# MaxiForce™ Rectangular Fixed Steel Bollard Installation Schedule

## Various Design Loads at 18" Impact Height

### Engineered Anchorage System for MaxiForce™ 3 x 6 Rectangular Steel Bollard

<table>
<thead>
<tr>
<th>Soil Lateral Bearing / Bearing Pressure</th>
<th>Design Load (lbs.)</th>
<th>Concrete Pier Diameter (in.)</th>
<th>Concrete Pier Height (in.)</th>
<th>Concrete Pier Reinforcing</th>
<th>Bollard Embedment at Concrete Pier</th>
<th>Concrete Grade Beam Depth (in.)</th>
<th>Concrete Grade Beam Width (In.)</th>
<th>Concrete Grade Beam Reinforcing</th>
<th>Longitudinal</th>
<th>Stirrups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Footing Option</td>
<td>Continuous Footing Option</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>225 psf/lf / 2,000 psf</td>
<td>3,000</td>
<td>18</td>
<td>38</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>24</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>225 psf/lf / 2,000 psf</td>
<td>3,750</td>
<td>18</td>
<td>40</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>26</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>418 psf/lf / 3,500 psf</td>
<td>6,000</td>
<td>18</td>
<td>38</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>26</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>200 psf/lf / 2,000 psf</td>
<td>6,000</td>
<td>18</td>
<td>48</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>32</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14” o.c.</td>
<td></td>
</tr>
<tr>
<td>525 psf/lf / 3,300 psf</td>
<td>7,500</td>
<td>18</td>
<td>38</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>26</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>250 psf/lf / 2,000 psf</td>
<td>7,500</td>
<td>18</td>
<td>48</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>32</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14” o.c.</td>
<td></td>
</tr>
<tr>
<td>175 psf/lf / 1,600 psf</td>
<td>7,500</td>
<td>18</td>
<td>54</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>36</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14” o.c.</td>
<td></td>
</tr>
<tr>
<td>335 psf/lf / 2,700 psf</td>
<td>10,000</td>
<td>18</td>
<td>48</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>32</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>234 psf/lf / 2,100 psf</td>
<td>10,000</td>
<td>18</td>
<td>54</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>36</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
<tr>
<td>171 psf/lf / 2,000 psf</td>
<td>10,000</td>
<td>18</td>
<td>60</td>
<td>4 - #4 vert.</td>
<td>18” Sleeve / 18” Embedment</td>
<td>40</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 11” o.c.</td>
<td></td>
</tr>
</tbody>
</table>

### Design and Construction Notes:

1.0 Design load location at 18” above finished grade.

2.0 The soil pressure value is shown at design load condition and should be verified that the site soil is adequate for the listed value.

3.0 See supplemental concrete pier / beam details for additional information.

4.0 Material Specifications: Concrete = 3,000 psi (28-day min.); Reinforcing ASTM A615 (60 ksi for all bars #5 and larger/ 40 ksi for all bars #4 and smaller).
### MaxiForce™ Rectangular Fixed Steel Bollard Installation Schedule

#### Various Design Loads at 27" Impact Height

**Engineered Anchorage System for MaxiForce™ 3 x 6 Rectangular Steel Bollard**

<table>
<thead>
<tr>
<th>Soil Lateral Bearing / Bearing Pressure</th>
<th>Design Load (lbs.)</th>
<th>Concrete Pier Diameter (in.)</th>
<th>Concrete Pier Height (in.)</th>
<th>Concrete Pier Reinforcing</th>
<th>Bollard Embedment at Concrete Pier</th>
<th>Concrete Grade Beam Depth (In.)</th>
<th>Concrete Grade Beam Width (In.)</th>
<th>Concrete Grade Beam Reinforcing Longitudinal</th>
<th>Stirrups</th>
</tr>
</thead>
<tbody>
<tr>
<td>225 psf/lf / 2,000 psf</td>
<td>3,000</td>
<td>18</td>
<td>42</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>28</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 12&quot; o.c.</td>
</tr>
<tr>
<td>225 psf/lf / 2,000 psf</td>
<td>3,750</td>
<td>18</td>
<td>46</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>32</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 12&quot; o.c.</td>
</tr>
<tr>
<td>450 psf/lf / 3,500 psf</td>
<td>6,000</td>
<td>18</td>
<td>42</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>28</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 12&quot; o.c.</td>
</tr>
<tr>
<td>210 psf/lf / 2,000 psf</td>
<td>6,000</td>
<td>18</td>
<td>54</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>36</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14&quot; o.c.</td>
</tr>
<tr>
<td>558 psf/lf / 5,000 psf</td>
<td>7,500</td>
<td>18</td>
<td>42</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>28</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 12&quot; o.c.</td>
</tr>
<tr>
<td>263 psf/lf / 3,500 psf</td>
<td>7,500</td>
<td>18</td>
<td>54</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>36</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14&quot; o.c.</td>
</tr>
<tr>
<td>192 psf/lf / 2,000 psf</td>
<td>7,500</td>
<td>18</td>
<td>60</td>
<td>4 - #4 vert.</td>
<td>18&quot; Sleeve / 18&quot; Embedment</td>
<td>40</td>
<td>12</td>
<td>4 - #4 cont.</td>
<td>#3 at 14&quot; o.c.</td>
</tr>
</tbody>
</table>

**Design and Construction Notes:**

1.0 Design load location at 27" above finished grade.

2.0 The soil pressure value is shown at design load condition and should be verified that the site soil is adequate for the listed value.

3.0 See supplemental concrete pier / beam details for additional information.

4.0 Material Specifications: Concrete = 3,000 psi (28-day min.); Reinforcing ASTM A615 (60 ksi for all bars #5 and larger/ 40 ksi for all bars #4 and smaller).
Engineered Anchorage System for the MaxiForce™ 3" x 6" Rectangular Fixed Steel Bollard Circular Concrete Pier Footing

1. MaxiForce™ Steel pipe bollard per specification.
2. See schedule for bollard embedment.
3. Finished grade or pavement.
4. Concrete base pier per schedule at each bollard.
5. #3 hoop ties at 12" O.C. and 2 - #3 ties at top and bottom of concrete pier.

Installation Orientation

Protected Side

Attack Side

See Schedule

See Schedule

1. MaxiForce™ Steel pipe bollard per specification.
2. See schedule for bollard embedment.
3. Finished grade or pavement.
4. Concrete base pier per schedule at each bollard.
5. #3 hoop ties at 12" O.C. and 2 - #3 ties at top and bottom of concrete pier.
Engineered Anchorage System for the MaxiForce™ 3" x 6" Rectangular Fixed Steel Bollard Continuous Concrete Beam Footing

1. MaxiForce™ Steel pipe bollard per specification.
2. See schedule for bollard embedment.
3. Finished grade or pavement.
4. Continuous concrete grade beam per schedule.
5. Stirrups per schedule.
6. Centerline of bollard and concrete grade beam.
7. Continuous longitudinal reinforcement per schedule - lap splice 32" min. for #6 and 27" min. for #5 rebars - TYP. UNO.
8. 4" min. hooks with 135 degree bend - TYP. UNO.

Installation Orientation

Protected Side

Attack Side

See Schedule

See Schedule

Drawing No. 1

Anchorage System for the MaxiForce™ 3" x 6" Rectangular Fixed Steel Bollard Continuous Concrete Beam Footing

1. MaxiForce™ Steel pipe bollard per specification.
2. See schedule for bollard embedment.
3. Finished grade or pavement.
4. Continuous concrete grade beam per schedule.
5. Stirrups per schedule.
6. Centerline of bollard and concrete grade beam.
7. Continuous longitudinal reinforcement per schedule - lap splice 32" min. for #6 and 27" min. for #5 rebars - TYP. UNO.
8. 4" min. hooks with 135 degree bend - TYP. UNO.