### SECURITY BOLLARDS GUIDE:

#### STYLE VARIATIONS AMONG BOLLARDS:

**PASSIVE UPRIGHT MOUNT—FIXED**
- A permanent solution to preventing unauthorized vehicular access
- Pier-Type Footing (or Continuing Grade Beam Footing)

**PASSIVE UPRIGHT MOUNT—REMOVABLE**
- Internal or external locking systems
- Physical removal required
- High-security versions, because of greater weight (300-1200 lbs.) will require heavy lifting equipment
- No locking mechanism is required due to the sheer weight of the bollard

**PASSIVE SHALLOW MOUNT BOLLARD**
- Prefabricated in the factory to meet specific site requirements
- Site specifications are ready to accept prefabricated single-to-multiple bollard units upon delivery by heavy-duty truck
- Unique in the industry by allowing location over undisturbed utility—electrical, plumbing, communications equipment that otherwise would be damaged by a deep-set vertical fixed or removable bollard

**PASSIVE SURFACE MOUNT**
- This system is the newest addition to the bollard family and comes in M30 and M50 capacities
- Its value is in its potential rapid random placement, although not yet shown as relevant to a RAM exercise (discussed below) because of size and weight. It can be deployed/removed/redeployed using heavy equipment and configured to local site configurations.

### Vehicle Speed: ASTM CRASH RATINGS

<table>
<thead>
<tr>
<th>Vehicle Speed</th>
<th>ASTM CRASH RATINGS</th>
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</table>
| (M) Medium-duty truck (15,000 lbs) | • M30 (30 mph)  
• M40 (40 mph)  
• M50 (50 mph) |
| (PU) Pickup truck (5,070 lbs)  | • PU40 (40 mph)  
• PU50 (50 mph)  
• PU60 (60 mph) |
| (C) Small passenger car (2,430 lbs) | • C40 (40 mph)  
• C50 (50 mph)  
• C60 (60 mph) |
| (H) Heavy goods vehicle (65,000 lbs) | • H30(30mph)  
• H40(40mph)  
• H50(50 mph) |

### Penetration ratings for high-speed standards are as follows and apply to all vehicle sizes.

- P1: Less than 3.3 feet
- P2: 3.31 to 23.0 feet
- P3: 23.1 to 98.4 feet

### NOTE*:

Penetration indicates the test vehicle’s maximum dynamic distance of penetration after impact with the barrier. Typically, the dynamic distance is barrier face to the front of the cargo bed. The barrier penetration rating does not imply that a barrier will perform as rated in all site conditions, approach routes, and topography. Also, only single-specimen tests at a specified impact location are required by this test method, and therefore, not all points of impact can be tested and validated for the penetration rating. Other impact locations may respond differently.
1. Foundation Requirements:
   a. Depth: 30 inches (762 mm).
   b. Concrete: 4500 psi (31026.4 kPa) concrete.
   c. Rebar: No. 5 bar.

2. Compliance:
   a. ASTM F2656: C40 P1, 2430 lbs (1102.2 kg) at 40 mph (64.4 kph), less than 39.37 inch (1.0 m) penetration.
   b. Welding: Conforms with AWS D1.1 standard.

3. Bollard Height Above Finished Grade: 30 inches (762 mm) or 36 inches (914 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.

4. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

** NOTE TO SPECIFIER ** A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there is NOT a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
ASTM C40 CRASH RATED REMOVABLE BOLLARD GENERAL ARRANGEMENT

ORDERING CODE: BDS-C40RB36-ST

BOLLARD O.D.

REBAR TO BE INSTALLED PER MANUFACTURES INSTRUCTIONS

TOP VIEW
ATTACK SIDE

COORDINATE HEIGHT
W/SPEC. NOTIFY
BULLARD OF TOPPER

TECHNICAL DRAWING

VACANCY CAP
TO BE PROVIDED FOR WHEN BOLLARD IS REMOVED

FOUNDATION CONTINUES

FINISHED DETAIL

48" TYP. O.C.
41 3/8" TYP. OPEN
36"

4" (MAX) T/PAVING

27" 30"

CARBON STEEL
BOLLARD RECEPTACLE

BOLLARD O.D.

FOUNDATION CONTINUES
1. Foundation Requirements:
   a. Depth: 30 inches (762 mm).
   b. Concrete: 4500 psi (31026.4 kPa) concrete.
   c. Rebar: No. 5 bar.

2. Compliance:
   a. ASTM F2656: C40 P1, 2430 lbs (1102.2 kg) at 40 mph (64.4 kph), less than 39.37 inch (1.0 m) penetration.
   b. Welding: Conforms with AWS D1.1 standard.

3. Bollard Height Above Finished Grade: 30 inches (762 mm) or 36 inches (914 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.

4. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

**NOTE TO SPECIFIER**

A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there IS a removable bollard requirement. Bollard height above finished grade shall remain at 30 inches (762 mm) unless otherwise approved via written consent from the manufacturer.
ASTM M30 CRASH RATED FIXED BOLLARD GENERAL ARRANGEMENT

ORDERING CODE: BDS-M30-FB-ST

BULLARD BOLLARDS

COORDINATE HEIGHT
W/ SPEC. NOTIFY BULLARD OF TOPPER

END CONDITION DETAIL

REBAR TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS

FOUNDATION CONTINUES

ATTACK SIDE

48" TYP. O.C

39 3/8" TYP. OPEN

36" 60"

35"

84"

24"

27' 30"

4" (MAX)
T/PAVING

48"

39"
1. Foundation Requirements:
   a. Depth: 30 inches (762 mm).
   b. Concrete: 4500 psi (31026.4 kPa) concrete.
   c. Rebar: No. 5 bar.

2. Compliance:
   a. ASTM F2656: M30 P1, 15000 lbs (6804 kg) at 30 mph (48.3 kph), less than 39.37 inch (1.0 m) penetration.
   b. Welding: Conforms with AWS D1.1 standard.

3. Bollard Height Above Finished Grade: 39 inches (991 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.

4. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

** NOTE TO SPECIFIER ** A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there is NOT a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
1. Foundation Requirements:
a. Depth: 30 inches (762 mm).
b. Concrete: 4500 psi (31026.4 kPa) concrete.
c. Rebar: No. 5 bar.

2. Compliance:
a. ASTM F2656: M30 P1, 15000 lbs (6804 kg) at 30 mph (48.3 kph), less than 39.37 inch (1.0 m) penetration.
b. Welding: Conforms with AWS D1.1 standard.
c. Bollard Height Above Finished Grade: 39 inches (991 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.
d. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

** NOTE TO SPECIFIER ** A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there IS a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
1. Foundation Requirements:
a. Depth: 9 inches (229 mm).
b. Concrete: 4500 psi (31026.4 kPa) concrete.
c. Rebar: No. 5 and No. 8 bar.

2. Compliance:
a. ASTM F2656: M30 P1, 15000 lbs (6804 kg) at 30 mph (48.3 kph), less than 39.37 inch (1.0 m) penetration.
b. Welding: Conforms with AWS D1.1 standard.

3. Bollard Height Above Finished Grade: 39 inches (991 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.

4. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

**NOTE TO SPECIFIER** A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there IS a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
ASTM M50 CRASHED RATED SHALLOW BOLLARD GENERAL ARRANGEMENT

ORDERING CODE: BDS-M50FB-SH

Dwg Title: BDS-M50FB-SH  Bullard Bollards

Created by: Bullard Bollards

Size: A4  Version: 1

Current date: 29.04.2020

Added: 29.04.2020

Scale: 1:1  Sheet: 1/1
1. Foundation Requirements:
   a. Depth: 9 inches (229 mm).
   b. Concrete: 4500 psi (31026.4 kPa) concrete.
   c. Rebar: No. 5 and No. 8 bar.

2. Compliance:
   a. ASTM F2656: M50 P1, 15000 lbs (6804 kg) at 50 mph (80.5 kph), less than 39.37 inch (1.0 m) penetration.
   b. Welding: Conforms with AWS D1.1 standard.

3. Bollard Height Above Finished Grade: 39.5 inches (1003 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.

4. Maximum Bollard Spacing: 58 inches (1473 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there IS a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
ASTM PU40 CRASH RATED FIXED BOLLARD GENERAL ARRANGEMENT

ORDERING CODE: BDS-PU40FB36-ST

END CONDITION DETAIL

COORDINATE HEIGHT
W/SPEC. NOTIFY BULLARD OF TOPPER

48" TYP. O.C

39 3/8" TYP. OPEN

36"

35 1/2"

4" (MAX)

T/PAVING

27" 30"

48"

39 3/8"

COORDINATE HEIGHT
W/SPEC. NOTIFY BULLARD OF TOPPER

24" 72"

24" 60"

FOUNDATION CONTINUES

ATTACK SIDE

REBAR TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS

FOUNDATION CONTINUES

48" 24"

ORDERING CODE: BDS-PU40FB36-ST

Dwg Title: ASTM PU40
Created by: Bullard Bollards
Size: A4
Version: 1

Current date: 29.04.2020
Added: 29.04.2020

Scale: 1:1
Sheet: 1/1
1. Foundation Requirements:
   a. Depth: 30 inches (762 mm).
   b. Concrete: 4500 psi (31026.4 kPa) concrete.
   c. Rebar: No. 5 bar.

2. Compliance:
   a. ASTM F2656: PU40 P1, 5070 lbs (2299.7 kg) at 40 mph (64.37 kph), less than 39.37 inch (1.0 m) penetration.
   b. Welding: Conforms with AWS D1.1 standard.
   c. Bollard Height Above Finished Grade: 36 inches (914 mm); pavers or other concrete topper is acceptable up to an additional 4 inches (102 mm). Notify manufacturer of requirement in advance prior to fabrication.
   d. Maximum Bollard Spacing: 48 inches (1219 mm) on center; meeting ADA handicap accessibility provision after decorative covers are installed.

** NOTE TO SPECIFIER ** A minimum of a 3 bollard array is required. If a smaller array is desired, engineering review and approval is required from manufacturer in order to validate prescribed crash rating. To be installed in areas where underground interferences are not a concern. Typically installed into sidewalks, roadways or other areas requiring perimeter defense where there is NOT a removable bollard requirement. Bollard height above finished grade shall remain at 39 inches (991 mm) unless otherwise approved via written consent from the manufacturer.
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