Using Stabilized Aggregate To Build Segmental Retaining Walls
Confirm estimate of wall material and stabilized aggregate required. (See Estimating Charts on pages 9 to 11.)

• Make sure all relevant installation guidance has been read and understood.

• Confirm that wall contractor’s and support contractor’s scope of work is clear and understood.

• Always start construction at the lowest point(s) in the structure.

• Confirm block and cap selection, color and quantities are approved before starting work. Discuss delivery schedule and site staging of materials to avoid work delays.

• Call local utility or one-call agency to get location of existing utilities and approval to dig before starting work. Confirm the location of any underground utilities and get job identification number.

• Confirm that site excavation is completed and safe before starting work.

• Review plans and specifications with wall project foreman before starting work and allocate trained crew members and specific equipment to perform the installation.

• Ensure all site activities and operations that you are responsible for conform to or exceed relevant health and safety guidelines. Make sure personal safety equipment for head, hands, eyes, ears and feet is worn at all times. Ensure that all machinery and equipment are in safe operating condition and handled in accordance with proper operating procedures.

• Determine if the wall heights require a Fall Protection System and allow only required people in the work area.
ACTIVE SOIL—The soil behind the wall that will theoretically move and place a load on the wall.

BACKFILL—The soil or stabilized aggregate used to fill the excavated area behind the wall.

BASE COURSE—The first course of block is laid on the prepared leveling pad. A certain number of courses can be buried depending on the finished height of a structure and wall geometry.

BATTER—The facing angle created by segmental retaining wall (SRW) unit setback, measured from a vertical line drawn from the toe of the wall, expressed in degrees.

COMPACTION—Densification of the soil material used for base and backfill with mechanical equipment such as a vibrating plate compactor or roller.

COURSE—The horizontal layers of blocks used to build a wall.

DRAINAGE AGGREGATE—Drainage fill placed within and immediately behind the SRW units and in other areas that may be required by the design engineer.

FINES—The smaller particles of aggregate. Silt and clay when discussing soil, sand when discussing stabilized aggregate.

FOUNDATION SOIL—The soil that supports the leveling pad and the reinforced soil zone of a soil-reinforced SRW system or the stabilized aggregate zone.

GEOSYNTHETIC—A generic term used to describe synthetic or plastic materials used in soil, such as fabrics, geogrids, drainage composites or erosion-control materials.

GEOTEXTILE—A textile-like material used in soil drainage and reinforcement applications. Usually comprised of polypropylene or polyester, it can be woven or non-woven.

GRADE—Ground level.

GRAVITY WALL—A retaining wall that does not use soil reinforcement. A gravity wall relies on the weight and setback of the block to resist the soil forces that are exerted on the wall.

LEVELING PAD AGGREGATE—A compactible, granular soil. Lean, unreinforced concrete may also be used for a leveling pad.

LEVELING PAD—The level surface (gravel or concrete) used to distribute the weight of the dry-stacked column of SRW units over a wider foundation area and to provide a working surface during construction. The leveling pad is constructed from the placement of aggregate of 6 inches +/- and forms the base on which the first course of blocks are laid.

MIX DESIGN FOR STABILIZED AGGREGATE—An approximate 6-to-1 or 7-to-1 ratio of stone to cement. Aggregate size can be 1/2 inch or 3/4 inch depending on the height of the structure. Use approximately 5 gallons of water to 100 pounds of cement. The design engineer will determine the specific mix. See page 12 for examples.

OVERTURNING—A potential failure mode of an SRW whereby lateral external forces cause the entire wall to rotate about the toe.

PERMEABLE SOIL—A soil that allows water to move through it at an appreciable rate.

PROCTOR (DENSITY)—A method for determining the moisture-density relationship in soils subjected to compaction.

RETAINED-SOIL ZONE—The area which is immediately behind or retained by the stabilized aggregate structure.

RUNNING BOND—A staggered vertical alignment used to create a consistent pattern.

SEGMENTAL RETAINING WALL (SRW)—A wall system built with modular blocks to retain soil. SRWs can also be built with or without geosynthetic reinforcement in addition to stabilized aggregate.

SLIDING—A potential failure mode of an SRW whereby lateral external forces cause the entire soil mass to slide forward along its base.

SLOPE, CREST—Angle of the soil above the wall usually expressed as a ratio such as 3:1 (3 feet horizontal to 1 foot vertical).

SLOPE, TOE—Angle of the soil in front of the wall usually expressed as a ratio such as 3:1 (3 feet horizontal to 1 foot vertical).

STABILIZED AGGREGATE—A formulated mix design of clean stone, cement and water that creates a permeable homogeneous zone (mass). It is obtained by the elimination of fine aggregates (sand) from the normal concrete mix.

STEPPING UP THE WALL BASE—Method used to maintain a level wall on a slope.

SURCHARGE, DEAD LOAD—A permanent surcharge on a wall that can exert lateral pressure against the wall as well as vertical force downward on the wall mass.

SURCHARGE, LIVE LOAD—A transient surcharge that can vary during the life of the structure. A live load is assumed to provide destabilizing forces but not resisting forces.

SWALE—A small ditch or depression formed on top and behind the SRW system to collect water and carry it away from the wall system.

TERRACED WALLS—Two or more walls set above or below each other. There are independent and dependent terraced walls. Depending on their relative locations, terraced walls may affect the stability of walls above or below them.
ABOUT STABILIZED AGGREGATE
APPLICATIONS
A cost-effective, non conventional retaining wall construction option, building with stabilized aggregate offers unique solutions to difficult site problems.

If there isn't enough space to construct a conventional retaining wall with geosynthetic reinforcement, stabilized aggregate can be an effective option. If poor in-fill soils are your challenge, using stabilized aggregate can reduce your construction costs.

Finally, excavating costs can be dramatically reduced. When building with geosynthetic reinforcement, the excavation depth behind the wall is typically 60 percent or more of the height of the wall. With stabilized aggregate, that drops to between 30 and 40 percent, depending on conditions.

This system is also an excellent alternative to rock removal, and can compete favorably with big-block systems.

IMPROVE PRODUCTIVITY
Walls built with stabilized aggregate in cut applications are often easier to build than conventional geosynthetic-reinforced walls. Excavation is reduced by about two-thirds and little or no soil return is required. The project can be built with smaller equipment, less manpower and better production rates than conventional structures.

Typically used with retaining walls greater than 3 feet high, stabilized aggregate structures have been built to heights in excess of 15 feet. For this installation manual, the estimating tables have been limited to an exposed wall height of 10' 8''.

HOW STABILIZED AGGREGATE WORKS
Stabilized aggregate effectively increases the depth of the facing unit. This allows for taller gravity walls.

A proven system over the past 10 years, more than 10 million square feet of retaining walls have been built worldwide using stabilized aggregate.

ESTIMATING STABILIZED AGGREGATE REQUIRED
Using the length and height of each wall or wall section, refer to the Estimating Charts on pages 9-11 to determine basic dimensions of leveling pad and mass of stabilized aggregate. Documentation of the design methodology developed by Anchor Wall Systems (AWS) for using this system is available upon request.

RECOMMENDED ANCHOR™ PRODUCTS
The following Anchor™ retaining wall products can be used with stabilized aggregate:
• Vertica® products
• Vertica Pro® products
• Diamond Pro Stone Cut™ products
• Diamond Pro® products
• Highland Stone® products
• Diamond Stone Cut™ products
• Diamond® products

The typical details and Estimating Charts in this Installation Manual are specific to Vertica® products. Details and Estimating Charts for other Anchor products may be downloaded at www.anchorwall.com. Because the volume of stabilized-aggregate material may change with each product, download the specific charts for the product you have chosen.

BASIC INSTALLATION WITH STABILIZED AGGREGATE
SETTING OUT THE WALL AND EXCAVATION
Verify wall layout and wall location with the client and other appropriate parties. Survey grade stakes with distance to wall face, elevation for bottom of wall and steps in the foundation should be marked.

Mark out the location of the excavation trench so that, when dug, it is wide enough to accommodate the wall block and complies with drawings and specifications. See excavation detail on page 6.

A geotechnical engineer should evaluate the foundation soil to verify that there is adequate bearing capacity for support of the structure before placing aggregate in the trench.

Firmly compact the soil in the base of the trench, using either a vibrating plate compactor or small vibrating trench roller before installing the leveling pad base aggregate.

LEVELING PAD
A leveling pad for the application of stabilized aggregate is typically constructed from granular stone base material or 3/4'' clean stone.

The pad must be a minimum of 6 inches
Basic Installation
With Stabilized Aggregate

Deep after compaction. An additional distance of at least 6 inches in front of and behind the wall block must be included in the leveling pad. See detail for excavation on page 8.

Fully compact the leveling pad using a vibrating plate compactor. Make sure the base material is level front to back and side to side.

**BASE COURSE**
This is the most important step in the construction process. Starting at the lowest point, lay the first block, checking level both front to back and side to side.

Place additional blocks side by side, flush against each other at the face, making sure the blocks are in full contact with the leveling pad.

Use a string line along back of blocks to align the wall units. Use a 4-to-6-foot level along the top of foundation blocks to check level side to side and use a shorter level to check level from front to back.

**CONSTRUCTION OF ADDITIONAL COURSES**
Clean any debris off the top of blocks.

Place the second course of blocks on top of the base course. Maintain running bond by placing units in a staggered pattern, running bond, to the course beneath. Pull each unit forward until the shear device is securely in contact with the units below. Use string line on each course to align the blocks along the wall. Do not exceed 2 feet vertical stacking of block before placing a lift of stabilized aggregate.

**DRAINAGE DESIGN**
Each project using stabilized aggregate is unique. The ground levels on a site will determine at what level to install the perforated drain pipe, but generally the drain pipe is positioned as low as possible behind the wall so water drains down, out and away from the wall into a storm drain, or to an area lower than and away from the wall.

The perforated pipe should be placed approximately 6 inches behind the back of the block. The actual location of the drain pipe should be noted on the engineered shop drawings.

**CONSTRUCTION WITH STABILIZED AGGREGATE**
Installers should follow the general rules for leveling pad and base course installation described on page 6.

When the leveling pad and base course installation is complete and necessary compacting has been completed for this phase, including the installation of drain pipe, the installation of stabilized aggregate can begin.

The stabilized aggregate mix should be placed behind the blocks in lifts of 8 inches and worked into all voids and cores of the blocks. The height of a column of the aggregate mix for a single pour or placement is typically placed in 24-inch lift thicknesses.

The contractor should be able to place additional lifts from 8 inches to 24 inches depending on site conditions and project scale. Subsequent pours can be conducted as soon as the stabilized aggregate has set—often 2 to 3 hours.

The stabilized aggregate can be placed directly from delivery vehicle or with skid-type loader or other equipment. The aggregate is formulated with no fine grain material and has a minimal hydrostatic load on the wall. Care should be taken to make sure the mix is stiff enough to fill the voids and cores of the structure but not leak through the face of the wall.

**CAPPING**
Follow standard practice when capping wall.

**FINISHING**
Protect the wall with a finish grade at the top and bottom.
**Typical Base Preparation**

- Native soil 6" minimum compacted
- Leveling granular-base leveling pad
- 2'-0" (minimum)

**1:1 Excavation Detail**

- Stabilized aggregate depth
- Vertica® block
- Finished grade
- Drain tile 4" dia.

**Ready for First Pour**

- Finished grade 6" by 6" by 2'-0"
- Drain tile 4" dia.

**First Pour**

- Stabilized aggregate depth
- Fabric optional
- Drain tile 4" dia.
- Finished grade

**Notes:**
1. Stabilized aggregate is to be placed in 8- to 24-inch (typical) lift
2. Stabilized aggregate must be manipulated into all voids between blocks to ensure adequate bond between block and concrete mass.

- ENSURE VOID AREAS BETWEEN UNITS ARE FILLED COMPLETELY

Construction Details
Using Stabilized Aggregate

Construction Details use Vertica® products. Details for other Anchor products are located at www.anchorwall.com.
*If differential movement between the stabilized aggregate and the wall face unit is a concern, layers of lightweight geogrid may be incorporated into the system. While generally not necessary, if used, the grid should be placed from near the front face of the wall system and extend into the stabilized aggregate about 1 foot. The geogrid can be laid directly on the cold joint surface with fresh stabilized aggregate placed directly on top.

**DAYLIGHT DETAILS**

- Daylight drainage through wall or storm water system.
- Daylight drain through face at 50’ maximum intervals.
- Daylight drain tile through wall face and extend to slope.

**SPACING VARIATION**

- 2nd course
- 1st course
- Spacing varies 50’ maximum

**FILTER FABRIC**

- LOW-PERMEABILITY SOIL
- STABILIZED AGGREGATE

**ANCHORWALL.COM**

1-877-295-5415
Construction Details
Using Stabilized Aggregate

FENCE DETAILS

Construction Details use Vertica® products. Details for other Anchor products are located at www.anchorwall.com.

- FENCE OR RAILING (DESIGNED BY OTHERS)
- LOW-PERMEABILITY SOIL
- FILTER FABRIC
- DEPTH VARIES
- SLEEVE AND NON-SHRINK GROUT AROUND POST SLEEVE INSTALLED DURING WALL CONSTRUCTION

VERTICA® BLOCK
CAP BLOCK

ANCHOR
BUILD SOMETHING BEAUTIFUL

ANCHORWALL.COM
1-877-295-5415
NO SLOPE OR SURCHARGE

<table>
<thead>
<tr>
<th>Clay And Silt Soil</th>
<th>Silty/Clayey Sand Soil</th>
<th>Clean Sand And Gravel Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>4 Courses</td>
<td>4 Courses</td>
<td>4 Courses</td>
</tr>
<tr>
<td>2' 8&quot; (800mm)</td>
<td>2' 8&quot; (800mm)</td>
<td>2' 8&quot; (800mm)</td>
</tr>
<tr>
<td>6 Courses</td>
<td>6 Courses</td>
<td>6 Courses</td>
</tr>
<tr>
<td>4' 0&quot; (1200mm)</td>
<td>4' 0&quot; (1200mm)</td>
<td>4' 0&quot; (1200mm)</td>
</tr>
<tr>
<td>8 Courses</td>
<td>8 Courses</td>
<td>8 Courses</td>
</tr>
<tr>
<td>5' 4&quot; (1600mm)</td>
<td>5' 4&quot; (1600mm)</td>
<td>5' 4&quot; (1600mm)</td>
</tr>
<tr>
<td>10 Courses</td>
<td>10 Courses</td>
<td>10 Courses</td>
</tr>
<tr>
<td>6' 8&quot; (2000mm)</td>
<td>6' 8&quot; (2000mm)</td>
<td>6' 8&quot; (2000mm)</td>
</tr>
<tr>
<td>12 Courses</td>
<td>12 Courses</td>
<td>12 Courses</td>
</tr>
<tr>
<td>8' 0&quot; (2400mm)</td>
<td>8' 0&quot; (2400mm)</td>
<td>8' 0&quot; (2400mm)</td>
</tr>
<tr>
<td>14 Courses</td>
<td>14 Courses</td>
<td>14 Courses</td>
</tr>
<tr>
<td>9' 4&quot; (2840mm)</td>
<td>9' 4&quot; (2840mm)</td>
<td>9' 4&quot; (2840mm)</td>
</tr>
<tr>
<td>16 Courses</td>
<td>16 Courses</td>
<td>16 Courses</td>
</tr>
<tr>
<td>10' 8&quot; (3250mm)</td>
<td>10' 8&quot; (3250mm)</td>
<td>10' 8&quot; (3250mm)</td>
</tr>
</tbody>
</table>

Detail shown is conceptual only and should not be used for construction without the seal of a local qualified engineer.
## SURCHARGE

<table>
<thead>
<tr>
<th>Course</th>
<th>Clay And Silt Soil</th>
<th>Silty/Clayey Sand Soil</th>
<th>Clean Sand And Gravel Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Courses</td>
<td>2' 8&quot; (800mm)</td>
<td>1'-4&quot; [400 mm]</td>
<td>1'-0&quot; [300 mm]</td>
</tr>
<tr>
<td>6 Courses</td>
<td>4' 0&quot; (1200mm)</td>
<td>2'-0&quot; [600 mm]</td>
<td>1'-7&quot; [475 mm]</td>
</tr>
<tr>
<td>8 Courses</td>
<td>5' 4&quot; (1600mm)</td>
<td>2'-7&quot; [775 mm]</td>
<td>2'-0&quot; [600 mm]</td>
</tr>
<tr>
<td>10 Courses</td>
<td>6' 8&quot; (2000mm)</td>
<td>3'-4&quot; [1000 mm]</td>
<td>3'-0&quot; [900 mm]</td>
</tr>
<tr>
<td>12 Courses</td>
<td>8' 0&quot; (2400mm)</td>
<td>3'-11&quot; [1175 mm]</td>
<td>3'-0&quot; [900 mm]</td>
</tr>
<tr>
<td>14 Courses</td>
<td>9' 4&quot; (2840mm)</td>
<td>4'-7&quot; [1375 mm]</td>
<td>3'-4&quot; [1000 mm]</td>
</tr>
<tr>
<td>16 Courses</td>
<td>10' 8&quot; (3250mm)</td>
<td>5'-2&quot; [1550 mm]</td>
<td>4'-0&quot; [1200 mm]</td>
</tr>
</tbody>
</table>

**Zone Of Stabilized Aggregate**

- **Clay And Silt Soil**: 250 psf (12 kPa) Surcharge
- **Silty/Clayey Sand Soil**: 250 psf (12 kPa) Surcharge
- **Clean Sand And Gravel Soil**: 250 psf (12 kPa) Surcharge

Detail shown is conceptual only and should not be used for construction without the seal of a local qualified engineer.
### 3:1 CRESTM SLOPE

<table>
<thead>
<tr>
<th>Clay And Silt Soil</th>
<th>Silty/Clayey Sand Soil</th>
<th>Clean Sand And Gravel Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Courses 2' 8&quot; (800mm)</td>
<td>4 Courses 2' 8&quot; (800mm)</td>
<td>4 Courses 2' 8&quot; (800mm)</td>
</tr>
<tr>
<td>1'-0&quot; [300 mm]</td>
<td>1'-0&quot; [300 mm]</td>
<td>1'-0&quot; [300 mm]</td>
</tr>
<tr>
<td>6 Courses 4' 0&quot; (1200mm)</td>
<td>6 Courses 4' 0&quot; (1200mm)</td>
<td>6 Courses 4' 0&quot; (1200mm)</td>
</tr>
<tr>
<td>1'-5&quot; [425 Mm]</td>
<td>1'-0&quot; [300 mm]</td>
<td>1'-0&quot; [300 mm]</td>
</tr>
<tr>
<td>8 Courses 5' 4&quot; (1600mm)</td>
<td>8 Courses 5' 4&quot; (1600mm)</td>
<td>8 Courses 5' 4&quot; (1600mm)</td>
</tr>
<tr>
<td>2'-0&quot; [600 mm]</td>
<td>1'-7&quot; [475 Mm]</td>
<td>1'-4&quot; [400 mm]</td>
</tr>
<tr>
<td>10 Courses 6' 8&quot; (2000mm)</td>
<td>10 Courses 6' 8&quot; (2000mm)</td>
<td>10 Courses 6' 8&quot; (2000mm)</td>
</tr>
<tr>
<td>2'-7&quot; [775 Mm]</td>
<td>2'-0&quot; [600 mm]</td>
<td>2'-0&quot; [600 mm]</td>
</tr>
<tr>
<td>12 Courses 8' 0&quot; (2400mm)</td>
<td>12 Courses 8' 0&quot; (2400mm)</td>
<td>12 Courses 8' 0&quot; (2400mm)</td>
</tr>
<tr>
<td>3'-4&quot; [1000 mm]</td>
<td>2'-4&quot; [700 mm]</td>
<td>2'-4&quot; [700 mm]</td>
</tr>
<tr>
<td>14 Courses 9' 4&quot; (2840mm)</td>
<td>14 Courses 9' 4&quot; (2840mm)</td>
<td>14 Courses 9' 4&quot; (2840mm)</td>
</tr>
<tr>
<td>4'-4&quot; [1300 mm]</td>
<td>3'-0&quot; [900 mm]</td>
<td>3'-0&quot; [900 mm]</td>
</tr>
<tr>
<td>16 Courses 10' 8&quot; (3250mm)</td>
<td>16 Courses 10' 8&quot; (3250mm)</td>
<td>16 Courses 10' 8&quot; (3250mm)</td>
</tr>
<tr>
<td>5'-0&quot; [1500 mm]</td>
<td>3'-7&quot; [1075 Mm]</td>
<td>3'-7&quot; [1075 Mm]</td>
</tr>
</tbody>
</table>

Detail shown is conceptual only and should not be used for construction without the seal of a local qualified engineer.

Using Stabilized Aggregate To Build Segmental Retaining Walls

Samples of stabilized aggregate with different water contents, formed into a ball are pictured below.

Too little water

Proper amount of water

Too much water

©2008 Anchor Wall Systems, Inc. 5959 Baker Road, Suite 390, Minnetonka, MN 55345-5996. For more information, call us toll-free in the U. S. at 1-877-295-5415 or visit www.anchorwall.com.