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### GEOGRID PLACEMENT

- **CASE G**
  - **Reinforcement Wall:** Flat Ground at Top of Wall
  - **Surcharge:** 100 psf Surcharge is light traffic i.e. car or pickup
  - **Grid:** SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS
  - **Dimensions:** 12" (D) x 7-5/8" (H) x 12-1/2" (L)

- **CASE H**
  - **Reinforcement Wall:** Flat Ground at Top of Wall
  - **Surcharge:** 250 psf Surcharge is heavier traffic i.e. RV, large vehicle
  - **Grid:** SRW Universal or SRW 3 Series Grid

### Material Estimating

- **Geogrid Type**
- **SRW Universal or SRW 3 Series Grid**
- **Exposed Hgt wo/cap**
- **Amount Buried**
- **Grid Sq Yd per Ln Ft**
- **Grid total depth**
- **# Block per Ln Ft**
- **# Cap per Ln Ft**

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal or SRW 3 Series Grid</th>
<th>Exposed Hgt wo/cap</th>
<th>Amount Buried</th>
<th>Grid Sq Yd per Ln Ft</th>
<th>Grid total depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRW Universal</td>
<td>1.2'</td>
<td>6&quot;</td>
<td>.90</td>
<td>.444</td>
<td>.500</td>
</tr>
<tr>
<td>SRW 3 Series</td>
<td>1.3'</td>
<td>6&quot;</td>
<td>.90</td>
<td>.444</td>
<td>.500</td>
</tr>
</tbody>
</table>

- **Surcharge**
- **Grain Pipe**
- **Granular Leveling Pad**
- **Reinforced Soil Zone**

- **Geogrid Placement**
- **Grid is measured from the face of the wall.**
- **Surcharge begins one foot behind wall facing.**
- **100 psf Surcharge is light traffic i.e. car or pickup**

- **CASE G**
  - **Grid is measured from the face of the wall.**
  - **Surcharge begins one foot behind wall facing.**
  - **100 psf Surcharge is light traffic i.e. car or pickup**

- **CASE H**
  - **Grid is measured from the face of the wall.**
  - **Surcharge begins two feet behind wall facing.**
  - **250 psf Surcharge is heavier traffic i.e. RV, large vehicle**

- **Reinforced Soil Zone**
  - **Drain Pipe**
  - **Gerogrid**
  - **Granular Leveling Pad**

- **30 Degree Soil** for walls up to 8’
30 DEGREE SOIL  for walls up to 8’

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CASE I

**“CASE I” Retaining Wall:**
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- No Surcharge on Wall

**Reinforced Soil Zone**
- Geogrid
- Drain Pipe
- Granular Leveling Pad

**Geogrid**
- SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS
- Grid is measured from the face of the wall.
- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

**CASE I** Retaining Wall:
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- No Surcharge on Wall

IF STAMPED ENGINEERING IS REQUIRED FOR THIS RETAINING WALL:
THIS DESIGN MUST BE STAMPED HERE BY A LICENSED ENGINEER.

### GEOGRID PLACEMENT

**Grid** is measured from the face of the wall.

<table>
<thead>
<tr>
<th>Grid Sq Yd per Ln Ft</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.444</td>
<td>0.889</td>
</tr>
<tr>
<td>0.444</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>0.889</td>
<td>1.917</td>
<td>2.167</td>
</tr>
<tr>
<td>1.000</td>
<td>3.444</td>
<td>4.000</td>
</tr>
</tbody>
</table>

### Grid Type

**Exposed Hgt wo/cap**
- 0'9" / 1'4" / 2'7" / 2'8" / 3'3" / 3'11/" / 4'7" / 5'1" / 5'8" / 6'3" / 6'10" / 7'5" / 7'11/2"

### Amount Buried
- 6" / 6" / 6" / 6" / 6" / 6" / 6" / 7" / 8" / 8" / 9" / 10" / 11"

### Total Hgt wo/cap
- 1.27' / 1.90' / 2.54' / 3.18' / 3.81' / 4.45' / 5.08' / 5.72' / 6.35' / 6.99' / 7.63' / 8.26' / 8.90'

### # Block per Ln Ft
- 1.92 / 2.88 / 3.84 / 4.80 / 5.67 / 6.72 / 7.68 / 8.64 / 9.60 / 10.56 / 11.52 / 12.48 / 13.44

### # Cap per Ln Ft*
- 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680

* See “Material Estimating” for Adhesive estimate.

### CASE J

**“CASE J” Retaining Wall:**
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- 100 psf Surcharge on Wall

**Reinforced Soil Zone**
- Geogrid
- Drain Pipe
- Granular Leveling Pad

**Grid** is measured from the face of the wall.

**Surcharge begins one foot behind wall facing.**

**100 psf Surcharge is light traffic i.e. car or pickup**

<table>
<thead>
<tr>
<th>Grid Sq Yd per Ln Ft</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 7&quot; 8&quot; 8&quot; 9&quot; 10&quot; 11&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Grid Type

**Exposed Hgt wo/cap**
- 0'9" / 1'4" / 2'7" / 2'8" / 3'3" / 3'11/" / 4'7" / 5'1" / 5'8" / 6'3" / 6'10" / 7'5" / 7'11/2"

### Amount Buried
- 6" / 6" / 6" / 6" / 6" / 6" / 6" / 7" / 8" / 8" / 9" / 10" / 11"

### Total Hgt wo/cap
- 1.27' / 1.90' / 2.54' / 3.18' / 3.81' / 4.45' / 5.08' / 5.72' / 6.35' / 6.99' / 7.63' / 8.26' / 8.90'

### # Block per Ln Ft
- 1.92 / 2.88 / 3.84 / 4.80 / 5.67 / 6.72 / 7.68 / 8.64 / 9.60 / 10.56 / 11.52 / 12.48 / 13.44

### # Cap per Ln Ft*
- 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680 / 0.7680

* See “Material Estimating” for Adhesive estimate.
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**CASE K**

“CASE K” Retaining Wall:
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- 250 psf Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

**CASE L**

“CASE L” Retaining Wall:
- Flat Ground at Top of Wall
- 3/1 Slope at Bottom of Wall
- No Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12” (D) x 7-5/8” (H) x 12-1/2” (L)

30 DEGREE SOIL for walls up to 8’
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**CASE M**

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

**CASE N**

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

---

**Reinforced Soil Zone**

- Geogrid
  - SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS
- County Block Standard Dimensions: 12" (D) x 7-5/8" (H) x 12-1/2" (L)

---

**Geogrid Type**

- SRW Universal - or - SRW 3 Series Grid

---

**Exposed Hgt wo/cap**

- 0'9 / 1'4 / 2'7 / 2'8' / 3'3' / 3'11 3 / 4'7 / 5'1 / 5'8 / 6'3 / 6'9 / 7'0 / 7'9 / 8'6 / 9'3 / 10'0 / 10'9 / 10'9

---

**Amount Buried**

- 6' 6' 6' 6' 6' 6' 6' 7' 8' 8' 9' 10' 11'

---

**Total Hgt wo/cap**

- 1.27' 1.90' 2.54' 3.18' 3.81' 4.45' 5.08' 5.72' 6.35' 6.99' 7.63' 8.26'

---

**Grid Sq Yd per Ln Ft**

- 0.00 0.444 0.444 0.444 0.444 0.444 0.444 0.444 0.444 0.444 0.444

---

**Grid total depth**

- 4.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00 4.00

---

**# Block per Ln Ft**

- 1.92 2.88 3.84 4.80 5.67 6.72 7.68 8.64 9.60 10.56 11.52 12.48

---

**# Cap per Ln Ft**

- .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680

---

*See “Material Estimating” for Adhesive estimate.*
CASE O

“CASE O” Retaining Wall:
- Flat Ground at Top of Wall
- 2.5/1 Slope at Bottom of Wall
- No Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

**CASE P**

“CASE P” Retaining Wall:
- Flat Ground at Top of Wall
- 2.5/1 Slope at Bottom of Wall
- 100 psf Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12” (D) x 7-5/8” (H) x 12-1/2” (L)

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**30 DEGREE SOIL** for walls up to 8’
### 30 Degree Soil

For walls up to 8’

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---

**CASE Q**

“CASE Q” Retaining Wall:
- Flat Ground at Top of Wall
- 2.5/1 Slope at Bottom of Wall
- 250 psf Surcharge on Wall

**Geogrid Placement**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest Hgt w/o cap</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Total Hgt w/o cap</td>
<td>1.27”</td>
<td>1.90”</td>
</tr>
<tr>
<td>Grid Sq yd per ln ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>-</td>
<td>4.00</td>
</tr>
<tr>
<td># Blocks per ln ft</td>
<td>1.92</td>
<td>2.88</td>
</tr>
</tbody>
</table>

---

See “Material Estimating” for Adhesive estimate.
**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

### CASE A

- **Geogrid:** SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS
- **County Block Standard Dimensions:** 12” (D) x 7-5/8” (H) x 12-1/2” (L)

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0'9 1/2’</td>
<td>1'4 1/2’</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Total Hgt wo/cap</td>
<td>1.27</td>
<td>1.90</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td># Block per Ln Ft</td>
<td>1.92</td>
<td>2.88</td>
</tr>
</tbody>
</table>

*See “Material Estimating” for Adhesive estimate.

### CASE B

- **Geogrid:** SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS
- **County Block Standard Dimensions:** 12” (D) x 7-5/8” (H) x 12-1/2” (L)

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0'9 1/2’</td>
<td>1'4 1/2’</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Total Hgt wo/cap</td>
<td>1.27</td>
<td>1.90</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td># Block per Ln Ft</td>
<td>1.92</td>
<td>2.88</td>
</tr>
</tbody>
</table>

*See “Material Estimating” for Adhesive estimate.

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**CASE C**

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

| Grid Type | SRW Universal | SRW 3 Series Grid
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0'9&quot;</td>
<td>1'4&quot;</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Total Hgt wo/amp</td>
<td>1.27</td>
<td>1.90</td>
</tr>
<tr>
<td>Grid Sq Yd per Lin Ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td># Block per Lin Ft</td>
<td>1.92</td>
<td>2.88</td>
</tr>
<tr>
<td># Cap per Lin Ft*</td>
<td>.7680</td>
<td>.7680</td>
</tr>
</tbody>
</table>

**CASE D**

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

| Grid Type | SRW Universal | SRW 3 Series Grid
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0'9&quot;</td>
<td>1'4&quot;</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Total Hgt wo/amp</td>
<td>1.27</td>
<td>1.90</td>
</tr>
<tr>
<td>Grid Sq Yd per Lin Ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td># Block per Lin Ft</td>
<td>1.92</td>
<td>2.88</td>
</tr>
<tr>
<td># Cap per Lin Ft*</td>
<td>.7680</td>
<td>.7680</td>
</tr>
</tbody>
</table>

*See "Material Estimating" for Adhesive estimate.*
**CASE E**

*CASE E* Retaining Wall:
- 2/1 Slope at Top of Wall
- Flat Ground at Bottom of Wall
- No Surcharge on Wall

Reinforced Soil Zone
Geogrid
Drain Pipe
Granular Leveling Pad

IF STAMPED ENGINEERING IS REQUIRED FOR THIS RETAINING WALL:
THIS DESIGN MUST BE STAMPED HERE BY A LICENSED ENGINEER.

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geogrid Hgt wo/cap</td>
<td>0'9 1/4</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>-</td>
</tr>
<tr>
<td># Block per Ln Ft</td>
<td>1.92</td>
</tr>
<tr>
<td># Cap per Ln Ft*</td>
<td>.7680</td>
</tr>
</tbody>
</table>

* See “Material Estimating” for Adhesive estimate.

**CASE F**

*CASE F* Retaining Wall:
- Flat Ground at Top of Wall
- 5/1 Slope at Bottom of Wall
- No Surcharge on Wall

Reinforced Soil Zone
Geogrid
Drain Pipe
Granular Leveling Pad

IF STAMPED ENGINEERING IS REQUIRED FOR THIS RETAINING WALL:
THIS DESIGN MUST BE STAMPED HERE BY A LICENSED ENGINEER.

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geogrid Hgt wo/cap</td>
<td>0'9 1/4</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>-</td>
</tr>
<tr>
<td># Block per Ln Ft</td>
<td>1.92</td>
</tr>
<tr>
<td># Cap per Ln Ft*</td>
<td>.7680</td>
</tr>
</tbody>
</table>

* See “Material Estimating” for Adhesive estimate.

Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12” (D) x 7-5/8” (H) x 12-1/2” (L)

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32 DEGREE SOIL for walls up to 8'

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**Geogrid:**
- SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12" (D) x 7-5/8" (H) x 12-1/2" (L)

**CASE G**
"CASE G" Retaining Wall:
- Flat Ground at Top of Wall
- 5/1 Slope at Bottom of Wall
- 100 psf Surcharge on Wall

**Geogrid Placement**
- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

<table>
<thead>
<tr>
<th>Grid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0’9’/5’1’</td>
<td>1’4’/5’1’</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6’6”</td>
<td>6’6”</td>
</tr>
<tr>
<td>Total Hgt wo/cap</td>
<td>1’2’’</td>
<td>1’9’’</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>6’6”</td>
<td>6’6”</td>
</tr>
<tr>
<td># Cap per Ln Ft</td>
<td>7.80’</td>
<td>7.80’</td>
</tr>
</tbody>
</table>

**CASE H**
"CASE H" Retaining Wall:
- Flat Ground at Top of Wall
- 5/1 Slope at Bottom of Wall
- 250 psf Surcharge on Wall

**Geogrid Placement**
- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

<table>
<thead>
<tr>
<th>Grid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0’9’/5’1’</td>
<td>1’4’/5’1’</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6’6”</td>
<td>6’6”</td>
</tr>
<tr>
<td>Total Hgt wo/cap</td>
<td>1’2’’</td>
<td>1’9’’</td>
</tr>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>6’6”</td>
<td>6’6”</td>
</tr>
<tr>
<td># Cap per Ln Ft</td>
<td>7.80’</td>
<td>7.80’</td>
</tr>
</tbody>
</table>

If used without the stamped engineering, the final determination of the suitability of the contemplated use, and its manner of use, are the sole responsibility of the user, and the user expressly releases HTS, SRW, block manufacturer, and retaining wall unit supplier of any and all liability that might arise as a result. These designs have been performed with National Concrete Masonry Association (NCMA) software and have been analyzed for the appropriate factors of safety. © 2012 Hardscape Technical Services • County Block® is a registered trademark of County Materials Corporation.

Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12” (D) x 7-5/8” (H) x 12-1/2” (L)

**CASE I** Retaining Wall:
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- No Surcharge on Wall

If stamped engineering is required for this retaining wall: this design must be stamped here by a licensed engineer.

**Geogrid Placement**
- Grid is measured from the face of the wall.

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount Buried</td>
<td>6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 7&quot; 8&quot; 8&quot; 8&quot; 9&quot;</td>
<td>6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 7&quot; 8&quot; 8&quot; 8&quot; 9&quot;</td>
</tr>
<tr>
<td>Total Hgt/wo/cap</td>
<td>1.27’ 1.90’ 2.54’ 3.18’ 3.81’ 4.45’ 5.08’ 5.72’ 6.35’ 6.99’</td>
<td>9’ 10’ 11’</td>
</tr>
<tr>
<td>Grid Sq Yd per Lin Ft</td>
<td>0.000 0.000 0.000 0.444 0.889 0.889 0.889 1.361 1.528 1.667 2.444 2.667 2.778</td>
<td></td>
</tr>
<tr>
<td>Grid total depth</td>
<td>- - - 4.00 8.00 8.00 8.00 12.25 13.75 15.00 22.00 24.00 25.00</td>
<td></td>
</tr>
<tr>
<td># Block per Lin Ft</td>
<td>3.10 3.20 3.84 4.00 5.67 6.72 7.68 8.64 9.60 10.56 11.52 12.48 13.44</td>
<td></td>
</tr>
<tr>
<td># Cap per Lin Ft *</td>
<td>.7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680</td>
<td></td>
</tr>
</tbody>
</table>

*See "Material Estimating" for Adhesive estimate.

**CASE J** Retaining Wall:
- Flat Ground at Top of Wall
- 4/1 Slope at Bottom of Wall
- 100 psf Surcharge on Wall

If stamped engineering is required for this retaining wall: this design must be stamped here by a licensed engineer.

**Geogrid Placement**
- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
<th>SRW 3 Series Grid ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount Buried</td>
<td>6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 7&quot; 8&quot; 8&quot; 8&quot; 9&quot;</td>
<td>6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 6&quot; 7&quot; 8&quot; 8&quot; 8&quot; 9&quot;</td>
</tr>
<tr>
<td>Total Hgt/wo/cap</td>
<td>1.27’ 1.90’ 2.54’ 3.18’ 3.81’ 4.45’ 5.08’ 5.72’ 6.35’ 6.99’</td>
<td>9’ 10’ 11’</td>
</tr>
<tr>
<td>Grid Sq Yd per Lin Ft</td>
<td>0.000 0.000 0.000 0.444 0.889 0.889 0.889 1.361 1.528 1.667 2.444 2.667 2.778</td>
<td></td>
</tr>
<tr>
<td>Grid total depth</td>
<td>- 4.00 8.00 8.00 8.00 8.00 8.00 12.25 13.75 15.00 22.00 24.00 25.00</td>
<td></td>
</tr>
<tr>
<td># Block per Lin Ft</td>
<td>1.92 2.88 3.84 4.00 5.67 6.72 7.68 8.64 9.60 10.56 11.52 12.48 13.44</td>
<td></td>
</tr>
<tr>
<td># Cap per Lin Ft *</td>
<td>.7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680 .7680</td>
<td></td>
</tr>
</tbody>
</table>

*See "Material Estimating" for Adhesive estimate.
32 DEGREE SOIL for walls up to 8’

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Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12” (D) x 7-5/8” (H) x 12-1/2” (L)

**CASE K**

- “CASE K” Retaining Wall:
  - Flat Ground at Top of Wall
  - 4/1 Slope at Bottom of Wall
  - 250 psf Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

**CASE L**

- “CASE L” Retaining Wall:
  - Flat Ground at Top of Wall
  - 3/1 Slope at Bottom of Wall
  - No Surcharge on Wall

**GEOGRID PLACEMENT**

- Grid is measured from the face of the wall.

---

**CASE K**

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0’9”</td>
</tr>
</tbody>
</table>

| Amount Buried | 6” | 6” | 6” | 6” | 6” | 6” | 7” | 8” | 8” |
| Total Hgt wo/cap | 1.27” | 1.90” | 2.54” | 3.18” | 3.81” | 4.45” | 5.08” | 5.71” | 6.35” | 6.99” |
| Grid Sq Yd per Ln Ft | 0.889 | 1.056 | 1.750 | 1.917 | 2.167 |
| Grid total depth | 4.00 | 4.00 | 9.00 | 12.50 | 17.25 |
| # Block per Ln Ft | 1.92 | 2.88 | 4.80 | 6.72 | 8.64 |
| # Cap per Ln Ft* | 7.680 |

**CASE L**

<table>
<thead>
<tr>
<th>Geogrid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Hgt wo/cap</td>
<td>0’9”</td>
</tr>
</tbody>
</table>

| Amount Buried | 6” | 6” | 6” | 6” | 6” | 6” | 7” | 8” | 8” |
| Total Hgt wo/cap | 1.27” | 1.90” | 2.54” | 3.18” | 3.81” | 4.45” | 5.08” | 5.71” | 6.35” | 6.99” |
| Grid Sq Yd per Ln Ft | 0.889 | 1.056 | 1.750 | 1.917 | 2.167 |
| Grid total depth | 4.00 | 4.00 | 9.00 | 12.50 | 17.25 |
| # Block per Ln Ft | 1.92 | 2.88 | 4.80 | 6.72 | 8.64 |
| # Cap per Ln Ft* | 7.680 |

*See “Material Estimating” for Adhesive estimate.
If used without the stamped engineering, the final determination of the suitability of the contemplated use, and its manner of use, are the sole responsibility of the user, and the user expressly releases HTS, SRW, block manufacturer, and retaining wall unit supplier of any and all liability that might arise as a result. These designs have been performed with National Concrete Masonry Association (NCMA) software.

**CASE M**
- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

**CASE N**
- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

Geogrid: SRW Universal 635 LTDS or SRW 3 Series 1093 LTDS • County Block Standard Dimensions: 12" (D) x 7-5/8" (H) x 12-1/2" (L)

---

32 DEGREE SOIL for walls up to 8'
**CASE O**

**Geogrid Placement**

- Grid is measured from the face of the wall.

<table>
<thead>
<tr>
<th>Grid Type</th>
<th>SRW Universal -</th>
<th>SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Ht wo/asp</td>
<td>0' 9' 6&quot;</td>
<td>6' 9&quot;</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Total Ht wo/asp</td>
<td>1.27'</td>
<td>1.90'</td>
</tr>
<tr>
<td>Grid Sq yd per ln ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>1.92'</td>
<td>3.84'</td>
</tr>
<tr>
<td># block per ln ft</td>
<td>7.680</td>
<td>7.680</td>
</tr>
<tr>
<td># cap per ln ft</td>
<td>7.680</td>
<td>7.680</td>
</tr>
</tbody>
</table>

*See “Material Estimating” for Adhesive estimate.*

---

**CASE P**

**Geogrid Placement**

- Grid is measured from the face of the wall.
- Surcharge begins one foot behind wall facing.
- 100 psf Surcharge is light traffic i.e. car or pickup

<table>
<thead>
<tr>
<th>Grid Type</th>
<th>SRW Universal -</th>
<th>SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Ht wo/asp</td>
<td>0' 9' 6&quot;</td>
<td>6' 9&quot;</td>
</tr>
<tr>
<td>Amount Buried</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>Total Ht wo/asp</td>
<td>1.27'</td>
<td>1.90'</td>
</tr>
<tr>
<td>Grid Sq yd per ln ft</td>
<td>0.000</td>
<td>0.444</td>
</tr>
<tr>
<td>Grid total depth</td>
<td>1.92'</td>
<td>3.84'</td>
</tr>
<tr>
<td># block per ln ft</td>
<td>7.680</td>
<td>7.680</td>
</tr>
<tr>
<td># cap per ln ft</td>
<td>7.680</td>
<td>7.680</td>
</tr>
</tbody>
</table>

*See “Material Estimating” for Adhesive estimate.*
**CASE Q Retaining Wall:**
- Flat Ground at Top of Wall
- 2/1 Slope at Bottom of Wall
- 200 psf Surcharge on Wall

**Grid is measured from the face of the wall.**
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

**CASE Q Retaining Wall:**
- Flat Ground at Top of Wall
- 2/1 Slope at Bottom of Wall
- 250 psf Surcharge on Wall

**Reinforced Soil Zone**
- Geogrid
- Drain Pipe
- Granular Leveling Pad

**Surcharge**
- If stamped engineering is required for this retaining wall:
  - this design must be stamped here by a licensed engineer.

**Geogrid Placement**

- Grid is measured from the face of the wall.
- Surcharge begins two feet behind wall facing.
- 250 psf Surcharge is heavier traffic i.e. RV, large vehicle

**Geogrid Type**
- SRW Universal - or - SRW 3 Series Grid

<table>
<thead>
<tr>
<th>Grid Type</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid Sq Yd per Ln Ft</td>
<td></td>
</tr>
<tr>
<td>0'9/2,5'</td>
<td>0.000</td>
</tr>
<tr>
<td>1'4/5</td>
<td>0.444</td>
</tr>
<tr>
<td>2'2/6</td>
<td>0.472</td>
</tr>
<tr>
<td>3'3/8</td>
<td>1.111</td>
</tr>
<tr>
<td>4'5/8</td>
<td>1.333</td>
</tr>
<tr>
<td>5'5/8</td>
<td>4.111</td>
</tr>
<tr>
<td>6'2/8</td>
<td>4.444</td>
</tr>
<tr>
<td>7'3/8</td>
<td>5.222</td>
</tr>
<tr>
<td>8'8/8</td>
<td>6.944</td>
</tr>
</tbody>
</table>

**Grid Sq Yd per Ln Ft**
- SRW Universal - or - SRW 3 Series Grid

<table>
<thead>
<tr>
<th>Grid Sq Yd per Ln Ft</th>
<th>SRW Universal - or - SRW 3 Series Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'9/2,5'</td>
<td>0.000</td>
</tr>
<tr>
<td>1'4/5</td>
<td>0.444</td>
</tr>
<tr>
<td>2'2/6</td>
<td>0.472</td>
</tr>
<tr>
<td>3'3/8</td>
<td>1.111</td>
</tr>
<tr>
<td>4'5/8</td>
<td>1.333</td>
</tr>
<tr>
<td>5'5/8</td>
<td>4.111</td>
</tr>
<tr>
<td>6'2/8</td>
<td>4.444</td>
</tr>
<tr>
<td>7'3/8</td>
<td>5.222</td>
</tr>
<tr>
<td>8'8/8</td>
<td>6.944</td>
</tr>
</tbody>
</table>

**Grid total depth**
- 4.00 4.00 4.25 10.00 12.00 13.50 22.50 25.50 37.00 40.00 43.00 47.00 62.50

**# Block per Ln Ft**
- 1.92 2.88 3.84 4.80 5.67 6.72 7.68 8.64 9.60 10.56 11.52 12.48 13.44 14.40

**# Cap per Ln Ft**
- 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768 0.768

*See "Material Estimating" for Adhesive estimate.*
section three: INSTALLATION

- block specifications ............................................ C•2
- wall layout, excavation ........................................ C•3
- protection of soils .............................................. C•4
- leveling pad ....................................................... C•5
- first course ....................................................... C•6
- backfill & compacting ......................................... C•7
- stepping & additional courses ............................. C•8
- capping & filter fabric ......................................... C•9
- SRW geogrid ..................................................... C•10-11
- curves ............................................................. C•11-12
- corners ........................................................... C•13-14
- drain pipes ....................................................... C•15
Installation
County Block Standard specifications

COUNTY BLOCK - STANDARD UNIT
DIMENSIONS
- height: 7 5/8"
- width (face): 12 1/2"
- depth: 12"
- face area: 0.6619 sq. ft.
- weight: 50 lbs.

COUNTY BLOCK CORNER UNIT
DIMENSIONS
- height: 7 5/8"
- width: 7 5/8"
- depth: 17 1/2"

COUNTY STRAIGHT CAP
DIMENSIONS
- height: 3 5/8"
- width: 15 1/2"
- depth: 12"
- face area: 0.3933 sq. ft.

COUNTY TAPERED CAP
DIMENSIONS
- height: 3 5/8"
- width 1: 9 3/8"
- width 2: 7 7/8"
- depth: 12"

NOTE: For retaining wall specifics such as construction of columns, stairs, pinning/connecting, splitting, corner blocks, etc. refer to the manufacturer's website or brochure.
section three: INSTALLATION

INSTALLATION

retaining wall layout

- Make sure that all components of the retaining wall and excavation are within property boundaries and construction easements.

- Mark the bottom area of the retaining wall with stakes and/or spray paint. Best practice is to offset stakes 5-10 feet from the proposed wall face so the reference points will stay intact during excavation.

- Measure from the marked area to the edge of the leveling pad and mark with spray paint and/or stakes.

- In a cut situation, measure to the back of the excavation, taking into account the amount of slope and/or benching; determined by OSHA safety requirements and local building codes. Mark this area with spray paint and/or stakes.

excavation

- Minimum leveling pad DEPTH is 6 inches. That is measured from the bottom of the first layer of proposed retaining wall units.

- Minimum leveling pad WIDTH (front to back) is 6 inches in front and 6 inches in back of the proposed retaining wall unit. Example: For a 12 inch deep retaining wall unit, from face to back, the minimum leveling pad width is 2 feet. However, because the unit is not always placed exactly in the middle of the leveling pad, it is recommended that leveling pad be 6” to 12” wider than the minimum requirement.

- The minimum BURIED DEPTH of the first row of retaining wall units is 6 inches. The typical minimum number of units buried for this program is one block. However, on walls with slopes at the bottom of wall the design may call for more than one unit to be buried. See the design tables for the correct buried depth.

- Excavate cuts to a safe slope or benching as determined by OSHA or local building codes.

- Excavate back, from the face of the wall, to the end of the longest SRW geogrid length, as indicated by your design table.

URGENT!
CALL BEFORE you dig!

Before excavation, see the “call before you dig” instructions in Section 1: Planning.
section three: INSTALLATION

INSTALLATION

▷ protection of soils

Suitable moisture content is required to achieve proper compaction. Foundation soils and all fill soils should be protected from rain and freezing during construction. Frozen soils must NOT be used in retaining wall construction.

compact sub base

- Compact the soils under the leveling pad to 95% “Standard Proctor Density” or greater (page D•6).
- If organic soils are encountered they must be removed and replaced with acceptable soils.

base stabilization*

- The purpose of the leveling pad is to provide a level surface to place the first course of units on. More importantly, the leveling pad spreads out the load of the retaining wall units over a larger area. The strength and quality of your retaining wall depends greatly on the strength and quality of your leveling pad materials.
- Over time the sub-base material can migrate into the leveling pad, thus contaminating it and diminishing its structural integrity. Base stabilization fabric (SRW SSS) separates the leveling pad materials from the sub-base materials so that its strength will not be compromised.

* Optional, but recommended.

TIP:

This may, or may not, be the proper time to install the drain pipe (see the drain pipe guidelines on page C•15).
leveling pad

- If possible, start the leveling pad at the lowest elevation of the wall. It is easier to step up than to step down.
- Place well graded gravel or drainage aggregate in the leveling pad trench (see "Excavation" section for minimum leveling pad depths).
- Compact leveling pad to 95% Standard Proctor Density or greater. (page D-6)

screeding leveling pad

- Place screed pipes across the compacted leveling pad (see illustration).
- If a 10 foot screed is used, an 8 - 9 foot separation of screed pipes works well on straight walls. Screed pipes may need to be closer on curves or corners.
- Make sure the top of the screed pipes are at the correct bottom of the proposed block elevation and are level.
- Place the finish leveling pad material. (If more than 1 ½” is required, do the compaction again.)
- Screed the leveling pad material smooth, being careful that the screed pipes stay level and at the correct elevation.
- Repeat the screeding operation for the length of the leveling pad or if the wall steps up, to the first step of the leveling pad.
- Do not walk on or otherwise disturb the leveling pad prior to laying the first course of retaining wall units.
laying first course

- Use steel stakes and a string line to lay out straight sections of the County Block retaining wall.
- String lines should be placed so that they go along the BACK of the block in order to ensure a straight line. As opposed to the rock face surface on County Block retaining wall units.
- If the string line is placed at the correct elevation it can be used to check elevation and side to side levelness of the retaining wall unit.
- For laying out a retaining wall that curves, flexible 3/4” PVC pipe works well (see illustration for staking) (see curve and corner guidelines beginning on page C-11).
- It is very important that the first course of County Block is laid correctly because it will determine the alignment of the rest of the retaining wall. Any deviations will be magnified as the height of the wall increases.
- It is usually best to start at the lowest elevation of the retaining wall. Again, it is easier to step up than to step down.
- If the bottom of the retaining wall unit has lugs, lips, or any other protrusions, use a hammer and chisel to break them off.
- Carefully place the unit on the screeded leveling pad, using the string line (for straight walls) or the flexible PVC pipe (for curved walls) as alignment guides.
- NEVER let the unit touch the string, because if each unit touches the string it will gradually push it out of alignment, which will result in a crooked wall. A good distance from the string is 1/16 - 1/8 inch away.
- Always check the level of the retaining wall units, front to back, side to side, and the elevation in relation to the adjacent units.
section three: INSTALLATION

INSTALLATION

backfill and compacting

- Always backfill and compact in 6 - 8” lifts, as each course of block is installed. Do NOT stack two or more courses and backfill in deeper lifts because it will be difficult, if not impossible, to achieve proper compaction.

- Place the backfill, leaving a minimum of 12 inches of space between the retaining wall unit and the backfill, for the drainage aggregate (1/2” to 3/4” angular gravel with a maximum of 5% fines).

- Compact the backfill to 95% Standard Proctor Density or better. (page D-6)

- Keep heavy compaction equipment at least 3 feet away from the retaining wall units. Lighter, walk-behind compaction equipment can be within the three foot area.

- Compact soil nearest the retaining wall units first, then work toward the back of the excavation.

- Clean out the 12 inch space behind the retaining wall unit with a shovel.

- Place the drainage aggregate behind, in the cores and in between the retaining wall units and compact. (This sequence minimizes the tendency of units to tip forward during the compaction process)

- Drainage aggregate doesn’t take as much force to compact correctly as the backfill material.

- Any backfill placed at the bottom (front) of the retaining wall should be compacted.

- These wall designs are based on loads imposed at completion of project. Care must be taken not to overload the wall during construction, such as with heavy equipment.
section three: INSTALLATION

INSTALLATION

elevation changes (stepping)

- The top of the first course unit will be the elevation of the leveling pad. Add 1/8 - 1/4 inch extra, to allow for a little settlement.
- Make sure the soil is compacted in and around the last several units in the first course.
- Prepare the stepped up leveling pad as previously instructed for base leveling pad.
- Place the first unit of the stepped up course upon the last and second to last unit of the first course (straddling in a half bond fashion).
- Place the second unit of the step up on the last unit of the first course, 1/2 on that unit and 1/2 on the stepped up leveling pad.

» If SRW geogrid is NOT going to be used, continue on to Additional Courses below.

» If SRW geogrid IS going to be used, skip to page C-10 for installation guidelines before continuing on to additional courses.

additional courses

- County Block retaining wall units are connected by pins which align the units, provide unit to unit shear connection, and provide the automatic setback (otherwise known as batter).
- Sweep any drainage aggregate or soil off the top of the retaining wall units.
- Install the pins required by the County Block retaining wall system. The pin is inserted after the upper unit is placed.
- Place the upper unit by straddling the 2 units below in a “half bond” fashion.
- Slide the unit forward, towards the face of the wall, engaging the pin.
- Continue to install each course of retaining wall units; backfill and compact; place drainage aggregate; and core fill to the top of wall elevation.
section three: INSTALLATION

INSTALLATION

capping

- Clean the top of the retaining wall units of all rock, dirt, and dust.
- Place a bead of adhesive (SRW Retaining and Paver Adhesive) around the top of the last retaining wall unit.
- Place the cap on the retaining wall units. Note: A string line can be used to help line up the caps and straighten any waves that may have developed in the retaining wall.

filter fabric*

- Place filter fabric (SRW NW4.5) on top of the backfill; over the drainage aggregate; and up against the top units or caps before placing the top/planting soils.
- It is recommended that the top/planting soils should be an 8 inch layer of impermeable soils.
- The filter fabric will help prohibit the migration of the fines from the planting soil down into the drainage aggregate and out the face of the retaining wall, thus preventing the plugging of the drainage aggregate and staining of the wall face.

* Optional, but recommended.

final steps of building the wall

- When finishing the project make sure that the final grade, both the top and bottom of the wall, are shaped so as to divert any water runoff away from the retaining wall. Protect the planting soil from erosion during heavy rains.
section three: INSTALLATION

INSTALLATION

➤ SRW geogrid

All installation instructions are the same as for gravity retaining walls EXCEPT for the addition of SRW geogrid. SRW geogrid reinforces the soil, thus allowing taller walls to be constructed. SRW Universal and SRW Series 3 SRW geogrids are bi-directional/bi-axial SRW geogrids, meaning the geogrid is the same strength in both directions. Because of that, this geogrid can be either rolled out parallel to the retaining wall or perpendicular to the retaining wall. If the geogrid depths are the same as the roll width, it may be more efficient to roll out the geogrid parallel to the retaining wall. If the geogrid depths called for are different than the roll width or if the wall curves, it is best to roll out the geogrid perpendicular to the retaining wall. (Not all geogrids are bi-axial; Stronger geogrids must be rolled out perpendicular to the retaining wall.)

➤ using SRW geogrid

• SRW geogrid depth is measured from the face of the retaining wall unit, to the back of the reinforced soil.

• Geogrid coverage should be 100%. However, the edges of the geogrid, should NEVER overlap. (See the end of this section for curve and corner SRW geogrid installation procedures.)

• Use your design table(s), found in Section 2 of this guide to determine which course(s) of block to install the geogrid on and how deep it extends into the reinforced soil.

• Place the geogrid as far forward on the retaining wall unit as possible without it showing through the front face of the retaining wall. Make sure that all pins are engaged by the geogrid.

• Lay the geogrid flat from the wall units to the tail of the geogrid. The backfill, drainage aggregate, and core fill should be level with the top of the retaining wall unit and backfill should be as smooth as possible, with no pockets that would create voids under the geogrid.

• Place the next course of block on top of the geogrid and fill the cores with drainage aggregate.

• Pull the geogrid taut, being careful not to pull the units back away from the pin or disturb the alignment of the units. Use landscape staples or stakes to hold the geogrid in place.

➤ continued on next page
INSTALLATION

using SRW geogrid (continued)

- Do not drive or compact directly on the geogrid. A minimum of 6 inches of soil is recommended to cushion the geogrid.
- When backfilling over the geogrid, work the soil from near the retaining wall units toward the tail of the geogrid. When compacting over the geogrid, work from near the retaining wall units toward the tail of the geogrid. This procedure helps keep the geogrid taut.
- See the curve and corner instructions (below), for geogrid placement.

continue building wall

- Continue building the retaining wall by returning to “additional courses” on page C-8.

convex • outside • curves

- To achieve desired curve alignment, use 3/4” flexible PVC pipe to outline the back of your retaining wall unit location. This will give you a guideline to help achieve smooth and accurate curves. If possible, it is best to start building a curve from the center of the curve and work outward in both directions.
- Start at the same location for all additional courses of retaining wall units.
- Because of the batter (unit setback), the bottom course radius will be larger than the radius of the top course. The taller the wall, the larger the bottom course radius needs to be in relation to the top course radius.

convex curve geogrid placement

- Geogrid coverage should be 100% butted together, but NOT overlapped on the retaining wall units.
- The geogrid tail, starting just behind the unit will be overlapped. A minimum of 3 inches of soil must be placed between these overlapping geogrid layers.
section three: INSTALLATION

INSTALLATION

concave • inside • curves

- To achieve desired curve alignment, use 3/4” flexible PVC pipe to outline the back of your retaining wall unit location. This will give you a guideline to help achieve smooth and accurate curves.
- If possible, it is best to start building a curve from the center of the curve and work outward in both directions.
- Start at the same location for all additional courses of units.
- Because of the batter (unit setback) the bottom course radius will be smaller than the radius of the top course. The taller the wall, the smaller the bottom course radius will be in relation to the top course radius.

concave curve
SRW geogrid placement

- Geogrid coverage should be 100% butted together, but NOT overlapped on the retaining wall units.
- There will be a V or pie shaped wedge of soil starting just behind the units which will not be reinforced. To compensate for the unreinforced section, on the next course of retaining wall units, geogrid is placed by centering over the pie shaped wedge of unreinforced soil below.
section three: INSTALLATION

INSTALLATION

outside 90° corner

• Building outside corners requires cutting one side of the Corner unit on each course and alternating the position of the cut block to maintain running bond pattern.

• **First Course:** Lay out the base course and successive courses working from the corners out. Begin by cutting the male side of a County Block Corner unit along the cut line. Make sure the key on the male side is inserted into the notch on the uncut female side. Apply SRW Adhesive to the female notch and male key before connecting them is suggested to help lock the channel together. Position the block on the base material to form a 90-degree corner. Place a County Block unit along the cut side of the Corner unit. Continue installing first course.

• **Second Course:** Cut the female side of a Corner unit along the cut line. Slide the notch over the key of an uncut male side. Position the Corner unit on top of the base row. Place County Block units alongside.

outside corner SRW geogrid placement

• SRW Universal and SRW Series 3 geogrids are bi-directional (same strength in both directions).

• Place the geogrid in the corner so that it goes across the top and towards the front of the units (just far enough so that it will not be seen out of the face of the retaining wall).

• If the geogrid is as wide or wider than the geogrid depth called for in the tables, one layer of SRW geogrid will reinforce the soil in both directions. Other unidirectional SRW geogrids would require an extra layer on the next course in a similar manner as is done on a concave curve.

• If the geogrid is not as wide as the depth called for in the tables, place grid on the next course in the opposite direction to compensate for the lack of proper depth in the layer below.
inside 90° corner

- On the first course, place the face of the first unit of the 90 degree corner at the center of and against the last unit of the wall that the corner is turning from (see illustration).
- On the second course start the corner in the opposite manner with the first unit being laid straddling the 90 degree corner.
- That unit must be set with the same amount of batter (set back) and slid into the corner the same distance as the batter (set back) for each course.
- The 90 degree unit must be placed against the face of the corner unit.
- Repeat the above steps, alternating the corner units so that they are woven together, forming the 90 degree corner.

inside curve geogrid placement

- The first layer of SRW geogrid should extend past the corner a distance which equals the height of the retaining wall divided by 4 (Height of Wall ÷ 4).
- The second layer of geogrid is laid, butting to the 1st layer.
- Per your design table, when the next layer of geogrid is required, that layer of geogrid, on the other leg of the corner, should extend past the corner a distance which equals the height of the retaining wall divided by 4. (Height of wall ÷ 4)
- Continue to alternate the geogrid extending past the corner on every other layer.
section three: INSTALLATION

INSTALLATION

» drainage pipe specifications

- The drain pipe should be a minimum diameter of 4 inches.
- The drain pipe must be sloped in order for gravity to direct the water to an outlet.
- Drain pipe outlets can be under the wall units, through the wall units or out the end of the retaining wall. An outlet must be placed at the lowest point of the retaining wall and a minimum of every 50 feet. The drain pipe must be sloped so water can gravitate out of the pipe.

drain pipe outlet (under/out end)

- Drainage aggregate is used for the leveling pad.
- The drainage aggregate chimney extends down to the leveling pad.
- The drain pipe is placed in the leveling pad directly under the drainage aggregate chimney.
- The outlets are either T’d out under the retaining wall units and daylight out of the slope in front of the retaining wall and/or the drain pipe daylight out of the end of the wall.

drain pipe outlet (through face of wall/out end)

- The leveling pad material can either be well graded gravel or drainage aggregate.
- Impervious soil (soil that water will not pass through such as road-base) is placed over the leveling pad and extends to the back of the excavation; between the units; in the unit cores; and in front of the retaining wall units, up to the finished grade elevation at the bottom (front) of the retaining wall.
- The drain pipe is placed at the bottom of the drainage aggregate chimney. The drain outlets are T’d out the face or out the end of the retaining wall.
- A notch will need to be cut in the bottom of the retaining wall unit for the outlet to exit through.
installation notes:
section four: RESOURCE

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### TOOLS/SUPPLY LIST

### SUPPLIES

#### necessary supplies/tools

- Square Shovel
- Spade Shovel
- 2 Foot Level
- 4 Foot Level
- String Line
- Steel Stakes
- Screed Pipes
- Wheel Barrow
- Rake
- Straight Edge or Screed Board
- Spray Paint
- Rubber Mallet
- Small Sledge Hammer
- Large Sledge Hammer
- Pick
- Diamond Saw
- Compactor 400-500 Lb. Plate
- Caulking Gun
- Flex Pipe for curves
- Snips
- Utility Blade
- Chipping Hammer
- Chalk or Pencil
- Measuring Tape
- Small Tools and Wrenches
- Hearing Protection
- Eye Protection
- Gloves
- Dust Mask
- Hand Compactor
- Garden Hose
- Broom
- Masonry Chisel
- Whisk Broom
- Digital Camera
- Trowel
- Square
- Wall Units and Caps
- SRW geogrid
- Stabilization Fabric

#### optional supplies/tools (for larger projects)

- Laser Level
- Bobcat
- Excavator
- Easy Level Screeding Tools
- Block Carrying Handle
- SRW geogrid Cutting Table
- Wall Unit Guillotine Splitter
- Density Testing Tools
- Diamond Table Saw
- Jumping Jack
- Diamond Grinder
- Concrete Mixer
- Ride on Compactor
- Large Landscape Rake
- 100’ Tape
QUALITY INSPECTION CHECKLIST
SITE QUALITY INSPECTION

This inspection list is a tool that can be used by Owners, Contractors, Inspectors and Engineers as a quality control guide for the retaining wall project prior to and during installation. This list will help assure that construction is in accordance with design tables, installation guidelines and specifications. Not only should the inspection review all aspects of the structural quality but also the quality of the aesthetics of the project. It is recommended that photos are taken to document the project from start to finish. The photos should be taken at each step of the project as follows:

1. Trench for leveling pad
2. Leveling pad completion
3. At each course of block
4. At each layer of compacted backfill
5. At each layer of installed geogrid
6. The finished project

The following checklists are a tool to help assure that all aspects of the retaining wall project are properly performed. Not all items in this check list will be applicable for all projects.

» PRIOR TO CONSTRUCTION
VERIFY
☐ Site design drawings and specification documents
☐ Utility location details
☐ Site elevation grading details
☐ List of project products and attached specifications
☐ Qualified engineered stamped designed package
☐ During construction site water control plan

» GENERAL EXCAVATION
☐ Locate and mark all utilities, etc. before starting excavation
☐ Call local gas companies before excavation
☐ Excavation of base leveling pad and wall reinforced zone meets construction drawings and specifications
☐ Excavated back-cut has been terraced to follow engineer specifications or in accordance to OSHA requirements (site specific exceptions may apply if approved by engineer)
☐ All water issues that have been uncovered due to excavation for the wall have been addressed and taken care of.

» SITE SURVEY
☐ Locations and elevations of all stakes should match construction drawings
☐ Each base elevation change should have corresponding stake
☐ Foundation soils should match or exceed design assumed types and strengths
☐ Retained soils should match or exceed design assumed types and strengths
☐ Site soils should not be frozen
☐ Wall heights do not exceed design
☐ Slopes above and below wall do not exceed design
☐ Loading should not exceed design
☐ Site water conditions should match the design

» FOUNDATION SOILS AND PREPARATION
☐ The sub-grade soils meet the minimum requirements as by the specified soil type.
☐ Any sub-grade soils that are unsuitable have been removed and replaced.
☐ The replaced or disturbed sub-grade soils must be compacted to 95% Standard Proctor Density.
☐ All changes have been documented and noted on the construction drawings
# Quality Inspection Checklist

**Site Quality Inspection**

## Base Leveling Pad
- Base leveling pad gravel is as specified in installation guidelines.
- The base leveling pad depth and width is in accordance with installation guidelines.
- The compaction density meets the requirements of the specifications.
- The base leveling pad is level horizontally and back to front.
- The minimum burial depth of the base leveling pad at each elevation base change and the location meet construction drawings.
- The base stabilization fabrics installation is in accordance to the installation guidelines.

## Drainage/Unit Infill
- Drainage gravel should be 1/2 to 3/4 inch clear crushed gravel with no fines.
- Clear crushed gravel should be filled into all unit voids and a minimum of 12 inches behind the units.
- Unit voids should be filled no more than one (1) course at a time.
- Perforated drainage pipe (if needed) should be sloped properly and daylight at proper intervals.

## Geosynthetic Reinforcements
- All reinforcements should be placed in the correct orientation.
- Reinforcements should be placed at the proper horizontal levels in the wall.
- Reinforcements should be of correct length as shown on design.
- Reinforcements should be properly connected to the units.
- Reinforcements should be properly tensioned before backfilling retained soils.
- Equipment should not be driven on the reinforcement.
- Reinforcements installed in curves, corners or other special applications should follow the design details or per geosynthetic manufacturer’s specification.

## Geosynthetic Fabrics
- Geosynthetic fabrics should be used per installation guidelines.

## Block Units
- The delivered and installed units are the same as indicated on the construction drawings and specifications. The unit size, color, and dimension tolerances meet or exceed the minimum requirements.
- Units are level side to side and front to back.
- Units are placed tightly to each other.
- Units setback and alignment should be checked and corrected on each row.
- All units are sound and free of cracks or other defects.
- All unit pins should be properly engaged.

## Reinforced Soils
- Soils should not be frozen.
- Soils should be at ultimate moisture (not too dry or too wet).
- Soils should be compacted in lifts not greater than 6-8 inches and to 95% Standard Proctor or greater.
- Soils on SRW geogrid layers should be flat and level to the top of the units.
- Soils should be placed and compacted to 95% Standard Proctor at the front or top of wall to the design wall burial depth.

## Top of Wall Units
- Cap units as per design.
- Capping units should be adhered to the top row of units using SRW adhesives and with adequate surface adhesive coverage.

## Above and Below Wall Finish Grading
- Final grades should meet design plans heights and tolerance.
- All grades, slope lengths and drainage swales should be in accordance to the design.
- Temporary erosion controls should be in place until final surface treatments have been established.

## Base Leveling Pad
- Base leveling pad gravel is as specified in installation guidelines.
- The base leveling pad depth and width is in accordance with installation guidelines.
- The compaction density meets the requirements of the specifications.
- The base leveling pad is level horizontally and back to front.
- The minimum burial depth of the base leveling pad at each elevation base change and the location meet construction drawings.
- The base stabilization fabrics installation is in accordance to the installation guidelines.
GENERAL INFORMATION ABOUT COMPACTION

SOIL COMPACTION

Compaction increases the density or unit weight of the soil, mechanically forcing air and water out of spaces between soil particles. Soils that are well-compacted will be able to support heavy loads without settling. This load bearing capacity is necessary to support sub-soils, base leveling pads, and backfill materials. High density soil compaction is critical for long term support for the weight of the wall, and any structures above the wall such as parking lots, roads, storage yards, and buildings.

factors influencing soil density

TO REACH THE ACCEPTABLE DENSITY LEVEL:

- Soils must have the correct compaction potential. Some soils will never reach acceptable levels, and others will need a lot of compaction energy to meet the required standard.
- The moisture content determines how well the soil compacts. Soils with the correct amount of moisture need less compaction energy.
- The type of machinery to compact the soil varies to accommodate different soil types and the scale of the project. The most effective mechanical compaction methods are ramming and vibration.
- The rate at which a compaction machine can compact the soil depends on the balance between the height it achieves, and the speed it can repeat the action. Compaction machines have ratings which indicate the height (amplitude) and speed (frequency) of operation to achieve optimum compaction density. This rating can vary depending on the type of machine and the kind of soil or conditions.
- When the soil is near or at maximum density, the compaction machine’s amplitude (the height it jumps) increases, giving a good visual indication of completion.

choosing the proper compaction equipment

VIBRATION: Machines such as vibratory plate or vibratory roller compactors are best used to compact granular (gravel and/or sands) soils. Vibratory plate or vibratory roller compactors have high frequency and low amplitude. These soils have little or no cohesion and can be best compacted through vibration.

RAM/IMPACT: Machines such as ramming plate compactors, jumping jacks, ramming rollers with or without sheepfoot protrusions are best used to compact cohesive (clay) soils. Ram/Impact machines have low frequency and high amplitude.

note:

When granular and clay soils are mixed, the machine used should be suitable for the soil that represents the largest percentage of the combined material.
compaction and lift heights
Soils are compacted into layers called lifts. The depth of the lift should not be greater than the compaction machine can handle. Loose soil is placed in these lifts or layers, compacted, and then another layer of loose soil is added. These steps continue until all the backfill materials have been compacted to finished grade.

Compaction starts from the bottom of the lift and gradually works its way to the surface where the machine is riding. The impact wave from the machine travels through the soil, down to the hard surface of the preceding lift, and then returns upward, setting the particles in motion. As the soil becomes compacted, the impact has a shorter distance to travel so that more force returns to the machine, making the machine bounce higher off of the ground. The deeper the lift of the soil, the longer it will take to compact the materials to the correct compaction density.

Each type of soil has a different lift-depth ratio for maximum compaction, and the machines have a wide range of lift-height capabilities. Ask your compaction machinery dealer for the correct specifications on the machines available for your project.

soil testing for compaction
The most common testing procedures for measuring density of soils:

- **STANDARD PROCTOR TEST**
- **MODIFIED PROCTOR TEST**

These tests determine the maximum density and optimum moisture content ratings for a particular type of soil or soil mixture.

The on-site Nuclear Test is the most accurate way of testing the soil density and moisture content after compaction. In the Nuclear Test, a hand-held Geiger probe using gamma rays from a radioactive source is inserted into the soil.

**standard proctor test**
The Standard Proctor Test is performed in a laboratory on a soil sample from the job site. This sample is divided into three layers, receiving 25 blows per layer. After the wet weight/cubic foot reading is recorded, the sample is then oven-dried for 12 hours to establish the water content.

**modified proctor test**
The Modified Proctor Test is the same as the Standard Proctor Test, but adds more weight and height to the instrument delivering the blows and increases the layers to five. This test is usually required when testing soils for high-shear strength to support heavier loads.
TIPS FOR WATER MANAGEMENT
DURING & AFTER CONSTRUCTION
WATER MANAGEMENT

Water in some form is a factor in a high percentage of retaining wall problems. Water can impart an addition lateral load of as high as 1.5 to 2 times greater than that of soil alone. It is important to identify possible water sources that may affect your retaining wall. Possible water sources may be surface water or runoff, ground water seeping out of the retained soil, or ground water percolating up from the foundation soil. Ground water seeping out of the retained soil or ground water percolating up from the foundation soil will require site specific engineering. External water in the form of ponds or streams in contact with the retaining wall will require site specific engineering as well. Some tips for water management during construction and for finished retaining wall configuration are as follows:

during construction
1. Soil must have the proper moisture content for compactability.
2. At the end of each day, shape the backfill so that water has to run off and will not be allowed to sit and soak in.
3. Depending on the soil type, it may be necessary to cover the backfill soil, both already placed and to be placed, to keep it from becoming saturated in the event of rain.
4. A perforated PVC drain pipe should be placed at the bottom of the 1 foot of drainage aggregate that is just behind the retaining wall units. The drain pipe must be a minimum of 4” in diameter with the perforated holes in the up position.
5. The drain pipe should be sloped such that the water can drain out of the pipe. Water can be drained out at the end of the retaining wall or if the wall is long enough, out the face of the wall. Outlets should be placed at the lowest point of the drainage system and must be a minimum of 50’ apart.

after construction
1. Grading at the top of wall should be shaped so as to divert any surface water or runoff away from the retaining wall.
2. A swale could be placed at the top of wall just behind the block that will channel the surface water or runoff away from the retaining wall.
3. If a swale is used, 8” of impermeable soil beneath the swale will keep the water exiting the retaining wall area from seeping down into the reinforced soil mass.

note:
The above water management suggestions are minimal requirements for water management.

<table>
<thead>
<tr>
<th>DRAINAGE AGGREGATE GRADATION</th>
<th>SIEVE SIZE</th>
<th>% PASSING</th>
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<tr>
<td>1 inch</td>
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</tr>
<tr>
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<tr>
<td>No. 200</td>
<td>0-5</td>
<td></td>
</tr>
</tbody>
</table>
Aggregates • Sand, gravel, or crushed rock used in the leveling pad, drainage behind and in the unit cores, concrete or backfill.

Amplitude • The vertical vibration of a roller or plate compactor.

Aspect Ratio • The length ratio of SRW geogrid reinforcing to the height of the wall for an SRW wall system (minimum .6H).

ASTM • The American Society of Testing and Materials is an international standards developing organization that develops and publishes voluntary technical standards for a wide range of materials, products, systems, and services.

Backfill • Gravel or other material used to replace material removed during construction behind retaining walls.

Backslope • The non-horizontal finish grade of soils behind a wall; typically expressed as horizontal distance to vertical height (H:V backslope); used in engineering calculations, backslope increases the design load on a wall.

Base Course • The base course is the first layer of retaining wall units placed on the leveling pad.

Base Stabilization Fabric • Stabilization fabrics provide a rugged separation layer between aggregate and subgrade. A fabric that provides a separation between two different types of soils, acts as a soil separator and provides structural stability to the gravel leveling pad.

Batter or Setback • A facing angle created by SRW unit setback, measured from a vertical line drawn from the toe of the wall. Batter can be expressed either in degrees or ratio of vertical to horizontal. A leaning of the wall face towards the retained fill is considered a positive batter, while an outward lean is considered a negative batter. Typical batter angles are 3 degrees to 15 degrees from vertical, sloping toward the infill soil. Batter is often built into a wall by off-setting (or “setting back”) successive courses of a wall by a specified amount.

Bearing Capacity • The pressure that a soil can sustain without failing.

Bidirectional or Biaxial SRW geogrid • SRW geogrid that provides the same tensile strength in two directions.

Bond or Half Bond • Blocks laid so that the top block overlaps the bottom block by half of its length.

Burial Depth • (Refer to Embedment Depth.)

Clay • Clay is made of fines with putty like properties and is sticky when wet. Clay soils can be very strong when in a dry state.

Cohesive Soils • Clay or soil with a high clay content, which has cohesive strength. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Compaction • Densification of soil by mechanical means, involving the expulsion of excess air. It is important to compact foundation and backfill soils to prevent future wall movement. Compaction is often accomplished using a hand tamper or a vibratory-plate compactor.

Concave Curves • When facing the wall, a curve that bends toward the viewer like the interior of a sphere.

Concrete Adhesive • A glue used to adhere concrete to concrete such as caps to wall units.

Convex Curves • When facing the wall, a curve that bends away from the viewer like the exterior of a sphere.

Course • A horizontal layer of retaining wall units.

Clear Crush Drain Gravel or Drainage Aggregate • Well-graded crushed aggregates with rock size of 1/2 inch to 3/4 inch that have no fines. This material is used in the hollow core of retaining wall blocks and directly behind the wall.

CSA • Canadian Standards Association

Cut Line • Limit of excavation behind the retaining wall.

Dead Load • An inert, inactive load, primarily due to the structure’s own weight.

Density • The weight of a concrete unit or compacted soil compared to the unit volume which is expressed as lbs/cubic feet (kg/m³)
section four: RESOURCE

Glossary

**Drain Pipe** • (Refer to *Perforated Drain Pipe*.)

**Drainage System or Chimney** • The band of vertical, clear crushed gravel, usually 12 inches wide, behind the retaining wall or in the hollow core, that allows water to flow down freely from the surface to the base of the wall to be carried away by the drainage system.

**Embedment or Burial Depth** • The primary benefit of wall embedment is to ensure the SRW is not undermined by erosion of the soil in front of the wall. Increasing the depth of embedment also provides greater stability when site conditions include weak bearing capacity of underlying soils, steep slopes near the toe of the wall, potential scour at the toe (particularly in waterfront or submerged applications), seasonal soil volume changes, or seismic loads.

**Excavation** • The process of removing soils for the installation of the leveling pad and the backfill reinforced zone of a retaining wall.

**Facing** • A generic term given to the face or unit of a retaining wall, used for aesthetic purposes and to prevent the backfill soil from escaping out from between the rows of reinforcement.

**Filter Fabric** • A textile-like material used in soil drainage. It is usually non-woven or spunbond material.

**Fines** • Silt and/or clay-sized particles.

**Foundation Soils** • The portion of soils below the leveling pad and reinforced soil zone that distributes pressure of the retaining wall bearing weight.

**Frequency** • The number of cycles per minute at which a roller or plate vibrator vibrates at (Hertz)

**Friction Angle (Phi)** • A measure of the shear resistance of a soil due to the interlocking of soil grains and the resistance to sliding between the grains.

**SRW geogrid/Geosynthetic Reinforcement** • A textile like material used in soil reinforcement along with soil, rock, earth, or other geotechnical engineering related material as an integral part of a man-made project, structure or system. It is usually comprised of polyester, polyethylene, or polypropylene.

**Global Stability** • Resistance to overall mass movement of the SRW system in a circular mode. Global stability may be a problem for tiered walls, walls with weak foundation soils and walls with a slope at the top or bottom. The factor of safety against an overall failure of a retaining wall or slope along a deep-seated slip surface passing beneath and behind a structure.

**Gradation** • A soil sample that passes through a specified sieve size range which is expressed in percentage of the mass.

**Grade, Finished** • The completed surfaces or elevation of lawns, walks and roads brought to grades as designed above or below the wall.

**Gravel or Granular Soil** • Granular material or soil made of gravel or sand that does not stick together and can pass through a No. 4 sieve.

**Gravity Wall** • A retaining wall without soil reinforcement where unit weight alone provides resistance to earth pressures. Gravity walls are generally less than three feet in height and do not support slopes or other loads above the walls.

**Groundwater** • Generally, all water that is underground as opposed to on the surface of the ground. Usually refers to water in the saturated zone below the water table.

**Height, Total Wall** • The vertically measured height of a retaining wall; includes the portion of the wall extending below the ground surface in front of the wall (subgrade).

**Hollow Core** • A hollow portion inside the block...
that provides engineering design flexibility.

- Impermeable Materials or Soils • Materials or soils through which water cannot pass such as clay.

- Infill • Soil located behind the SRW units and drainage fill. May be reinforced with soil reinforcement.

- Interlock • The transfer of force between one retaining wall unit to another by means of weight or mechanical connection. This resistant is measured by lbs/sq. ft.

- Leveling Pad • The leveling pad is a level surface, consisting of crushed stone or unreinforced concrete, which distributes the weight of the SRW units over a wider area and provides a working surface during construction. The leveling pad typically extends at least 6 in. (152 mm) from the toe and heel of the lowermost SRW unit and is at least 6 in. (152 mm) thick.

- Lift • A layer of soil or depth between each compaction process. All compaction equipment has a rate or lift depth at which it can achieve proper soil density. A lift height is typically 6 to 8 inches and should be no more than eight inches.

- Live Load • The weight of all non-permanent objects on top of a retaining wall such as vehicles or movable storage items or snow. Live load does not include wind or seismic loading.

- Long Term Design Strength (LTDS) • The allowable strength in the soil reinforcement at the end of the service life of the soil-reinforcement SRW. It is taken into account in the design process.

- Moisture Content • The amount of water that soils contain is moisture content. This is measured in % of water to weight of compacted soil.

- NCMA • (National Concrete Masonry Association) Creators of retaining wall design software called NCMA SRWall that is a standard for the segmental retaining wall industry.

- Negative Slope • A slope that has an elevation lower than the bottom or toe of the wall.

- Nuclear Density Testing • A method or equipment used to accurately test the density/moisture of compacted soils.

- Optimum Moisture Content • The ideal level of moisture present so that soil can be compacted to its maximum density.

- Organic Materials • Spongy soils, usually made from vegetative matter, that are not suitable for construction use.

- Orientation of SRW geogrid • For unidirectional geogrid, correct alignment of geogrid to wall face. A geogrid’s direction of strength should be perpendicular to the wall.

- Padfoot or Sheepsfoot • A roller vibrator that has knob-like protrusions on the drum surface that aids in compacting clayey soils to proper density.

- Permeable • The ability of materials, soils or a retaining wall unit to allow water to pass through it.

- Perforated Drain Pipe • Flexible or rigid pipe with holes that water can penetrate and drain into.

- Plate Compactor • A vibrator plate that is used to compact sand or gravels.

- Positive Slope • A slope that has an elevation higher than the top of the wall.

- PVC Flexible Pipe • Flexible pipe (3/4 inch), made of plastic or PVC. Used as a guide for curvature of base wall units.

- Reinforced Backfill Materials or Fill • Compacted structural fill used behind soil-reinforced SRW units which contains horizontal soil reinforcement.

- Retained Soil • Retained soil is the undisturbed soil for cut walls or the common backfill soil compacted behind infill or reinforced backfill soils.

- Reinforced Soil Zone • The area behind the SRW wall that is reinforced by SRW geogrid or other reinforcing systems.
RETAINING WALL TERMINOLOGY
GLOSSARY

• S •

Sand • Granular material passing through a No. 4 sieve but is predominantly retained on a No. 200 sieve.

Screed • Process of leveling a gravel leveling pad utilizing a straight edge pulled across set screed pipes.

Screed Board or Straight Edge • A straight board or aluminum straight edge that is pulled across set screed pipes to level the gravel leveling pad.

Screed Pipes • Steel pipes that are placed level across the gravel leveling pad when a straight edge is drawn across to level the leveling pad.

Segmental Retaining Wall (SRW) • A retaining wall, normally comprised of soil or aggregates stabilized by horizontal layers of reinforcement such as SRW geogrids. The facing for such walls generally consists of dry cast concrete blocks. Which are placed without the use of mortar (dry stacked), and which rely on a combination of mechanical interlock and mass to prevent overturning and sliding. By industry convention, SRW walls have face inclinations of 70 to 90 degrees (near vertical). SRW slopes have inclinations of 70 degrees or less.

Setback • The distance that each course is aligned behind the preceding (lower) course.

Shear Capacity • All SRW units provide a means of transferring lateral forces from one course to the next. Shear capacity provides lateral stability for this mortarless wall system.

Silt • Clay or sandy soil particles that pass through the No. 200 sieve (US Standard).

Soil Separation Fabric • Separation fabrics serve as a barrier between fine grain soils and load-distributing aggregate fill material to keep different types of soils from migrating.

SRW - (Refer to Segmental Retaining Wall.)

Standard Proctor Density • A test that determines the maximum dry density (typically 95%) for specific soil types. Specified compaction densities for fills are often based on a percentage of Standard Proctor for a specific moisture content.

Sub-base or Subgrade • The soil below the base leveling pad of a retaining wall.

Sub-Base Leveling Trench • Trench that contains crushed stone, concrete etc. to create leveling pad.

Surcharge • Weight or load acting in, on, or near a retaining wall that impacts its ability to perform. A roadway or building foundation can be a surcharge. Surcharge loads must be included in the design and engineering of retaining walls.

Swale • A small ditch or depression formed on top and behind the SRW system to collect water and carry it away.

• T •

Tensile Strength • The ability of a material to withstand tension; a term often used as an abbreviation for ultimate tensile stress. It is much higher than the greatest safe stress.

Tiered or Terraced Walls • Two or more stacked walls with each upper wall set back from the underlying wall. Tiered wall designs should be reviewed by a qualified engineer.

Toe of Wall • Front, base portion of a retaining wall.

• U •

Uniaxial or Unidirectional • Having one direction; or relating to or affecting one axis. Having tensile strength in one direction only.

• W •

Well Graded Gravel (GW) • Aggregate materials that have a full range of sizes from dust to the largest rock.
Resource Notes
# Request Form: HTS Stamped Engineering for 8’ & Under Retaining Walls

## General Wall Information

1. **Project Name**
   - Property Address
   - Property Owner
   - Property Phone

2. **Installer/Company**
   - Contacts Name
   - Address
   - City, State, Zip
   - Phone and Fax
   - Contacts Email

3. **General Wall Information**

   - **What block do you plan to use?**

   - **What geogrid do you plan to use?**

   - **Company buying materials from?**

   - **Maximum exposed wall height(ft):**

   - **Is this wall project multi-tiered or terraced?**
     - [ ] YES (Please check page I•2 for multi-tier program specs.)
     - [ ] NO

4. **Slope Information**

   - **Will there be a slope at the TOP of the finished wall? (Ex: 2 horizontal to 1 vertical; aka 2/1)**
     - [ ] YES
     - [ ] NO
     - If YES, what is the angle of slope? ___________

   - **Is the slope rise the same or greater than 2x’s the height of the wall?**
     - (This is the elevation change from top of wall to top of slope. See figure 1 above.)
     - [ ] YES
     - [ ] NO
     - If NO, what is the slope height(ft)? ___________

   - **Will there be a slope at the BOTTOM of the finished wall? (Ex: 2 horizontal to 1 vertical; aka 2/1)**
     - [ ] YES
     - [ ] NO
     - If YES, what is the angle of slope? ___________

5. **Surcharge (Load) Information**

   - **Indicate type of surcharge (load) on top of the wall:**
     - [ ] Lawn/Grass
     - [ ] Light auto parking/drive (car)
     - [ ] Heavy vehicle parking/drive (RV)

   - **Is there any surcharge close to the wall (within a distance of 2x’s the walls height)?**
     - [ ] NO
     - [ ] YES
     - Type of load:__________________ Distance from wall(ft): ___________

6. **Soils Information**

   - **Is there a recent soils report available?**
     - [ ] YES (Include soils report with this request)
     - [ ] NO (See manual page A•10 Soil Sampling Instructions)

---

**Confused? refer to your HTS manual “section one: PLANNING”**

---

Note: Continues on back side
Continued from front side

**5 other proposed project / site variables**

Is there any type (steel, wood, PVC) of fence going on top of the wall?

- YES
- NO

Are there utilities, or anything else needing to go through the facing or reinforced soil?

- YES
- NO

**Additional Notes:**


**6 send final stamped engineering to**

- Send to Installer address

| Attention |  |
| Company |  |
| Address |  |
| City, State, Zip |  |
| Phone and Fax |  |
| Contacts Email |  |

**7 purchasing information**

(Optional: To better serve our dealers/customers)

Where do you plan on purchasing the materials for this project?

If known, what company manufactured the block you will be using?

How did you hear about HTS?


**8 payment information**

(HTS accepts the following credit cards or checks)

- VISA
- MASTERCARD
- Business
- Personal

| Account Number |  |
| Exp Date | CID (3-digits on back) |
| Name on Card |  |
| Billing Address |  |
| City, State, Zip |  |

**PLEASE FILL OUT ALL ITEMS ON THIS FORM:** By submitting and signing this form I certify that the information provided herein is accurate and correct. HTS will forward all required information to a licensed and registered engineer in the state of the project. If any site conditions change (e.g. water seepage, soil changes, surcharge changes, or height changes etc.), are encountered, construction of retaining wall must be stopped and Hardscape Technical Services informed of the new conditions before placing ANY retaining wall units. It can then be determined if the stamped designs are appropriate or if changes are required. If your local building authorities accept stamped engineering documentation in a fax or email format, the turnaround time is estimated to be no longer than five working days from the day that Hardscape Technical Services receives ALL the required information (including payment). If embossed (raised) stamping is required by your local building authorities, add the necessary time to return the stamped engineering by means other than electronic.

Information Supplied By:

Signature and Date:

---

**checklist:**

- For quicker turnaround, make sure form is complete and accurate.
- Complete plans or sketches of site and proposed wall
- Take photos of wall site
- If needed, determine slope
- Get soils report or take sampling of soil
- Is raised stamping required by local authorities? Yes
- Include with Request Form:
  - Plans or sketches
  - Photos of wall site
  - Soil report or sampling
  - Payment information

Send to:
HTS
PO Box 369
Princeton, MN 55371

Phone: 866-582-0894
hts@hardscapetech.com

Need more information:
www.hardscapetech.com
HTS - Hardscape Technical Service

IS HERE TO HELP!

This manual is the “Missing Link” for planning, designing, obtaining stamped engineering, and step-by-step installation guidelines for your retaining wall project!

PRODUCT IDENTIFICATION

Use the product descriptions below to help identify materials, and/or to ensure your customers of the quality construction process you will be using.

About SRW Geogrid

SRW Universal and Series 3 Geogrids are a bi-directional/biaxial geogrids, meaning they provide the same tensile strength in two directions and can be installed either perpendicular or parallel to the block. They are composed of high molecular weight, high tenacity multifilament polyester yarns that are woven into a stable network placed under tension. The high strength polyester yarns are coated with a PVC material.

<table>
<thead>
<tr>
<th>Grid Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture Size (Average)</td>
<td>.75” x .75”</td>
</tr>
<tr>
<td>Creep Limited Strength</td>
<td>769</td>
</tr>
<tr>
<td>Wide Width Tensile</td>
<td>1200</td>
</tr>
<tr>
<td>Long Term Design</td>
<td></td>
</tr>
<tr>
<td>Strength (LTDS)</td>
<td>688</td>
</tr>
</tbody>
</table>

About SRW Fabrics

SRW fabrics offer optimum performance when used in stabilization and drainage applications. Produced from quality raw materials, they provide the perfect balance of strength and separation, functioning exceptionally in a wide range of performance requirements. SRW SS5 meets AASHTO M288-92 requirements for Class A and B Subsurface Drainage, Class A and B Erosion Control and Medium Survivability Separation Fabrics.

<table>
<thead>
<tr>
<th>Fabric Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Weight (Typical)</td>
<td>4 oz</td>
</tr>
<tr>
<td>Grab Tensile</td>
<td>200 lbs</td>
</tr>
<tr>
<td>Mullen Burst</td>
<td>400 psi</td>
</tr>
<tr>
<td>Permittivity</td>
<td>.05 sec⁻¹</td>
</tr>
</tbody>
</table>

SRW SS5 Stabilization Fabric

<table>
<thead>
<tr>
<th>Fabric Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (Typical)</td>
<td>4.2 oz</td>
</tr>
<tr>
<td>Grab Tensile</td>
<td>120 lbs</td>
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<tr>
<td>Mullen Burst</td>
<td>240 psi</td>
</tr>
<tr>
<td>Water Flow Rate</td>
<td>135 gpm/sq ft</td>
</tr>
</tbody>
</table>

*Specifications current at time of printing. Visit www.SRWproducts.com or call 1-800-752-9326

HTS WEBSITE | WWW.HARDSCAPETECH.COM

By simply logging onto our website, you will have access to a time-saving material estimating spreadsheet, which eliminates most hand calculations. The materials that will be addressed in this estimating spreadsheet will be the retaining wall unit, the cap, adhesive, leveling pad materials, drainage aggregate, soil stabilization fabric, filter fabric and geogrid.
Step-by-step instructions for material estimating.

Installation methods to help your job go smoothly.

Helpful tips & techniques.

THE MOST COMPLETE GUIDE to PLANNING, BIDDING, ENGINEERING & BUILDING

8 Feet & Under Retaining Walls

INCLUDED IN THIS BOOK

HOW TO CALCULATE THE COST OF YOUR RETAINING WALL
MATERIAL ESTIMATING

step 5 - LEVELING PAD MATERIALS
a. Multiply the linear feet of the wall section by 1.5 to determine the number of cubic yards of leveling pad materials needed.

b. Divide the number of cubic yards by 27 to determine the number of cubic feet of leveling pad materials.

c. To determine the number of cubic feet of drainage aggregate needed, multiply the number of cubic feet of leveling pad materials by 1.0846.

d. Divide the number of cubic feet of drainage aggregate by 27 to determine the number of cubic yards of drainage aggregate needed.

step 6 - DRAINAGE AGGREGATE
a. Multiply the linear feet of the wall section by 1.5 to determine the number of cubic yards of drainage aggregate needed.

b. Divide the number of cubic yards by 27 to determine the number of cubic feet of drainage aggregate needed.

step 7 - SOIL STABILIZATION FABRIC
a. Multiply the linear feet of the wall section by 0.02 to determine the number of linear feet of soil stabilization fabric needed.

b. Divide the number of linear feet of soil stabilization fabric by 12 to determine the number of rolls of soil stabilization fabric needed.

section one: PLANNING

section two: DESIGN TABLES

section three: INSTALLATION

installation

geogrid

All geogrid instructions and information in this manual are based on standard SRW geogrid placement. Geogrid instructions are provided for all SRW geogrid types, including those that are bi-axial or bi-directional. Geogrid should be placed in a manner that allows for the best possible soil stabilization, taking into consideration the type of soil and the specific requirements of your project.

using geogrid

Geogrid should be placed on the back of the retaining wall unit and should be laid flat against the back of the reinforced soil. The use of geogrids should be determined by the geotechnical analysis of the soil conditions and the design of the retaining wall.

CASE B - GEOGRID PLACEMENT

Geogrid should be placed on the back of the retaining wall unit and should be laid flat against the back of the reinforced soil. The use of geogrids should be determined by the geotechnical analysis of the soil conditions and the design of the retaining wall.

Evolving Retaining Walls

www.hardscapetech.com

Log onto the HTS website for a time-saving material estimating spreadsheet and wall ideas.

www.hardscapetech.com | 1-866-582-0894

26 DEGREE SOIL for walls up to 8'