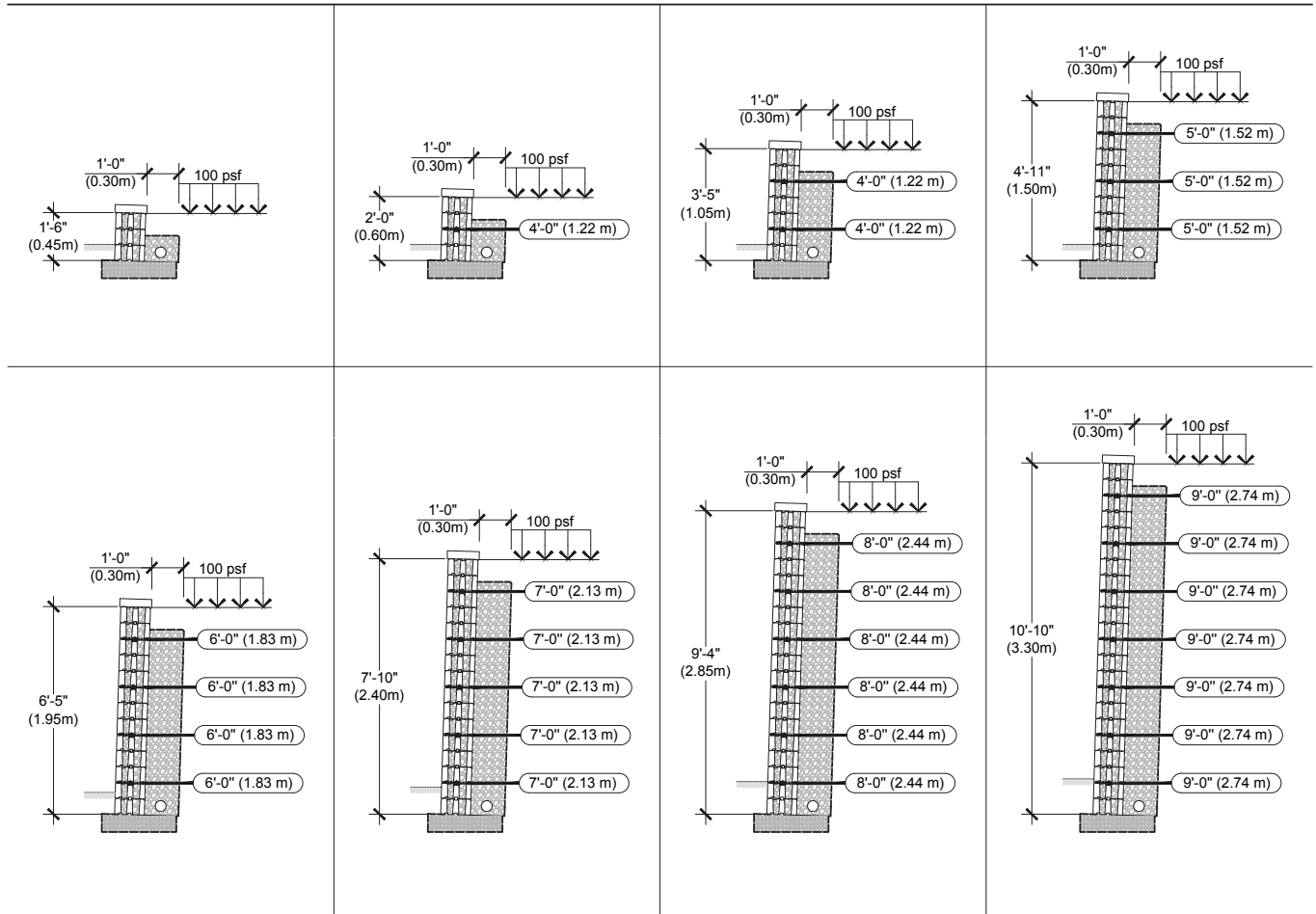


Note:

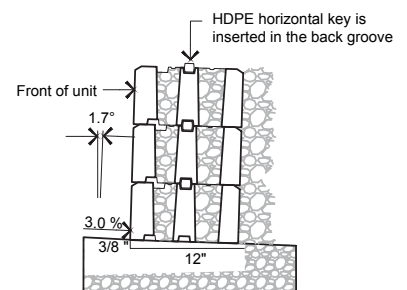
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 6 :
100 psf Surcharge (1 ft behind the wall)
No Backslope
No Toe Slope



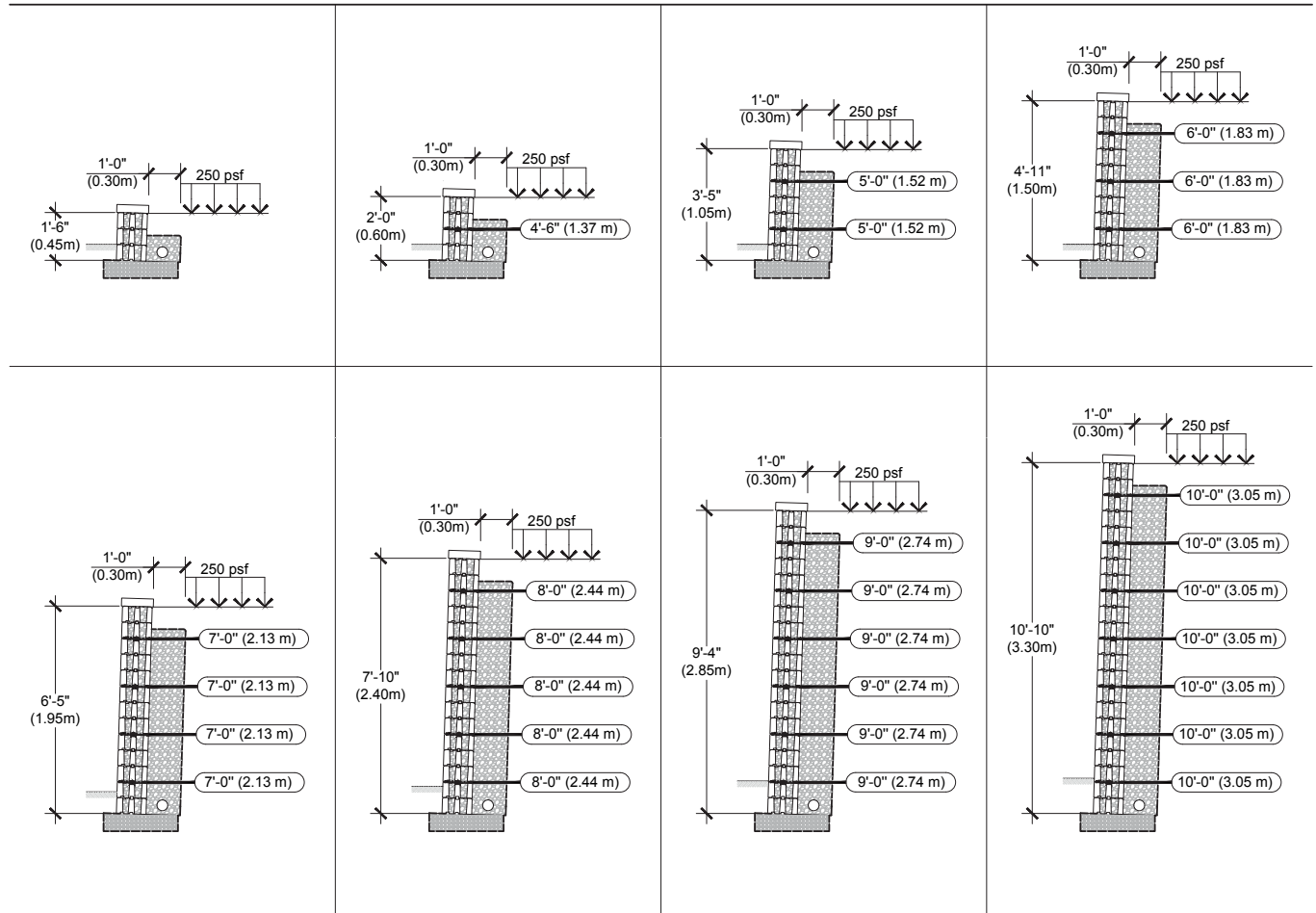
1. The information contained in the design charts is supplied for information purposes only and as such should only be used for preliminary designs.
2. The height (H) of the wall is the total height from the leveling pad to the top of the wall not including the thickness of the cap.
3. Soil parameters: reinforced soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 30^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.
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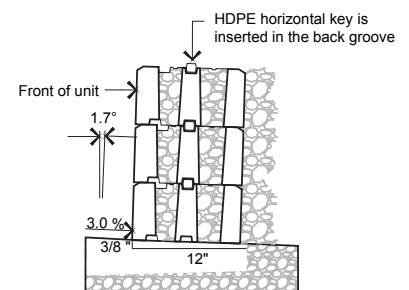
Note:
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.10, Cds=0.8, Ci=0.8)

CASE N° 7 :
250 psf Surcharge (1 ft behind the wall)
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 ($\phi = 30^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 30^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

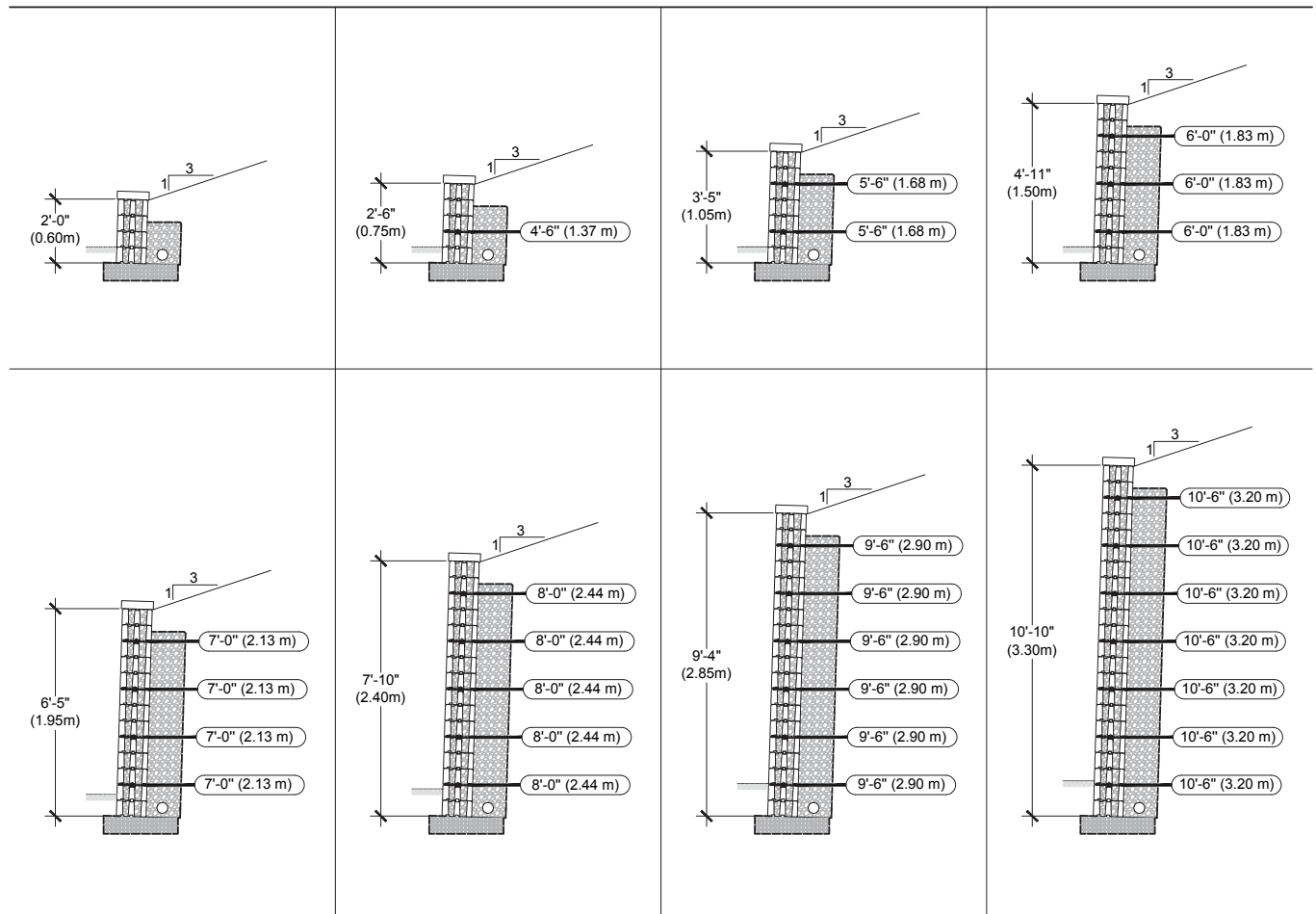


Note:

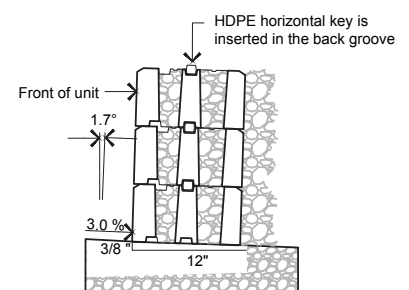
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

FINE SANDS & SILTY SANDS ($\phi=30^\circ$, $\gamma = 120$ pcf)
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 ($\phi = 30^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 30^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 30^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.

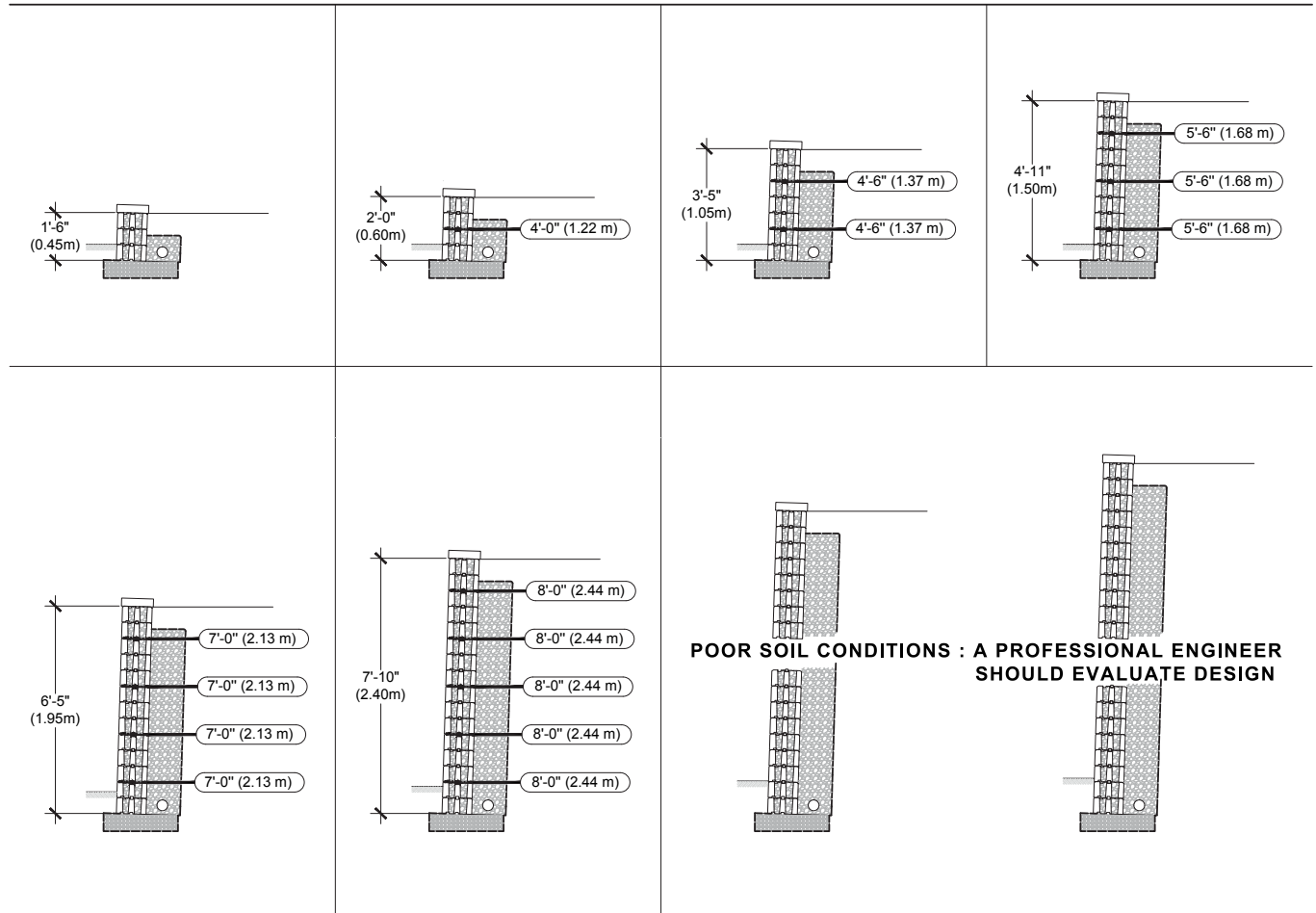


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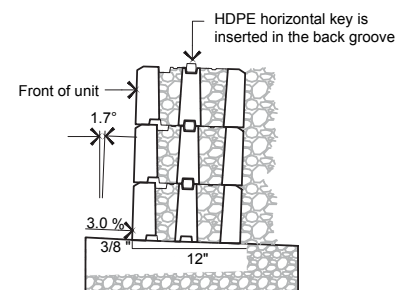
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8" along 12"

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

CASE N° 9 :
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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
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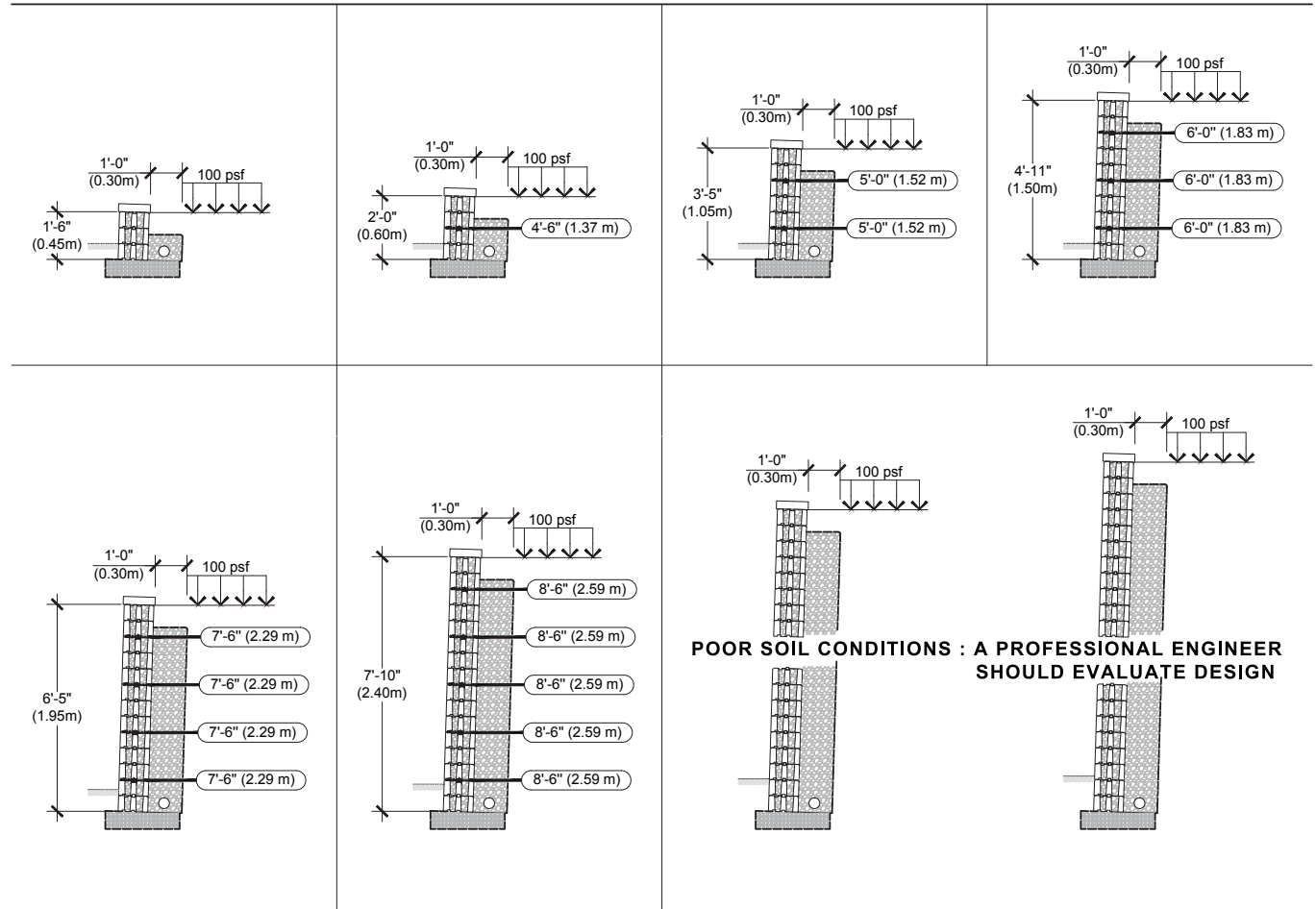
Note:

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 3/8 " along 12"

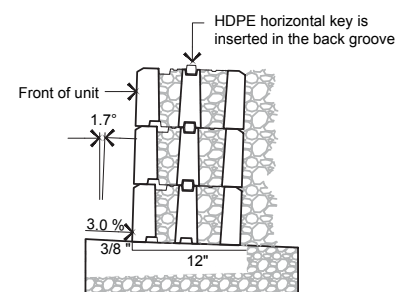
LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

CASE N° 10 :

100 psf Surcharge (1 ft behind the wall)
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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.
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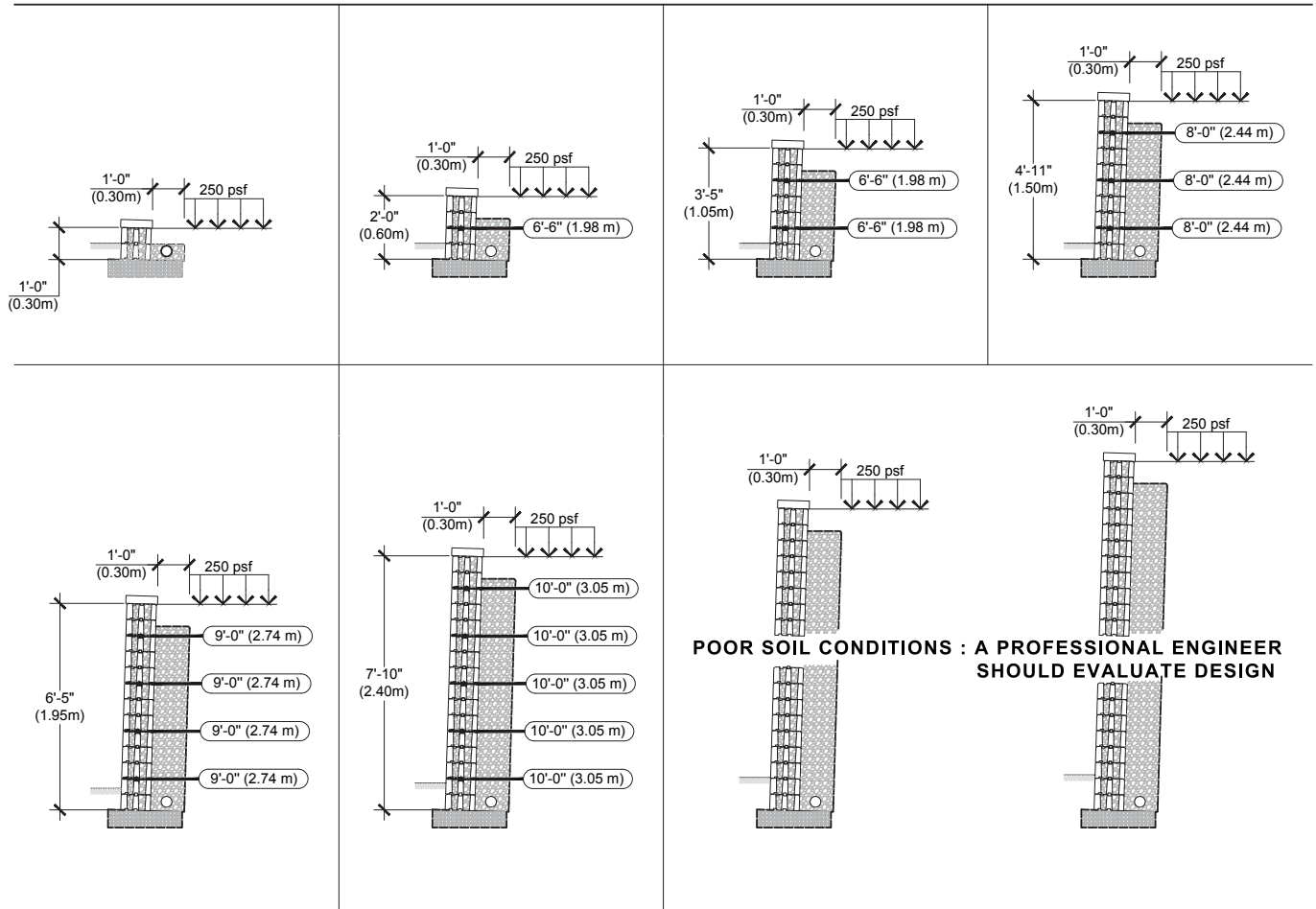


Note:

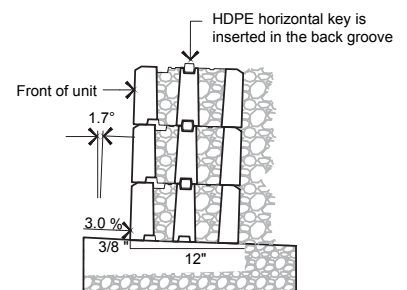
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8 " along 12"

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

CASE N° 11 :
250 psf Surcharge (1 ft behind the wall)
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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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 accept no liability for the incorrect use of information contained in the design charts.
13. For further information, please contact our technical service department.

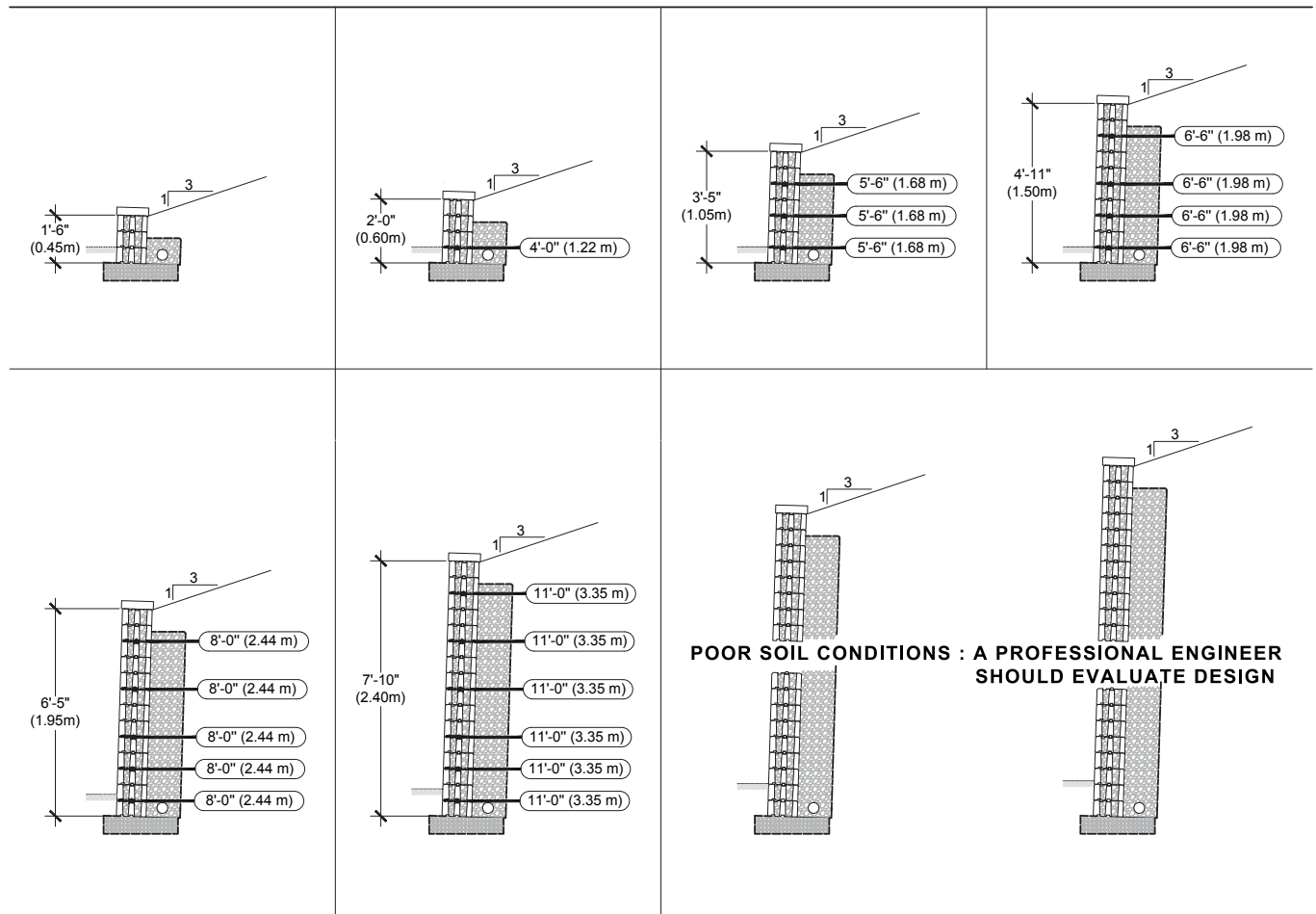


Note:

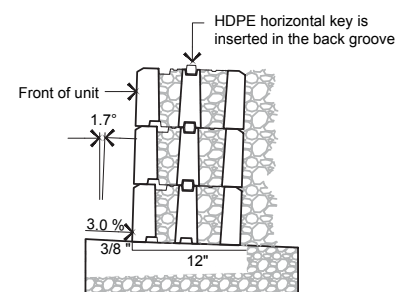
Near Vertical walls shall be constructed with positive batter by tilting units back towards fill on leveling pad. A negative 3.0 % minimum leveling pad slope is recommended. A 3.0% slope is equivalent to an elevation drop of 3/8 " along 12"

LOW PLASTICITY SILTS AND CLAYS ($\phi=26^\circ$, $\gamma = 120$ pcf)
GEOGRID: MIRAGRID 3XT BY TENCATE (RFd=1.10, RFcr=1.45, RFid=1.05, Cds=0.7, Ci=0.7)

CASE N° 12 :
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 ($\phi = 26^\circ$, $\gamma = 120$ pcf); retained soil ($\phi = 26^\circ$, $\gamma = 120$ pcf); foundation soil ($\phi = 26^\circ$, $\gamma = 120$ pcf)
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 6 in (150 mm) 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.
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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 3/8" along 12"

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