

**SECTION 34 75 13.13  
ACTIVE VEHICLE BARRIERS**

SPEC WRITER NOTE:

1. Delete text between // \_\_\_\_\_ // not applicable to project. Edit remaining text to suit project.
2. Determine design loads required to meet the specified rating; See VA Physical Security Design Manual (PSDM).

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Active anti-ram rated vehicle barriers at entrances.

**1.2 RELATED REQUIREMENTS**

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this section.

- A. Barrier Foundations: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Stationary Bollards: Section 05 50 00, METAL FABRICATIONS.
- C. Barrier Color: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Electrical Power and Control Wiring: Division 26, ELECTRICAL.

SPEC WRITER NOTE: Select appropriate security access control system specification for integrating barriers with centrally controlled system.

- E. Facility Access Control: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.
- F. Facility Access Control Software: Section 28 13 16, PHYSICAL ACCESS CONTROL SYSTEM AND DATABASE MANAGEMENT.
- G. Intrusion Detection: Section 28 16 00, INTRUSION DETECTION SYSTEM.
- H. Vehicular Paving and Curbs: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- I. Vehicular Paving: Section 32 12 16, ASPHALT PAVING, for asphalt driveway and approach paving.
- J. Bollard Drain Connection: Section 33 40 00, STORM SEWER UTILITIES.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.

- B. American Welding Society (AWS):
  - 1. D1.1/D1.1M-15 - Structural Welding Code - Steel.
- C. ASTM International (ASTM):
  - 1. D1187/D1187M-97(2011)e1 - Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
  - 2. A123/A123M-15 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 3. A514/A514M-14 - High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
  - 4. F2200-14 - Automated Vehicular Gate Construction.
  - 5. F2656/F2656M-15 - Crash Testing of Vehicle Security Barriers.
- D. British Standards (BS):
  - 1. EN 10294-2-12 - Hollow Bars for Machining. Technical Delivery Conditions. Non Alloy and Alloy Steels.
- E. International Electrotechnical Commission (IEC):
  - 1. 60529-13 - Degrees of Protection Provided By Enclosures (IP Code).
- F. Master Painters Institute (MPI):
  - 1. No. 18 - Primer, Zinc Rich, Organic.
- G. National Electrical Manufacturers Association (NEMA):
  - 1. MG 1-14 - Motors and Generators.
- H. UL LLC (UL):
  - 1. Listed - Online Certifications Directory.
- I. United States Army Corps of Engineers (USACE):
  - 1. DOD Anti-Ram Vehicle Barrier List.
- J. United States Department of State (DS):
  - 1. SD-STD02.01-Revision A - Vehicle Crash Testing of Perimeter Barriers and Gates.

#### 1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting // at project site // minimum 30 days before beginning Work of this section.

SPEC WRITER NOTE: Edit participant list to ensure entities influencing outcome attend.

- 1. Required Participants:
  - a. Contracting Officer's Representative.
  - b. // Architect/Engineer. //
  - c. Contractor.

- d. Installer.
- e. // Manufacturer's field representative. //
- f. Other installers responsible for adjacent and intersecting work, including foundation, electrical system, security system and paving installers.

SPEC WRITER NOTE: Edit meeting agenda to incorporate project specific topics.

- 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
  - a. Installation schedule.
  - b. Installation sequence.
  - c. Preparatory work.
  - d. Protection before, during, and after installation.
  - e. Installation.
  - f. Utility connections.
  - g. Inspecting and testing.
  - h. Other items affecting successful completion.
- 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

**1.5 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
  - B. Submittal Drawings:
    - 1. Show size, configuration, and fabrication and installation details.
    - 2. Show dimensions and clearances between barriers and other adjacent permanent construction.
    - 3. Show interconnecting piping between system components.
- SPEC WRITER NOTE: Retain paragraph below when equipment includes wiring.
- 4. Show power and control wiring diagrams and routing between system components.
  - 5. Include setting drawings and templates for anchors, // sleeves, // and other items // embedded into concrete foundations.
- C. Manufacturer's Literature and Data:
    - 1. Description of each product.

2. Current product listing on USACE Department of Defense Anti-Ram Vehicle Barrier List.
  3. Installation instructions.
  4. Warranty.
- D. Samples:
1. Bollard: Full sized, complete assembly including selected finish.
  2. Approved samples may be incorporated into work.
- E. Test reports: Certify // each product complies // products comply // with specifications.
1. Show ram resistance rating.
- F. Certificates: Certify // each product complies // products comply // with specifications.
1. Show electrical components are UL Listed for specified application.
  2. Submit factory service representative installation certification.
- G. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer // with project experience list //.
  2. Installer // with project experience list //.
  3. Welders and welding procedures.
- H. Operation and Maintenance Data:
1. Care instructions for each exposed finish product.
  2. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Regularly manufactures specified products.
  2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
    - a. // Project Experience List: Provide contact names and addresses for completed projects. //
- B. Installer Qualifications: // Product manufacturer. // Manufacturer authorized representative. //
1. Regularly installs specified products.
  2. Installed specified products with satisfactory service on five similar installations for minimum five years.
    - a. // Project Experience List: Provide contact names and addresses for completed projects. //

SPEC WRITER NOTE: Revise subparagraph below to suit Project location. Consider replacing time with a maximum distance allowed.

3. Maintenance Service Office: Within // two hours // travel time from project site.

C. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M.

**1.7 FIELD CONDITIONS**

A. Field Measurements: Verify field conditions affecting vehicle barrier fabrication and installation. Show field measurements on Submittal Drawings.

1. Coordinate field measurement and fabrication schedule to avoid delay.

**1.8 WARRANTY**

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

**PART 2 - PRODUCTS**

**2.1 SYSTEM DESCRIPTION**

SPEC WRITER NOTE:  
1. When multiple vehicle barriers are required duplicate paragraphs and edit to describe each system.  
2. USACE list includes active bollard, active drop-arm beam, active gate, active net, active post and beam, active wedge, and active cable barrier systems.

A. Vehicle Barrier System: // Device listed in USACE DOD Anti-Ram Vehicle Barriers List. //

1. Configuration: // Wedge // Plate // Beam // Bollard // Drop-arms // sliding gates //.

2. Type: // Permanent // Portable //.

3. Mounting: // Recessed, flush with pavement when not deployed // Surface, above pavement // As indicated on drawings //.

4. Operation: // Hydraulic // Manual //.

- 5. Deployed Position: Secured, preventing vehicle passage.
- 6. Stored Position: Unsecured, allowing vehicle passage.

**2.2 SYSTEM PERFORMANCE**

- A. Design active vehicle barrier complying with specified performance:

SPEC WRITER NOTE: Specified performance is required by PSDM.

- 1. Ram Resistance: ASTM F2656 or DS SD-STD02.01 rated to stop 1,800 kg (4,000 lb.) vehicle traveling 48 km/hr. (30 mph) on impact.

SPEC WRITER NOTE: Penetration ratings range from P1 to P4 based on penetration distance. USACE does not list devices rated P4.

- 1. P1; rated less than 1 m (3.3 feet).
- 2. P2; rated 1.01 to 7 m (3.3 to 23.0 feet).
- 3. P3; rated 7.01 to 30 m (23.1 to 98.4 feet).
- 4. P4; rated 30 m (98 feet) and greater.

- 2. Dynamic Penetration Resistance: // P1 // P2 // P3 ///

**2.3 PRODUCTS - GENERAL**

- A. Provide each product from one manufacturer.
- B. Electrical Components: UL Listed to suit application.
- C. Sustainable Construction Requirements:

SPEC WRITER NOTE:

- 1. Specify products containing greatest recycled content practicable to maximize material recovery. See EPA Comprehensive Procurement Guidelines (CPG) for guidance about individual products and available recycled content. Section 01 81 13 sets overall project recycled content requirements.
- 2. Steel recycled content depends upon furnace type. AISC reports industry wide 32 percent for basic oxygen furnace and 93 percent for electric arc furnace.

- 1. Steel Recycled Content: 30 percent total recycled content, minimum.

**2.4 AUTOMATICALLY OPERATED HYDRAULIC BARRICADE SYSTEM**

- A. Barrier Material: ASTM A514/A514M, T-1, Grade B; High impact steel.
  - 1. Yield Strength: 690 MPa (100 ksi).
  - 2. Tensile Strength: 760 to 895 MPa (110 to 130 ksi).

- B. Finish:
1. Galvanizing: ASTM A123/A123M; after fabrication.
  2. Paint: Powder coat after galvanizing.
- C. Barrier Height Fully Deployed Secure Position: Minimum // \_\_\_\_\_ // mm  
(// \_\_\_\_\_ // inches).
- D. Barrier Dimensions: As indicated on drawings.
- E. Response Time from Stored to Fully Deployed Position:
1. Normal Operating Conditions: Maximum 5 seconds.
  2. Emergency Operation Conditions: Maximum 1 second.
- F. Size hydraulic pump and motor for six complete cycles per minute.
- G. Normal Activation: Electrically-driven hydraulic pump operating at  
// \_\_\_\_\_ // MPa (// \_\_\_\_\_ // psi) and // \_\_\_\_\_ // L/min.  
(// \_\_\_\_\_ // gpm) activating double acting cylinder.
- H. Operating Modes:
1. Normal: Electrically store and deploy barrier.
  2. Automatic: Field adjustable, timer controlled, electric barrier storage and deployment.
  3. Default: Manually deploy barrier.
  4. Emergency: Deploy barrier at emergency speed.
- I. System Controller: Synchronized relays and timers or programmable microprocessor.
- J. Control Panel:
- SPEC WRITER NOTE: Describe panel location  
when not shown on drawings.
1. Location: // \_\_\_\_\_ . //
  2. Normal Operation: Momentary contact switch stores or deploys barrier.
  3. Emergency Operation: Sound audible alert, deploy barrier, and lock controls.
  4. Emergency Reset: Key switch to unlock system allowing normal operation.
- K. Power Source: Normal // 20 // Ampere, // 120 or 220 // Volts AC, single phase, 60 Hz. main power.
- L. Foundation: Reinforced concrete pad specified in // Section 03 30 00, CAST-IN-PLACE CONCRETE // Section 03 30 00, (SHORT-FORM) CAST-IN-PLACE CONCRETE //; sized // to support barrier and resist vehicle impact load // as indicated on drawings //.

1. Concrete: Minimum 27.5 MPa (4,000 psi) 28-day compressive strength.

M. Operation Features:

1. Heating and Cooling Equipment: Maintain hydraulic and electric systems within optimum operating temperature range.
2. Traffic lights at barrier entrance and exit.
3. Remote operator stations.
4. Barrier status indicator lights.
5. Detector loop indicating vehicle presence, velocity, and direction.

SPEC WRITER NOTE: retain electric slab heating for freezing ambient temperature locations.

6. Electrically heated slab preventing snow and ice buildup.

N. Installed Weight: // \_\_\_\_\_ // kg (// \_\_\_\_\_ // pounds).

O. Pit Drain: Install drain in each pit to meet Stormwater Management Plan.

## 2.5 AUTOMATICALLY OPERATED HYDRAULIC BOLLARD SYSTEM

A. Bollards: Steel construction.

1. Configuration: // single bollard // three-bollard array //.
2. Finish: Powder coat.
3. Bollard Dimensions: // As indicated on drawings. //
  - a. Diameter: // \_\_\_\_\_ // mm (// \_\_\_\_\_ // inches).
  - b. Height: Minimum // \_\_\_\_\_ // mm (// \_\_\_\_\_ // inches).
4. Decorative Treatment: // Aluminum // Steel // as indicated on drawings.
5. Roadway Plates: Skid resistant surface.
6. Bollard Drains: Piped for connection to storm drains. See Section 33 40 00, STORM SEWER UTILITIES.

B. Response Time from Stored to Fully Deployed Position:

1. Normal Operating Conditions: Maximum // \_\_\_\_\_ // seconds.
2. Emergency Operation Conditions: Maximum // \_\_\_\_\_ // seconds.

C. Operating Modes:

1. Normal: Electrically store and deploy barrier.
2. Automatic: Field adjustable, timer controlled, electric barrier storage and deployment.
3. Default: Manually deploy barrier.
4. Emergency: Deploy barrier at emergency speed.

SPEC WRITER NOTE: Retain weather resistant option when power units is mounted outdoors.

- D. Hydraulic Power Unit: Integral steel skid mounted with // weather resistant // enclosure containing:
1. Electric motor, sized for // \_\_\_\_\_ // cycles per hour.
  2. Motor driven hydraulic pump.
  3. High pressure manifold with electrically operated bi-directional valves allowing manual operation on power loss.
  4. Hydraulic accumulator, sized for three complete cycles of connected bollards on power loss.
  5. Double acting hydraulic cylinders.
  6. Hand pump for operating bollards during prolonged power loss.
  7. Separate emergency hydraulic power source and control override for emergency speed deployment on power loss and normal accumulator reserve depletion.
  8. Interconnecting hydraulic piping, power wiring, and control wiring.
  9. Control panel.
  10. Piping and wiring terminals outside enclosure.
- E. Control Circuit Operation: // 20 Volt, 50/60 Hz supply (optionally 240 Volt, 50/60 Hz or 24 Volt DC) // Reduce by internally mounted transformer to // 24 Volt AC // 24 Volt DC // for external control stations.
- F. Control Panel:

SPEC WRITER NOTE: Describe panel location when not shown on drawings.

1. Location: // \_\_\_\_\_. //
2. Normal Operation: Momentary contact switch stores or deploys barrier.
3. Emergency Operation: Sound audible alarm, deploy barrier, and lock controls.
4. Emergency Reset: Key switch unlocks system allowing normal operation.
5. Prevent deployment when vehicle is detected above barrier.

SPEC WRITER NOTE: Traffic control gates  
is acceptable with bollards for normal  
traffic control.

- G. Traffic Control Gate: ASTM F2200; vertical pivoting gate arm.
  - 1. Gate Arm: // Wood, // Steel, // Plastic, // breakaway, replaceable type.
  - 2. Operator and Controller Enclosure: Steel, weather resistant.
  - 3. Operator: Electric motor.
  - 4. Controller: Automatic, activated by // remote control station // vehicle detector loops // card reader //.
- H. Vehicle Detector Loop: Presence and direction wire loop detector.
- I. Traffic Signals: Red and green traffic lights, post mounted.
  - 1. Green Light: Signal bollards fully stored.
  - 2. Red Light: Signal bollards partially and fully deployed.
  - 3. Mounting Post: Steel pipe, // \_\_\_\_\_ // diameter.

## 2.6 MANUALLY OPERATED BOLLARD SYSTEM

- A. Bollards: Steel construction.
  - 1. Configuration: // single bollard // three-bollard array //.
  - 2. Finish: Powder coat.
  - 3. Bollard Dimensions: // As indicated on drawings. //
    - a. Diameter: // \_\_\_\_\_ // mm (// \_\_\_\_\_ // inches).
    - b. Height: Minimum // \_\_\_\_\_ // mm (// \_\_\_\_\_ // inches).
  - 4. Decorative Treatment: // Aluminum // Steel // as indicated on drawings.
  - 5. Roadway Plates: Skid resistant surface.
  - 6. Bollard Drains: Piped for connection to storm drains. See Section 33 40 00, STORM SEWER UTILITIES.
- B. Hydraulic Power Unit: Integral steel skid mounted with // weather resistant // enclosure containing:
  - 1. Hand pump to deploy and store bollards.

## 2.7 CABLE DROP ARM BARRIER SYSTEM

- A. Barrier: Manually operated, counterbalanced, hinged, semaphore type, rigid crash beam with integral high strength wire rope supported by buttress at both ends when beam is lowered.
  - 1. Height: Maximum // \_\_\_\_\_ // mm (// \_\_\_\_\_ // inches) above grade to beam centerline.
  - 2. Clear Opening: // As indicated on drawings // Minimum // \_\_\_\_\_ // m (// \_\_\_\_\_ // feet) between face of buttresses //.

## B. Operation:

1. Beam Raising: Manual with maximum // \_\_\_\_\_ // N (// \_\_\_\_\_ // pounds force).
2. Locking: Manual locking pin with padlocking to secure beam in guard position.
3. Padlock: Government furnished.

## C. Finish: Painted.

1. Warning Tape: Reflective, red color bands applied to beam.

**2.8 SLIDING GATES**

- A. Configuration: // Single // Double // gate.
- B. Classification: // Type 1 Overhead // Type 2 Cantilever //.
- C. Pipe and Tubing: // Zinc-coated steel // Aluminum; milled finished; ASTM B 429/B 429M //.
- D. Gate and Post Sizes: ASTM F 1916.
- E. Gate Frame Construction: // Welded // Fittings //.
- F. Hardware:
  1. Latches: // Single side // Both sides //.
  2. Locking Devices: // Pad locks // Integral keyed locks //.
  3. Rollers, Hangers, and Stops: // Galvanized steel // Milled finished aluminum //.

**2.9 FINISHES**

- A. Steel Paint Finish:
  1. Manufacturer's standard industrial enamel finish system.
    - a. One coat primer.
    - b. One or more finish coats.
    - c. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Aluminum Paint Finish:
  1. Manufacturer's standard industrial enamel finish system.
    - a. One coat primer.
    - b. One or more finish coats.
    - c. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Finish exposed surfaces after fabrication.

**2.10 ACCESSORIES**

SPEC WRITER NOTE: Retain barrier coating to separate dissimilar metals and to separate metals from cementitious materials.

- A. Barrier Coating: ASTM D1187/D1187M.
- B. Welding Materials: AWS D1.1/D1.1M, type to suit application.
- C. Anchors: Manufacturer's standard, corrosion resistant, to suit application.
- D. Galvanizing Repair Paint: MPI No. 18.
- E. Touch-Up Paint: Match shop finish.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Examine and verify foundation suitability for product installation.
- B. Coordinate delivery and installation of anchors, sleeves, and other items embedded in concrete foundations.
- C. Coordinate barrier system layout and installation with connections to power supplies, perimeter security system, and security access control system.
- D. Apply barrier coating to steel surfaces in contact with // dissimilar metals // and cementitious materials // to minimum 0.7 mm (30 mils) dry film thickness.

**3.2 INSTALLATION**

- A. Install products according to manufacturer's instructions // and approved submittal drawings //.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Anchor barriers to foundations.
- C. Connect electrical power and control wiring.
- D. Touch up damaged factory finishes.
  - 1. Repair galvanized surfaces with galvanized repair paint.
  - 2. Repair painted surfaces with touch up primer.

**3.3 FIELD QUALITY CONTROL**

- A. Manufacturer Services:

1. Provide factory service representative to inspect and adjust barriers.
2. Certify installation complies with manufacturer's instructions.

**3.4 ADJUSTING AND CLEANING**

- A. Clean exposed barrier surfaces. Remove contaminants and stains.
- B. Adjust barriers to operate smoothly, easily, and properly. Confirm locks engage accurately and securely without forcing or binding.
- C. Lubricate hardware and other moving parts.

**3.5 DEMONSTRATION AND TRAINING**

- A. Instruct VA personnel in proper barrier operation and maintenance.
  1. Trainer: Manufacturer approved instructor.
  2. Training Time: // Four // hours minimum.
- B. Acceptance Condition: After completing work, operate barriers 15 consecutive calendar days without breakdown.

**3.6 PROTECTION**

- A. Protect barriers from // traffic and // construction operations.
  1. Remove and store barrier gate arms to prevent damage from construction operations.
  2. Reinstall barrier gate arms immediately before Substantial Completion.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

- - - E N D - - -