

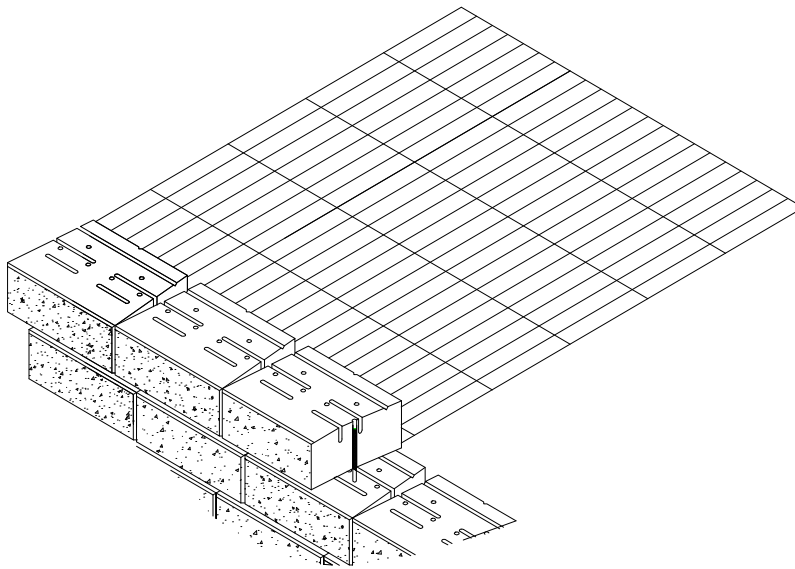


VERSA-LOK®

Retaining Wall Systems

Solid Solutions.™

STANDARDIZED MASTERPLAN for walls 2.0 to 6.0 foot **VERSA-LOK Standard** **Retaining Walls**



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Page 1 of 12 Std.
Rev. July 2019



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VERSA-LOK® STANDARD UNIT STANDARDIZED ENGINEERING PLAN

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Wall designs for this Standardized Engineering Plan have been developed in accordance with current NCMA (National Concrete Masonry Association) segmental retaining wall guidelines from the SRW Design Manual, Ver. 3 - Using NCMA SRWALL4 software and Versa-Lok VDF (Vendor Development Files). Versa-Lok Segmental Retaining Wall Systems (SRW's) are approved by ICC Evaluation Service, LLC - ESR #1784

DISCLAIMER: All Versa-Lok Standardized Plans are based on the following assumptions:

- 1. Wall Installation:** All Versa-Lok wall construction is to be performed in accordance with NCMA (National Concrete Masonry Association), Versa-Lok, Manufacturer or Distributor recommendations. Specific design recommendations and standards can be referenced in NCMA (3rd Edition) Design Manual. This Standardized Plan provides a limited overview of the Versa-Lok segmental retaining wall system.
- 2. Site Soils:** It is assumed that the project site soils are equivalent or stronger than the soils values for the various conditions presented in this Standardized Engineering Plan.
- 3. Standardized Plan Use or Approval:** This Standardized Plan is not a substitute for any agency required: Permitting, specific local codes, required inspections, approvals, additional documentation or site specific engineering and / or working with installation professionals. User should contact the appropriate professional with any questions in regards to this Standardized Versa-Lok Plan.
- 4. Seismic Loads:** No seismic loads have been contemplated or added within this Standardized Plan - as current building codes do not require it for walls 6' ft. and under in height.
- 5. Sealed Standardized Versa-Lok Plan:** Use of this plan may require the seal or review of a duly licensed professional engineer by some jurisdictions or agencies. Any such sealing of this document shall be secured and paid for by the user. McNear Brick & Block, Inc.'s Retaining Wall Division Manager can assist to help the user connect with a qualified engineering design or soils professional.
- 6. Representations / Warranties:** McNear Brick & Block, Inc. and/or Versa-Lok® makes no claim, representation or warranty, expressed or implied that any wall construction may or may not require a building permit, the services of a professional engineer, or an installation professional. Versa-Lok® is a registered trademark of Kiltie Corporation.

All information presented herein is presented as general information only. Though every attempt has been made to ensure its accuracy, applicability and suitability for its intended use - this information should not be relied upon for any specific installation without independent professional confirmation and review for accuracy, applicability and suitability for the user's intended project or specific application. Anyone using or relying on this material wholly assumes any and all liability, obligations and / or consequences that may result or arise from such use. Both McNear Brick & Block, Inc., Versa-Lok® (or Kiltie Corporation), their officers, employees, or dealers accepts no liability whatsoever from the user's use of this document or any installation of the Versa-Lok systems depicted herein.



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SPECIFICATIONS FOR VERSA-LOK "STANDARD" / GEOGRID RETAINING WALL

Materials

Retaining wall units shall be VERSA-LOK **Standard Block Units** as manufactured by McNear Brick and Block, San Rafael, CA. The units are 16 inch wide x 6 inch tall x 12 inch deep with a straight split face finish. Wall units shall meet the requirements of ASTM C 1372. All retaining wall construction shall meet local code and ICC ESR# 1784 requirements. Pins shall be VERSA-Tuff pins from VERSA-LOK Retaining Wall Systems. Cap adhesive shall be VERSA-LOK Adhesive - (or equivalent).

The reinforced wall backfill soil from the site is to meet or exceed pre-determined calculated soils criteria (see page 6). The soil shall be free of debris, clumps, rocks larger than one inch, and organic materials. Do not use high plastic soils that have a PI>20 or LL>40. (Quarry imported road base or 3/4" crushed rock is also acceptable within geogrid zone).

Geogrids shall have a minimum LTDS = 1,670 lb/ft - Such as: Miragrid 3XT, StrataGrid 200SG, or Synteen SF35 (or geogrid of equivalent or greater strength); are available at many McNear Versa-Lok Dealers. Roll sizes (widths & lengths) vary by geogrid manufacturer. Geogrids are coated polyester with the design strength in a uniaxial direction (roll direction).

The leveling pad shall be constructed of well-graded crushed aggregate similar to ¾ inch minus.

The drain aggregate shall be angular, free-draining rock such as ¾ inch clean crushed stone with less than 5% passing the #200 sieve, or Cl. II Permeable material.

The drainpipe shall be 4" min. perforated or slotted, PVC SDR35 or corrugated HDPE tubing.

Wall Foundation

Foundation soil shall be excavated as required for the leveling pad (2'w x 6"h min.) and the reinforced fill zone to the depths and locations shown. The exposed foundation soil should be observed prior to construction to verify that the exposed material is suitable for a net design bearing pressure of 2000 psf and that the base of the excavation is free of loose soil, uncompacted fill, or water. Undercut any unsuitable soil. Undercut areas shall be filled with compacted suitable granular soil or crushed stone .

Construct the leveling pad with compacted angular crushed stone, road base* or lean concrete to lines and grades shown on the plans. *(Use of compacted road base material may require leveling of the lower unit with a maximum of 1" of sand.)

Wall Construction

Before proceeding, obtain a copy of VERSA-LOK Standard Design & Installation Guidelines. Thoroughly review all construction fundamentals and begin wall construction according to these guidelines.

Prior to construction, the project owner (herein the user) is responsible to determine if Versa-Lok Standardized Engineering is acceptable to local governing agency and for verifying that the proposed site conditions, soils and installation meet the requirements within this documentation. The user is responsible to follow all construction guidelines herein and meeting the requirements of this specification, as well as any and all required submittals and documentation to the governing agency.

Install the first course of units on the leveling pad. Place the next course of units on top of the first course so that the block placed is pinned into two separate units below with a minimum block overlap of four inches. Install two pins per unit through pinhole into receiving slot of lower course units. Pull units forward to engage pins. Place drainage materials, backfill, compact and continue construction to top-of-wall.

Cap units shall be glued in place to upper course wall units.

Geogrid Reinforcement

Geogrids meeting or exceeding the LTDS of 1670 lb/ft shall be cut to design lengths and placed between the blocks at the elevations shown on the plan. The geogrids primary strength direction will be directed perpendicular to the wall face (into the fill) roll direction. The geogrid shall be placed horizontally and lay flat on the reinforced fill soil. The geogrid shall be placed so that a minimum of 8 inches of geogrid is between the block layers. Slack in the geogrid shall be removed prior to placing additional backfill. Backfill shall be placed from the back of the retaining wall facing to the end of the geogrid.

Construction equipment shall not be operated directly on the geogrid.

Wall Backfill

Wall backfill material shall be placed in maximum 6" - 8" loose lifts starting directly behind the block units and moving toward the end of the geogrid layer. Each lift should be compacted with a minimum of 3 passes with automated compaction equipment to the requirements of the structural fill. Backfill shall be placed, spread, and compacted in such a manner that minimizes wrinkles and movement of the geogrid. Placing fill in this manner tensions the soil reinforcing and strengthens the SRW - geogrid connection. During backfill placement the three-foot zone directly behind the wall shall be limited to the use of hand operated compaction equipment only.

Drainage aggregate shall be placed directly behind the wall units a minimum of 12" thick. Aggregate to consist of either 1/2" to 3/4" clean crushed angular rock or Class II permeable.

Protection of Work

The surface of the wall backfill shall be graded at the end of each day of work to provide positive surface drainage away from the wall. Grading shall include proper contouring of fills in adjacent areas to prevent the flow of surface water into the reinforce earth zone.

The design of the wall is based on conditions and loads imposed on the wall at completion of the project. Prior to project completion, the wall is vulnerable to damages caused by construction activity adjacent to the wall. Of particular concern is construction equipment on the reinforced backfill at the top of the wall. Only equipment with a weight not exceeding one ton can be used in the three foot zone directly behind the back of the wall face.

The soil in front of the wall shall be protected from future erosion.



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APPLICATION

The VERSA-LOK / Geogrid wall system is a reinforced soil retaining wall structure combining an architecturally attractive concrete facing block with geogrid reinforcement. The geogrid reinforcement (or equivalent strength geogrid) interlocks with the VERSA-LOK **Standard Block Units** and fill soil to create a stable gravity retaining wall. Design of these reinforced soil structures uses well-established guidelines that are readily available. If site conditions do not match Standardized Masterplan conditions site specific engineering will need to be completed.

This Standardized Masterplan can be used when acceptable to local building officials and when site wall height, surcharge loading, and soil types are consistent with this document and may require the determination of a qualified Engineer. Determine if building permits are required for wall construction. If permits are required, submit the Standardized Masterplan along with any site drawings, survey plats, literature, etc. that may be required by the building officials. A Professional Engineer's seal / stamp may be required by some localities on the Standardized Masterplan document; in that event, contact McNear's Wall Div. Mgr. to assist in facilitating an engineering contact; (email: dave@mcnear.com for further help or assistance).

STANDARDIZED ENGINEERING PURPOSE & LIMITATIONS

The purpose of Standardized Engineering is to provide] | ^ & | æ ^ a wall designs for small VERSA-LOK retaining walls up to 6' feet in height. The ICC (International Code Council - Sec. 105.2.4) recommends a building permit for walls greater than 4' feet in total height. This Standardized Engineering does not alleviate the need for any required building permit; though it does provide the building department and user pre-calculated wall designs in conformance with building codes and industry standards.

Y @ } soil conditions do not meet the æ • ~ { ^ a / 0 0 parameters, the user should have an engineer review the site } soil conditions at the proposed wall location to determine appropriate design parameters. All soil parameters assumed in the design are well-drained, long-term strength conditions, with stable foundation soils. Highly plastic silts and clays should be avoided without specific design recommendations from local a geotechnical engineer.

Standardized Engineering is NOT applicable for: Walls over 6' ft., seismic designs, walls in contact with water, (i.e. near or at rivers, lakes, and ponds). Tiered or multi-tiered wall applications are not considered in these tables, as well as any structurally surcharged wall(s) including, but not limited to; building slabs, foundations, footings, pads, pools or taller / more complex walls require site specific engineering design.

There are many possibilities for slope and surcharge loadings or combinations of both. Four typical geometric cases were selected for the tables. Case A is a typical retaining wall with a horizontal backfill, Case B is a 150 pound per square foot surcharge i.e. car, light truck, Case C is a 3:1 horizontal to vertical sloping surcharge, Case D is a 2:1 horizontal to vertical sloping surcharge.

In all geometric cases it is assumed the ground line at the base of the wall is horizontal. The following is a summary of the design parameters used and the minimum factors of safety that the tables are based on. If the ground line at the base of the wall is not level the Standardized Masterplan cannot be used, a site specific analysis is needed.



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LOADING CONDITIONS

CASE A	CASE B	CASE C	CASE D
LEVEL BACKFILL NO SURCHARGE	LEVEL BACKFILL 150 psf SURCHARGE	SLOPING BACKFILL 3H:1V MAXIMUM	SLOPING BACKFILL 2H:1V MAXIMUM

Standardized Masterplan only permits the use of the soil classifications listed below. If your site soil conditions do not meet the indicated soil types a site specific design will be needed.

The Masterplan soil classifications are based on the three of the five IBC soil classifications of which Class 3, 4 and 5 are considered in this Masterplan. These class soil types are defined below with their respective Unified Soil Classification designations.

IBC Class 3 Soils - (34° degree ϕ angle)

IBC Class 3 soil consists of gravel and/or gravel-sand (GW and GP) which are free draining and have predictable design properties.

IBC Class 4 Soils - (30° degree ϕ angle)

IBC Class 4 soil consists of silty gravel, clayey gravel, sands, silty sands (GM, GC, SW, SP, SM and SC) which are free draining and have predictable design properties.

IBC Class 5 Soils - (28° degree ϕ angle)

IBC Class 5 soil consists of fine sand, clayey sand, silts, silty clays and lean clay (ML and CL), low to medium plasticity.

NOTE: Documentation of soil types, compaction testing, geogrid materials, special inspection or other engineering services may be required to use Standardized Masterplan when obtaining permits.

WALL BATTER: 7.125 Degrees. All depicted designs meet the minimum factors of safety listed below.

MINIMUM FACTORS OF SAFETY CALCULATED

Reinforcement Pullout = 1.5

Reinforcement Rupture = 1.5 External

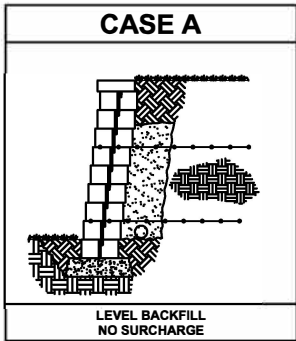
Sliding = 1.5

Overturning = 2.0

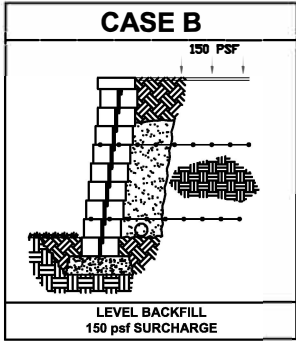
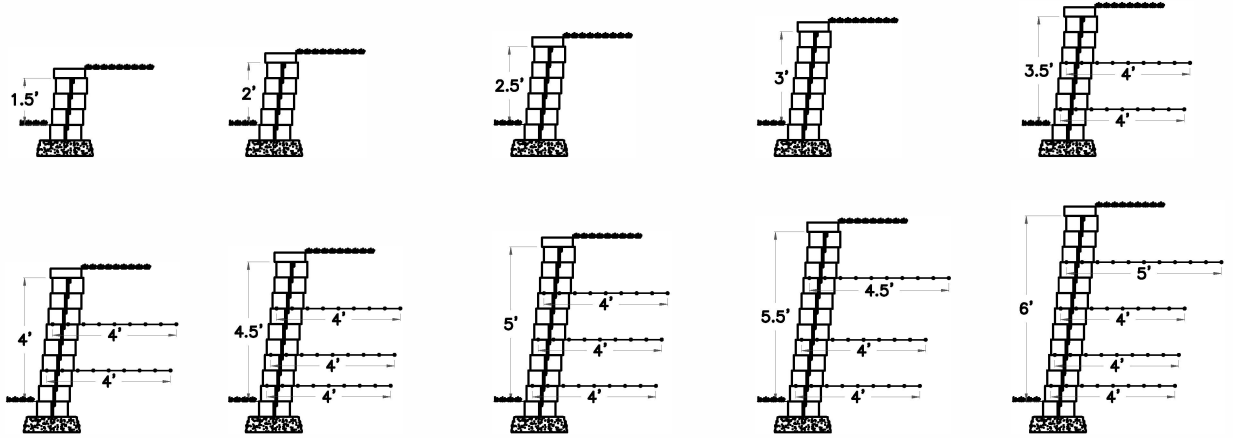
Overall for Unknowns = 1.5

Bearing Capacity = 2000 psf minimum

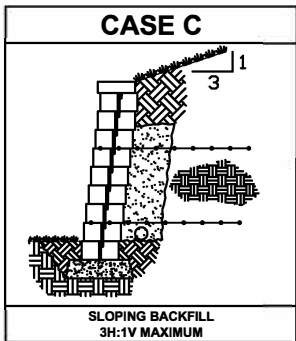
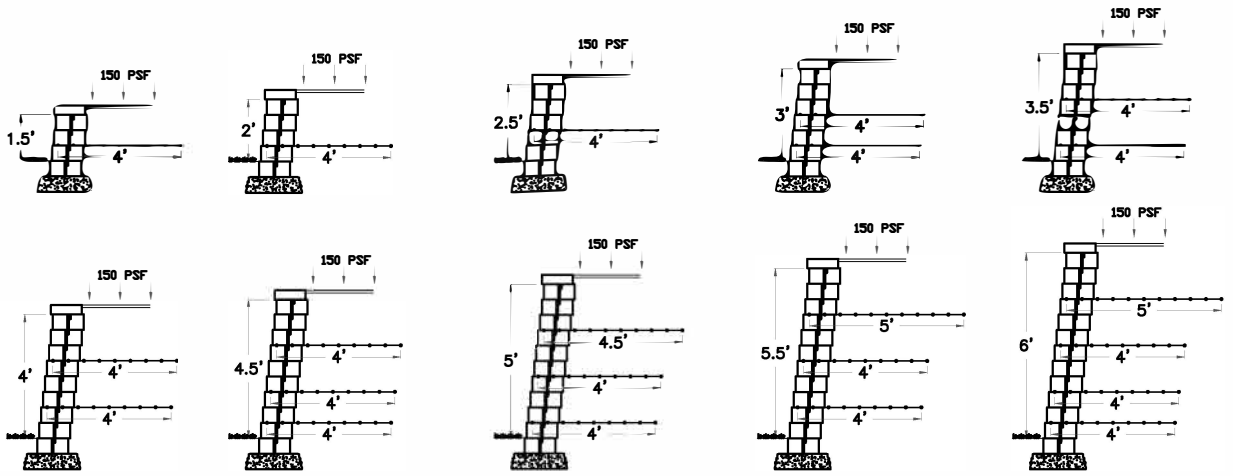




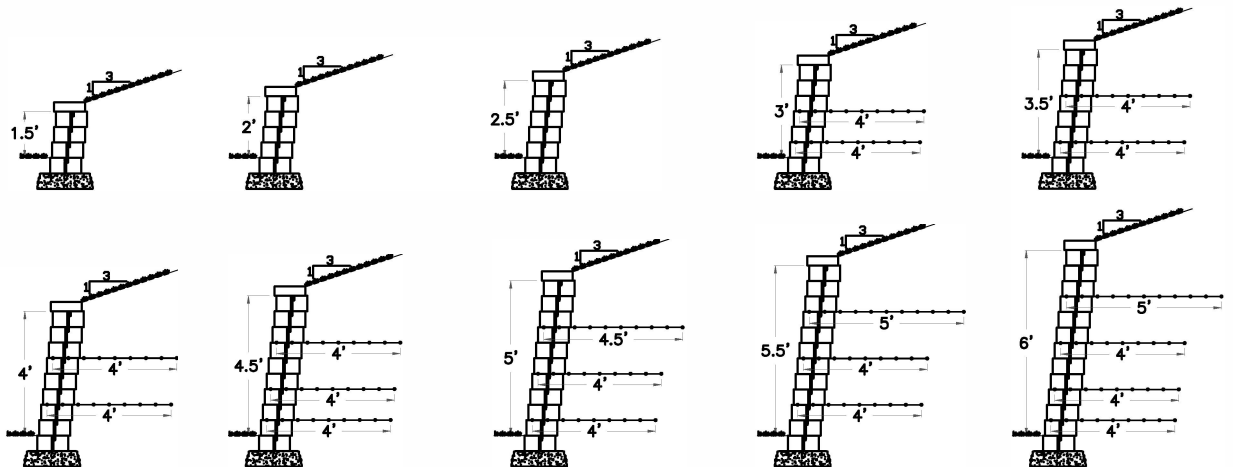
IBC CLASS 3 SOIL



IBC CLASS 3 SOIL



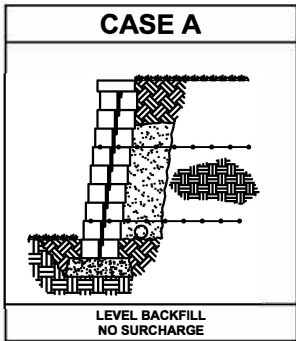
IBC CLASS 3 SOIL



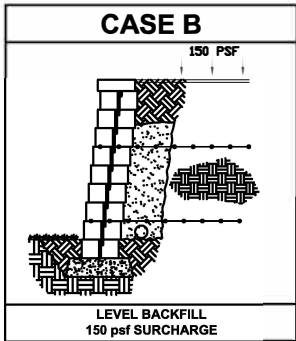
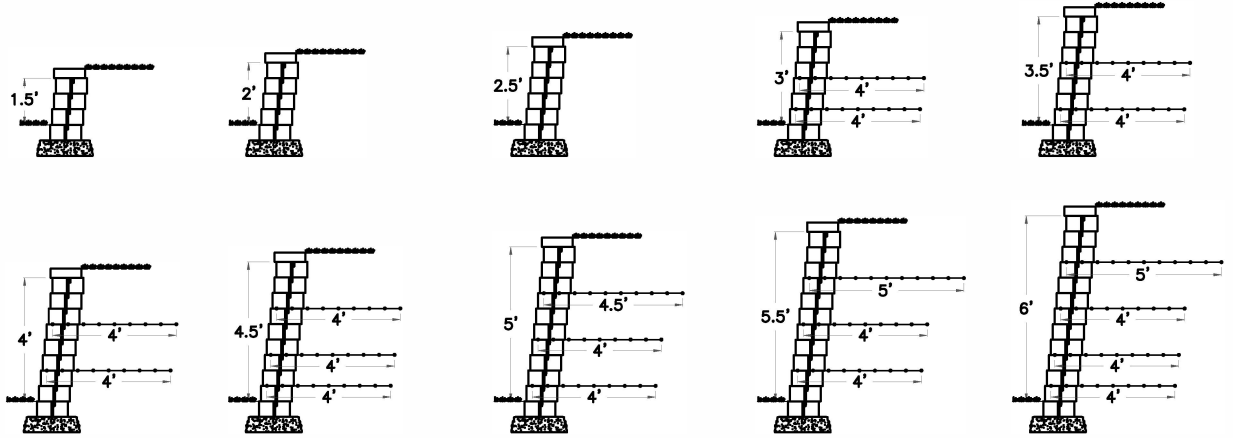
VERSA-LOK STANDARD UNITS &
MIRAGRID 3XT, STRATAGRID SG200, OR
SYNTEEN SF 35 GEOGRID

**IBC CLASS 3 SOIL
REINFORCED WALLS**

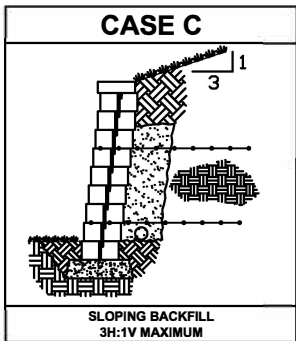
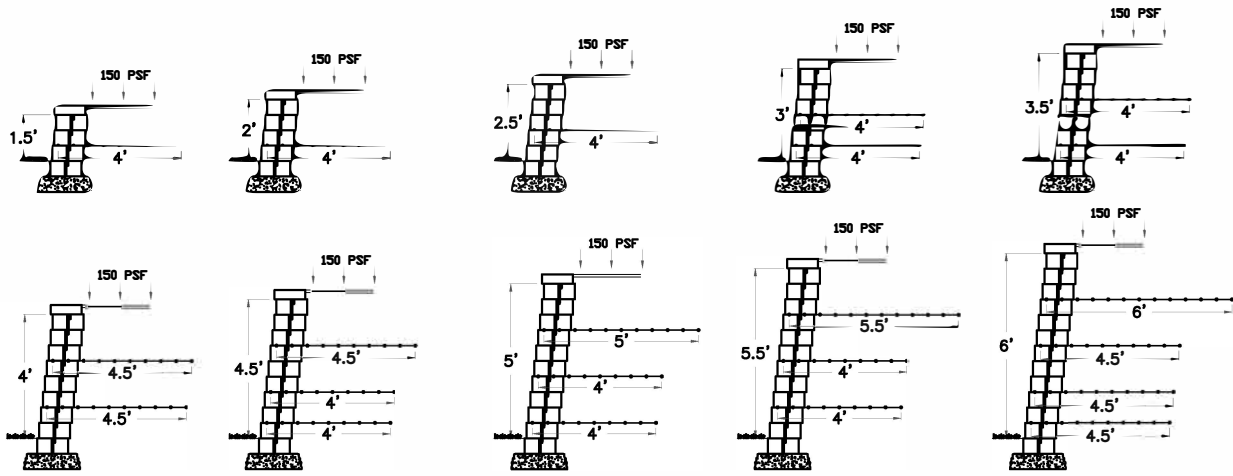
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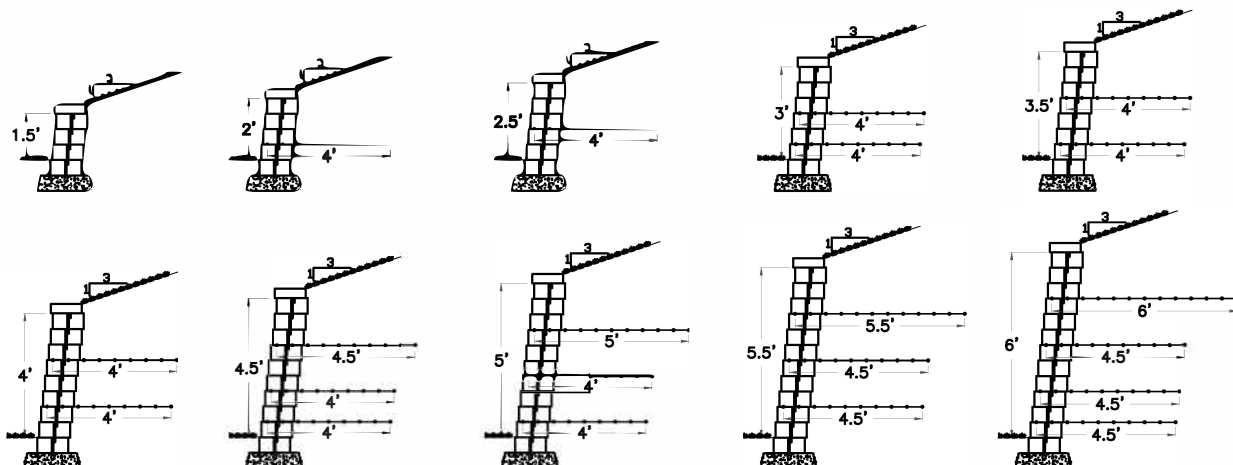
IBC CLASS 4 SOIL



IBC CLASS 4 SOIL



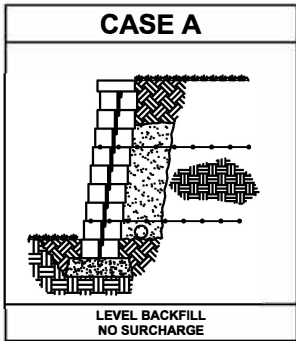
IBC CLASS 4 SOIL



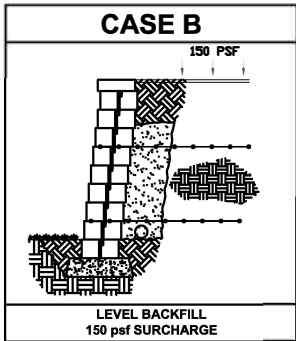
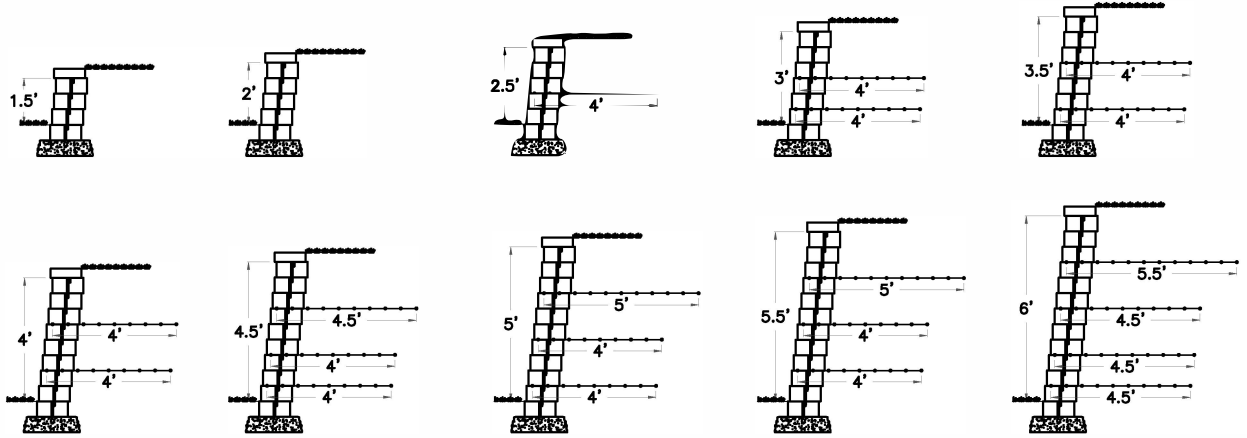
VERSA-LOK STANDARD UNITS &
MIRAGRID 3XT, STRATAGRID SG200, OR
SYNTEEN SF 35 GEOGRID

**IBC CLASS 4 SOIL
REINFORCED WALLS**

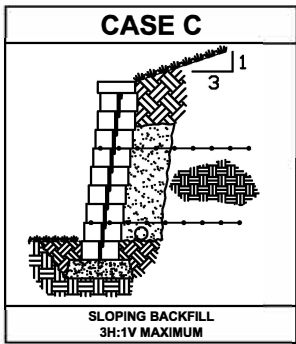
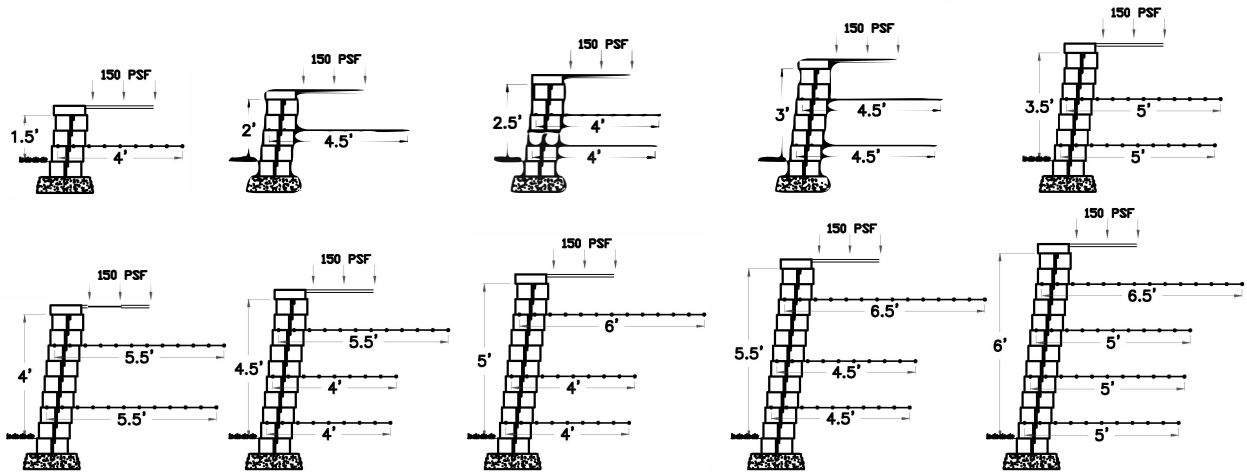
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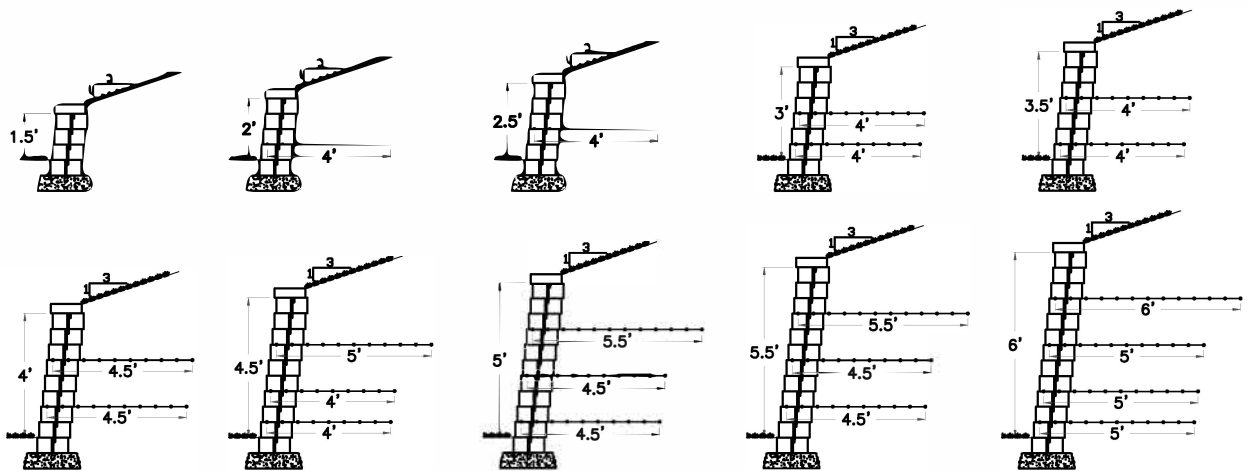
IBC CLASS 5 SOIL



IBC CLASS 5 SOIL



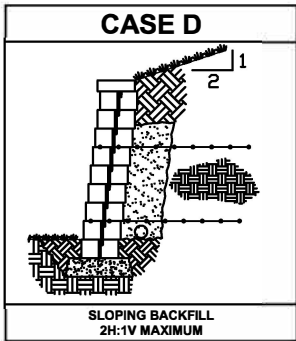
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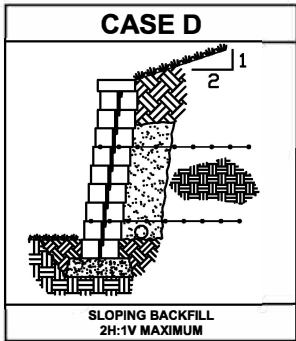
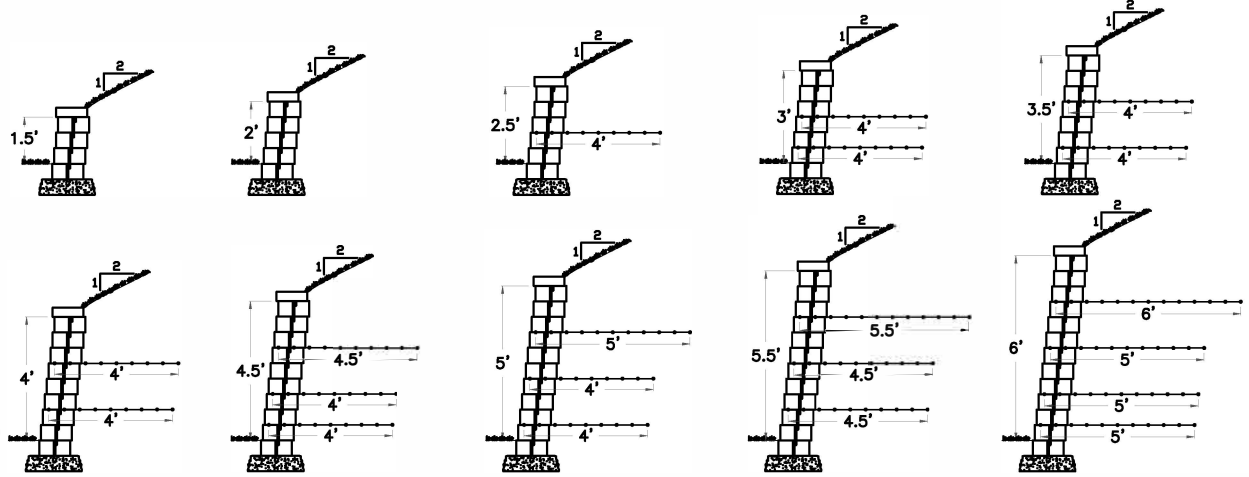
VERSA-LOK STANDARD UNITS &
MIRAGRID 3XT, STRATAGRID SG200, OR
SYNTEEN SF 35 GEOGRID

**IBC CLASS 5 SOIL
REINFORCED WALLS**

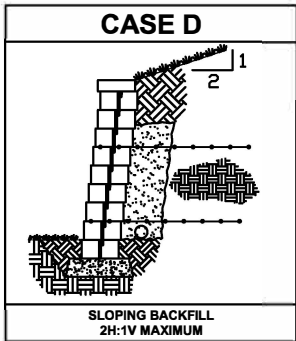
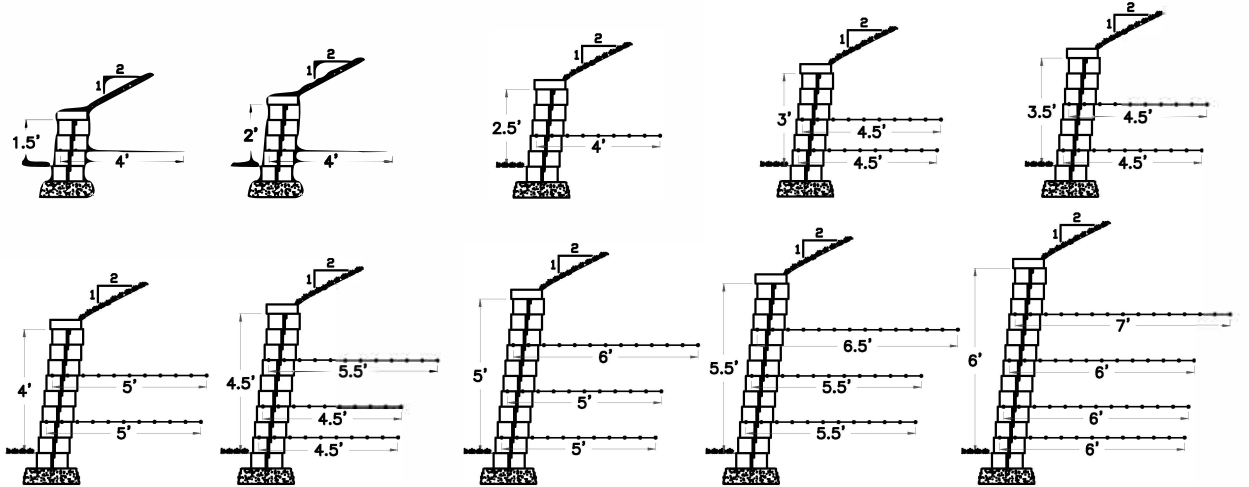
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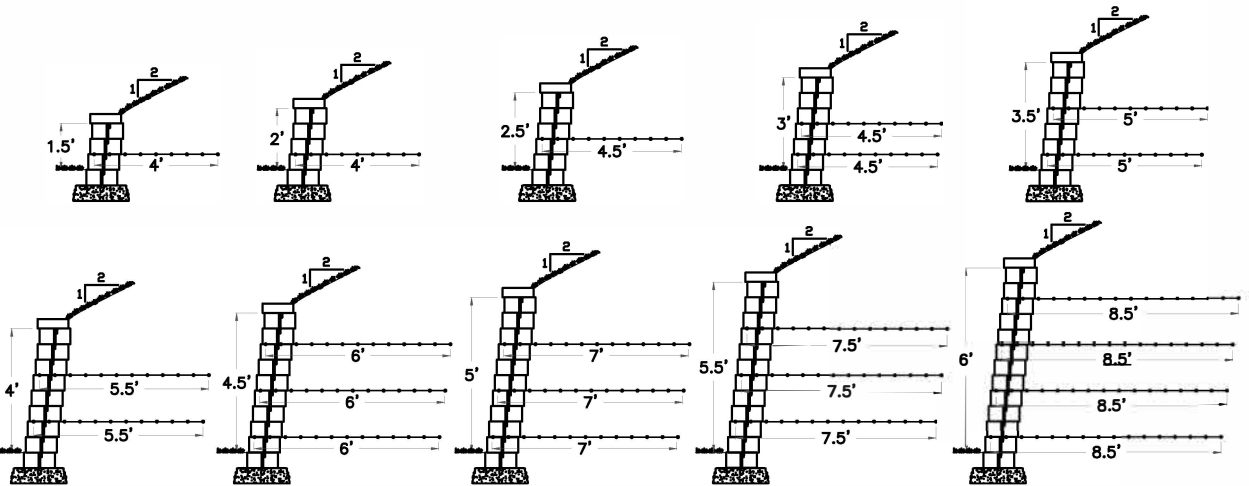
IBC CLASS 3 SOIL



IBC CLASS 4 SOIL



IBC CLASS 5 SOIL

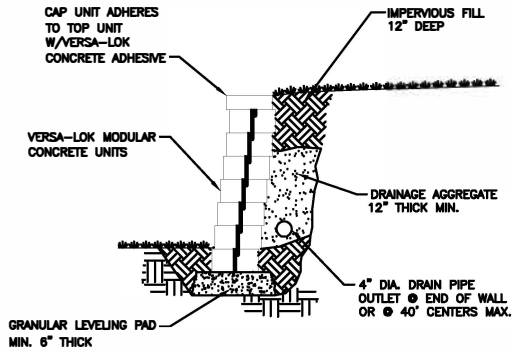


VERSA-LOK STANDARD UNITS &
MIRAGRID 3XT, STRATAGRID SG200, OR
SYNTEEN SF 35 GEOGRID

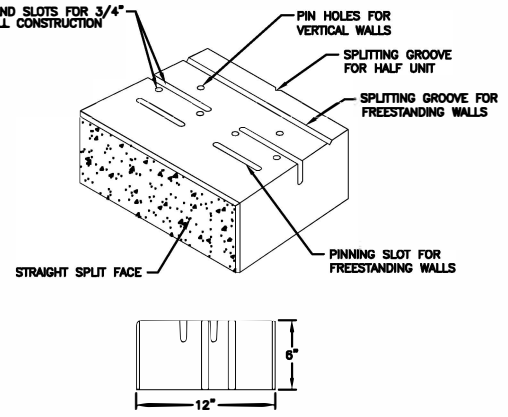
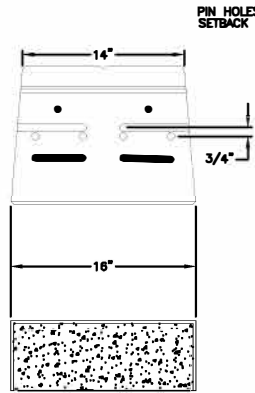
2H:1V MAXIMUM SLOPE REINFORCED WALLS



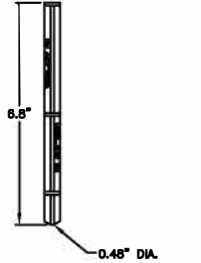
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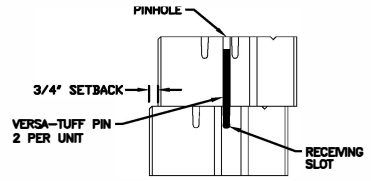
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SCALE: NONE



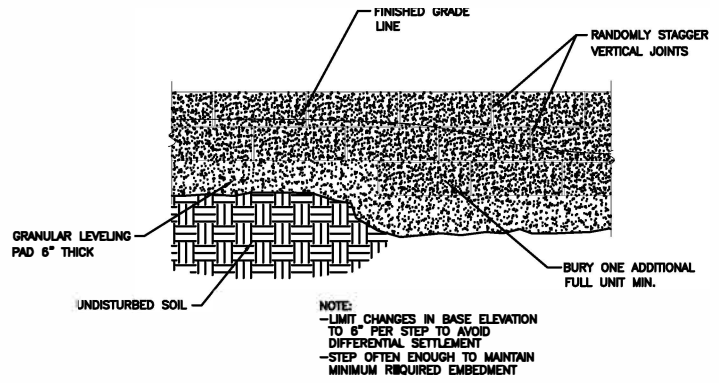
VERSA-LOK UNIT
UNIT DIMENSIONS
SCALE: NONE



VERSA-TUFF PIN
PIN DIMENSIONS
SCALE: NONE



PINNING DETAIL
CROSS SECTION
SCALE: NONE



STEPPING BASE DETAIL
SCALE: NONE

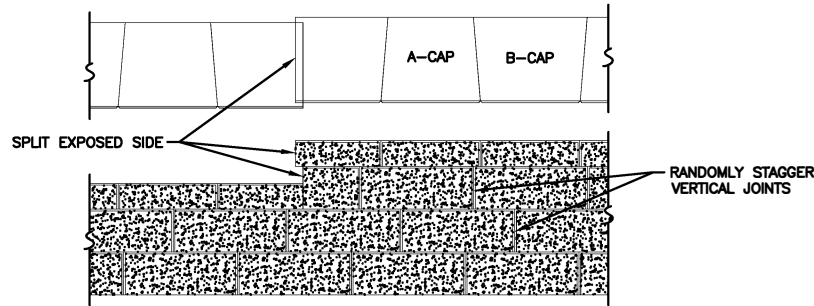
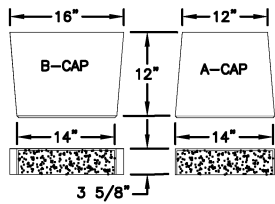


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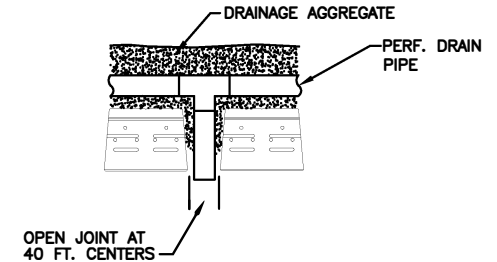
MICHAEL J. MERRILL,
CONSULTING ENGINEER
P.O. BOX 1123
SAN RAMON, CA 94583
PH: 925-577-3232

DETAILS	SCALE: AS NOTED
	DRAWN BY: KAM
STANDARD UNIT MASTER PLAN	CHECKED BY:
	DATE: 02/04
	DRAWING NO.: MCN MASTERPLAN

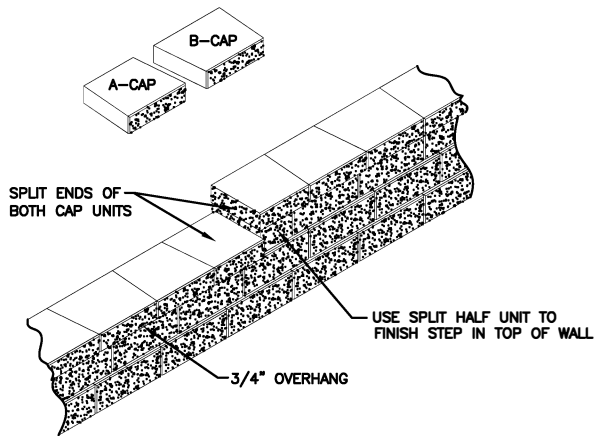
FOR STRAIGHT WALLS, ALTERNATE A-CAP AND B-CAP



CAPPING DETAIL—PROFILE
STEP AT TOP OF WALL
SCALE: NONE

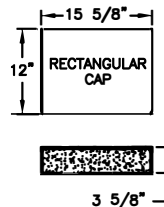


DRAIN DETAIL
WALLS OVER 4'
SCALE: NONE

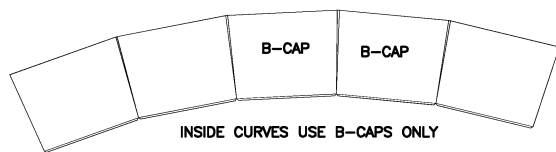


GENERAL NOTES FOR CAPPING:

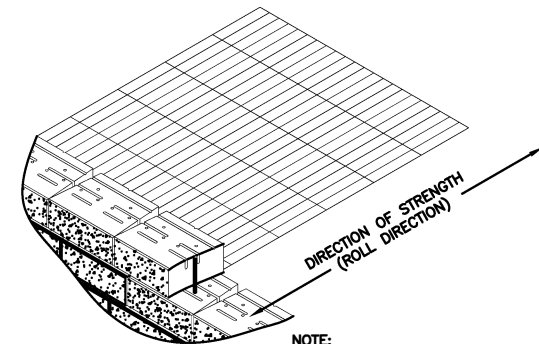
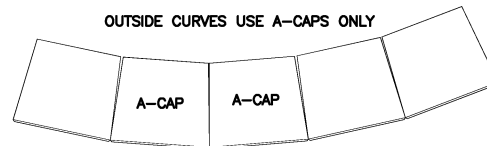
1. CAPS SHALL BE ADHERED TO WALL USING VERSA-LOK CONCRETE ADHESIVE
2. CAPS MAY BE PLACED WITH A 1/2" TO 3/4" OVERHANG OF TOP COURSE
3. WHEN SPLITTING CAP UNIT FOR WALL END DO NOT USE A CAP SECTION LESS THAN 6" WIDE
4. DO NOT OVERHANG CAP AT END OF COURSE MORE THAN 1"



MCNEAR RECTANGULAR CAP
SCALE: NONE



CAPPING DETAIL—PLAN VIEW
CURVES
SCALE: NONE



- NOTE:
1. FOLLOW GEOSYNTHETIC GRID MANUFACTURER'S INSTALLATION INSTRUCTIONS AND SPECIFICATIONS
 2. GEOGRID LENGTH AND ELEVATION PLACEMENT SHALL BE DETERMINED BY PROJECT ENGINEER

GEOSYNTHETIC INSTALLATION DETAIL
SCALE: NONE



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FX: 415-453-3141

DETAILS

MASTERPLAN

SCALE: AS NOTED

DRAWN BY: KAM

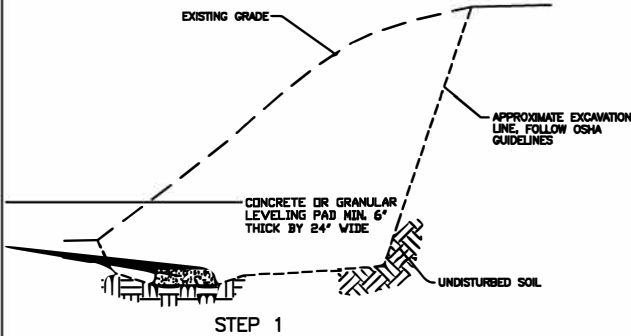
CHECKED BY:

DATE: 02/04

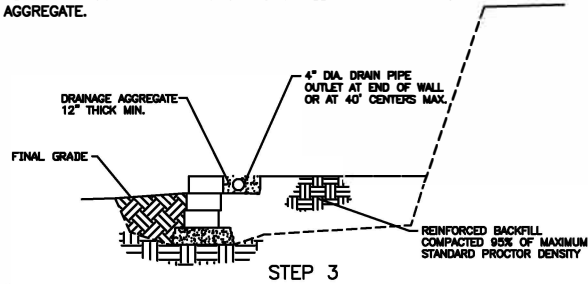
DWG. NO. MCN MASTERPLAN

CONSTRUCTION SEQUENCE

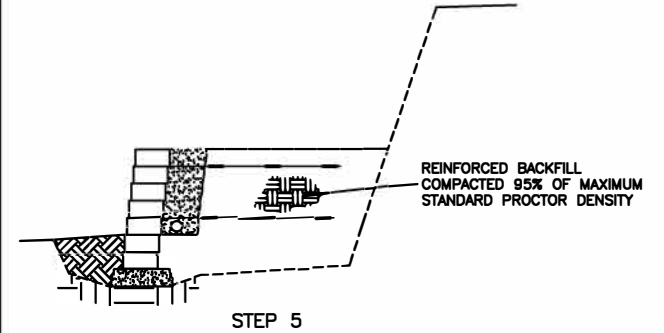
- VERIFY LOCATION OF EXISTING STRUCTURES AND UTILITIES.
- EXCAVATE AREA LARGE ENOUGH TO ACCOMMODATE LEVELING PAD, REQUIRED UNIT EMBEDMENT, AND REQUIRED GEOGRID LENGTHS.
- PROOF ROLL AND COMPACT EXCAVATED FOUNDATION AREA.



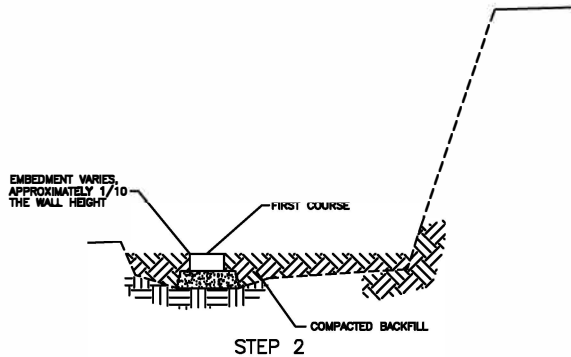
- PLACE NEXT COURSE OF UNITS. INSERT TWO CONNECTION PINS THROUGH TWO OF THE FOUR CENTER HOLES OF THE UPPER COURSE UNITS INTO THE CENTER SLOTS OF THE LOWER COURSE UNITS.
- CHECK LEVEL AND ALIGNMENT OF UNITS.
- CONTINUE PLACING COURSES OF UNITS AND COMPACTING BACKFILL IN FRONT OF AND BEHIND UNITS UNTIL REACHING HEIGHT OF FINAL GRADE IN FRONT OF WALL.
- BEGINNING JUST ABOVE THE FINAL GRADE IN FRONT OF WALL, PLACE DRAINAGE AGGREGATE BEHIND THE UNITS TO REQUIRED THICKNESS.
- INSTALL DRAINAGE COLLECTION PIPES AT BASE OF DRAINAGE AGGREGATE, WITH PERFORATION OR SLOTS FACING DOWN.
- SLOPE DRAIN PIPE TO ALLOW GRAVITY FLOW OF WATER TO OUTSIDE THE WALL SYSTEM, OUTLETTING PIPES AS REQUIRED.
- PLACE AND COMPACT REINFORCED BACKFILL BEHIND DRAINAGE AGGREGATE.



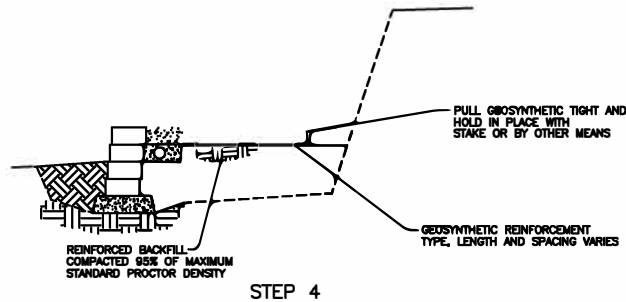
- CONTINUE PLACEMENT OF WALL UNITS, GEOSYNTHETIC, DRAINAGE AGGREGATE AND REINFORCED BACKFILL BY REPEATING STEP 4 UNTIL WALL IS WITHIN ONE FOOT OF FINAL HEIGHT.
- STACK NO MORE THAN THREE COURSES BEFORE BACKFILL IS PLACED BEHIND WALL.
- COMPACT BACKFILL IN NO GREATER THAN 6" THICK LIFTS.



- PLACE LOWEST COURSE OF WALL UNITS ON LEVELING PAD, SETTING UNIT SIDES AGAINST ADJACENT UNITS.
- LEVEL UNITS SIDE-TO-SIDE, FRONT-TO-REAR, AND WITH ADJACENT UNITS.
- CHECK ALIGNMENT ALONG BACK OF UNITS.
- PLACE AND COMPACT BACKFILL IN FRONT AND BEHIND UNITS TO BE EMBEDDED BELOW FINAL GRADE.



- CONTINUE PLACING UNITS, DRAINAGE AGGREGATE AND REINFORCED BACKFILL, UNTIL REACHING HEIGHT OF GEOSYNTHETIC LAYER.
- LAY THE REQUIRED LENGTH OF GEOSYNTHETIC HORIZONTALLY ON TOP OF THE UNITS, ENSURING HIGHEST STRENGTH DIRECTION OF GEOSYNTHETIC IS PERPENDICULAR TO WALL FACE.
- PLACE NEXT COURSE OF UNITS ON TOP OF GEOSYNTHETIC AND PIN DOWN THROUGH GEOSYNTHETIC INTO UNITS BELOW.
- PLACE DRAINAGE AGGREGATE BEHIND UNITS TO REQUIRED THICKNESS.
- PULL BACK OF GEOSYNTHETIC TO REMOVE ANY WRINKLES OR LOOSENESS. DO NOT OVER TENSION.
- USE STAPLES, STAKES, OR HAND TENSION TO KEEP GEOSYNTHETIC TAUT UNTIL BACKFILL IS PLACED ON TOP.



- PLACE AND COMPACT IMPERVIOUS SOIL BEHIND THE TOP 12 INCHES OF THE WALL.
- PLACE AND ALIGN CAP UNITS, WITH A SLIGHT OVERHANG, ON TOP COURSE.
- AFTER ENSURING PROPER ALIGNMENT, REMOVE AND THEN ADHERE CAPS WITH VERSA-LOK ADHESIVE.

