



CRETATM STONE

ENGINEERING MANUAL



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PAVELOC

INDUSTRIES, INC.



CRETA™ STONE

The name Creta is derived from the word Cretaceous. *The Cretaceous period in history belonged to the geologic time when a system of rocks and sedimentary deposits from the most recent period of the Mesozoic era was characterized by the development of flowering plants and the disappearance of dinosaurs.*

A fresh concept in interlocking retaining walls has been achieved, creating the effect and elegance of a natural stone wall. The CRETA™ STONE Retaining Wall System introduces a natural look and style to retaining walls with its Old World appearance and simple construction.



CRETA™ STONE wall is perfect for patio seat walls, garden walls, even small commercial applications. It has a rustic appearance created by a tumbling process. This process creates the appearance of natural stone while incorporating the integrity of an interlocking wall system. CRETA™ STONE wall is available in three solid colors and four color blends. CRETA™ STONE comes in a three stone size package to form the random pattern look. CRETA™ STONE is split faced both sides to allow construction of free standing walls. CRETA™ STONE is available in a straight and



radius wall package to accommodate straight and curved wall applications, a corner package and a step package. To “top off” the wall, a three-inch thick cap stone is available in the three size cap package. The CRETA™ STONE caps overlap the front and rear of the wall by an inch and a half.

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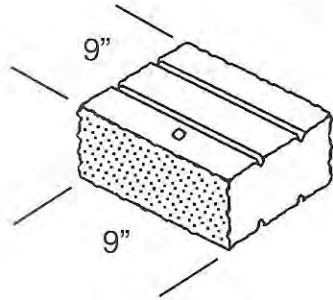
Paveloc's Creta™ Stone Retaining Wall System is manufactured to meet or exceed current ASTM C140-96 standards.

Licensed under U.S. Patent 5,528,873 1996

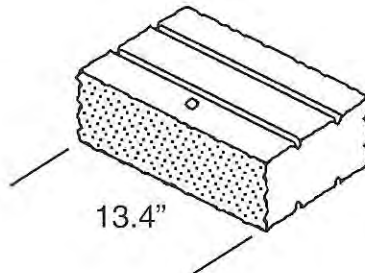
DEFINITION OF TERMS USED IN THIS MANUAL

- ALLOWABLE BEARING CAPACITY:** The safe capacity of the foundation soils to support the weight of a segmental retaining wall measured in pounds of weight per square foot area of foundation soil.
- BACKSLOPE:** Slope of the ground behind a segmental retaining wall, measured in a ratio of horizontal running feet to vertical rise feet such as 3:1.
- BASE LEVELING PAD:** Compacted gravel or cast concrete used to provide a level working surface for placement of the segmental retaining wall block units.
- BATTER (4° SETBACK) WALL:** Each segmental retaining wall course is displaced a horizontal distance of approximately 3/8" from the course below, providing a backward slanting face.
- COMPACTED BACKFILL ZONE:** Granular soils placed between the drainage zone and the retained soils.
- CONCAVE RADIUS:** Curved inward, as viewed from the interior of a circle.
- CONNECTION STRENGTH:** The strength resisting movement between a layer of geogrid reinforcement and the segmental retaining wall block units.
- CONVENTIONAL WALL:** A segmental retaining wall without geogrid reinforcement.
- CONVEX RADIUS:** Curved outward, like a circle viewed from the outside.
- COURSE:** A layer of segmental masonry blocks consisting of blocks placed side by side and one block in height.
- CRETA™ STONE WALL:** A segmental retaining wall using Paveloc Industries' Creta™ Stone segmental block units.
- CUT WALL:** A segmental retaining wall that has the majority of its courses below the surface of the previous existing ground surface so that a new lower ground surface is provided in front of the wall.
- DRAINAGE FILL ZONE:** Free draining coarse-grained soil used as a drainage layer for discharge of water.
- DRAINTILE:** Pipe placed in the drainage fill zone of a segmental retaining wall to convey accumulated water by gravity to a suitable lower elevation discharge location such as a storm sewer or ground surface beyond the retaining wall.
- FILL WALL:** A segmental retaining wall that has the majority of its courses above the surface of the existing previous ground surface so that a new higher ground surface is provided behind the wall.
- FINISHED GRADE:** Surface of the ground at the planned finished elevation.
- FOUNDATION SOILS:** Existing soil mass supporting the leveling pad, drainage fill zone and the reinforced compacted backfill zone of a reinforced soil segmental retaining wall or the compacted backfill of a gravity retaining wall.
- GEOGRID:** A planar sheet consisting of a grid of connected polymeric tensile elements used as a horizontal reinforcement material in segmental retaining walls, consisting of Strata Systems Stratagrid 300 for Creta™ Stone Walls.
- NON-WOVEN GEOTEXTILE:** A specific type of filter geotextile used as a soil separator.
- PVC INSERTS:** High-density polyvinyl chloride inserts used to align and interlock the courses of a Creta™ Stone wall.
- REINFORCED WALL:** A segmental retaining wall with geogrid reinforcement.
- RETAINED SOILS:** Soil immediately behind the reinforced compacted backfill zone in reinforced wall systems, or immediately behind the compacted backfill zone in conventional wall systems.
- SEGMENTAL RETAINING WALL:** A retaining wall constructed with masonry block units without mortar.
- SHEAR STRENGTH:** The strength resisting sliding between a part of material and the other part of material.
- SURCHARGE:** Weight from vehicular traffic on a pavement above a segmental retaining wall.
- VERTICAL (0° SET-BACK) WALL:** Each segmental retaining wall course is located in-line with the course below, providing a vertical face.

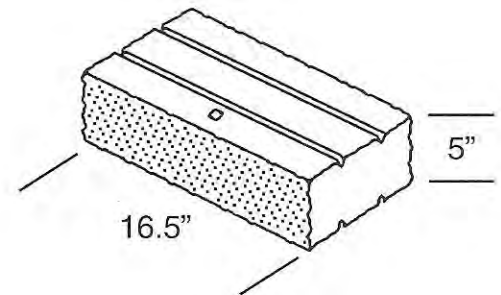
STRAIGHT WALL PACKAGE



STONE WEIGHT
32 lbs.

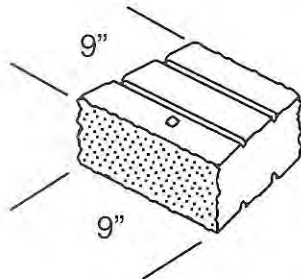


STONE WEIGHT
48 lbs.

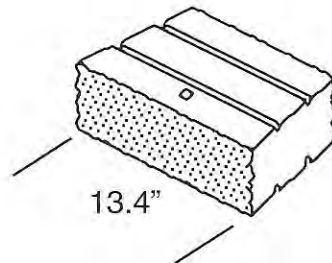


STONE WEIGHT
60 lbs.

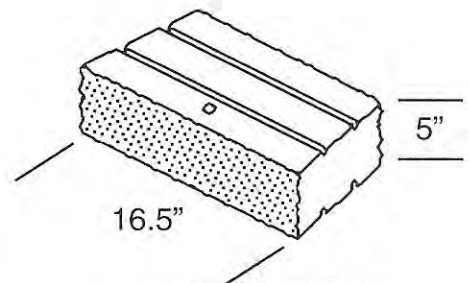
RADIUS WALL PACKAGE



STONE WEIGHT
28 lbs.

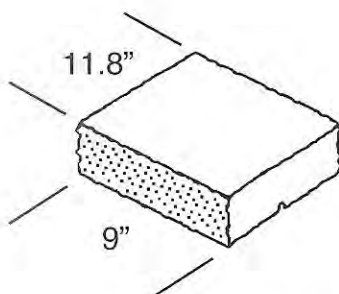


STONE WEIGHT
42 lbs.

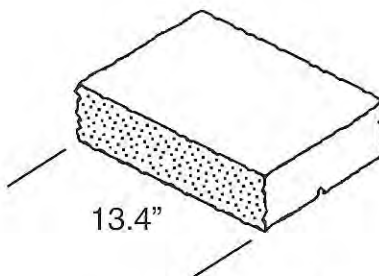


STONE WEIGHT
52 lbs.

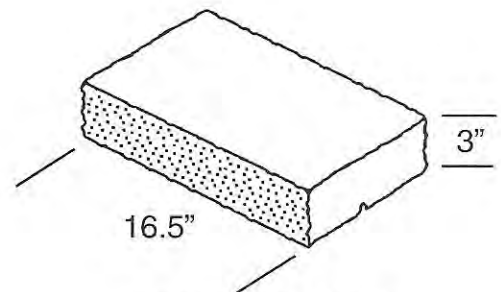
CAP PACKAGE



STONE WEIGHT
26 lbs.



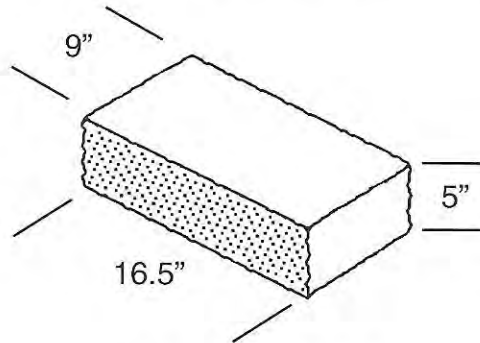
STONE WEIGHT
39 lbs.



STONE WEIGHT
48 lbs.

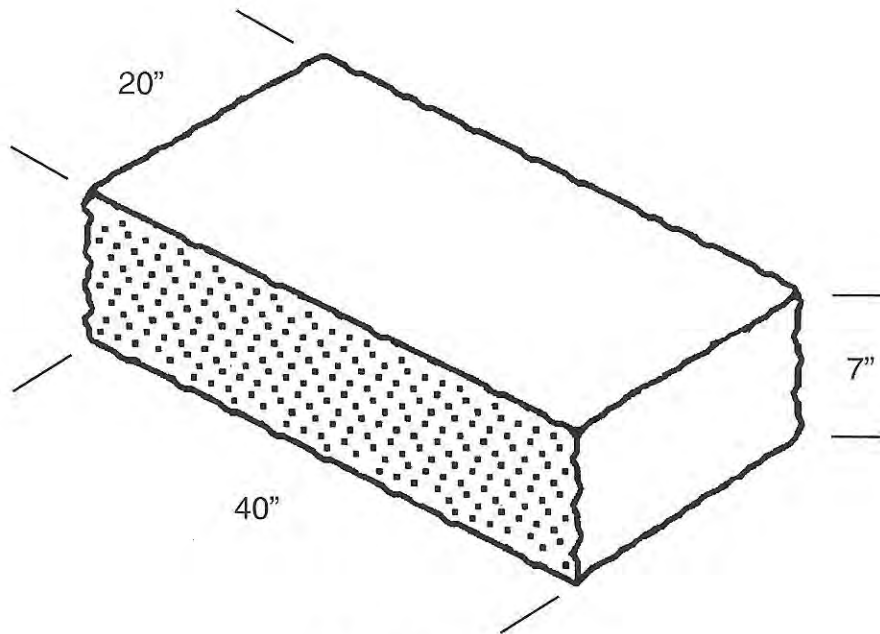
Due to the inherent characteristics of concrete, as well as the tumbling process, actual size and weight may vary.

CORNER UNIT



STONE WEIGHT
62 lbs.

STEP UNIT



STONE WEIGHT
481 lbs.

Due to the inherent characteristics of concrete, as well as the tumbling process, actual size and weight may vary.

DESIGNING

- Start with a simple drawing of your project.
- Indicate the desired length and height of your CretaTM Stone wall.
- The location of cut walls may decrease stability of nearby pavement, structures, and utility conduits, and relocation of cut walls may be needed.

This information will be necessary to complete the estimating portion of your project.

ESTIMATING

First, determine the desired height and length of your new CretaTM Stone wall.

- Remember to make allowances for a proper depth for your wall. Include any CretaTM Stone courses that will be embedded below grade, but do not include the cap stone.
- If your wall height is less than 3 feet (with no surcharge), we recommend the bottom course of CretaTM Stones be placed approximately 6" below finished grade for embedment. For conditions not found in this manual, contact a qualified geotechnical engineer to determine if additional embedment depth is required.

Calculation: Wall Height +(plus) Embedment -(minus) 3" (cap allowance) = Total Wall Height.

Example: for a wall **2'6" high** (desired height above grade) by **10' long**...

- **First, convert wall height to inches... (2' x 12" per foot) + 6" = 30"**

30"	+	6"	-	3"	=	33"
DESIRED WALL HEIGHT	PLUS	EMBEDMENT	MINUS	CAP ALLOWANCE	EQUALS	TOTAL WALL HEIGHT

- **Next, convert your total wall height back into feet... 33" ÷ 12" per foot = 2.75'**

Next, determine the square face footage of your new CretaTM Stone wall...

Calculation: Wall Height x Length = Square Face Feet.

Example: **2.75' high wall** (total wall height) x **10' long wall** = **27.5 square face feet**

- Keep in mind that the minimum radius of CretaTM Stone is 3 feet at the top course for a convex wall using all stone shapes. See page 13 (minimum radius measurements).

Finally, determine the total linear footage of caps necessary to finish off the top of your CretaTM Stone wall...

10' (desired wall length in feet) = 10' (total linear footage)

You now have two figures, 27.5 (square face footage) and 10' (total linear footage for caps).

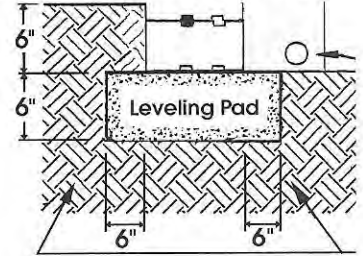
PREPARING THE FOUNDATION SOILS

- Excavate the existing soils to the planned level of the foundation soils and to a lateral extent to include the base leveling pad, drainage fill zone, and the compacted backfill zone of the segmental retaining wall.
- Additional excavation shall be made to remove topsoil and/or tree roots.
- For cut walls, excavate steps or terraces into the retained soil zone.
- Evaluate the foundation soils so that the actual soil conditions meet or exceed the assumed design conditions for soil type, shear strength and allowable bearing capacity.

PREPARING THE BASE LEVELING PAD

The base leveling pad provides a stable, but flexible pad for the Creta™ Stone retaining wall foundation.

- Excavate a shallow trench 21" wide and at least 12" deep, being level along the wall length. Step down or up when needed.
- Compact well-graded crushed stone in two 3-inch-thick lifts. The recommended crushed stone gradation for the base leveling pad is presented on page 24 of this manual. The base leveling pad is recommended to be compacted to a density of at least 95 percent of the maximum Standard Proctor density (ASTM C140-99b). Compacting provides a stable pad for the first course of Creta™ Stone.
- Level the surface of the compacted base leveling pad front to back and along the length of the wall. Any added crushed stone must be compacted as stated above.



RESERVING CORNER PIECES

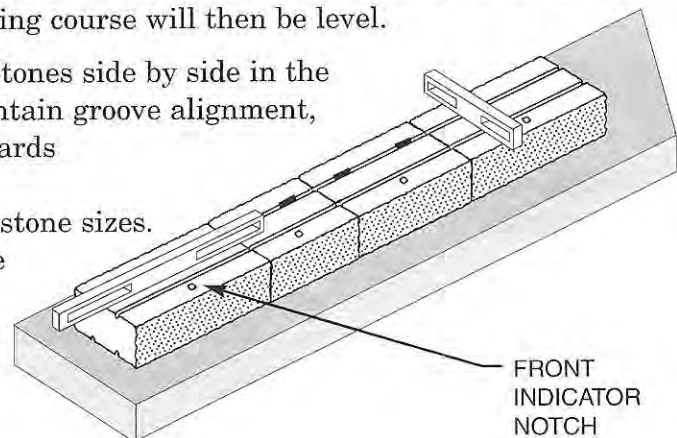
Every pallet of straight Creta™ Stone includes a minimum of (8) large right and (8) large left corner stones. Each pallet of radius Creta™ Stone includes a minimum of (2) large right and (2) large left corner stones. If extra corner stones are required, a Creta™ Stone Corner Package is available.

Before construction begins, calculate the number of right and left corner stones required and set them aside until needed. Corner stones not used to construct outside corners can be used as standard wall stones. See page 9 (Outside Corners).

THE FIRST COURSE

The first course is the most important course and must be completely level for the wall to function properly. When the first course is level, each overlying course will then be level.

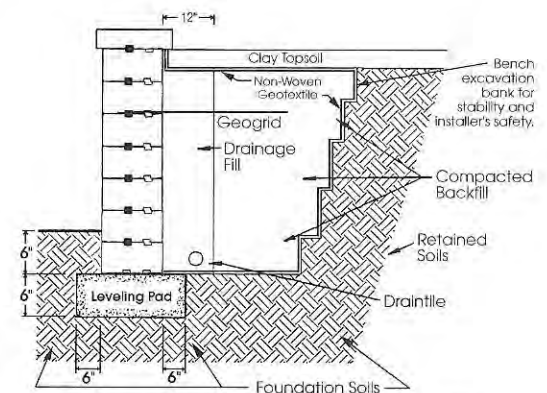
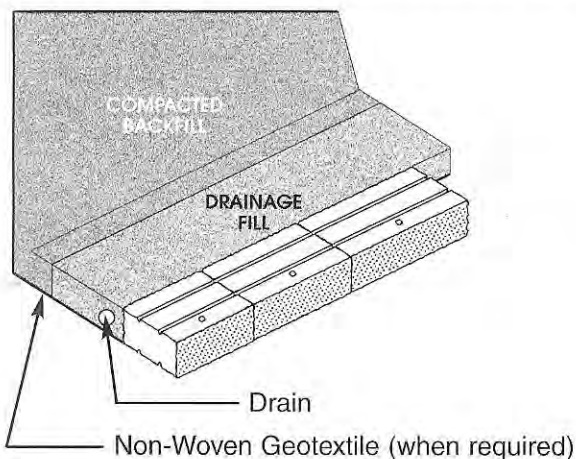
- Install the first course by placing the Creta™ Stones side by side in the center of the base leveling pad. In order to maintain groove alignment, the front indicator notch must always face upwards and towards the front of the wall.
- Place Creta™ Stones randomly, using all three stone sizes.
- Level each Creta™ Stone front to back and side to side. Use sand or fine granular material for minor adjustments.



DRAINAGE FILL ZONE

Drainage fill allows water to drain out from behind the segmental retaining wall system, thereby reducing the pressure exerted on the wall from damaging water build-up.

- Place 4-inch-diameter drintile (PVC Polyvinyl Chloride Plastic Pipe or Corrugate Plastic Pipe) parallel and behind the first course of Creta™ Stone. Provide discharge out of ends or through the front face of the wall.
- Back fill at least 12" behind the wall with granular drainage fill only. The recommended graduation for the drainage fill is presented on page 24 of this manual.
- Compact the drainage fill behind each course of Creta™ Stone as you install it. Use only hand operated compaction equipment within (3) three feet of the retaining wall.
- Place and compact backfill behind the drainage fill zone in accordance with the Compacted Backfill section on this page.
- Before installing additional courses, sweep off any excess drainage fill or backfill that may have gotten into the grooves or on top of the Creta™ Stone. Cleaning off the top of the Creta™ Stone allows the next Creta™ Stone course to sit evenly upon the course below it, creating a stronger bond.



Typical application using "Non-Woven Geotextile" (when required)

COMPACTED BACKFILL

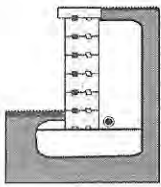
The compacted backfill will include geogrid reinforcement for reinforced walls, but will not include geogrid reinforcement for conventional walls. Recommendations for placement of geogrid reinforcement within the compacted backfill is presented in the Geogrid Placement section on page 22 of this manual.

- Place the compacted backfill granular soil between the drainage fill zone and the retained soils. Recommendations for the graduation of the soil for the compacted backfill are presented on page 24 of this manual for both reinforced compacted backfill for reinforced walls, and unreinforced compacted backfill for conventional walls. Place the compacted backfill in approximately 5-inch-thick layers (approximately level with each Creta™ Stone course).
- Compact the compacted backfill to a density of at least 95 percent of the maximum Standard Proctor density (ASTM D-698). Move the compactor parallel to the segmental retaining wall face, beginning near the Creta™ Stones and successively compact toward the retained soils away from the wall face. Only hand operated compaction equipment should be allowed within (3) three feet of the front face of the Creta™ Stones.

(continued on next page)

COMPACTED BACKFILL continued

- The backfill placement and compaction shall proceed at a level surface along the entire length of the segmental retaining wall, before the next layer of backfill is placed and compacted.
- Where a back slope is planned behind the segmental retaining wall, a drainage ditch shall be constructed parallel and behind the Creta™ Stone segmental retaining wall to positively drain surface water run-off from flowing over the face of the retaining wall.
- Place at least 5 inches of compacted clay topsoil as a cap over the drainage zone and compacted backfill.
- Protect the back slopes with erosion control vegetation and/or with plastic erosion control mats.



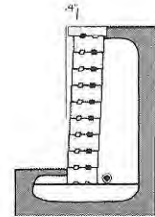
TYPICAL
VERTICAL WALL
APPLICATION

Use the front alignment groove to create a straight wall.

PVC INSERTS

The PVC inserts align the wall and provide a bond between layers.

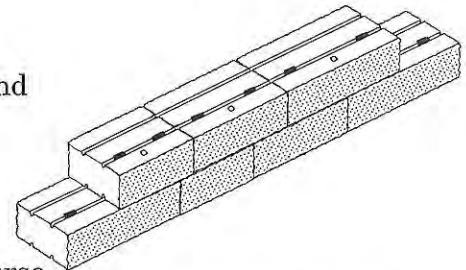
- Place two PVC inserts into the specified groove of each Creta™ Stone.
- For VERTICAL walls, place the PVC inserts in the front grooves. For 4° (or 3/8") SET BACK walls use the back grooves.



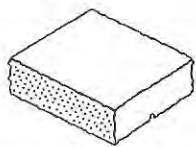
TYPICAL 4° WALL
SETBACK APPLICATION
Use the rear alignment groove to create a 4° batter wall

THE NEXT COURSE

- Place Creta™ Stone overlapping the joint of the previous course and over the two PVC inserts.
- Make sure the Creta™ Stone is completely resting on the underlying course and over the PVC inserts.
- Move the Creta™ Stone forward toward the face of the wall while maintaining contact with the underlying Creta™ Stone course.



Particular attention should be paid to the placement of the various size stones to overlap all joints. No joints should align from course to course.



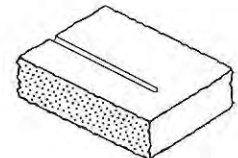
CAPS

Creta™ Stone caps have a single groove on the bottom with a finished top. The shorter distance from the groove is the front face of the cap.

When placing the cap, the PVC insert always goes in the front groove of the course below. This allows for a 1 1/2" overhang on the front and back of the Creta™ Stone wall. For safety and prevention of vandalism, always adhere caps to the top course of the retaining wall.

END CAPS have a single groove on the bottom ending approximately 2 1/2" from the end of the cap stone. There are at least (4) right and (4) left end caps included on each pallet.

- To utilize the end cap, split off 1" to 1 1/2" before the groove begins.
- To roughen up the chiseled end of Creta™ Stone end cap, use the small scrap piece and rub the chiseled end of the cap until the tumbled look is achieved.



OUTSIDE CORNERS

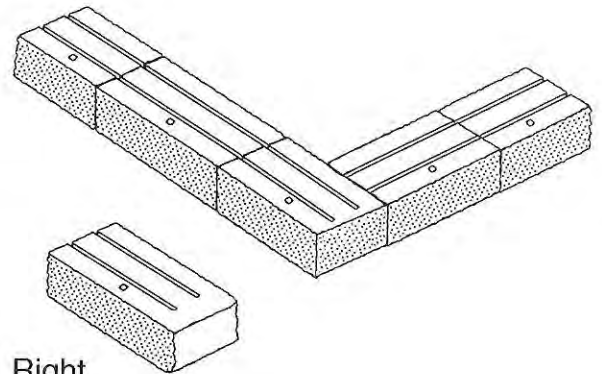
To create an outside corner, use the Creta™ Stone straight wall package. Remember to set aside the corner stones.

STEP ONE: Follow basic installation instructions for preparation and excavation of subgrade and placement of base leveling pad.

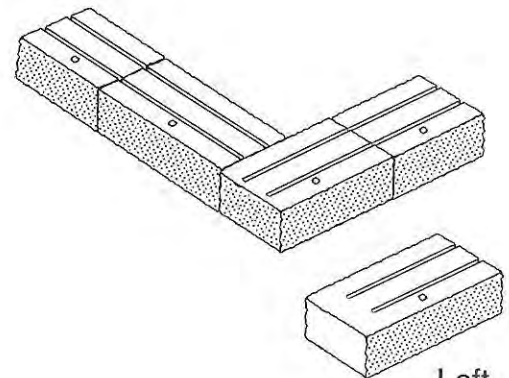
STEP TWO: Split corner stones. There are a minimum of (8) large right and (8) large left stones which may be used as corner stones by splitting the end off with a chisel or mechanical stone splitter.

STEP THREE: To roughen up the split end of the Creta™ Stone corner you just made, use the small scrap piece and rub the split end of the large stone until the tumbled look is achieved.

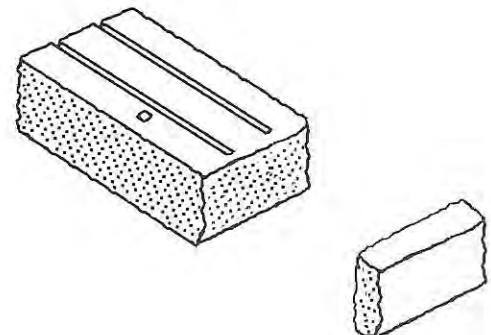
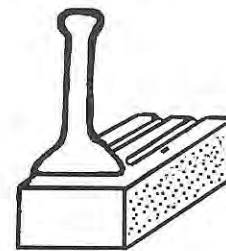
STEP FOUR: Start building your corner layer by layer. Beginning at the corner, alternate coursing at corner with one right hand corner then one left hand corner, etc..., until desired height is achieved. To eliminate shifting of the corner stones, use one PVC insert and apply adhesive to the top of each corner stone before setting the next layer.

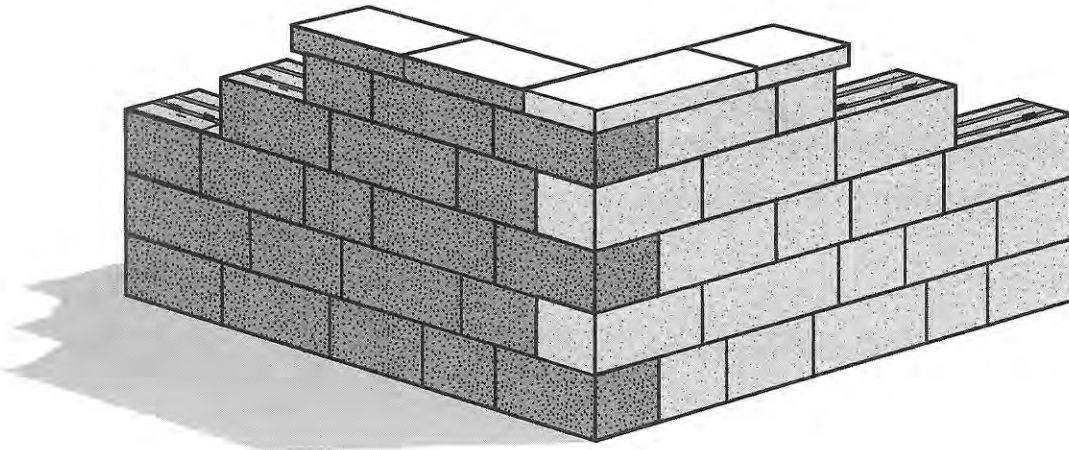


Right



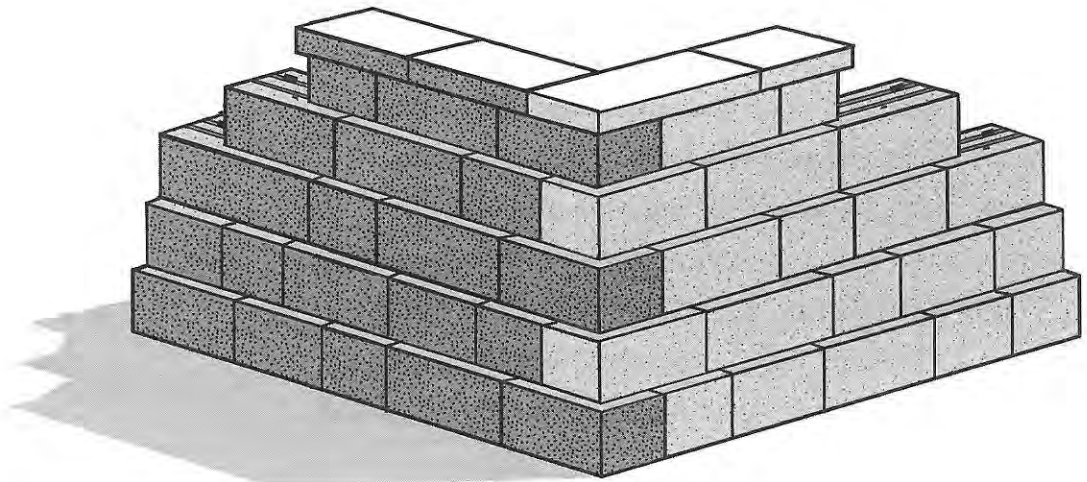
Left





Vertical Walls

Corner stone will use one PVC insert, placed in the front groove.



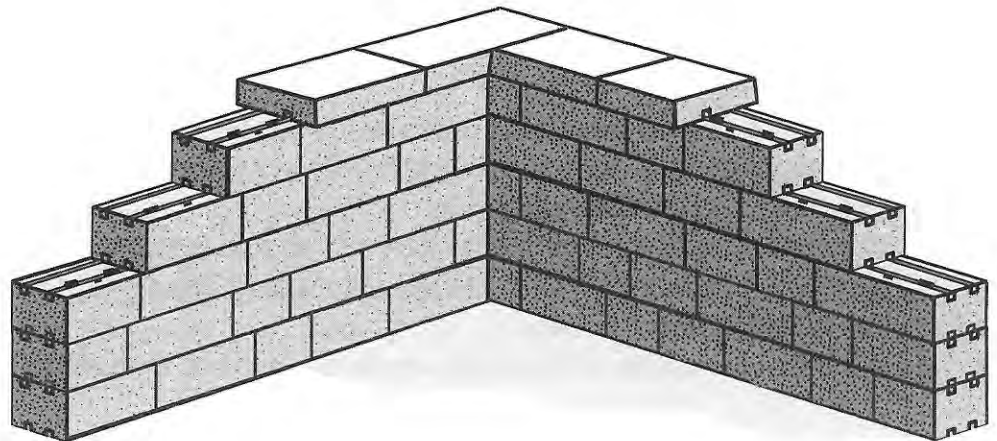
4° Wall setback

Corner stone will use one PVC insert, placed in the back groove.

INSIDE CORNER

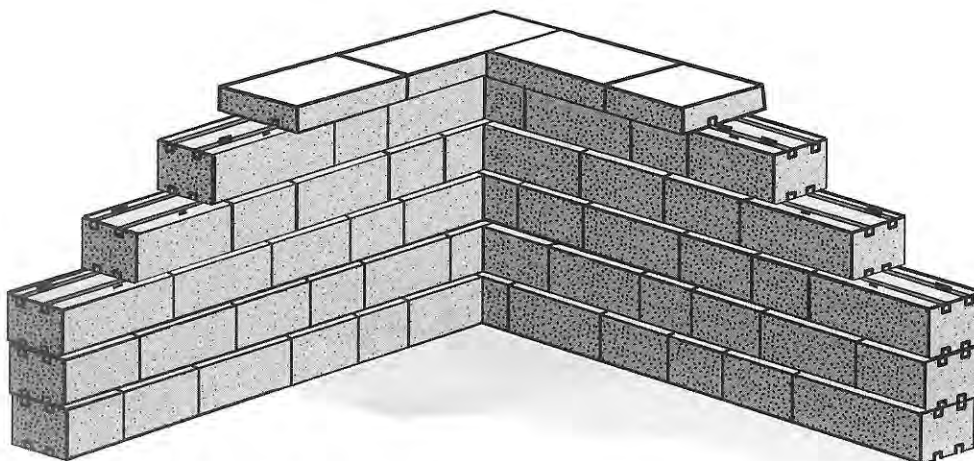
To create an inside retaining corner, use the Creta™ Stone straight package.

- Follow basic installation procedures for preparation and excavation of subgrade and placement of base leveling pad.
- Start building your corner layer by layer, alternating coursing at the corner, until desired height is achieved. There is no need to split corner stones or alternate right and left corners as on an outside corner.
- To eliminate shifting of the corner stones, use one PVC insert and apply adhesive to the top of each corner stone before setting the next layer.



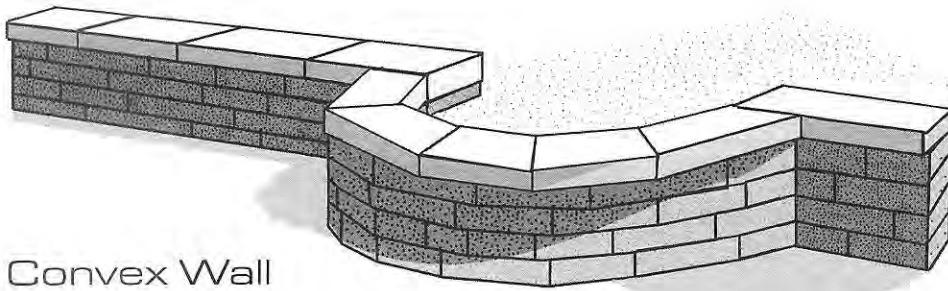
Vertical Walls

Corner stone will use one PVC insert, placed in the front groove.



4° Wall setback

Corner stone will use one PVC insert, placed in the back groove.



Convex Wall

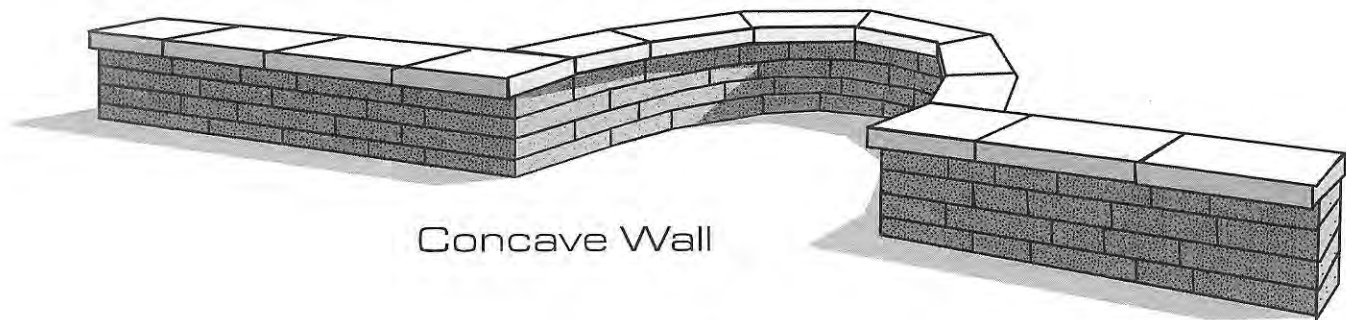
RADIUS WALLS

Start with the basic installation procedures using the radius package.

- Follow basic installation procedures for preparation and excavation of subgrade and placement of base leveling pad.
- For convex walls, layout consideration should be given to final radius at top of wall, keeping in mind that the **minimum radius using all three stone shapes is three feet at the top course.**
- All caps on radius walls will have to be saw cut to accommodate specified radius.

For concave non-free standing walls, the straight wall package should be used.

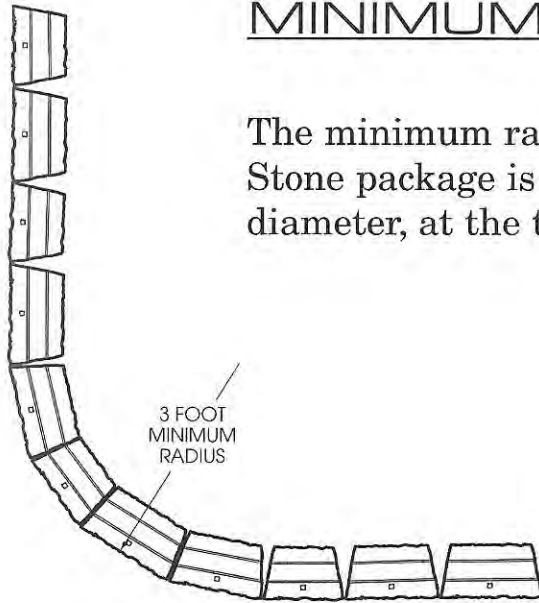
For free standing radius walls other than 3' radius, stones may need to be cut to avoid gaps. Consideration should be given to the placement of geogrid, if required. Review geogrid placement charts in this manual, or consult a qualified geotechnical engineer.



Concave Wall

MINIMUM RADIUS MEASUREMENTS

The minimum radius that can be achieved using the Creta™ Stone package is a three foot outside radius or six foot outside diameter, at the top course, using all three stone sizes as shown.

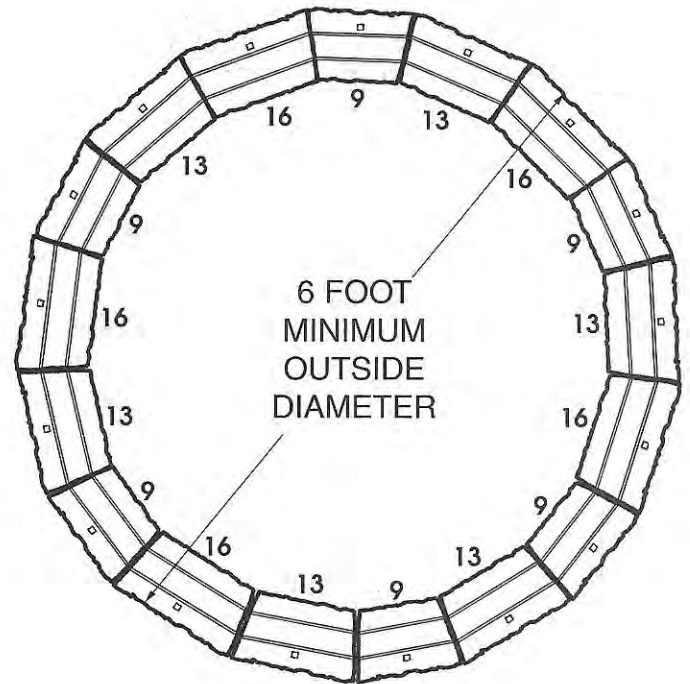


TO CALCULATE THE RADIUS OF THE BOTTOM ROW OF A CRETA™ STONE WALL WITH A 4° BATTER, JUST FOLLOW THE STEPS BELOW.

- Divide wall height by .42
(height of a Creta™ Stone wall stone in feet).
This will give you the number of Creta™ Stone courses in the wall.
- Multiply the number of courses by 3/8" (.375) setback.
- Add the three-foot minimum radius to this number to get the radius at the first course.

CALCULATION EXAMPLE:

If wall height = 3'
 $3' \div .42 = 7.15$ (number of courses in wall)
 7 wall units high x .375" setback = 2.625"
 $3' + 2.625" =$ radius at first course

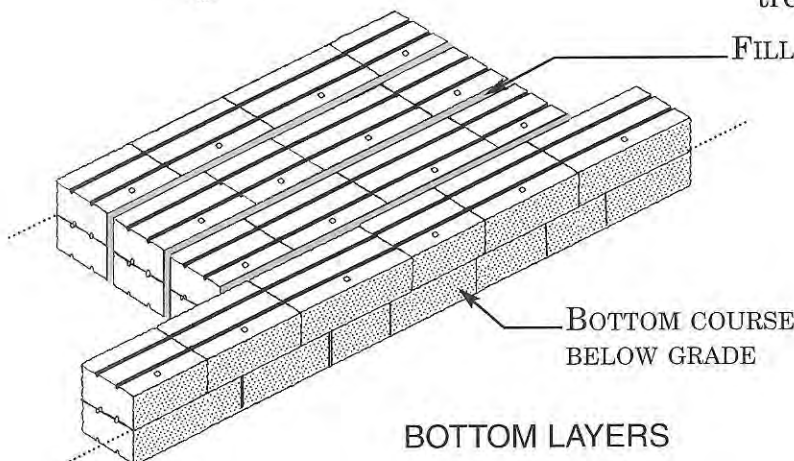
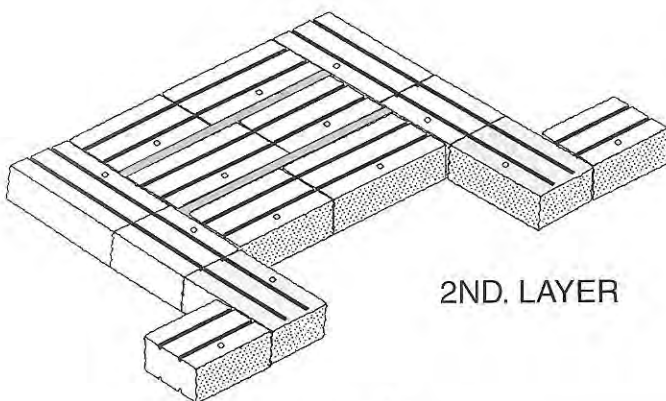
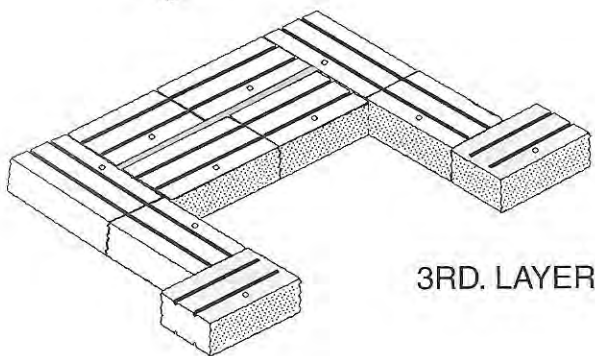
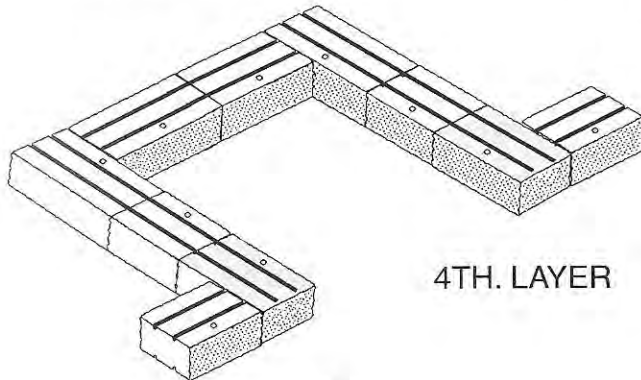


CRETA™ STONE

BUILDING STEPS

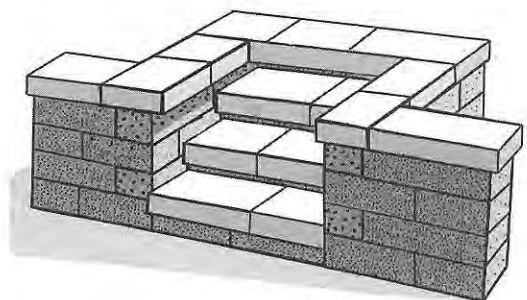
Steps built into a wall.

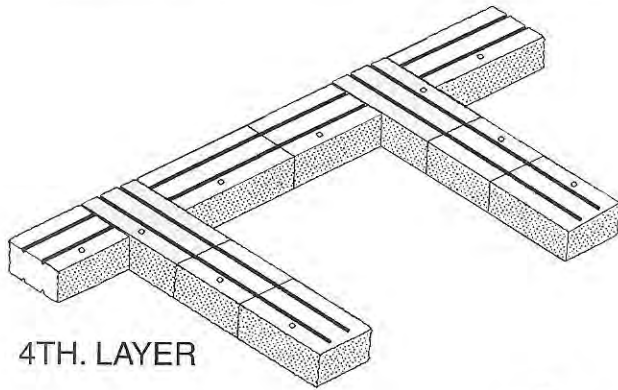
BUILDING STEPS USING RETAINING WALL THROUGHOUT THE CONSTRUCTION OF THE STEPS.



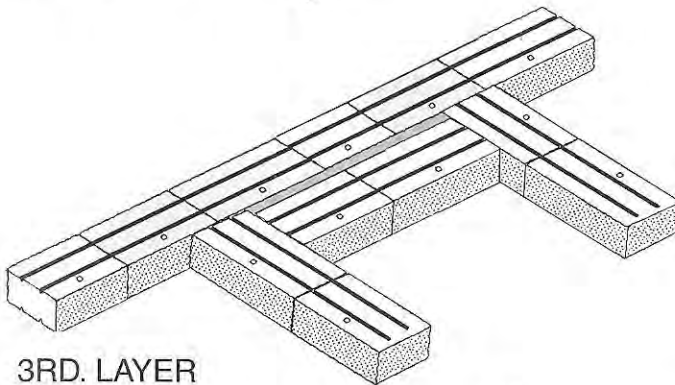
- Follow Basic Installation procedures for preparation and excavation of subgrade and placement of base leveling pad.
- Install Creta™ Stone on the base leveling pad per the base course instruction. Remember that the bottom layer should be duplicated and buried for stability. The actual design, number of risers and treads will vary depending on the architect design specifications.
- Allow 1 1/2" gap between Creta™ Stone wall stones in the step area. The gaps are to accommodate the size of the caps. Fill the gaps with granular fill.
- Continue building the steps layer by layer, alternating coursing at wall intersection as illustrated. For extra stability, apply adhesive between each layer of Creta™ Stone.
- Adhere Creta™ Stone caps in place as tread.

FILL THE GAPS WITH GRANULAR FILL

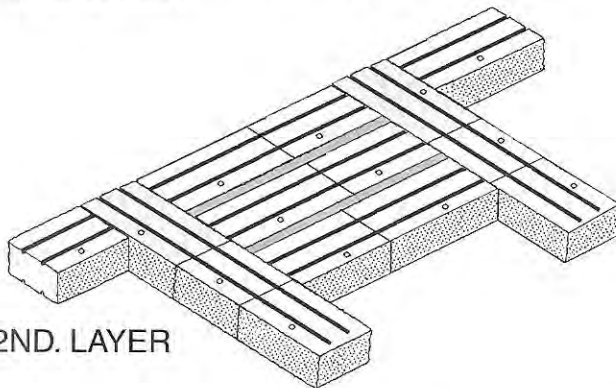




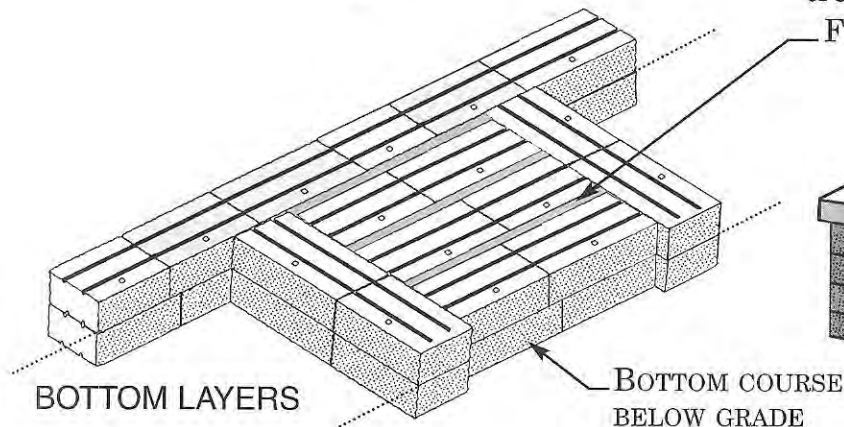
4TH. LAYER



3RD. LAYER

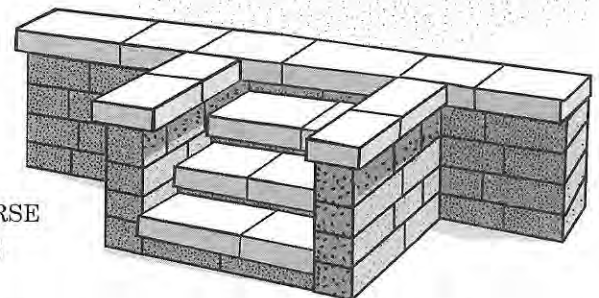


2ND. LAYER



BOTTOM LAYERS

BOTTOM COURSE
BELOW GRADE



Steps built out of a wall

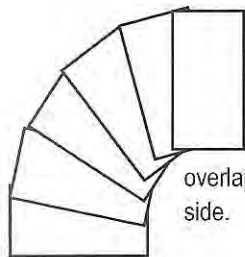
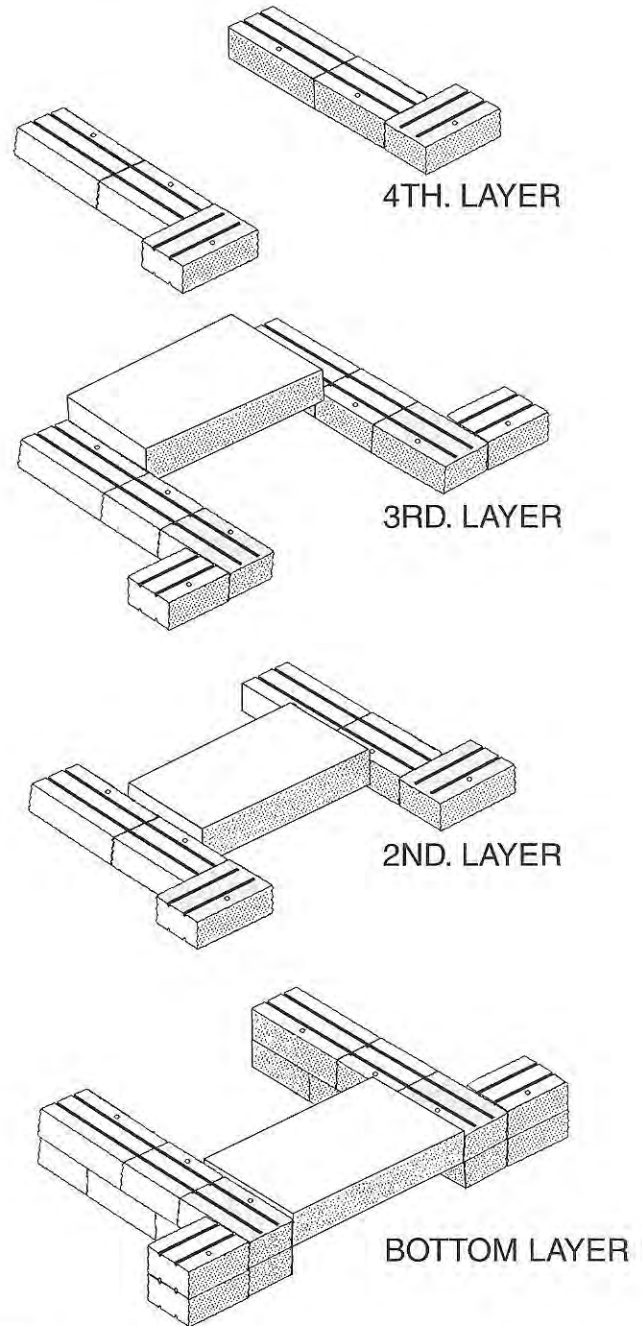
BUILDING STEPS USING RETAINING WALL THROUGHOUT THE CONSTRUCTION OF THE STEPS.

- Follow Basic Installation procedures for preparation and excavation of subgrade and placement of base leveling pad.
- Install Creta™ Stone on the base leveling pad per the base course instruction. Remember that the bottom layer should be duplicated and buried for stability. The actual design, number of risers and treads will vary depending on the architect design specifications.
- Allow 1 1/2" gap between Creta™ Stone wall stones in the step area. The gaps are to accommodate the size of the caps. Fill the gaps with granular fill.
- Continue building the steps layer by layer, alternating coursing at wall intersection as illustrated. For extra stability, apply adhesive between each layer of Creta™ Stone.
- Adhere Creta™ Stone caps in place as tread.

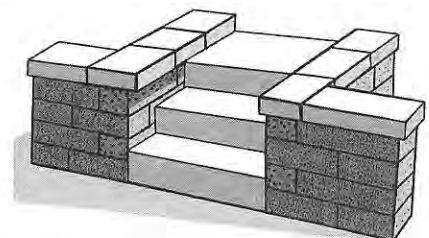
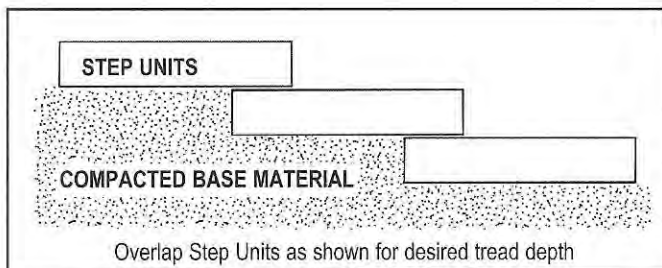
FILL THE GAPS WITH GRANULAR FILL

BUILDING STEPS USING THE STEP PACKAGE

- Follow Basic Installation procedures for preparation and excavation of base leveling pad.
- Install Creta™ Stone on the base leveling pad per the base course instructions. Be advised that the bottom layer should be duplicated and buried for stability. The actual design, number of risers and treads will vary depending on the architect design specifications.
- Area behind the first step unit and each step unit must to be filled with base material compacted to maximum density in 3 to 4 inch lifts.
- Desired tread depth can be achieved by varying the amount of overlap of the step unit above.



On radius stair treads the desired width and radius of the step installation can be achieved by varying the overlap of the following step on one side.



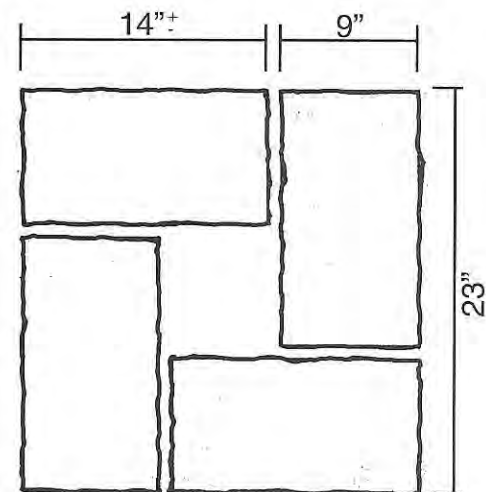
Columns

With the use of our new corner stone package, many different column sizes can be constructed.

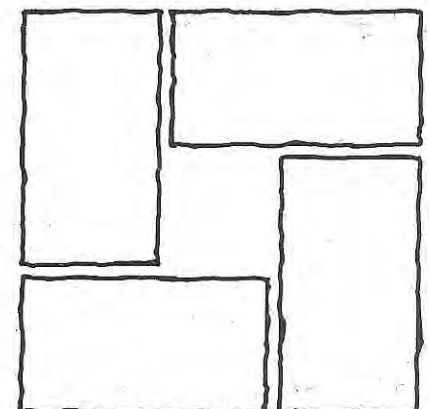
The nominal 23 inch column is a freestanding column and the nominal 32 inch column can be constructed freestanding or tied into wall panels.

The nominal 23 inch freestanding column can be constructed by utilizing the Creta™ Stone Corner pieces with 2 to 2 1/2 inches split off the appropriate end.

- Follow Basic Installation procedures for preparation and excavation of base leveling pad.
- Install Creta™ Stone on the base leveling pad per the base course instructions. Be advised that the bottom layer should be duplicated and buried for stability. The actual design and height of column will vary depending on the architect design specifications.
- To achieve a nominal 23 inch column, each corner stone needs to have 2 to 2 1/2 inches split off the appropriate end.
- To achieve a tumbled appearance for the split end of the Creta™ Stone corner you just made, use the small scrap piece and rub the split end of the large stone until the tumbled look is achieved.
- Install the first course using four 14 inch Creta™ Stone corner units with split end facing outward according to the diagram shown at right (Diagram #1).
- Install second course with stones ship lapped over seams, as in the diagram at right (Diagram #2).
- Alternate each course to achieve desired height.
- After desired height is achieved, apply Creta™ Stone cap or preferred specified precast coping.



First and odd courses
Diagram #1



Second and even courses
Diagram #2

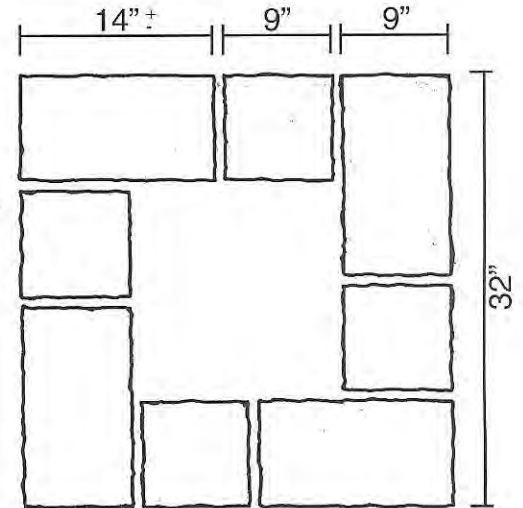
Apply adhesive between every course, as well as the caps (or precast coping).

If desired column height is higher than 4 feet, a qualified engineer should be contacted to ascertain if any engineering is required.

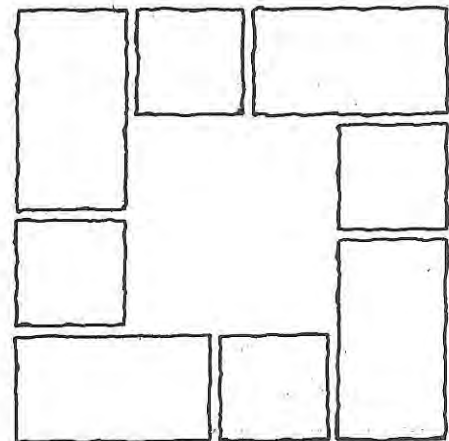
Freestanding 32 inch column

The nominal 32 inch freestanding column can be constructed by utilizing Creta™ Stone corner unit with 2 to 2 1/2 inches split off appropriate end and 9 inch Creta™ Stone wall unit.

- Follow Basic Installation procedures for preparation and excavation of base leveling pad. A cast-in-place concrete leveling pad may be used for free-standing installation.
- Install Creta™ Stone on the base leveling pad per the base course instructions. Be advised that the bottom layer should be duplicated and buried for stability. The actual design and height of column will vary depending on the architect design specifications.
- To achieve a nominal 32 inch column, each corner stone needs to have 2 to 2 1/2 inches split off the appropriate end.
- To achieve a tumbled appearance for the split end of the Creta™ Stone corner you just made, use the small scrap piece and rub the split end of the large stone until the tumbled look is achieved.
- Install the first course using four 14 inch Creta™ Stone corner units with split end facing outward and four 9 inch Creta™ Stone wall units (according to diagram 1).
- Install second course with stone pattern rotated and seams ship lapped (according to diagram 2).
- If joints are continuous (in-line with each other) geogrid is needed.
- Alternate each course to achieve desired height, apply adhesive to the top of each corner stone before setting the next layer.
- After desired height is achieved, apply Creta™ Stone cap or preferred specified precast coping.



First and odd courses
(Diagram 1)



Second and even courses
(Diagram 2)

If desired column height is higher than 4 feet, a qualified engineer should be contacted to ascertain if any engineering is required.

If center column planting is desired, place Stratagrid 300 geogrid on every two courses with the interior filled in with drainage fill. The top three courses (maximum) should be filled in with soil wrapped on all sides and bottom with a non-woven geotextile to prevent soils from migrating into the drainage fill or through the seams.

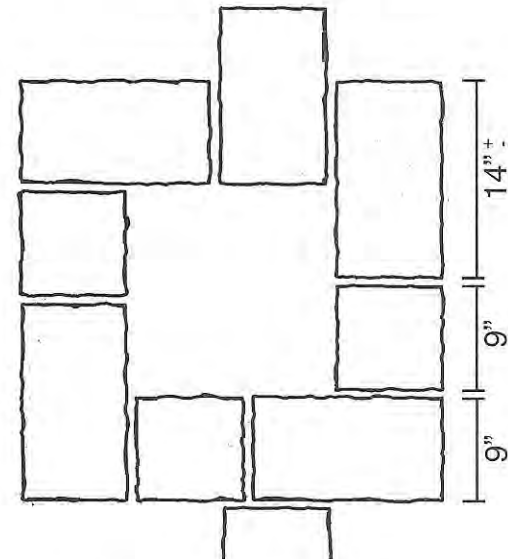
32 inch columns with wall panels

The nominal 32 inch column with wall panels can be constructed by utilizing Creta™ Stone corner unit with 2 to 2 1/2 inches split off appropriate end, 9 inch Creta™ Stone wall unit and 13.5 or 16.5 inch Creta™ Stone wall unit.

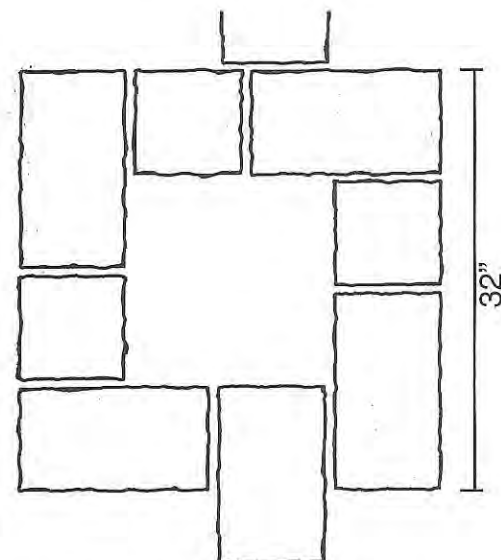
- Follow Basic Installation procedures for preparation and excavation of base leveling pad.
- Install Creta™ Stone on the base leveling pad per the base course instructions. Be advised that the bottom layer should be duplicated and buried for stability. The actual design and height of column will vary depending on the architect design specifications.
- To achieve a nominal 32 inch column, each corner stone needs to have 2 to 2 1/2 inches split off the appropriate end.
- To achieve a tumbled appearance for the split end of the Creta™ Stone corner you just made, use the small scrap piece and rub the split end of the large stone until the tumbled look is achieved.
- Install the first course using four 14 inch Creta™ Stone corner units with split end facing outward and four 9 inch Creta™ Stone wall units, replace 9 inch units with 13.5 or 16.5 inch Creta™ Stone wall units where wall panels are desired (according to diagram 1).
- Install second course with stone pattern rotated and seams ship lapped (according to diagram 2).
- If joints are continuous (in-line with each other) geogrid is needed.
- Alternate each course to achieve desired height, apply adhesive to the top of each corner stone before setting the next layer.
- After desired height is achieved, apply Creta™ Stone cap or preferred specified precast coping.

If desired column height is higher than 4 feet, a qualified engineer should be contacted to ascertain if any engineering is required.

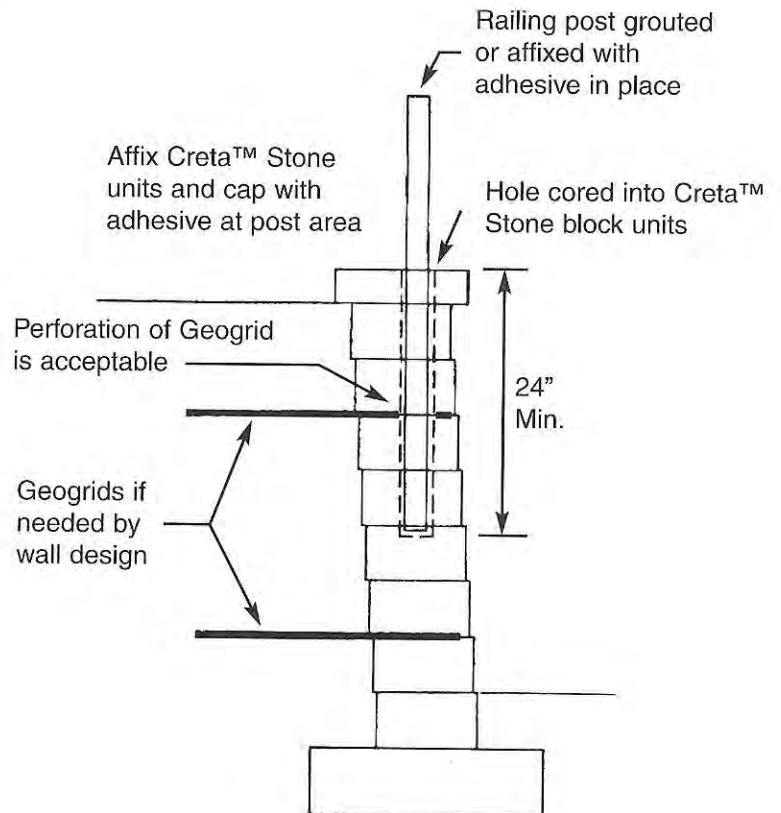
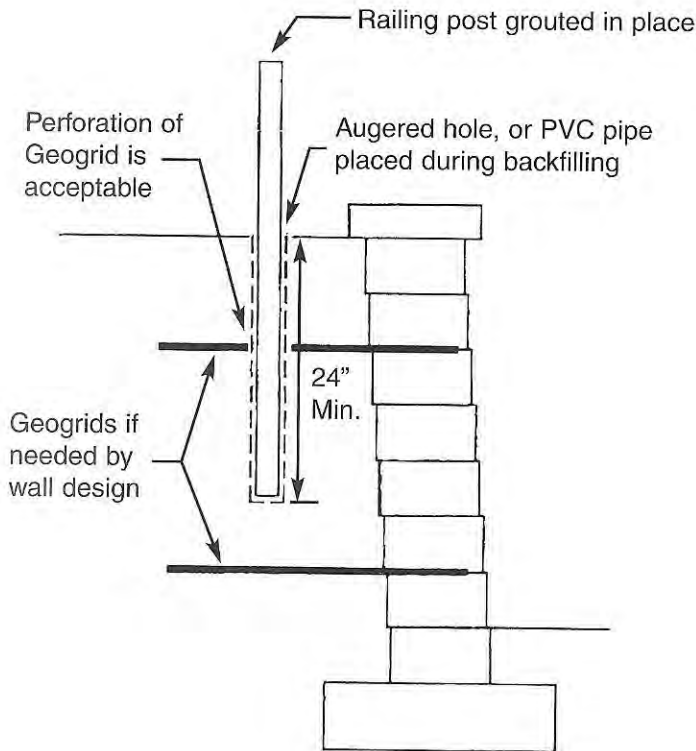
If center column planting is desired, place Stratagrid 300 geogrid on every two courses with the interior filled in with drainage fill. The top three courses (maximum) should be filled in with soil wrapped on all sides and bottom with a non-woven geotextile to prevent soils from migrating into the drainage fill or through the seams.



First and odd courses
(Diagram 1)



Second and even courses
(Diagram 2)



NOTE:

These details are for information on applications only. These details should not be used for final construction without design by a qualified engineer for the specific loading conditions of the application.

Segmental retaining wall systems in water applications require additional design considerations due to the destructive environment of water. Several factors will effect the stability of a retaining wall system.

Water level
Base erosion
Buoyancy

Water flow
Flooding

Wave action
Possible scour

Rise and fall of water
Foundation soils

- A qualified geotechnical engineer must provide final design guidelines for all submerged walls and walls in a water environment.

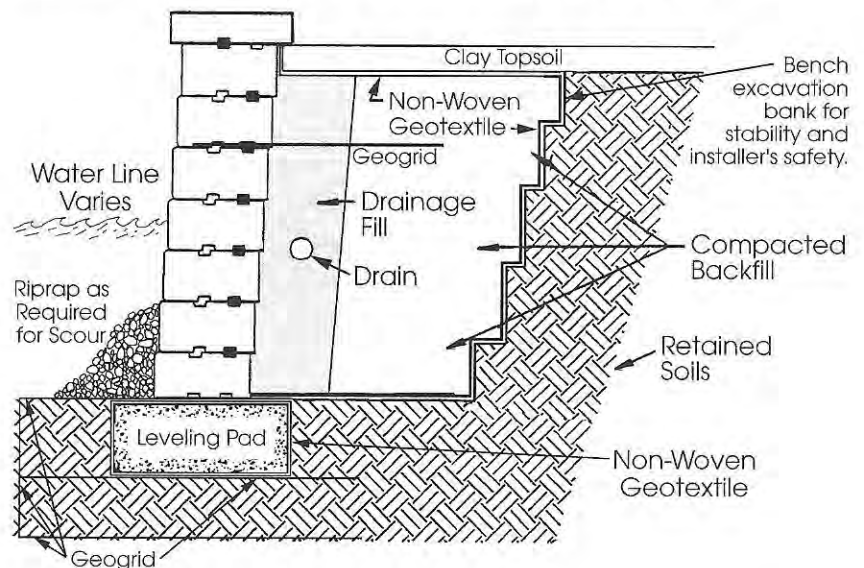
General Design Considerations...

The base leveling pad will provide a stable, but flexible layer for the wall foundation. Your geotechnical engineer will determine the depth of the base leveling pad and placement of geogrid in the foundation, if needed. Surround or enclose the base leveling pad with a non-woven geotextile. This will prevent migration of the soils used in the base leveling pad.

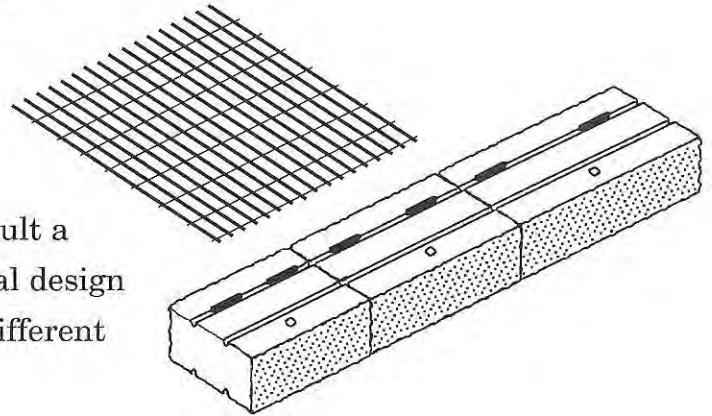
Proper backfill and geogrid placement will stabilize the wall allowing for proper drainage. Drainage backfill should be 3/4" gravel with no fines. Your geotechnical engineer will determine geogrid placement.

Submerged walls must include non-woven geotextile placed around the perimeter of the excavated site. This prevents soil migration into the drainage backfill causing it to clog. The clogged area will restrict water from draining out behind the wall.

Scour is caused by water flow and wave action working to erode the foundation of the wall system. Riprap and geotextile placed at the toe of the wall will help protect the foundation soils from erosion. Your geotechnical engineer will determine the size and amount of the riprap, as well as the type of geogrid required.

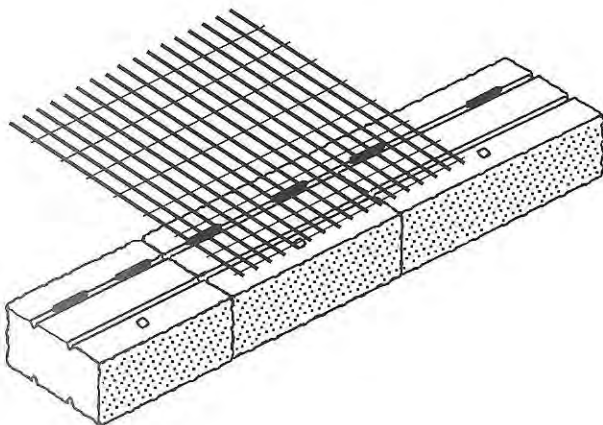


Placement of geogrid is crucial in any segmental retaining wall system. Each project can be different, depending upon the soil conditions, water retention and wall height. Consult the design charts for specific length and placement of geogrid on pages 29 thru 54. Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.



- Follow the recommendations in the Basic Installation section of this manual for the Creta™ Stone wall until reaching the level where geogrid reinforcement is required.
- Before placing the geogrid, place and compact the backfill in 5-inch-thick layers, so that the top of the layer where the geogrid reinforcement is to be placed is level with the top of the Creta™ Stone course. This will provide a level surface across the Creta™ Stone course and compacted backfill for the geogrid placement.
Use only hand operated compaction equipment within (3) three feet of the retaining wall.
- Measure and cut Stratagrid 300 geogrid to the specified design length as shown on the geogrid placement charts or as required by a qualified geotechnical engineer.
- Place Creta™ Stone PVC inserts in the appropriate groove. Stratagrid 300 will easily mold over the Creta™ Stone PVC inserts.
- Place Stratagrid 300 Geogrid reinforcement over the entire Creta™ Stone course, 1/4" back from the face of the wall, and extending back and over the compacted backfill. Place the geogrid with the strength direction (roll length direction) perpendicular to the Creta™

Stone retaining wall face. Place the next course of Creta™ Stone in accordance with the Basic Installation section of this manual. Remove wrinkles and slack from the geogrid by pulling the geogrid away from the Creta™ Stone wall face and embed landscape spikes through the geogrid openings and into the compacted backfill to maintain tautness of the geogrid reinforcement during placement of the next layer of compacted backfill.



MATERIAL SAFETY DATA SHEET

SECTION I - IDENTITY NAME:

Concrete Masonry (Retaining Wall Stones)

SECTION II - HAZARDOUS INGREDIENTS:

None - (Sawing or grinding may result in the release of nuisance dust particles)
Dust particles may contain quartz dust (S102) 5 Mg/M3
(Respirable Dust) 10 Mg/M3 (Total Dust)

SECTION III - HEALTH HAZARD DATA:

Sawing or grinding may result in release of dust particles which may:
ACUTE: Cause minor irritation of the eyes or nose.
CHRONIC: Results in lung disease (Silicosis) if exposed to excessive amount for prolonged periods.

SYMPTOMS

SKIN: Dust on previously irritated skin.
EYES: Irritation of eyes.
INHALE: Irritation of nose or shortness of breath.

FIRST AID

SKIN: Wash with soap and water.
EYES: Flush eyes generously for 15 minutes. If irritation persists, contact a physician.
INHALE: Remove to fresh air. If difficulty in breathing, contact a physician.

SECTION IV - SPILL OR LEAK PROCEDURES:

STEPS TO BE TAKEN IN THE CASE MATERIAL IS RELEASED OR SPILLED:

Sweep up and discard.
WASTE DISPOSAL METHOD: Dispose of as common waste.
FEDERAL HAZARDOUS WASTE NUMBER(s): None.

SECTION V - SPECIAL PROTECTION INFORMATION:

RESPIRATORY PROTECTION: Wear NIOSH approved respirator and goggles when sawing or grinding.
VENTILATION: In a confined area.
PERSONAL PROTECTION EQUIPMENT: Gloves when required, safety shoes, back support.

SECTION VI - SPECIAL PRECAUTIONS:

PRECAUTION TO BE TAKEN WHEN HANDLING OR STORING: Concrete blocks are assembled in various sized cubes. In the shipping process the cubes may become unstable. Care must be taken in the handling, proper lifting methods and disassembling of the cubes to prevent the individual units from falling, causing injury.

OTHER PRECAUTIONS: X-Transportation.

DOT HAZARD CLASSIFICATION: None

PLACARD REQUIRED: None

LABEL REQUIRED: As required by Applicable State and Local regulations.

NOTICE: All statements, technical information and recommendations contained herein are based on available scientific tests and data which we believe is reliable. The accuracy and completeness of such data are not warranted or guaranteed. We cannot anticipate all conditions under which this information and our products, or the products or other manufacturers in combination with our products may be used. PAVELOC INDUSTRIES assumes no liability or responsibility for loss or damage resulting from the improper use or handling of our products, from incompatible product combinations, or from failure to follow instructions, warnings and advisories in the product's label and Material Safety Data Sheet.

SCOPE OF DESIGN CHARTS

These charts present information for Creta™ Stone retaining wall preliminary material quantity estimates and designs. Final design of the retaining wall should be performed by a qualified geotechnical engineer. The user of these Design Charts is responsible for the proper application of the Design Charts. Giles Engineering Associates, Inc. (*Giles*) assumes no liability for the improper use of the Design Charts.

The typical diagrams of the various Creta™ Stone retaining wall configurations present the terminology used in the Design Charts. The wall heights and backslopes shown in the Design Charts represent a range of configurations that are typically present for retaining wall applications. The soil conditions for the foundation soils zone and the retained soil zone represent the range of naturally occurring soils typically acceptable for retaining walls. Specific types of granular soils for the compacted backfill zone material are recommended and were selected for their engineering properties and retaining wall performance characteristics. Specific non-woven geotextile products for surrounding the unreinforced compacted backfill zone and separation from the unexcavated soils of retaining walls were selected for their engineering properties and retaining wall performance characteristics.

Other retaining wall configurations may be needed for a specific site, and other subsurface conditions may be present at a specific retaining wall site. Preliminary material quantity estimates and design evaluation and final designs by a qualified geotechnical engineer are recommended for configurations and conditions that are different from those presented in the Design Charts.

SOIL MATERIAL SPECIFICATIONS

The following tables present material specifications for the soils recommended for the leveling pad, drainage fill zone, and compacted backfill zone. Also provided are the product brand names of non-woven geotextiles that have appropriate properties for the intended separation and filtration functions needed for the backfill soils of the retaining walls.

LEVELING PAD AND GEOGRID REINFORCED COMPACTED BACKFILL	
Sieve Size	Percent by Weight Passing
3/4"	100
1/2"	100 to 90
3/8"	95 to 75
No. 4	70 to 50
No. 16	45 to 25
No. 200	15 to 5

DRAINAGE FILL AND UNREINFORCED COMPACTED BACKFILL	
Sieve Size	Percent by Weight Passing
1"	100
3/4"	100 to 84
1/2"	60 to 30
No. 4	6 to 0
No. 16	3 to 0

NON-WOVEN GEOTEXTILE PRODUCTS FOR SEPARATION
AMOCO 4545
LINQ 125EX
MIRAFI 140NL
POLYFELT TS420
TREVIRA 011/140

BASIS OF DESIGN CHARTS

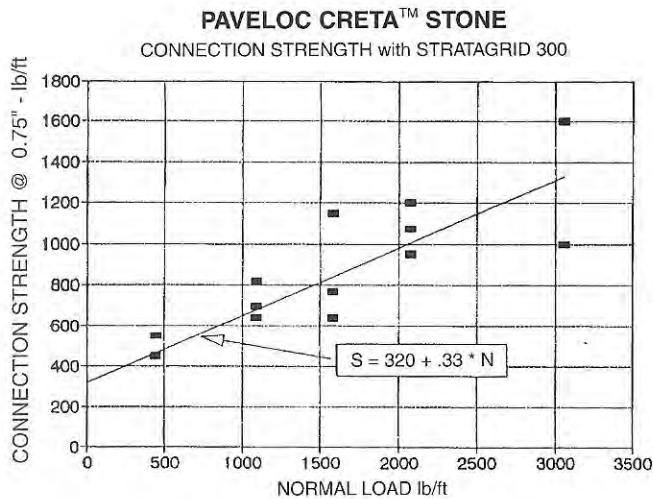
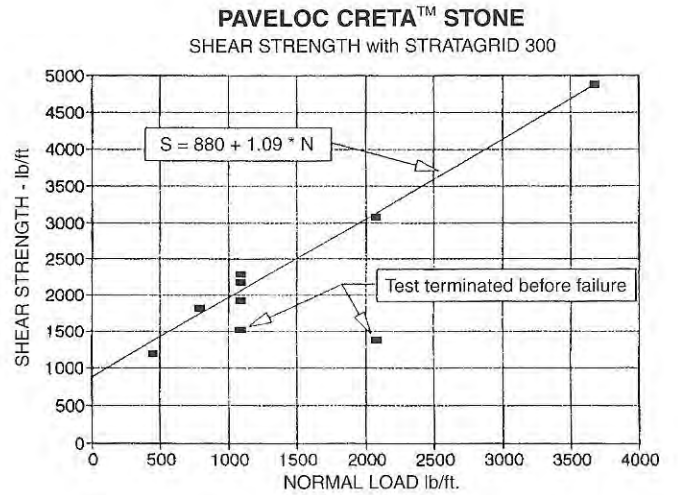
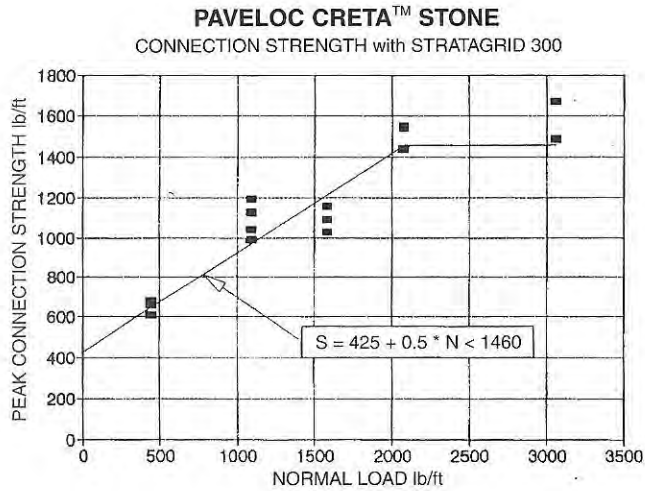
The design charts are based upon the following:

1. National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls, First and Second Edition.
2. NCMA computer program SRWall Version 2.1
3. Paveloc Industries, Inc. Creta™ Stone material properties provided by Paveloc Industries, Inc.
4. Strata Systems, Inc. Stratagrid 300 index property test minimum average roll values reported on the Product Data sheet, dated December 1996, and other Strata Systems Technical Bulletins, provided by Strata Systems, Inc.
5. University of Wisconsin - Platteville test results of Creta™ Stone and Stratagrid 300 connection strength and shear strength between Creta™ Stone units determined by NCMA Test Methods SRWU-1 and SRWU-2, respectively, February 1997, provided by the College of Engineering, Mathematics, and Science, University of Wisconsin - Platteville.
6. Engineering property assumptions for leveling pad, drainage fill, and backfill materials recommended for use in retaining walls constructed in accordance with the Design Charts and Design Manual.
7. Foundation soils and retained soils with the engineering classification descriptions and engineering parameters shown on the Design Charts.
8. Groundwater table deeper than a distance of 66% of the wall height below the leveling pad base.
9. The foundation soils have an allowable bearing capacity of 2,000 psf or more.
10. The retaining wall components are assembled and the soils are placed and compacted in accordance with the Design Manual.
11. The global (overall) stability of the retaining wall constructed in accordance with the Design Charts and Design Manual has a factor of safety equal to or greater than 1.3.
12. The retaining wall owner/installer will contract with a qualified geotechnical engineer to provide a final design or to provide a preliminary and final design of the retaining wall if conditions differ from the conditions presented in the Design Charts and Design Manual.

USE OF DESIGN CHARTS

1. Determine desired retaining wall face batter, either 4° or 0°.
2. Determine which of three types of soils from the following list are present at the foundation soils zone and the retained soil zone. See typical diagrams for zone descriptions.
 - a. Silts and clays.
 - b. Sandy silts, silty sands and sands.
 - c. Well-graded sands and gravels.
3. Determine that the groundwater table is below the leveling pad base a distance of at least 66% of the total wall height.
4. Determine that the allowable load bearing capacity of the foundation soils is equal to or greater than 2,000 psf.
5. Contract with a qualified geotechnical engineer if assistance is needed for Steps 2, 3 and 4.
6. Determine the backslope desired behind (above) the retaining wall and select the backslope from the following list. See the typical diagrams for backslope definition.
 - a. Level
 - b. 3H:1V (three units of horizontal measurement and one unit of vertical measurement) for slopes ranging from level to a 3H:1V maximum slope.
 - c. 2.5H:1V for slopes ranging from 3H:1V to 2.5H:1V maximum slope.
 - d. Level with roadway or parking lot pavement.
7. Determine the desired wall heights. See the typical diagrams for wall height definition.
8. Determine from the appropriate Design Charts the geogrid lengths and locations for the information obtained in Steps 1, 2, 6 and 7 above.
9. For wall heights intermediate to the specific wall heights provided in the Chart Designs, use the chart for the next highest wall height, and:
 - a. for level and 3H:1V backslopes, relocate top layer of geogrid in the Design Chart to the location between the 4th and 5th block course below the cap block.
 - b. for 2.5H:1V backslopes, relocate top layer of geogrid in the Design Chart to between the 3rd and 4th block course below the cap block.
 - c. for level backslopes with a pavement, relocate top layer of geogrid in the Design Chart to between the 1st and 2nd block course below the cap block.

Creta™ Stone Shear Capacity and Connection Strength Data



PRODUCT DATA

All testing of shear strength and connection strength was furnished by the Department of Civil Engineering at the University of Wisconsin-Platteville. All testing on Creta™ Stone shear strength and connection strength was done using Strata Grid 300. We recommend and warranty the use of Strata Grid 300 on all Creta™ Stone Retaining walls built to proper design specifications. We cannot recommend alternative geogrids due to insufficient testing data, not compiled by Paveloc Industries, Inc.

STRATA GRID®

STRATAGRID is a geogrid reinforcement for soil, manufactured with high molecular weight/high tenacity polyester yarn. The yarns are knitted into a dimensionally stable, uniform network of apertures providing significant tensile reinforcement capacity in two principal directions. This polyester geogrid is engineered to be both mechanically and chemically durable, in both the harsh construction installation phase and in aggressive soil (pH range from 2-12 or aqueous) environments. A black PVC coating provides further chemical and mechanical, as well as ultraviolet protection. Following are Index Property test values for the STRATAGRID product line.

Minimum Average Roll Values for STRATAGRID

Date: December 1, 1996

S T R A T A G R I D

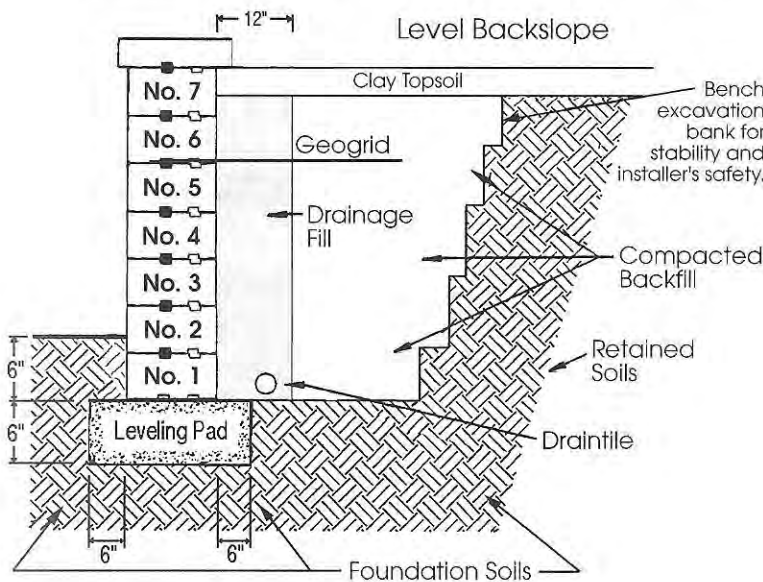
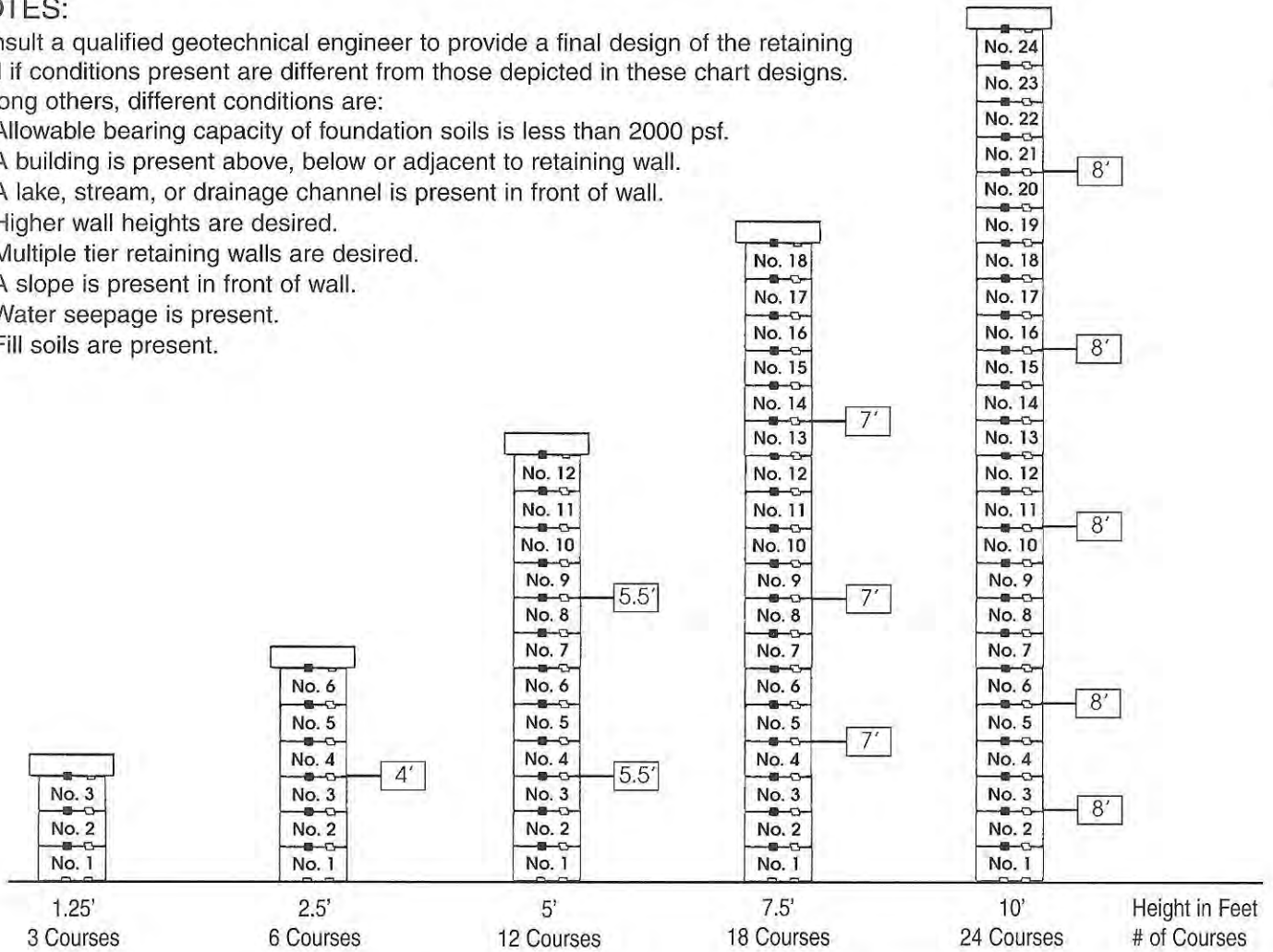
Property	Test Method	Units	100	200	300	400	500	600	700								
Geometry	Rib/Strand Count	Measured	(min)														
	-MD		number/ft	12.5	13.9	15.8	7.8	7.7	7.7								
	-CMD		number/ft	14.9	15.4	7.1	7.3	3.8	3.9								
	Aperture Size	ID Calipered	(nom)														
	-MD		inches	0.45	0.65	0.60	0.99	1.0	0.96								
	-CMD		inches	0.55	0.68	1.56	0.97	2.3	2.09								
	Open Area		% (nom)	65%	65%	74%	55%	54%	60%								
Thickness	ASTM D1777	(nom)	inches	0.045	0.055	0.052	0.053	.05	0.059								
										-Rib/Strand	inches	0.047	0.057	0.066	0.061	.06	0.066
Weight	ASTM C3776		oz/yd	5.0	9.5	10.0	13.7	12.5	14.5								
										-Junction							
Strength	Wide Strip	ASTM D4595	(min)														
	-MD		lbs/ft	1,200	2,420	3,000	4,400	4,400	7,400								
	-CMD		lbs./ft	700	1,600	1,000	3,600	1,800	1,800								
	Creep Reduced Strength		(min)														
	-MD		lbs./ft	745	1,503	1,863	2,733	2,733	4,596								
Long Term Design Strength	GRI-GG4	(min)	lbs./ft	616	1,242	1,540	2,260	2,260	3,800								
										-MD	lbs./ft	360	808	505	1,818	909	909
										-CMD							
Identification	Roll Size	Width x Length	feet	6 x 150	6 x 300	6 x 300	6 x 150	6 x 150	6 x 150								
		Area	sq. yds	100	200	200	100	100	100								
		Weight	pounds	30	130	135	100	90	100								
	Style Number			GB-3022	GB-4024	GB-6033	GB-6037	GB-10027	GB-15027								

- (1) (min) = Minimum acceptable value (i.e. lowest average roll value).
- (2) MD - Machine Direction, running along the roll length.
- (3) CMD = Cross Machine Direction, running across the roll length (i.e. running along the roll width).
- (4) Maximum inside dimension measured by calipers in each direction.
- (5) (nom) = Nominal value accepted (i.e. 5%).
- (6) Percent open area measured without magnification. Calculated from calipered measurements.
- (7) ASTM Methods D4632 & D4595 adapted to geogrids.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs. Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



— 8' — Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

Level Backslope

0° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

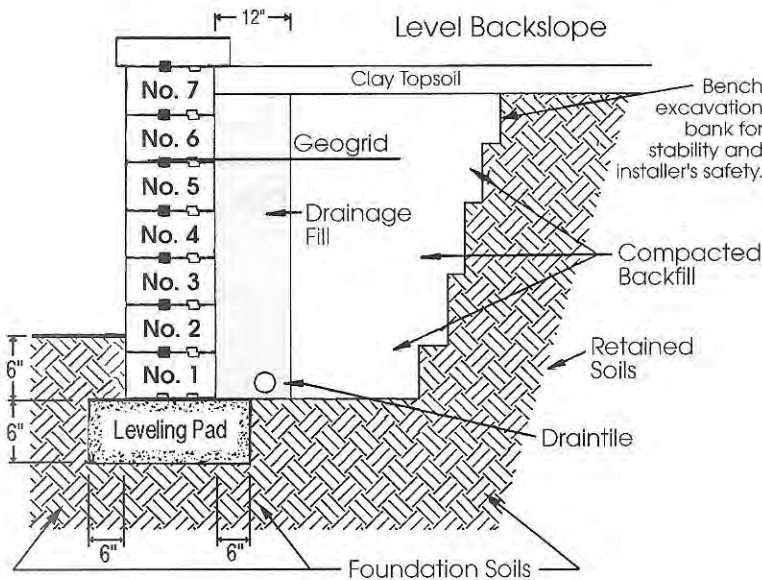
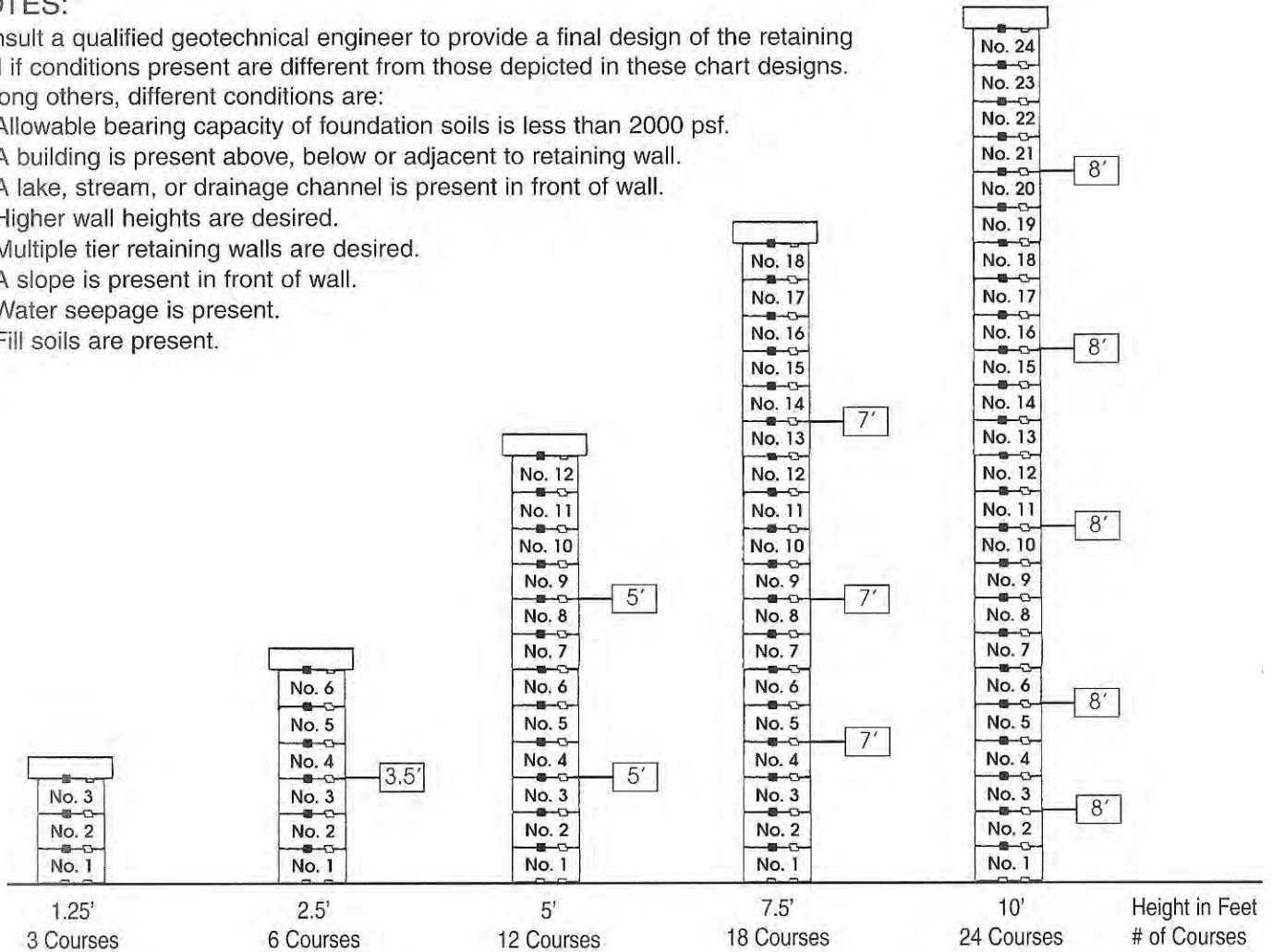
Foundation: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

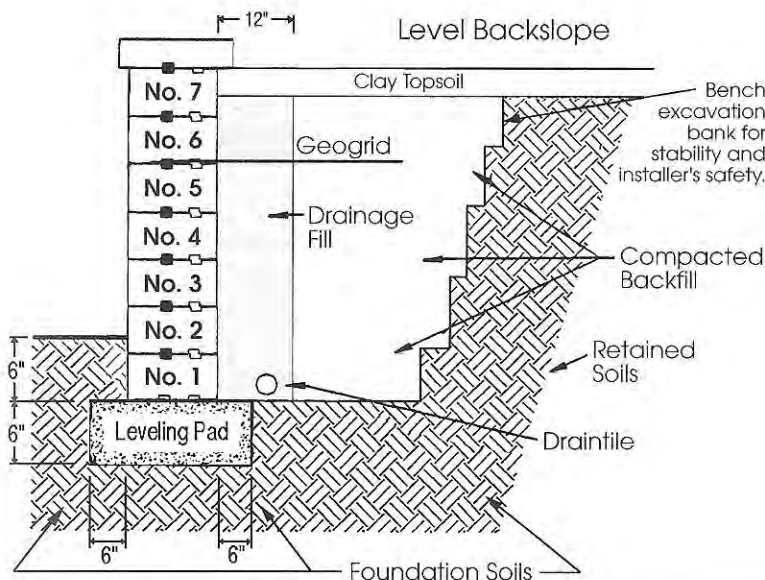
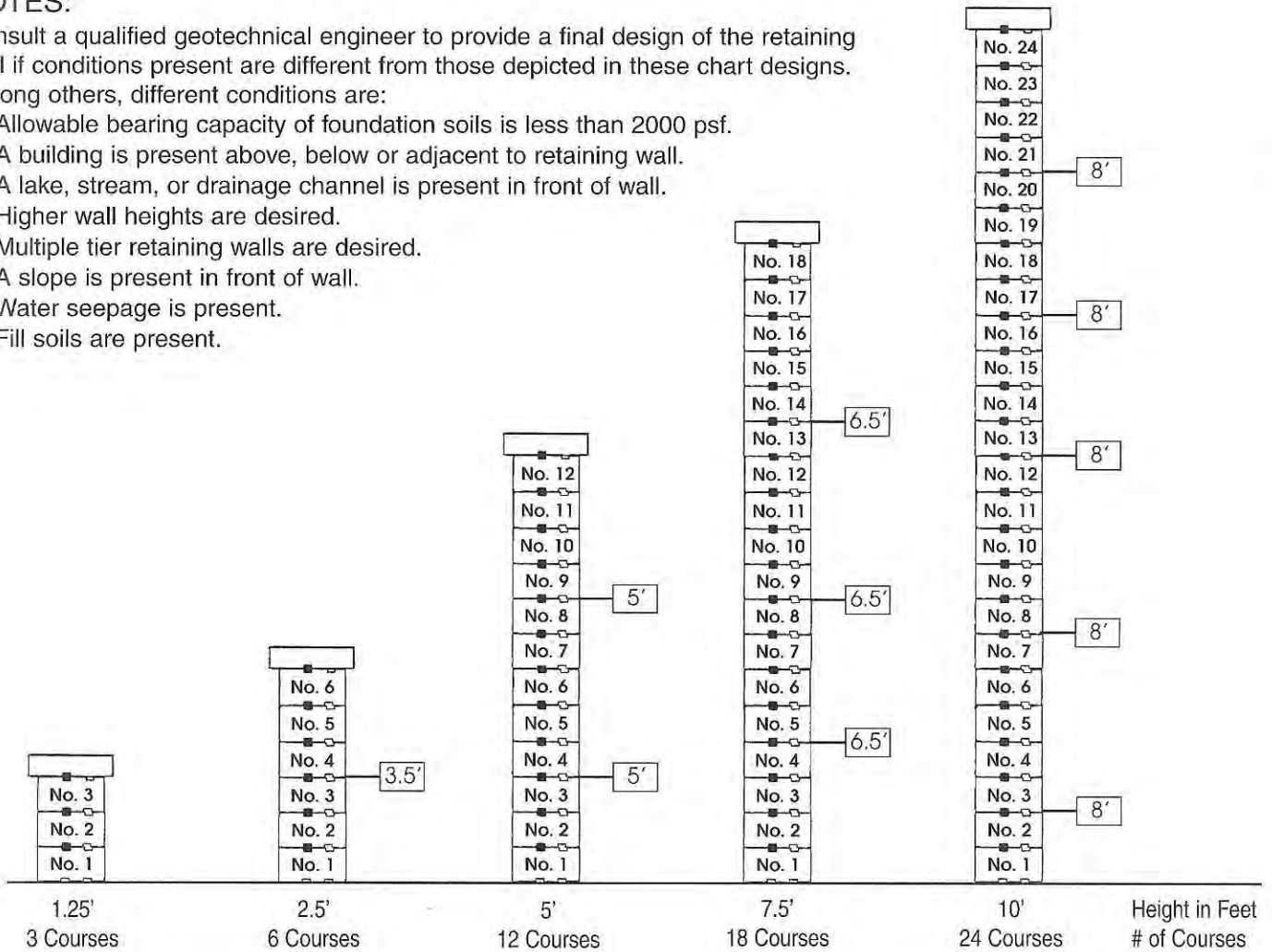
Level Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



— 8' — Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

Level Backslope

0° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

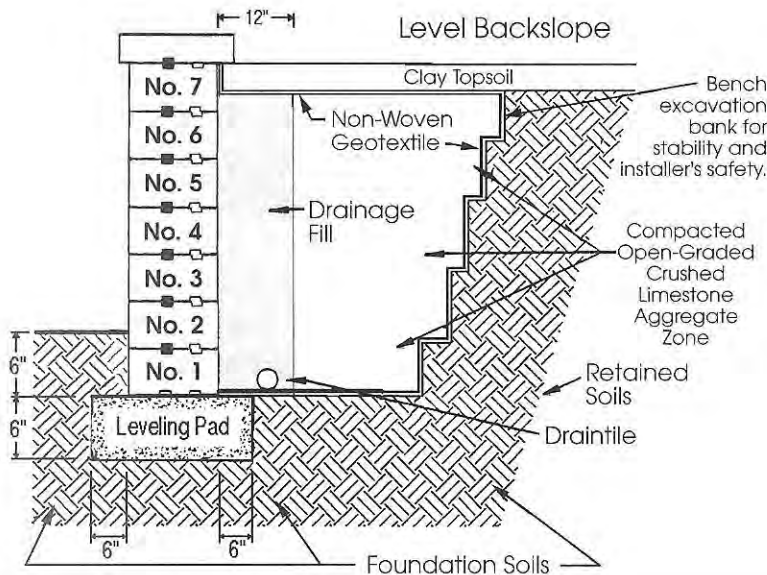
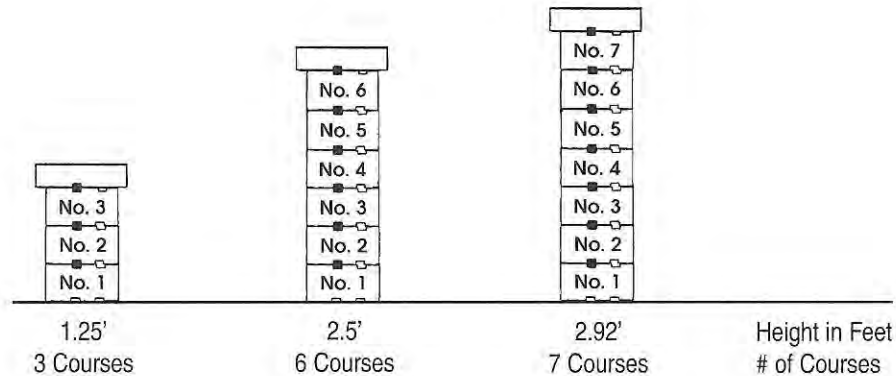
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



Level Backslope

0° Face Batter

Backfill: (open graded crushed limestone aggregate - ASTM 67 stone)
 $\phi=45^\circ$ $\gamma=115$ pcf.

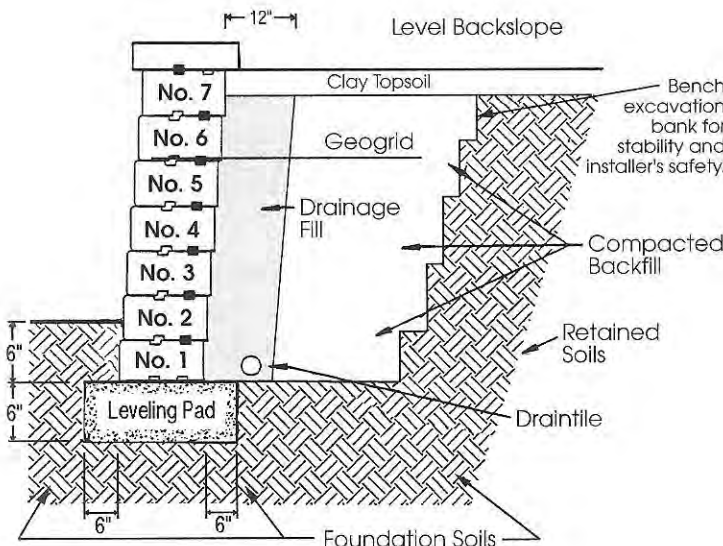
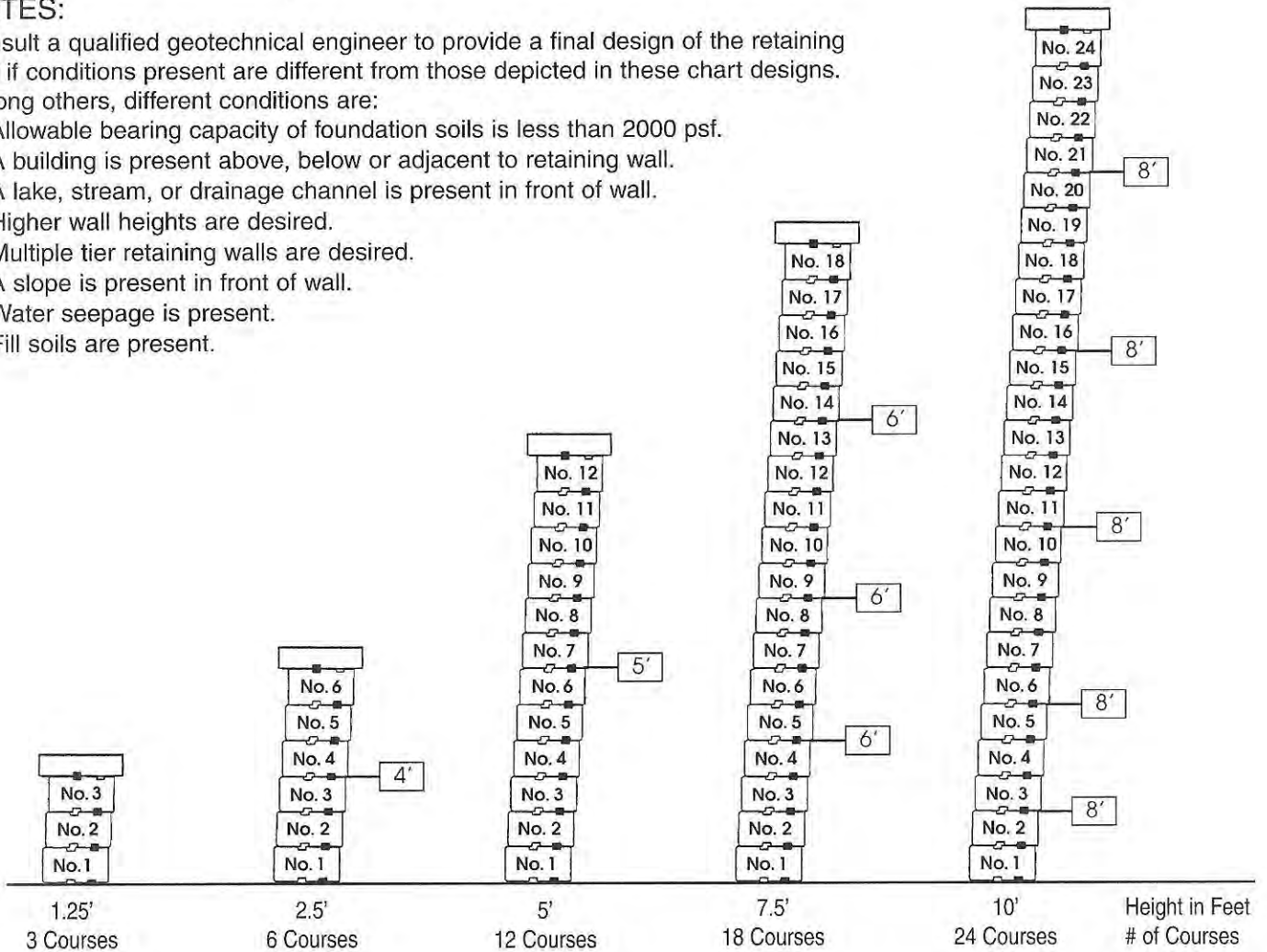
Foundation: (silts and clays, sandy silts, well graded sand and gravel)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

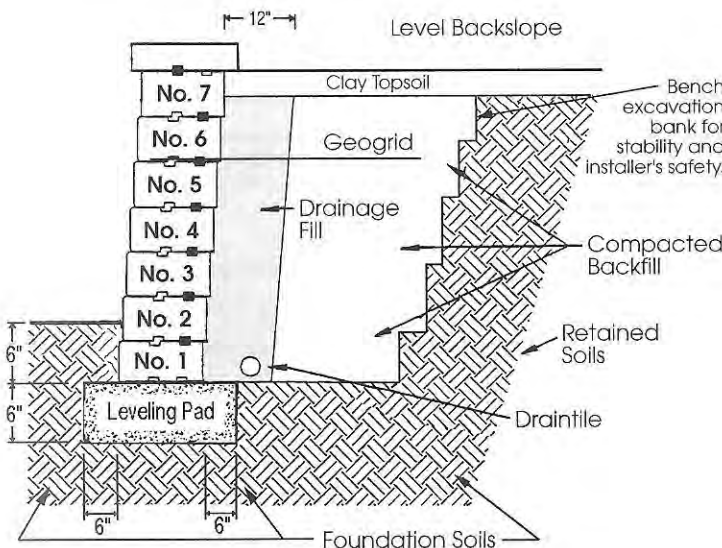
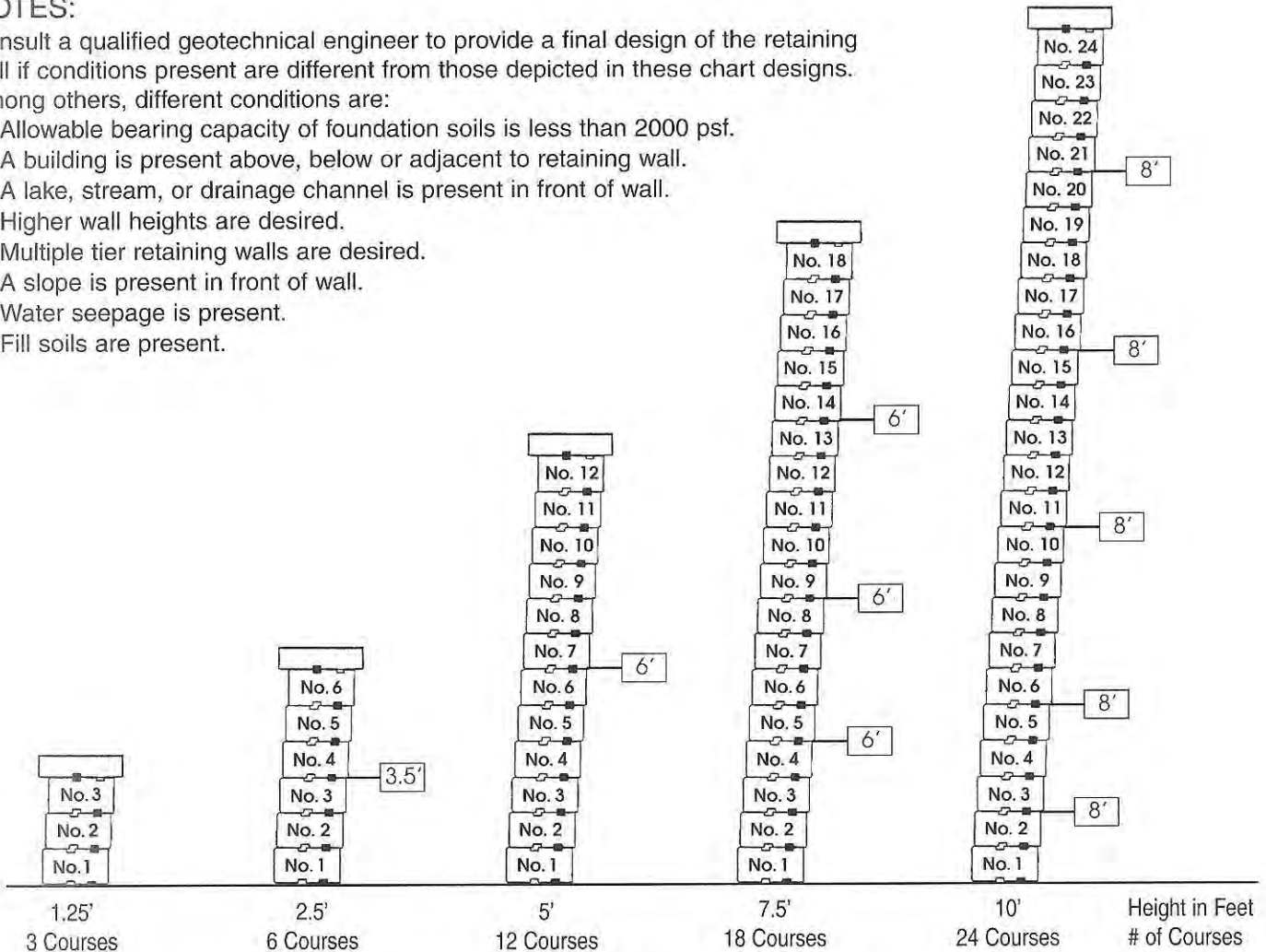
Level Backslope
4° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

Level Backslope

4° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

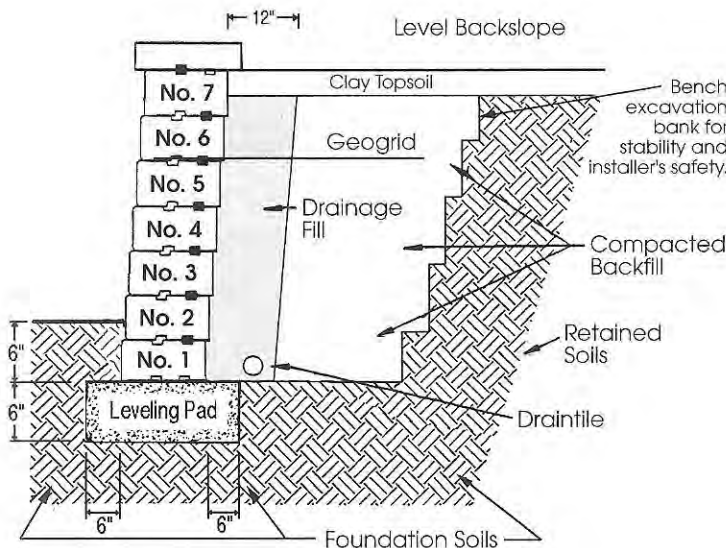
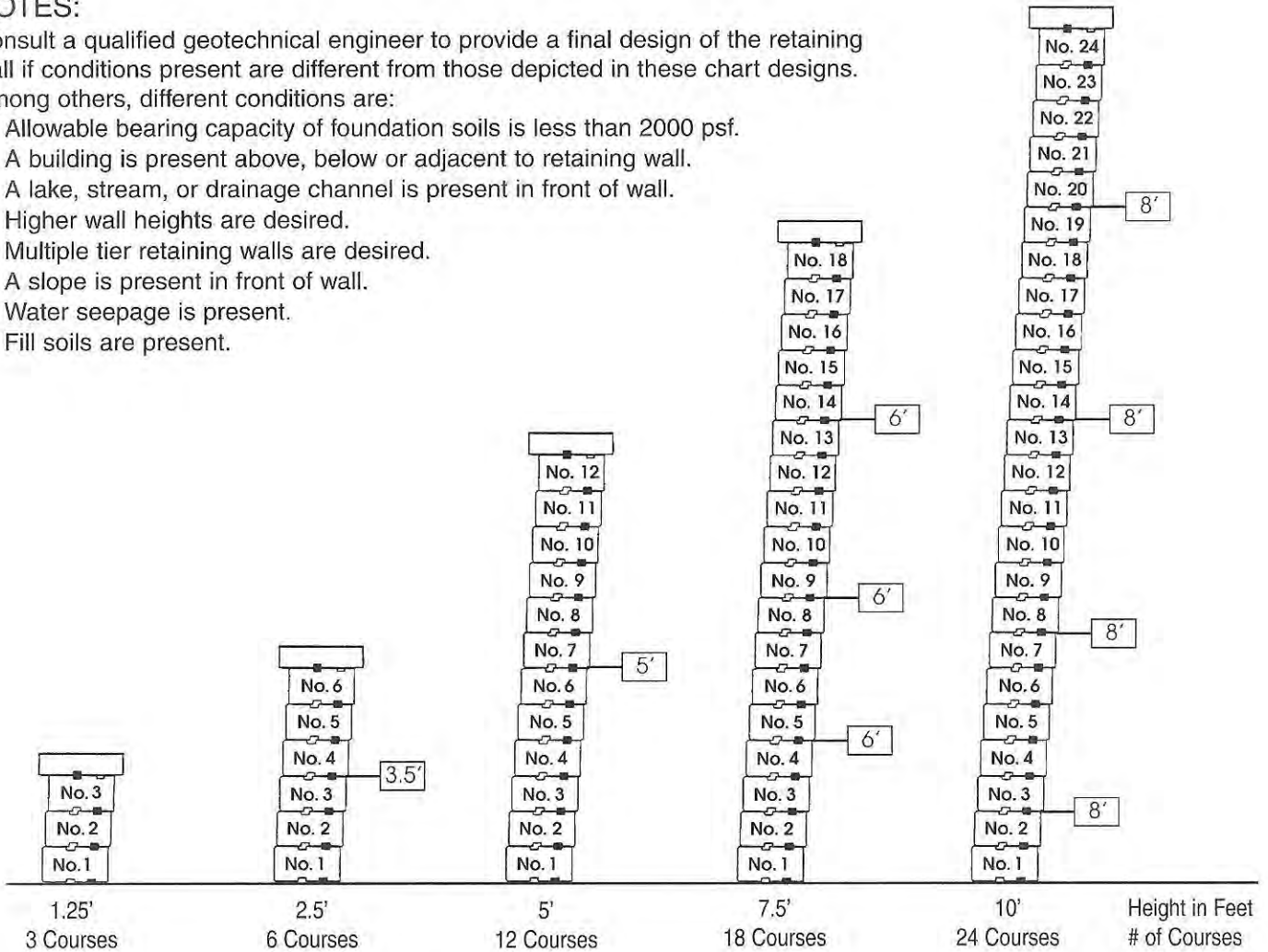
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



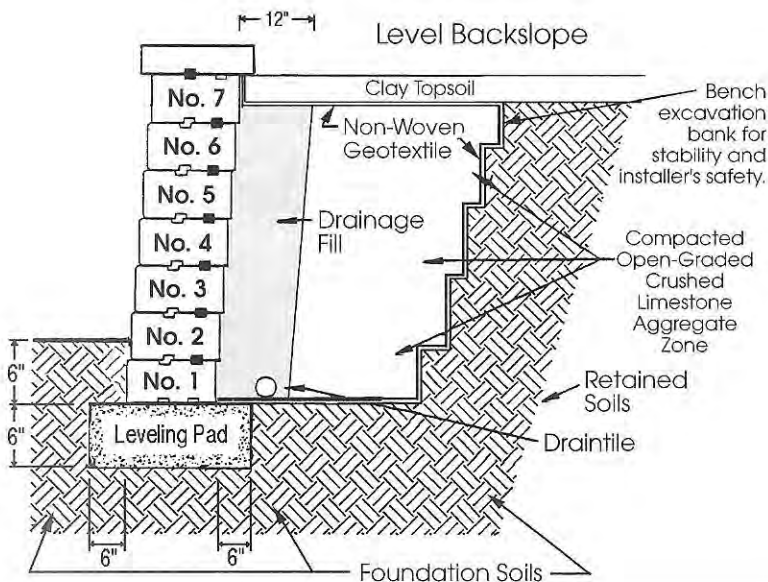
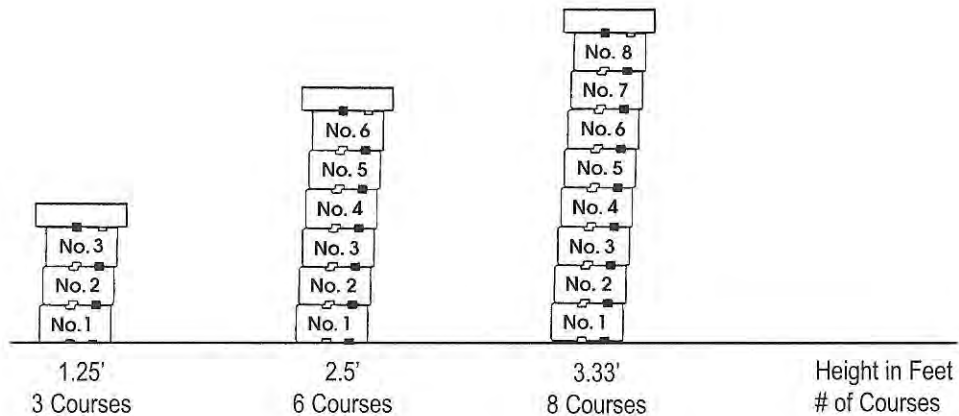
8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

Level Backslope
4° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs. Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



Level Backslope

4° Face Batter

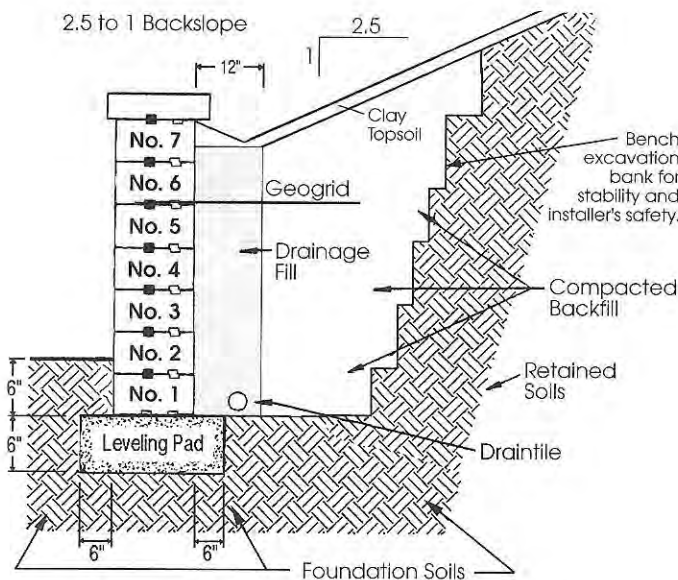
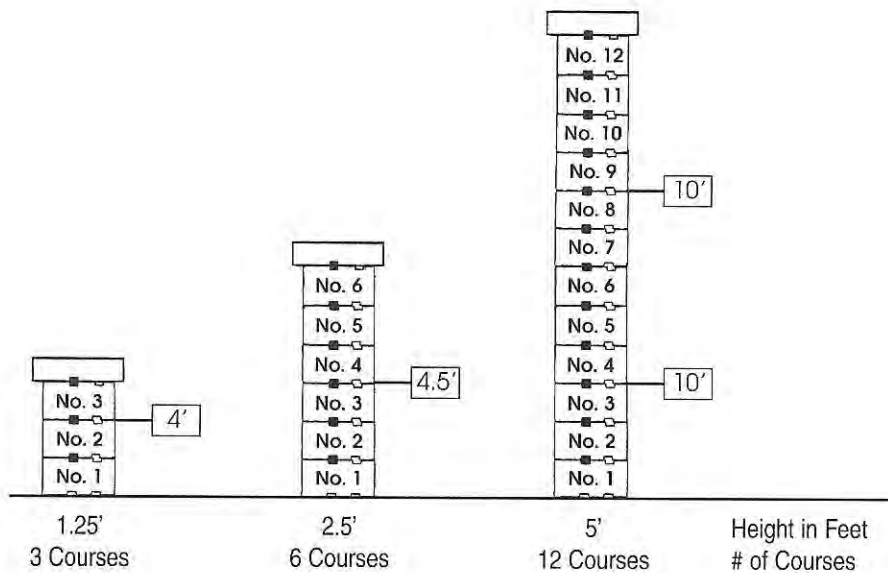
Backfill: (open graded crushed limestone aggregate - ASTM 67 stone)
 $\phi=45^\circ$ $\gamma=115$ pcf.

Foundation: (silts and clays, sandy silts, well graded sand and gravel)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs. Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

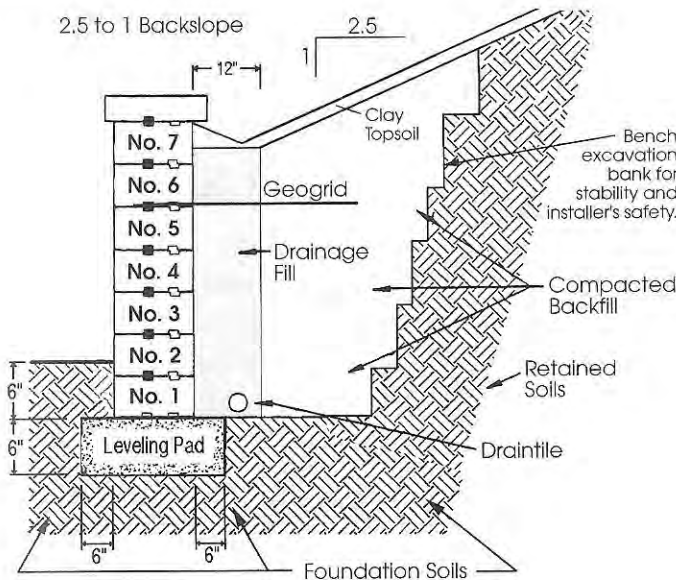
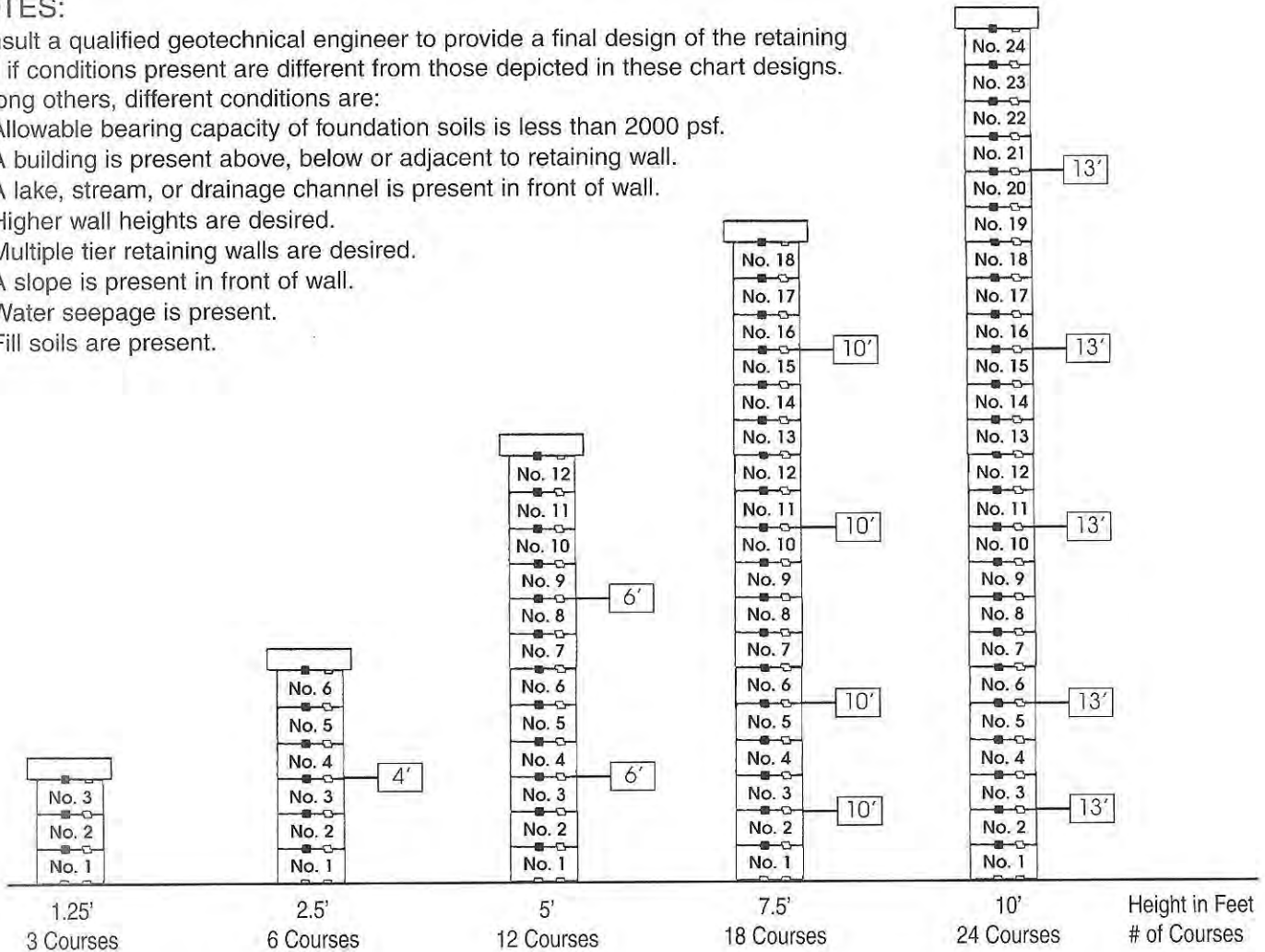
2.5 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

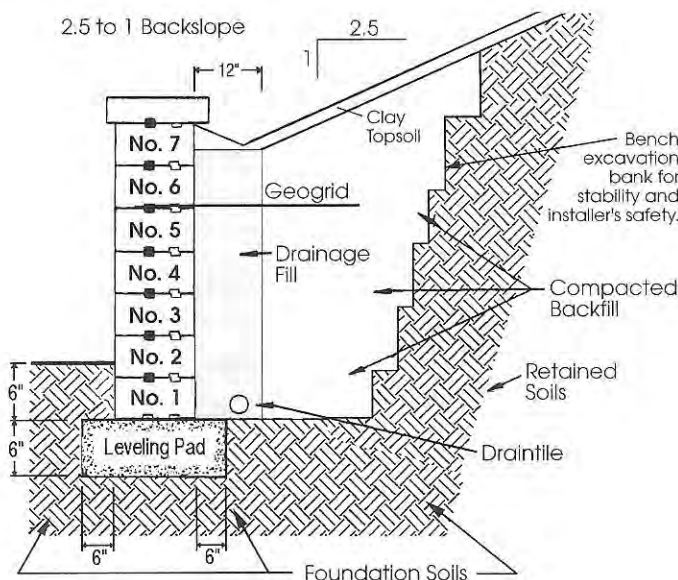
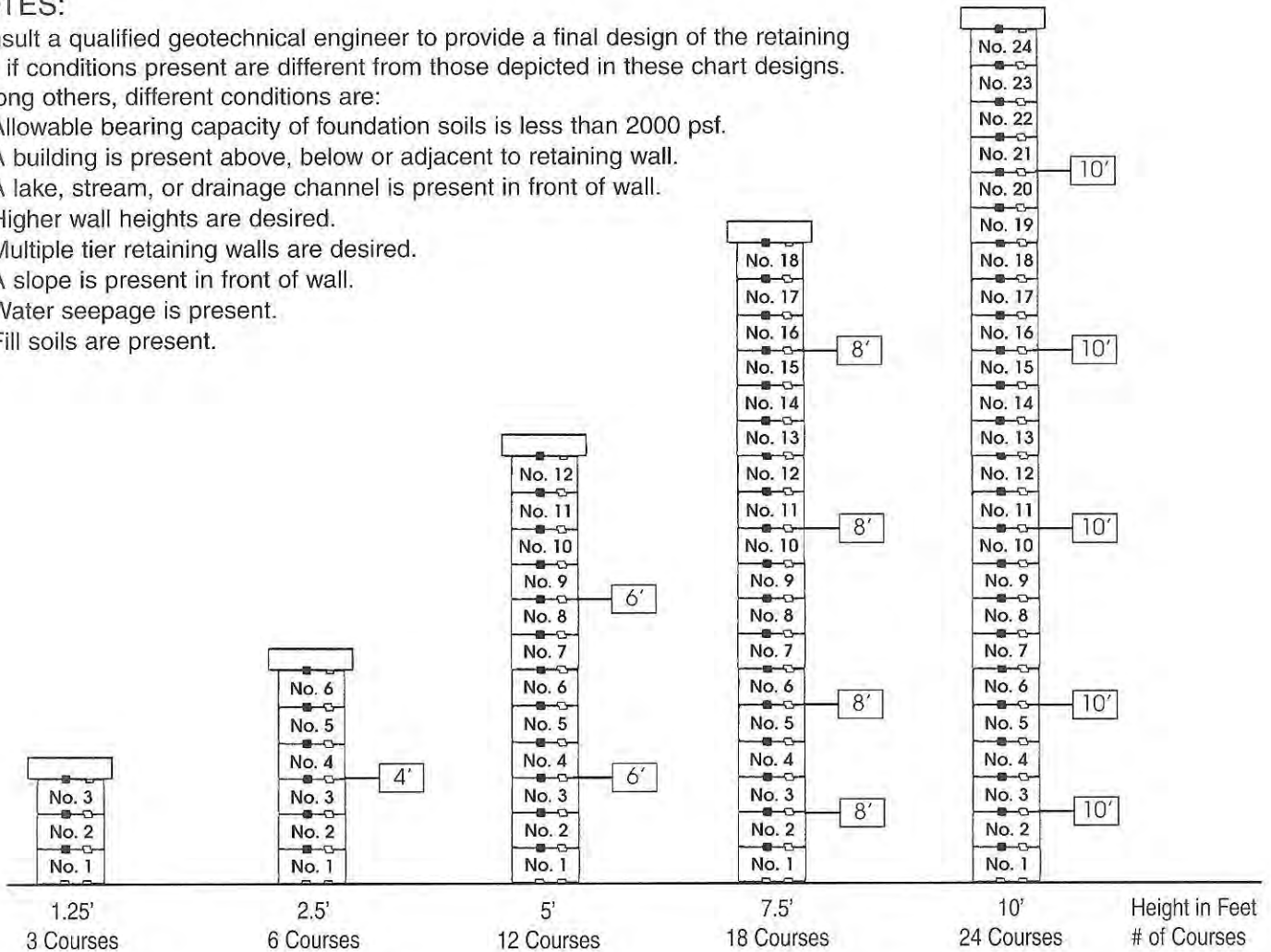
2.5 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

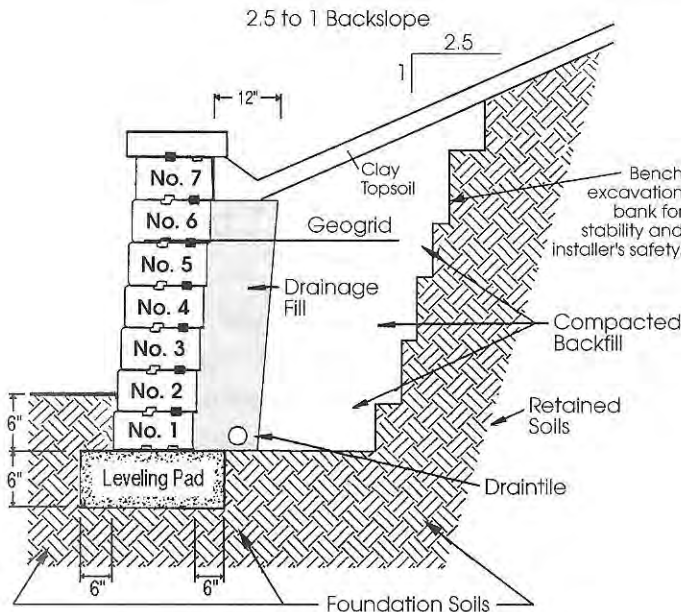
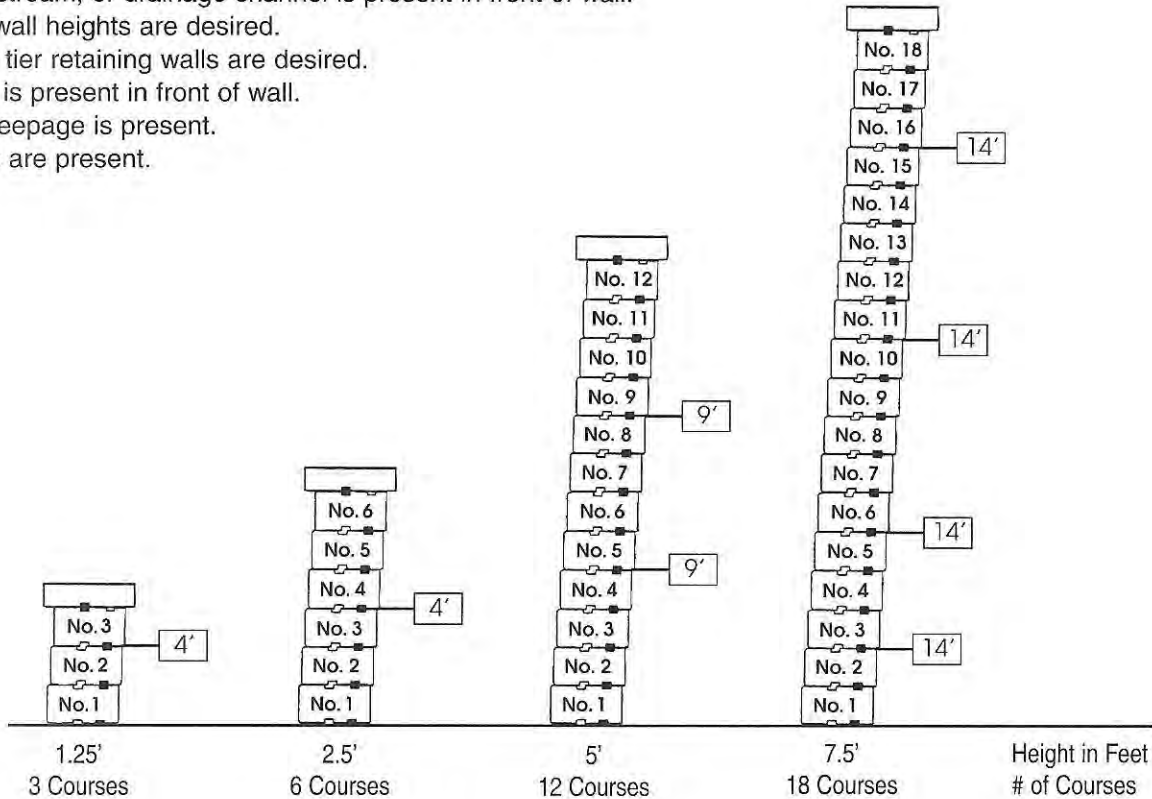
2.5 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8" Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall.

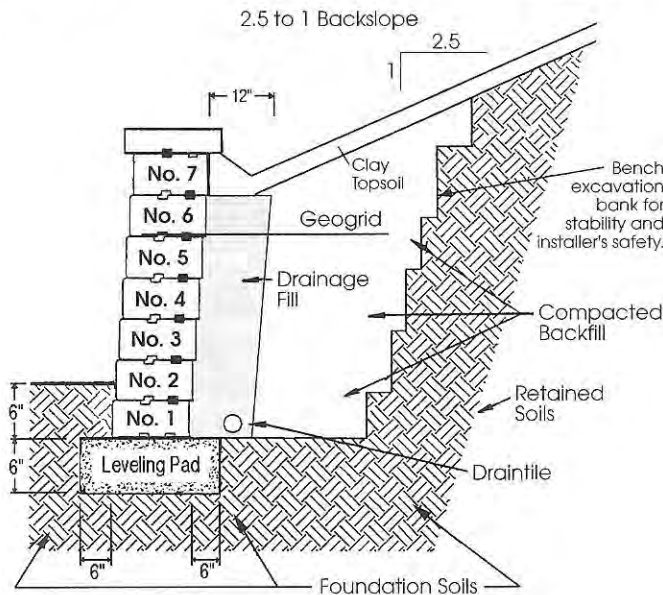
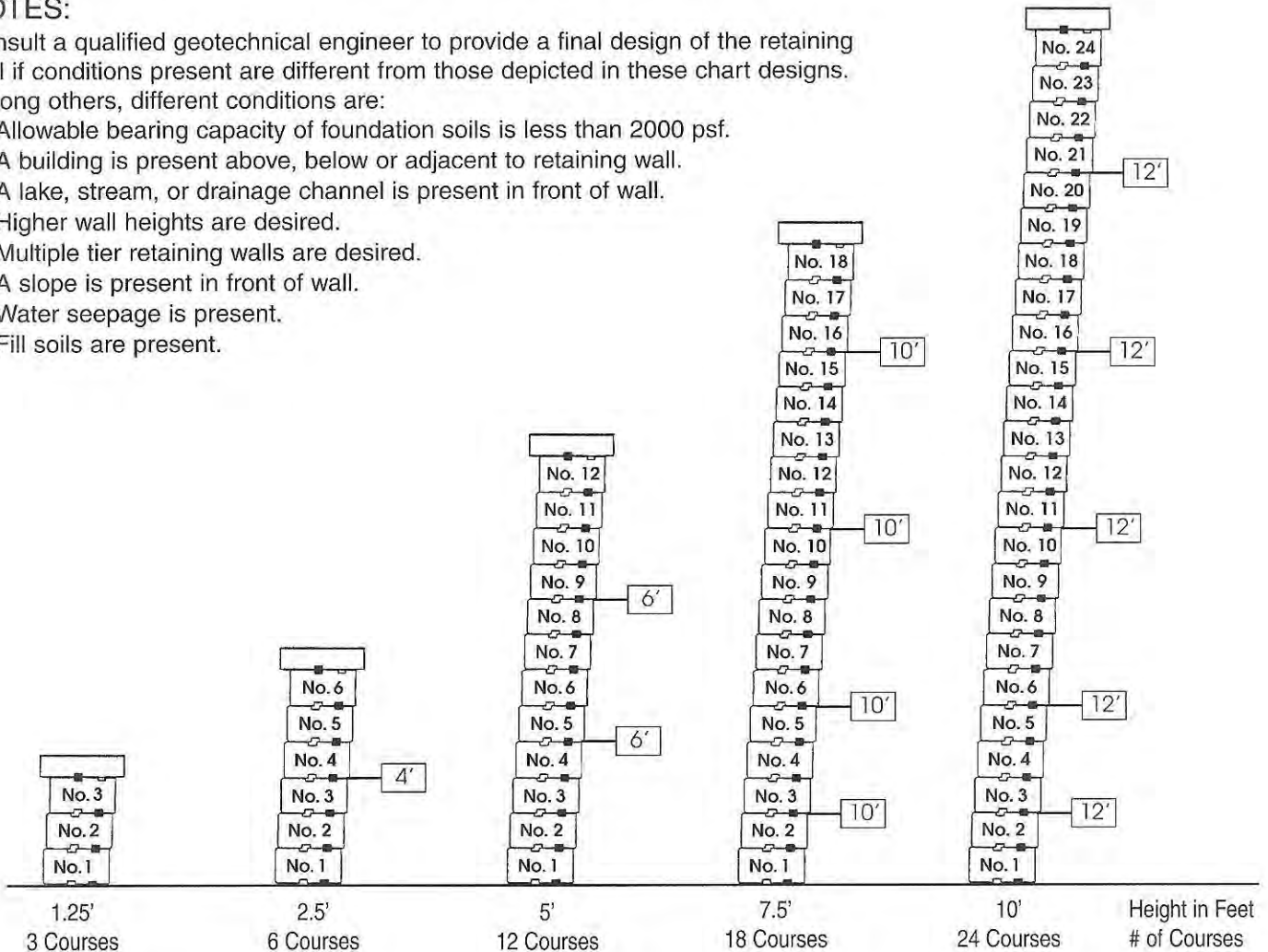
2.5 to 1 Backslope
4° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts & clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts & clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



— 8' — Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

2.5 to 1 Backslope

4° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

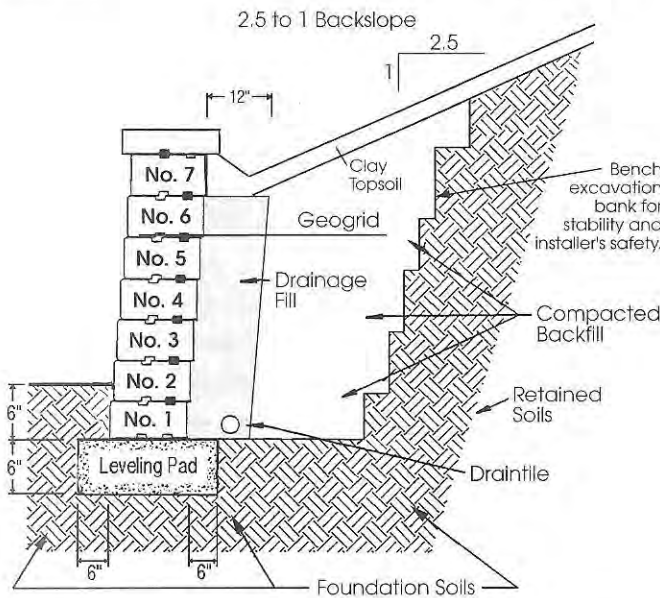
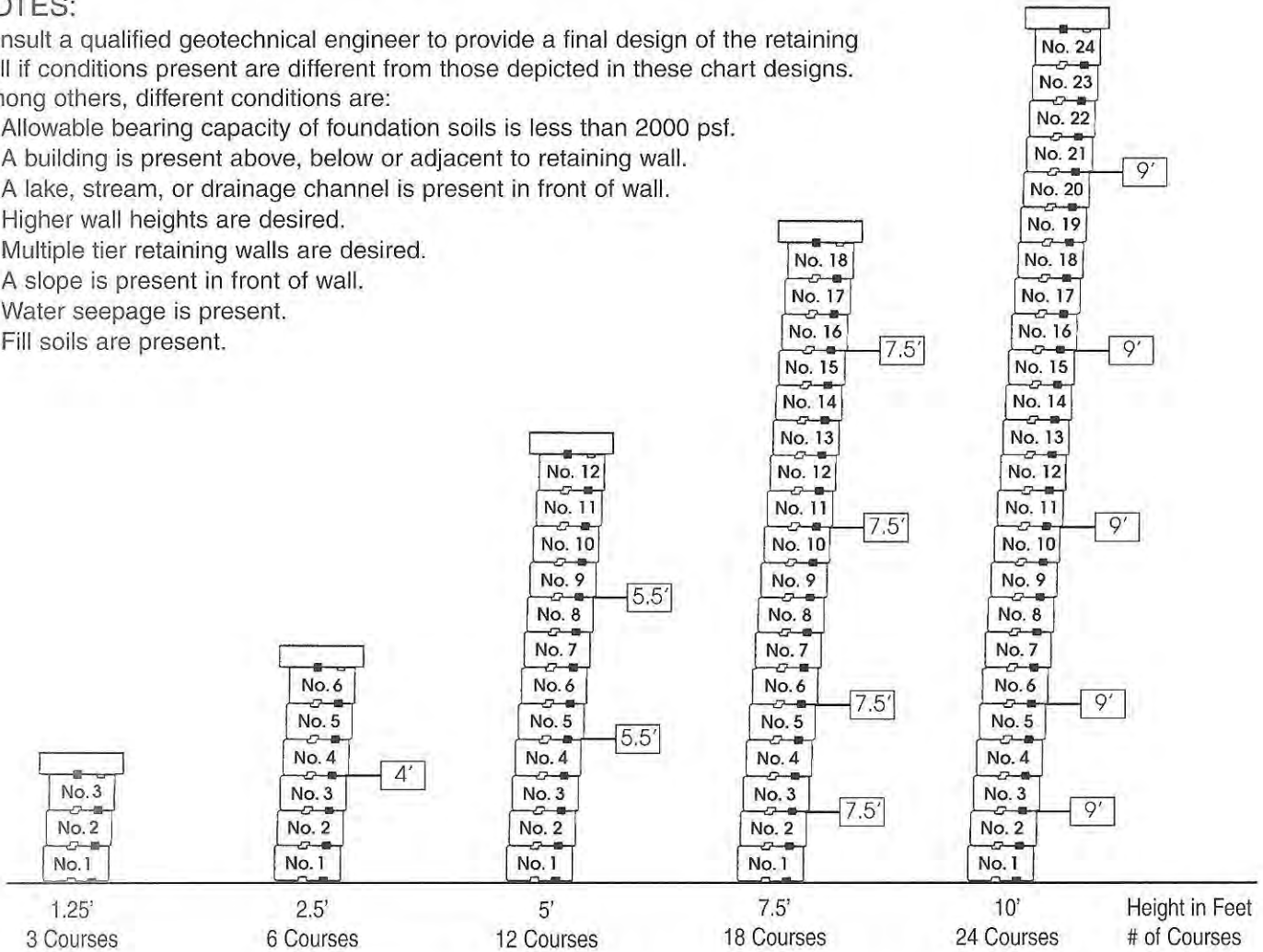
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



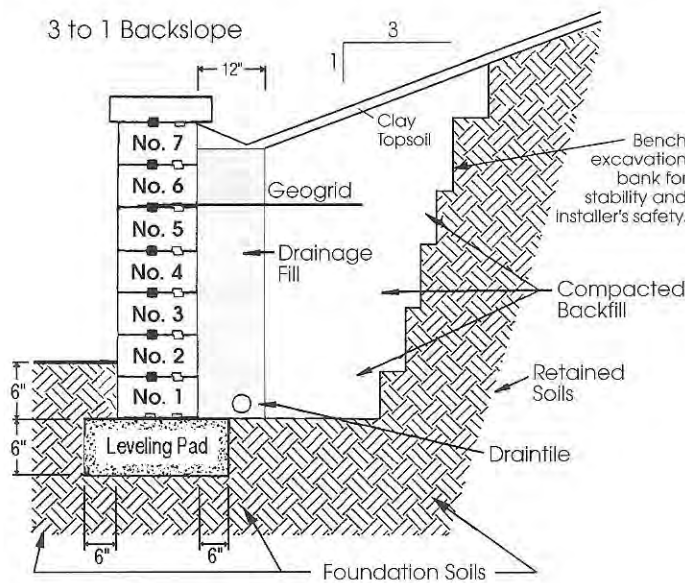
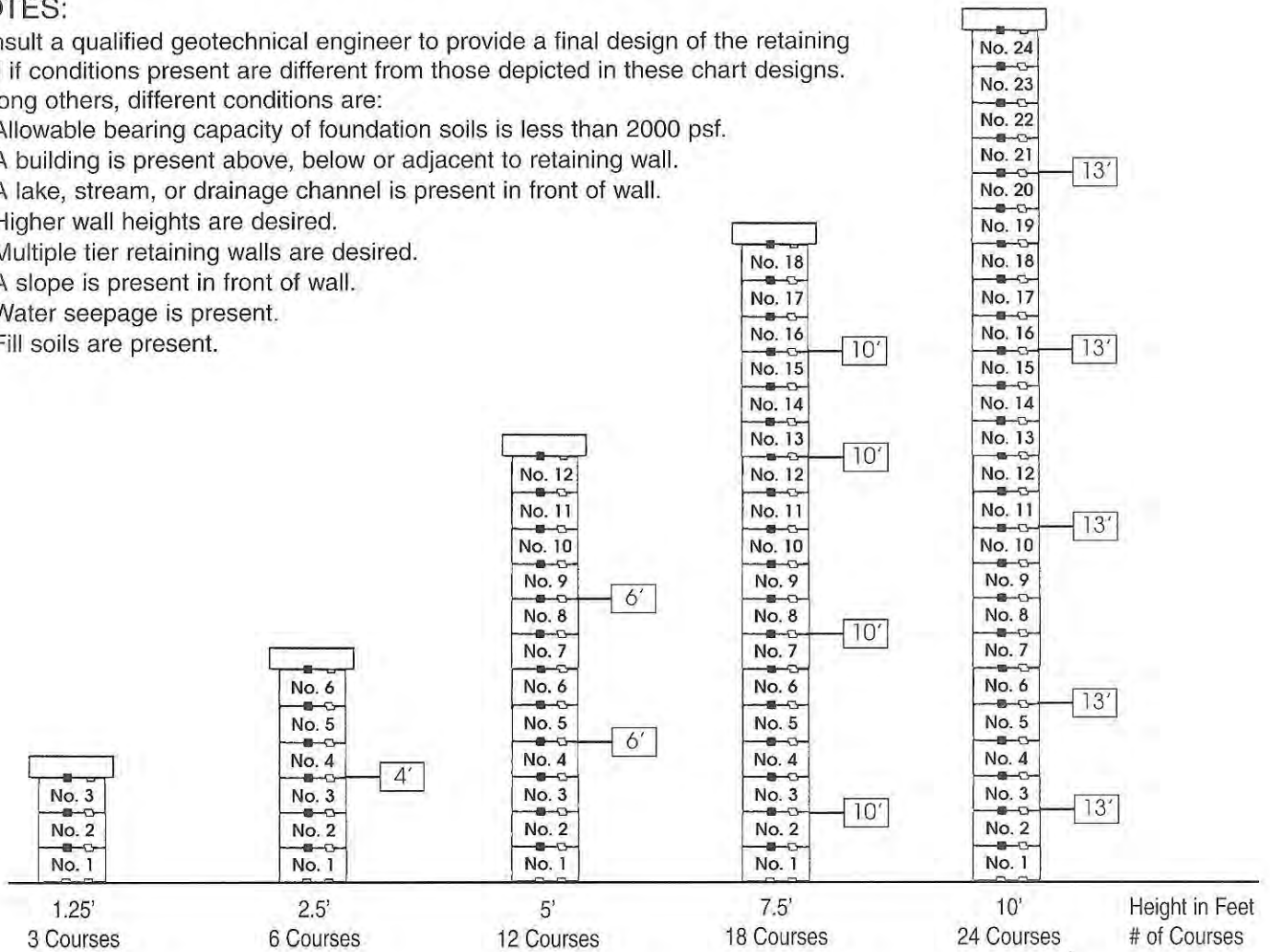
8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

2.5 to 1 Backslope
4° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs. Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

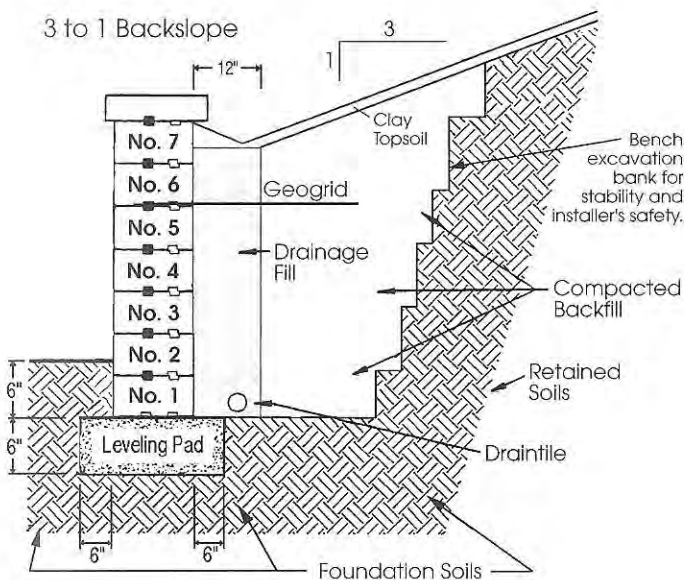
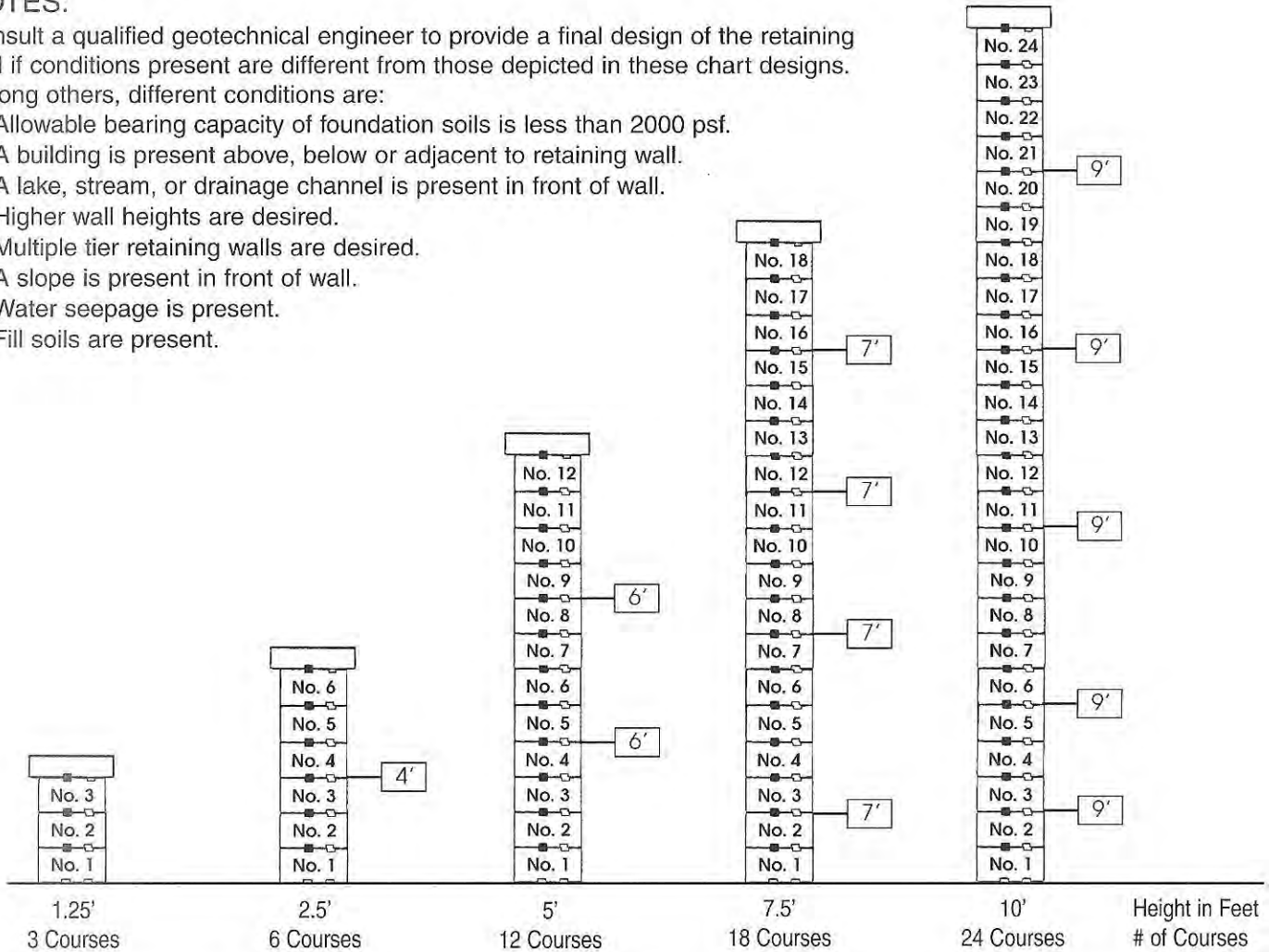
3 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



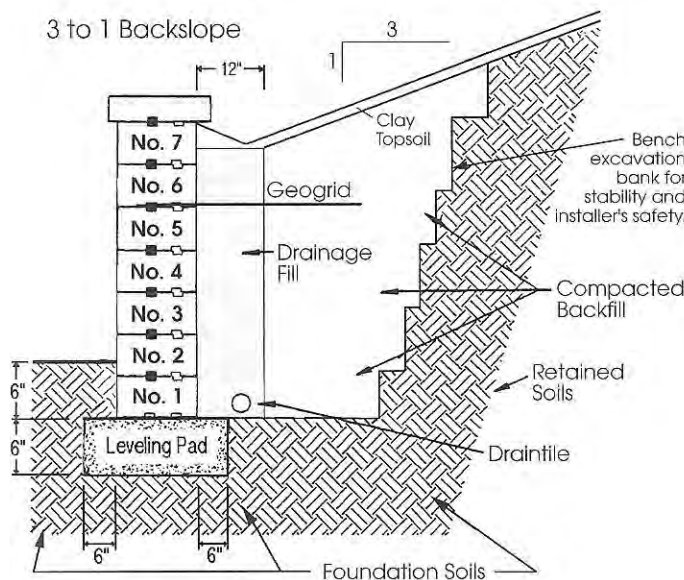
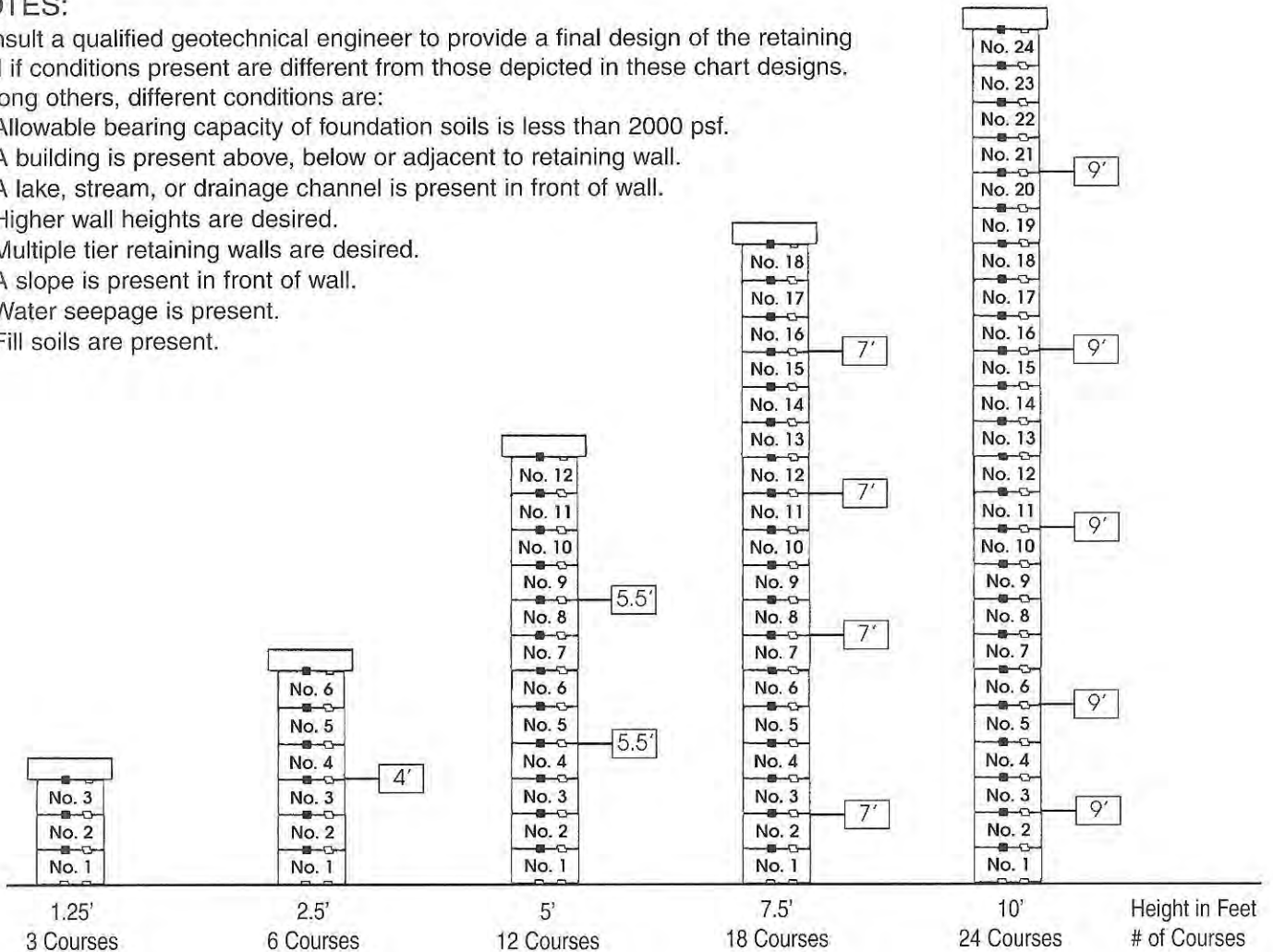
8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

3 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs. Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



— 8' — Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

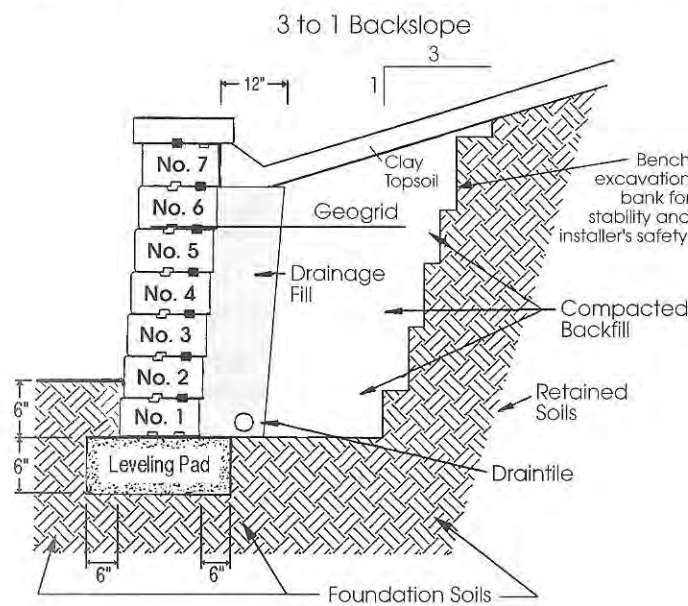
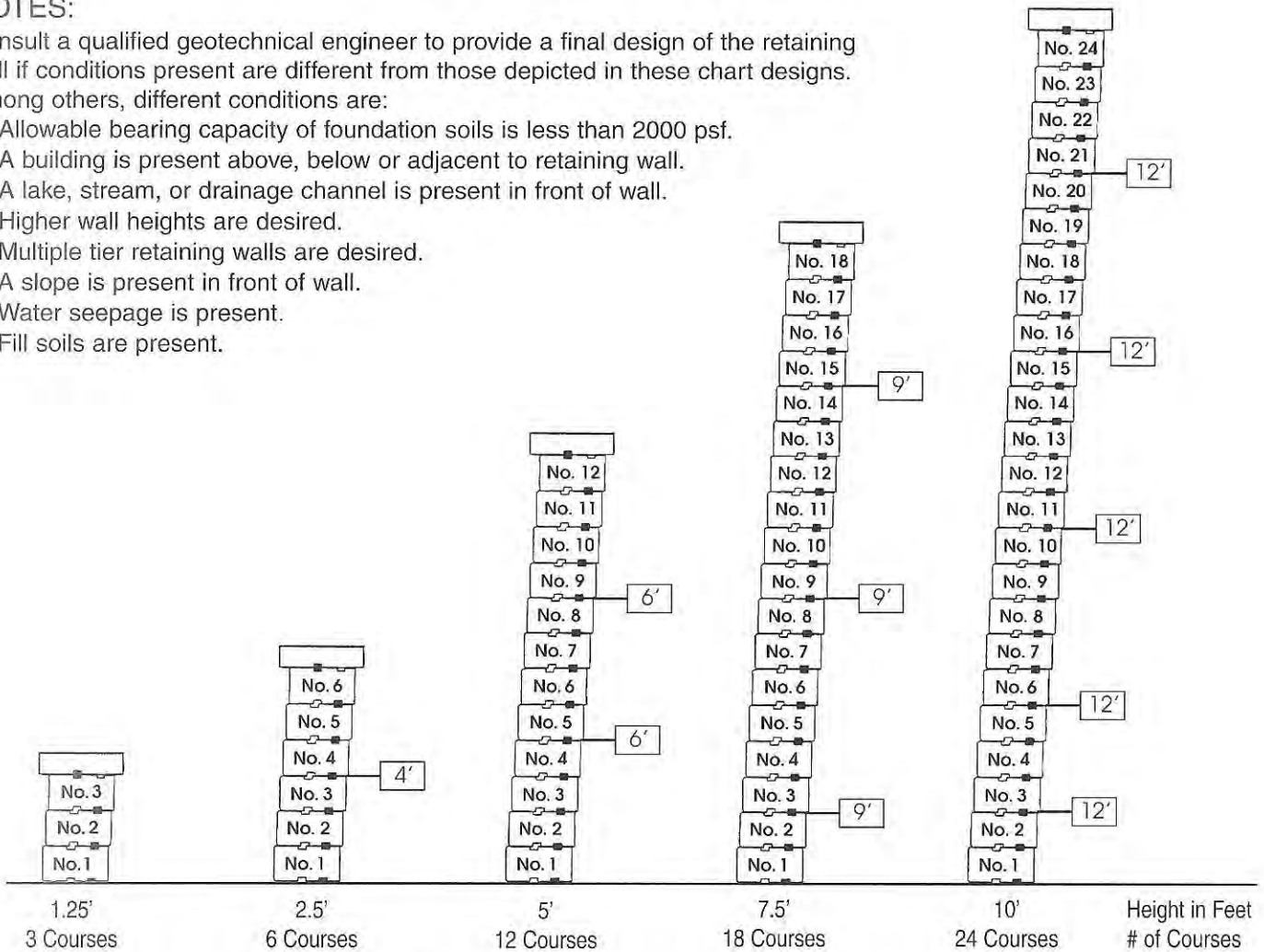
3 to 1 Backslope
0° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

3 to 1 Backslope
4° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (silts & clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

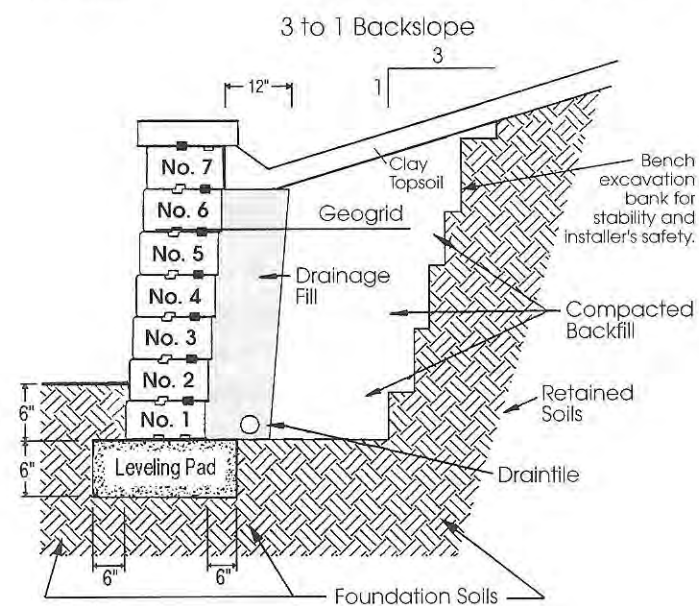
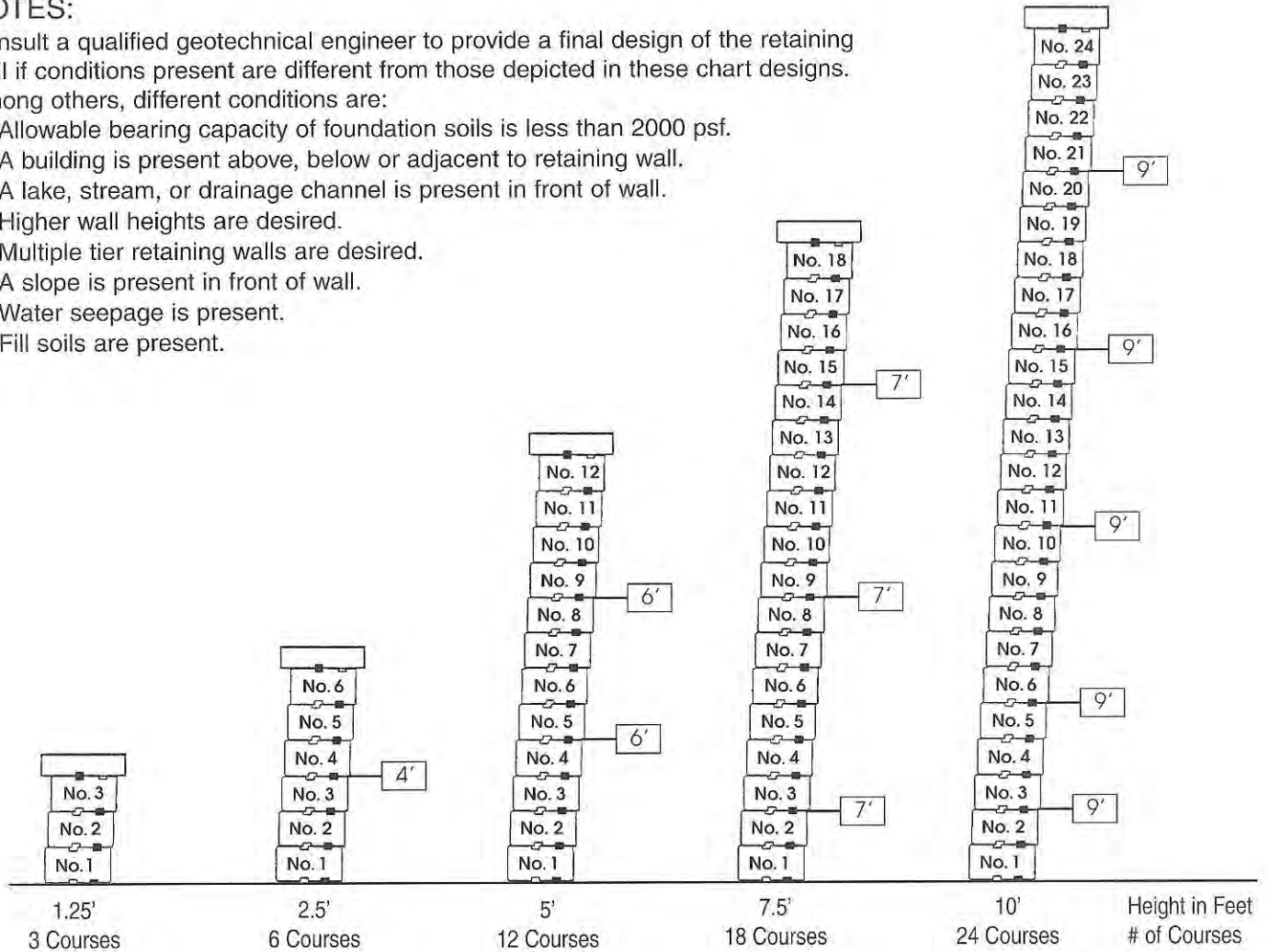
Foundation: (silts & clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.

NOTES:

Consult a qualified geotechnical engineer to provide a final design of the retaining wall if conditions present are different from those depicted in these chart designs.

Among others, different conditions are:

- Allowable bearing capacity of foundation soils is less than 2000 psf.
- A building is present above, below or adjacent to retaining wall.
- A lake, stream, or drainage channel is present in front of wall.
- Higher wall heights are desired.
- Multiple tier retaining walls are desired.
- A slope is present in front of wall.
- Water seepage is present.
- Fill soils are present.



— 8' — Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

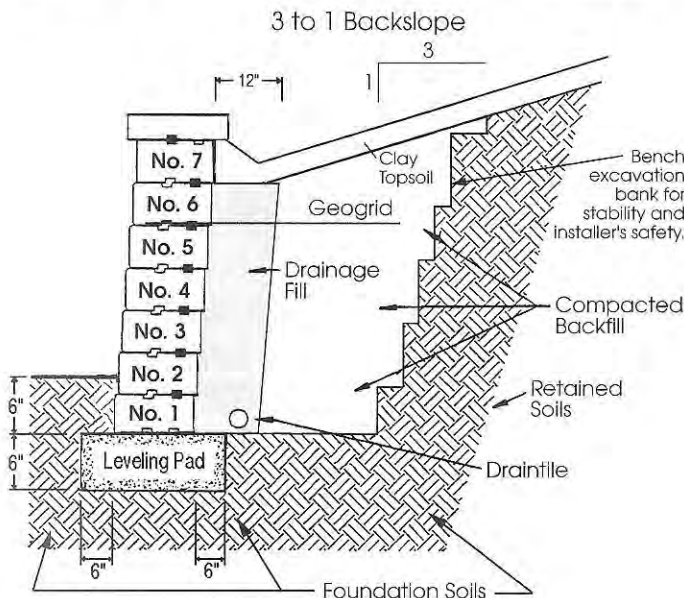
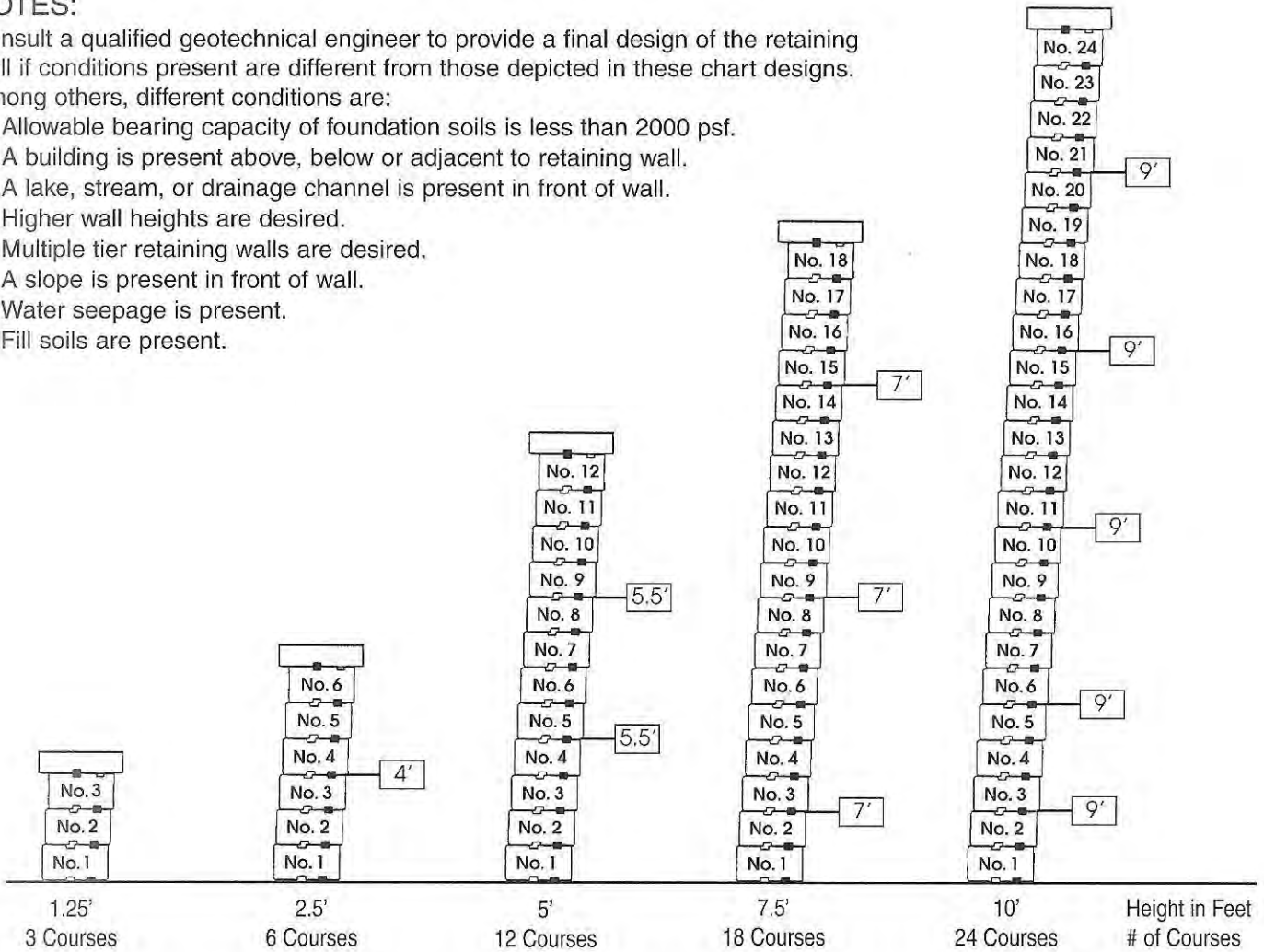
3 to 1 Backslope
4° Face Batter
Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.
Foundation: (sandy silts, silty sands)
 $\phi=30^\circ$ $\gamma=135$ pcf.

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8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

3 to 1 Backslope
4° Face Batter

Backfill: (well graded sand & gravel)
3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.

Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

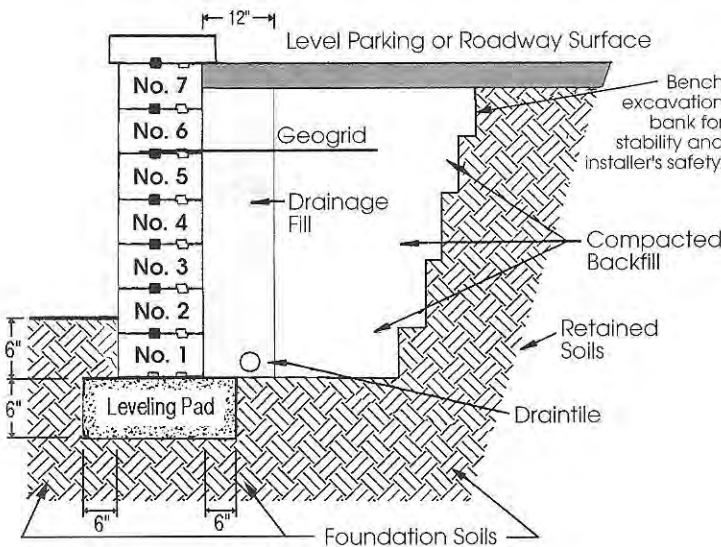
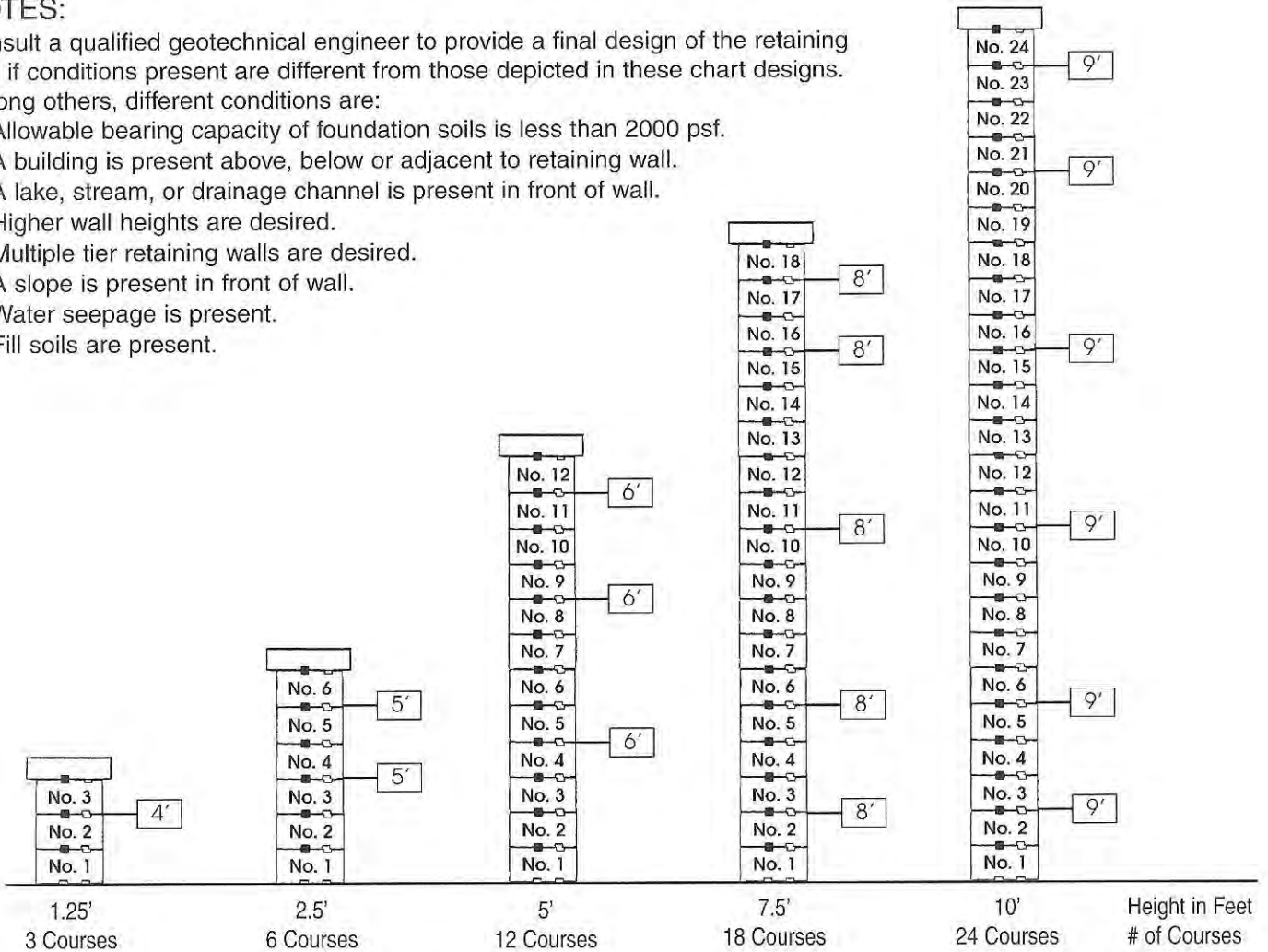
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

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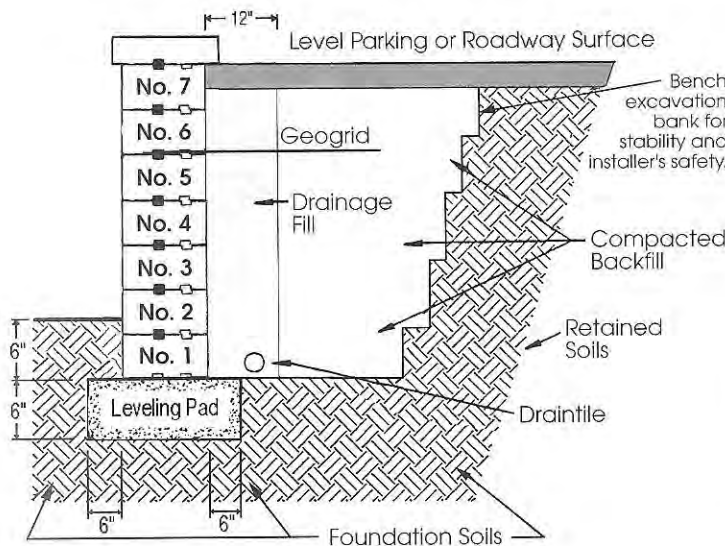
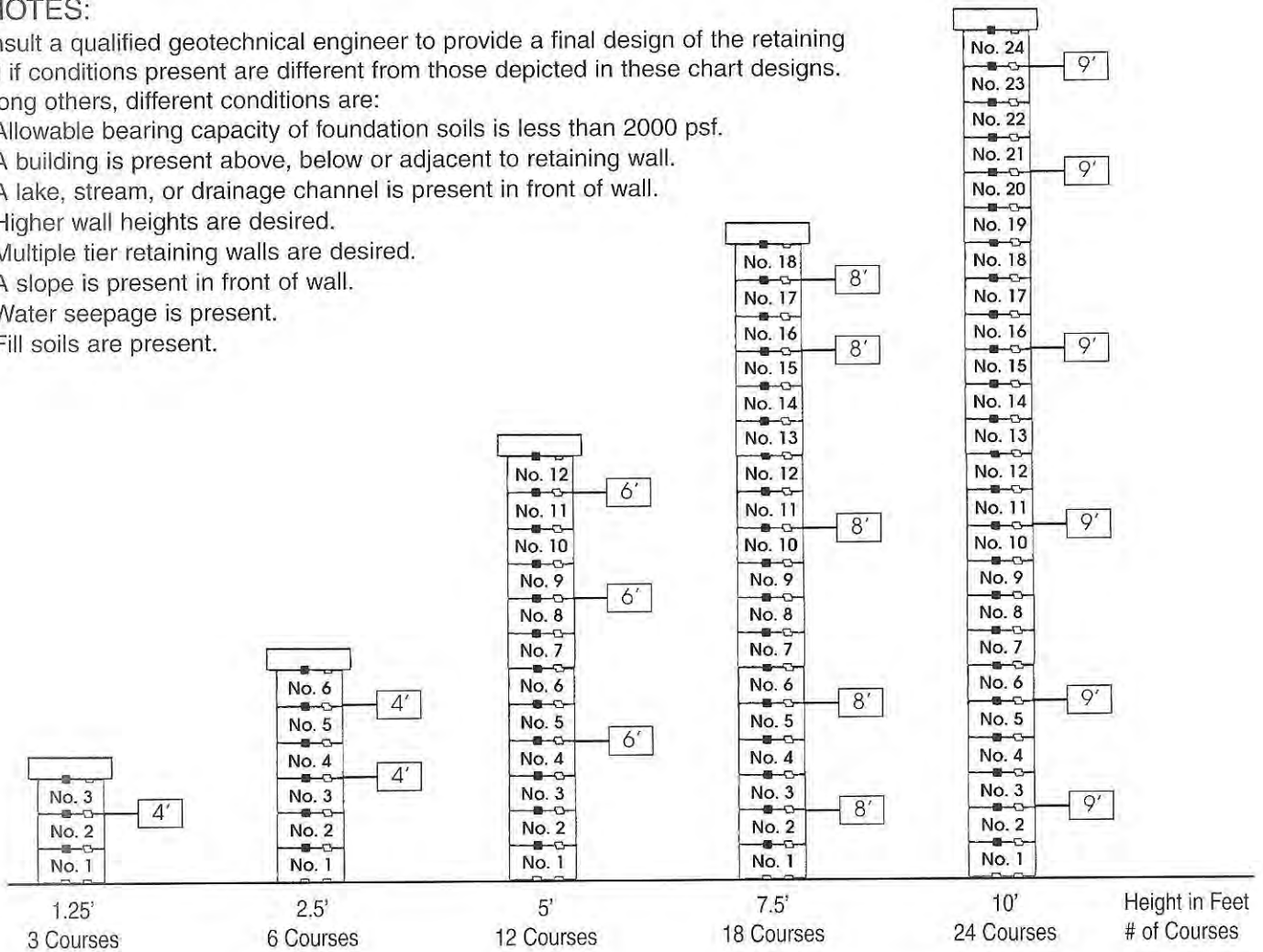
250 psf Surcharge / Level
0° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts and clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts and clays)
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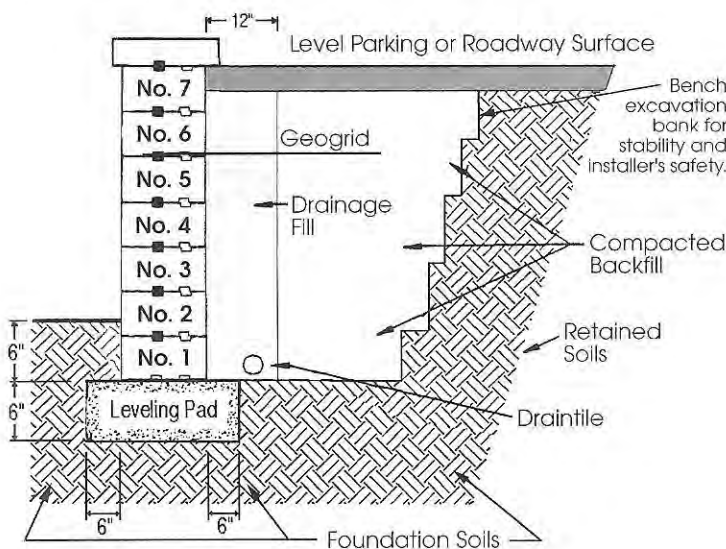
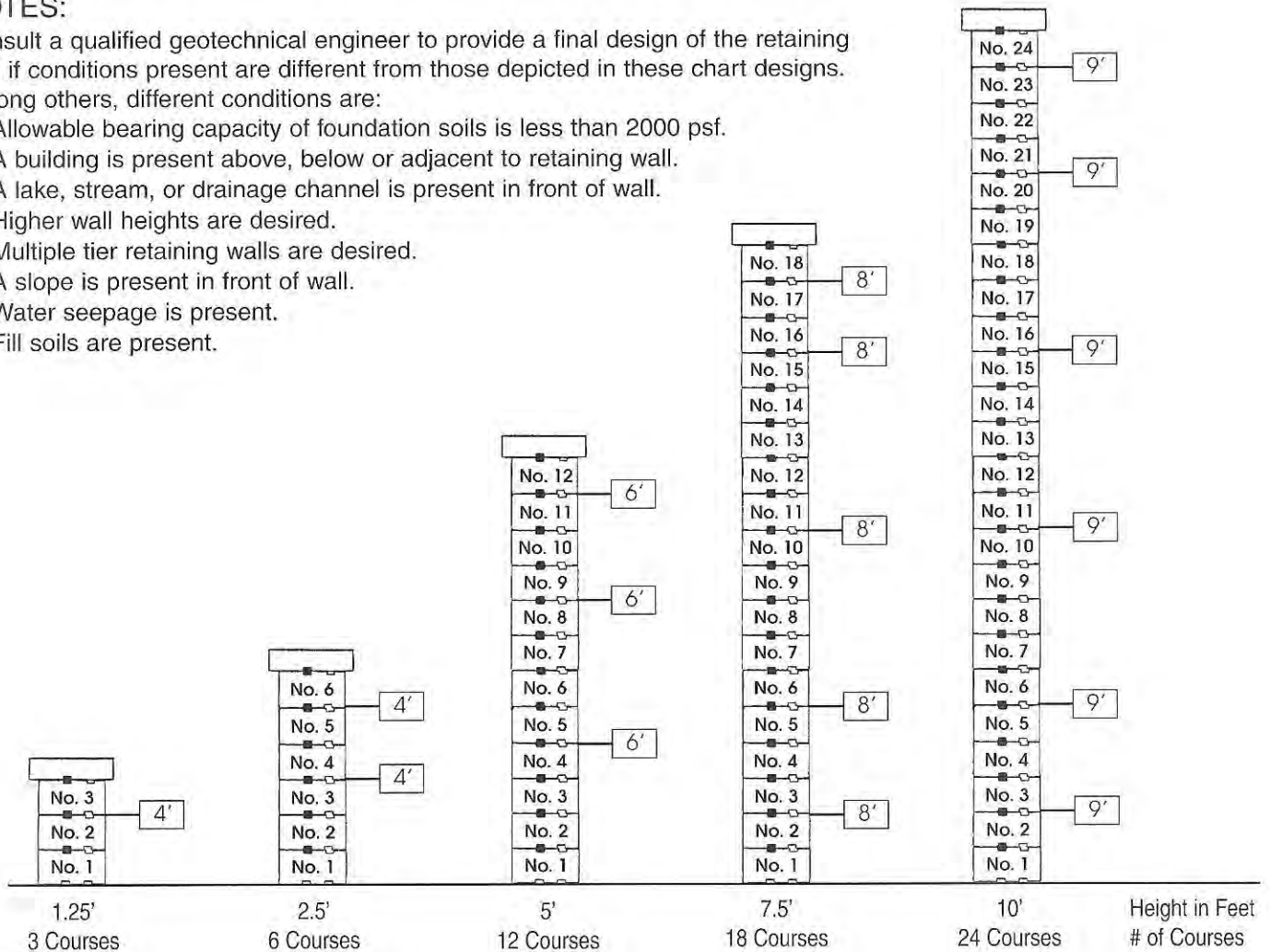
250 psf Surcharge / Level
0° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
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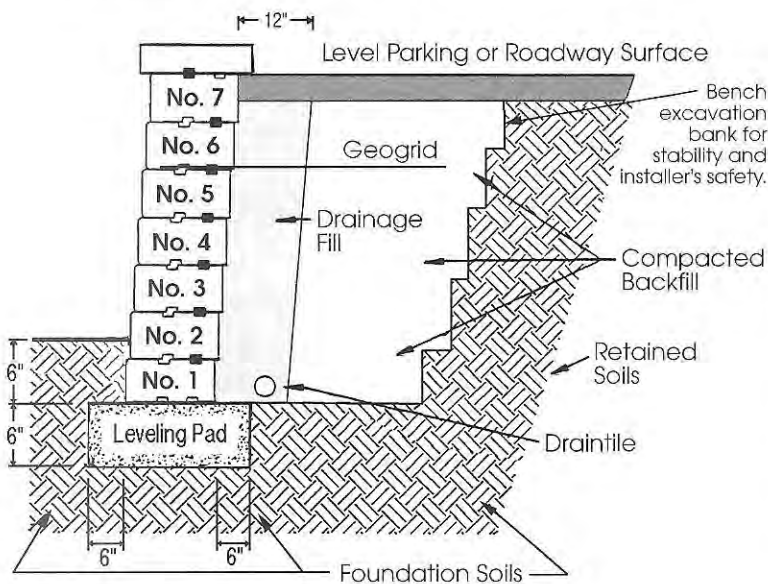
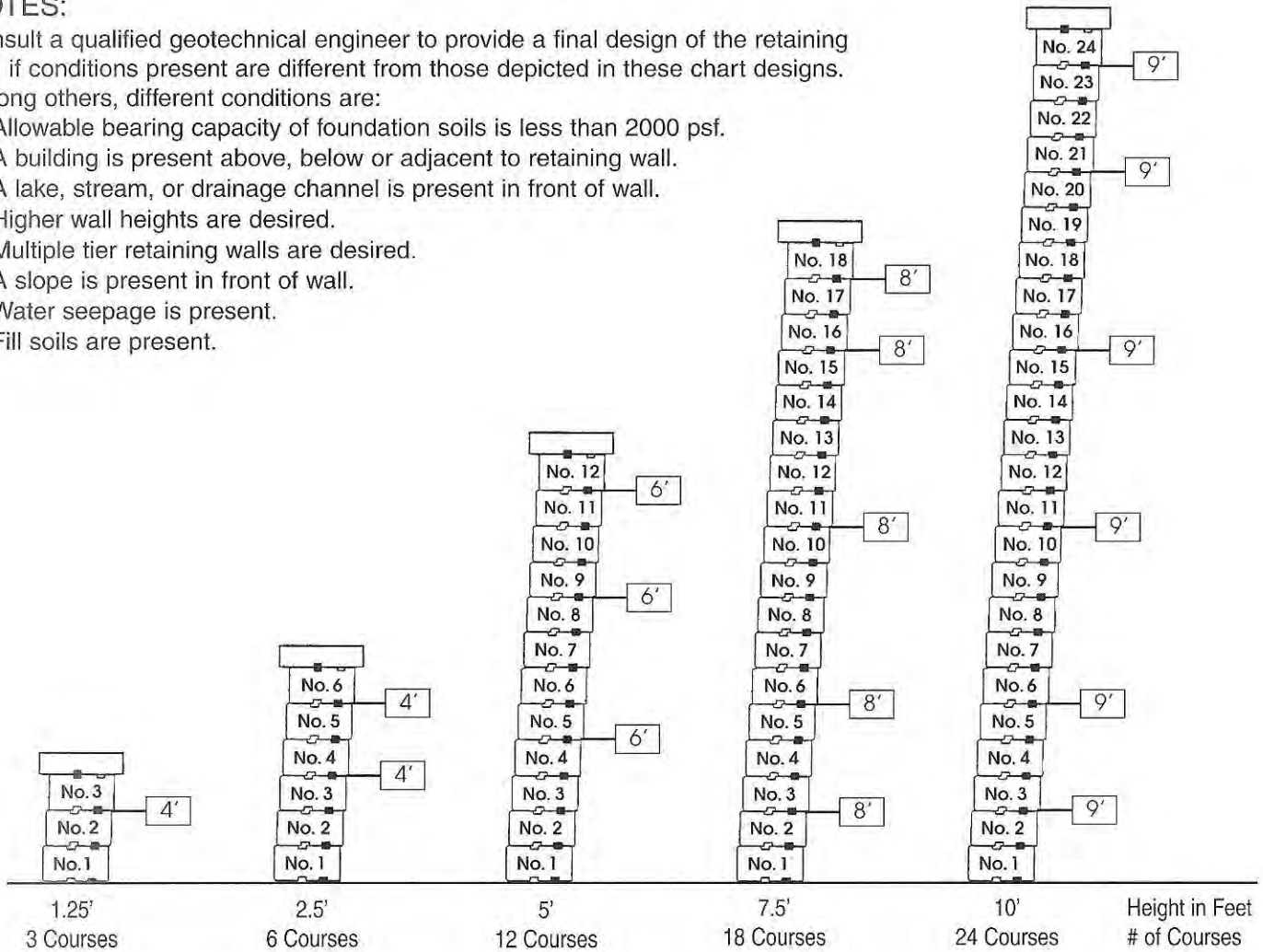
8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

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0° Face Batter
Backfill: (well graded sand & gravel)
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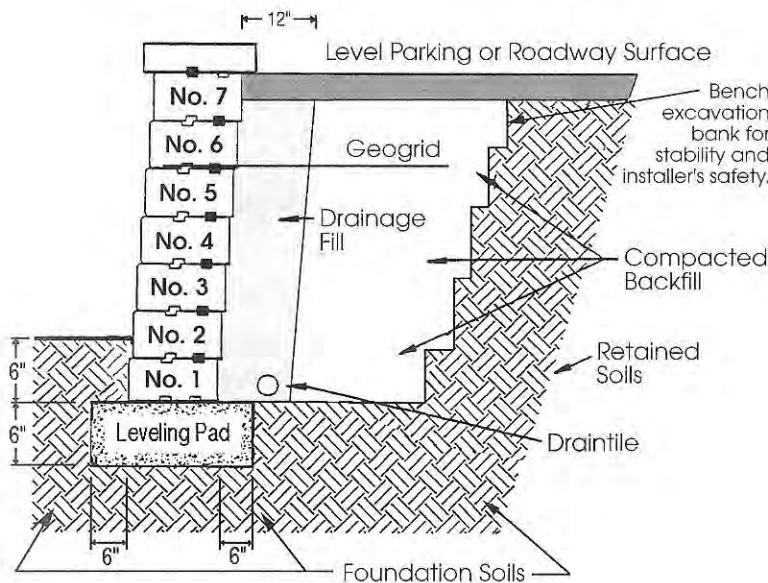
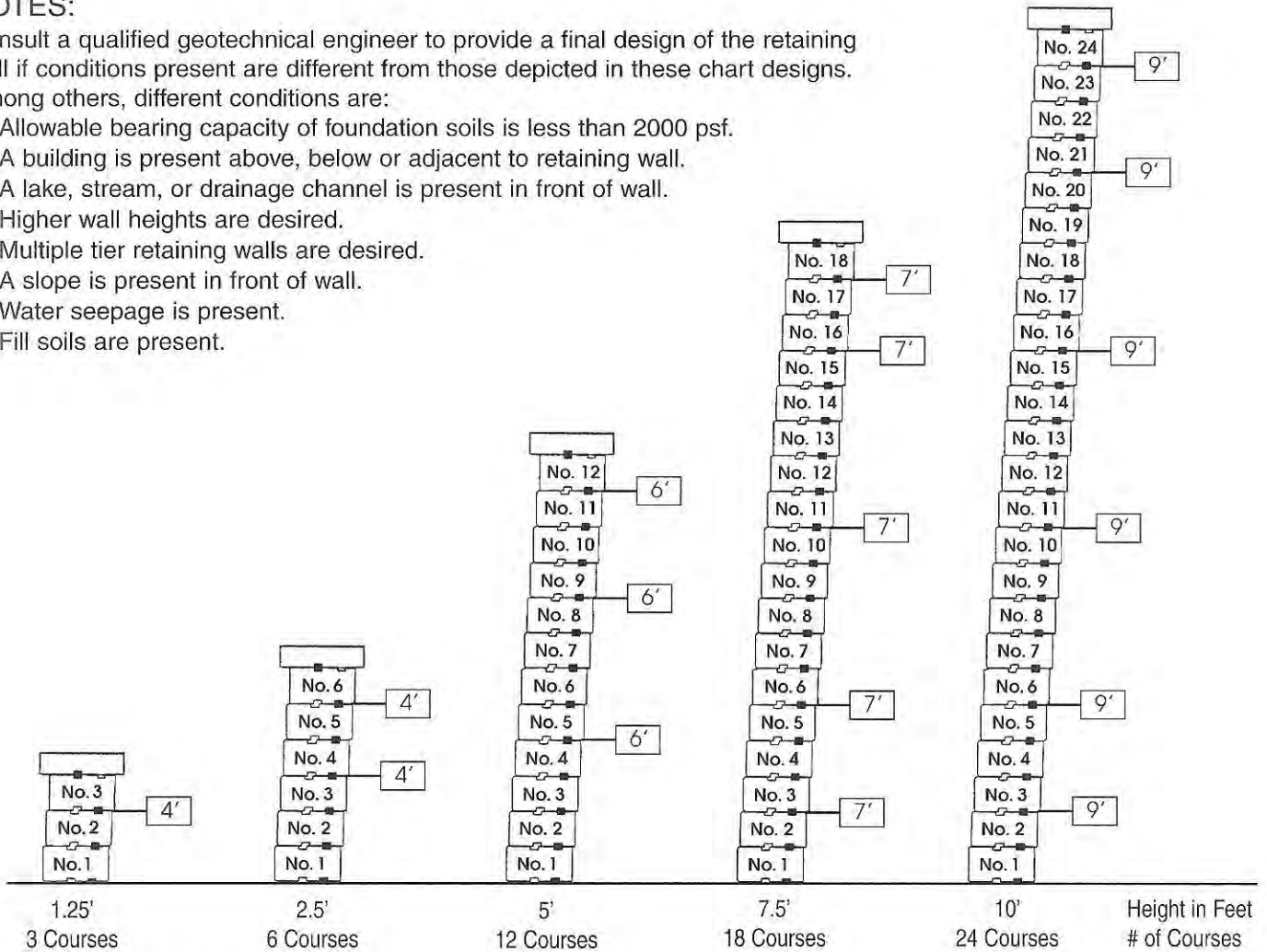
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250 psf Surcharge / Level
4° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (silts & clays)
 $\phi=28^\circ$ $\gamma=135$ pcf.
Foundation: (silts & clays)
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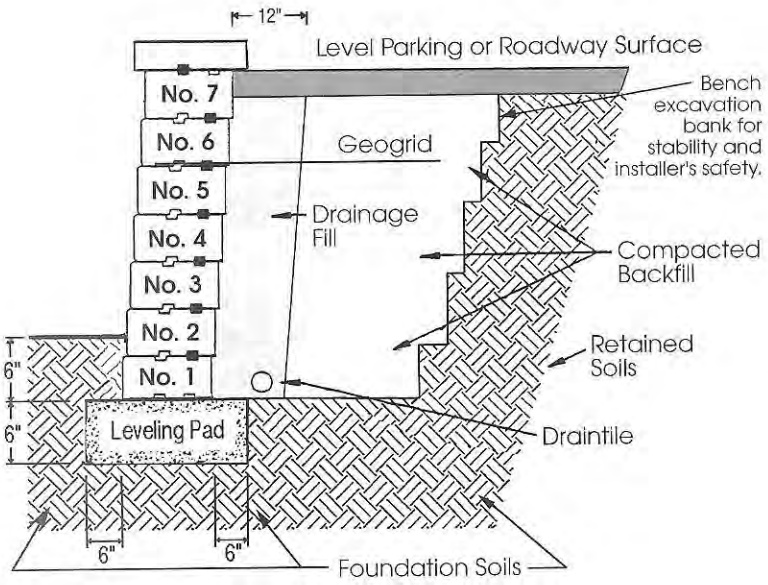
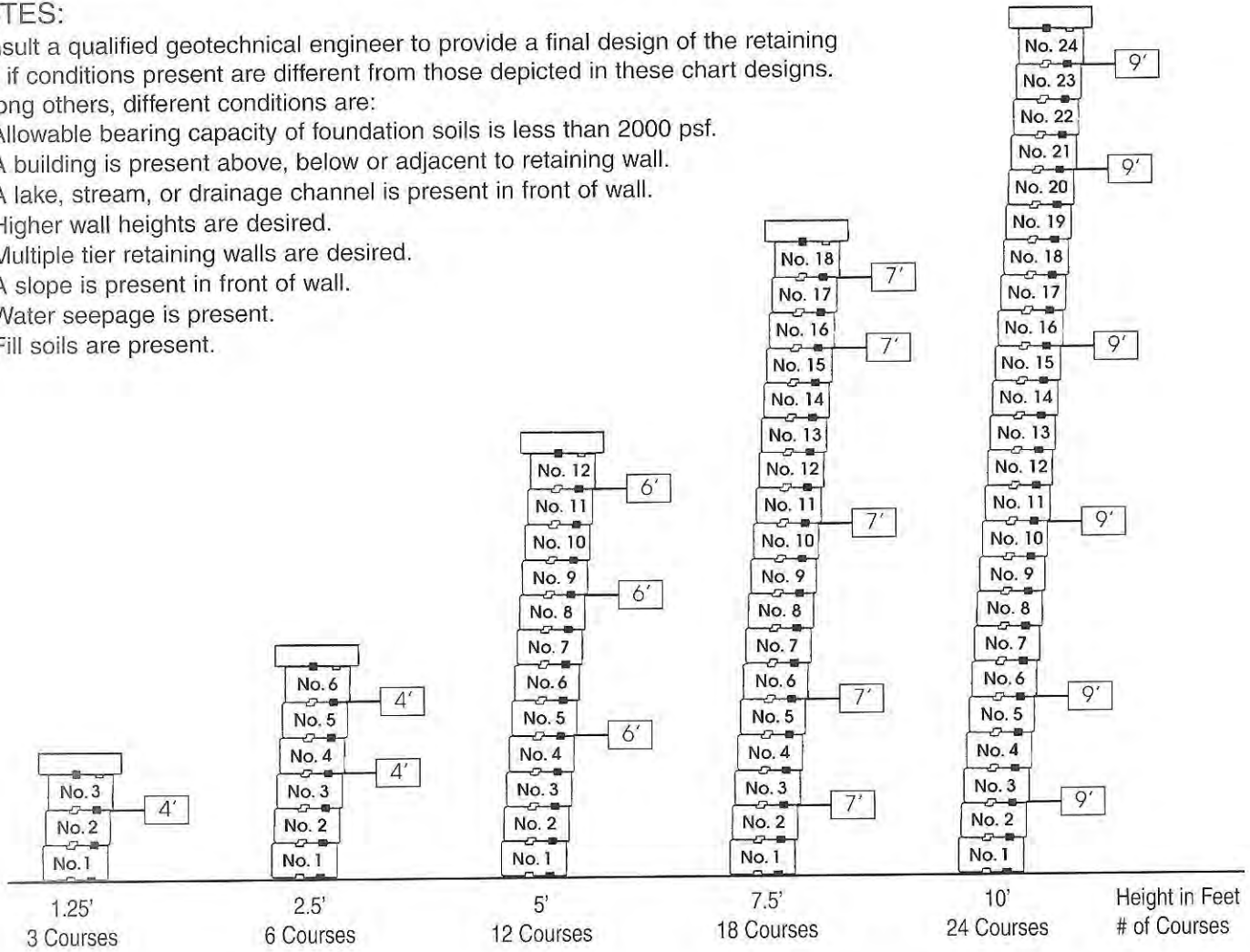
250 psf Surcharge / Level
4° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (sandy silts, silty sands)
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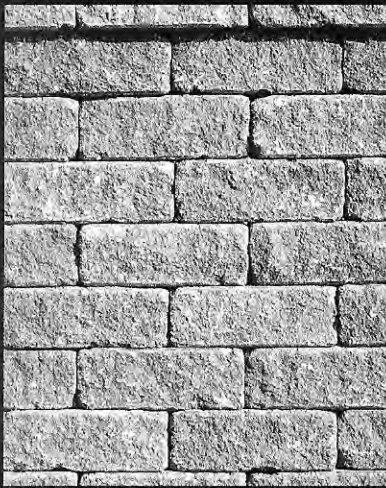
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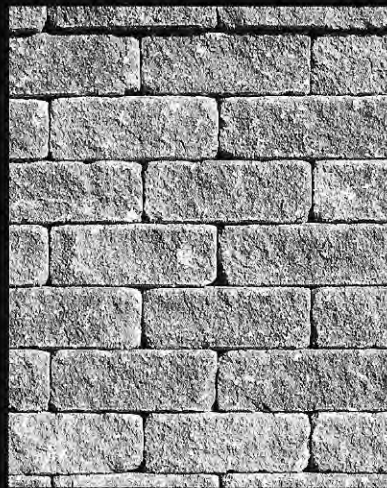
8' Indicates length of *Stratagrid 300* Geogrid required as measured from the face of the wall

250 psf Surcharge / Level
4° Face Batter
Backfill: (well graded sand & gravel)
 3/4" maximum, $\phi=34^\circ$ $\gamma=120$ pcf.
Retained: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.
Foundation: (well graded sands & gravel)
 $\phi=34^\circ$ $\gamma=135$ pcf.

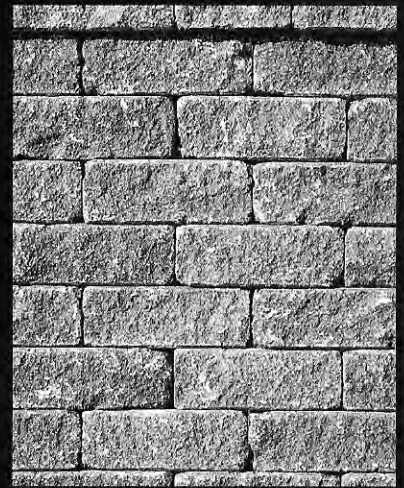
SOLID COLORS



BUFF STONE

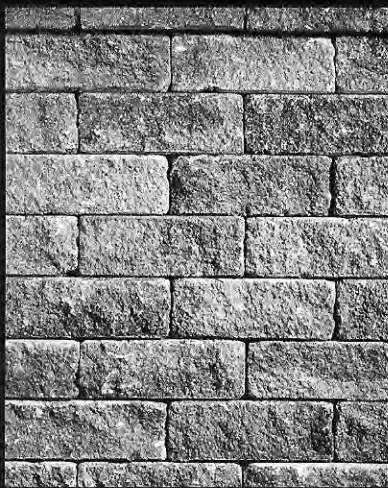


LIMESTONE GRAY



HONEY STONE BROWN

COLOR BLENDS



ROSE STONE

Charcoal
Light Gray
Rose

MOSS STONE

Charcoal
Light Gray
Green



FIELD STONE

Dark Gold
Buff
Charcoal

MOUNTAIN STONE

Terra Cotta
Brown



This guide is designed to assist in your color selection. Exact color matches cannot be guaranteed due to the inherent characteristics of concrete. It is recommended that final color selection be made from actual product samples.



CRETATM STONE

Manufactured By

PAVELOC

INDUSTRIES, INC.

8302 South Route 23
Marengo, Illinois 60152
1-800-590-2772

www.paveloc.com