

SECTION 34 71 13  
ACTIVE VEHICLE BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Electric wedge plate barrier system.
  - 2. Anti-ram bollard system.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO HB-17: Standard Specifications for Highway Bridges
- B. American Welding Society
  - 1. AWS D1.1/D1.1M: Structural Welding Code – Steel
- C. ASTM International (ASTM)
  - 1. ASTM A 106/A 106M: Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
  - 2. ASTM F 2656: Standard Test Method for Vehicle Crash Testing of Perimeter Barriers
- D. National Electrical Manufacturers Association (NEMA)
  - 1. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum)
- E. U. S. Department of State
  - 1. SD-STD-02.01: Specification For Vehicle Crash Test of Perimeter Barriers and Gates
- F. U. S. Federal Highway Administration (FHWA)
  - 1. MUTCD: Manual of Uniform Traffic Control Devices
- G. U. S. National Archives and Records Administration
  - 1. 29 CFR 1910: Occupational Safety and Health Standards
- H. Underwriters Laboratories (UL)
  - 1. UL 486A-486B: Wire Connectors

1.3 SYSTEM DESCRIPTION

- A. Barrier systems used must be listed in either the Department of State (DoS) certified or Department of Defense (DoD) approved anti-ram vehicle barrier lists. Barrier widths shall be 'as certified/approved' on these lists. Alternatively, if a barrier system's width is between the widths of two listed barrier systems that are identical except for their widths, then that barrier system is also acceptable. Exceptions and acceptable widths will only be taken from the DoD anti-ram vehicle barrier list. The design and structural materials of the vehicle barrier furnished shall be the same as those used in the crash tested barrier. Crash test must have be performed and data compiled by an approved independent testing agency in accordance with either ASTM F 2656 or SD-STD-02.01.

Barriers tested and certified on the previous Department of State standard, SD-STD-02.01 and listed on the DoD approved anti-ram vehicle barrier list are also acceptable.

#### 1.4 SUBMITTALS

##### A. Product Data:

1. Barrier Systems: Complete list of equipment, materials, including industrial standards used and how they apply to the applicable component and manufacturer's descriptive data and technical literature, catalog cuts, and installation instructions. Information necessary to document a minimum 1-year successful field operation performance history for each type of vehicle barrier installed.
2. Spare Parts: Data for each different item of material and equipment used, after approval of the detail drawings. Include in the data a complete list of parts and supplies, with current unit prices and source of supply.

B. Shop Drawings: Detail drawings containing complete wiring and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Show on the Drawings proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including foundation and clearances for maintenance and operation. Include with the Detail drawings a copy of the Department of State certificate of barrier performance.

C. Delegated Design Submittal: Submit for products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Anti-Ram Security Bollards: Provide Security Bollards capable of withstanding the effects of loads and stresses within limits meeting the Performance Requirements and other criteria specified in this Section. Submittals for the security bollards shall represent a configuration equivalent to those tested by the manufacturer and certified to meet or exceed a crash rating of M50 in accordance with ASTM F2656-07.

D. Test Reports: Field test reports in booklet form showing all field tests, including component adjustments and demonstration of compliance with the specified performance criteria, upon completion and testing of the installed system. Indicate with each test report the final position of controls.

E. Operation and Maintenance Data: Operation manuals shall outline the step-by-step procedures required for system startup, operation, and shutdown. The manuals shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall include routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals shall include piping layout, equipment layout, and simplified wiring and control diagrams of the system as installed.

#### 1.5 QUALITY ASSURANCE

##### A. Regulatory Requirements:

1. Welding: Qualify procedures and personnel according to the following:
  - a. AWS D1.1/D1.1M Structural Welding Code - Steel.
  - b. AWS D1.2/D1.2 M Structural Welding Code - Aluminum.
  - c. AWS D1.6/D1.6M Structural Welding Code - Sheet Steel.
  - d. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Fabricator/Installer Qualifications: A firm having minimum 5 years documented experience in producing metal fabrications similar to those indicated.
- C. Professional Engineer Qualifications: A professional engineer legally qualified to practice in jurisdiction is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of vehicle barriers that are similar to those indicated in material, design, and extent.

#### 1.6 COORDINATION

- A. Coordinate installation of Vehicle Barriers that are anchored to or that receive other Work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, reinforcing and items with integral anchors, that are to be embedded in concrete or the final assembly. Deliver such items to Project site in time for installation.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect components placed in storage from the weather, humidity, and temperature variation, dirt and dust, or other contaminants. Store structural materials on sleepers or pallets and protect them from rust and objectionable materials such as dirt, grease, or oil.

#### 1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
  1. Established Dimensions: Verify all measurements in the field; establish dimensions and proceed with fabricating vehicle barriers with actual dimensions. Coordinate with all other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  2. Provide allowances for trimming and fitting at site at no additional cost or Work.

#### 1.9 EXTRA MATERIALS

- A. Provide a manufacturer's standard recommended spare parts package, with current unit prices and source of supply complete with detailed manuals on parts replacement, with each barrier to facilitate 1 year of normal operation. Give particular consideration to system components which are not readily available from local or commercial sources and which are critical to the operation of the system.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. All vehicle barriers shall meet or exceed a crash rating of M50 in accordance with ASTM F2656-07, as equivalent to K12 and meeting the following:
  - 1. Vehicle weight: 15,000 pounds minimum.
  - 2. Impact Speed: 50 miles per hour.
  - 3. Impact energy: 1,253 ft-kips.
  - 4. Performance Level P1.
  - 5. Penetration Definition: Vehicle and cargo stopped.
  - 6. Permitted penetration: 3 feet.
  
- B. The wedge plate barrier system shall be an electrically operated wedge plate system.
  - 1. No hydraulic systems shall be required or used.
  - 2. The barrier shall not have buttresses.
  - 3. The barrier weight restrictions for vehicles traveling over this barrier shall be IAW AASHTO HB-17 axle load = 32,000 lb/14,515 kg (16 ton/14.5 MT).
  - 4.

### 2.2 ELECTRIC WEDGE PLATE BARRIERS

- A. General Description:
  - 1. The electric wedge plate barrier shall be an above-grade assembly that, in the "DOWN" position, shall present a visible obstacle to approaching vehicles. The height of the barrier shall be a minimum of 30 inches as measured from the roadway surface to the centerline of the electric wedge plate barrier. The electric wedge plate barrier shall be capable of blocking the road width indicated on the Drawings. The electric wedge plate barrier end shall contain a locking pin with padlock acceptance for securing the electric wedge plate barrier when it is in the "DOWN" position. Electric wedge plate barrier shall withstand a 15,000 pound vehicle traveling at 30 mph, with maximum vehicle penetration of 20 feet.
  
- B. Powered Electric wedge plate barrier: The electric wedge plate barrier shall be operated by means of an electric power system. The electric wedge plate barrier shall be capable of being raised or lowered within an 8 to 15 second time range.
  - 1. Failure Mode of Operation: Disconnect system for the electric wedge plate barrier shall be provided to allow manual operation of the barrier in the event of an electrical or mechanical failure.
  - 2. Electric Operator: DC Motor with battery back-up, integrated weather resistant operator enclosure; limit switch(s); disconnect; and manual crank-counter-balance operation.

3. The electric wedge plate barrier shall support up to three back-up batteries (54 Ahr). Each battery shall be supervised and charged separately.
  4. The electric wedge plate barrier system shall be provided with three backup batteries to maintain security and established protocols in the event of a power failure.
- C. Failure Mode of Operation: A disconnect system for the electric wedge plate barrier shall be provided to allow manual operation of the barrier in the event of an electrical or mechanical failure.
- D. The electric wedge plate barrier shall be provided complete with gate plate assembly, electric power unit, system controller, backup battery power, all indicated selectable features, equipment, and accessories for a complete and functional installation meeting the intended purpose of site security.
- E. Electric Wedge Plate Barrier Manufacturer.
1. Basis-of-Design Product: Subject to compliance with requirements, provide NASATKA NMSB IIIB Series Crash Barrier. Subject to compliance with all requirements, acceptance by the Owner and a determination of aesthetic equivalence by the Architect products by the following may also be acceptable:
    - a. Gibraltar Perimeter Security.
  2. Substitutions: Not Permitted.
- F. Electrical Work:
1. Motors, manual or automatic motor control equipment and protective or signal devices required for the operation specified herein shall be provided in accordance with Division 26 – “Electrical” requirements. All field wiring for loop detectors, communication lines, and power circuits shall have surge protection. Any wiring required for the operation specified herein, but not shown on the Drawings shall be provided under this Section in accordance with Division 26 – “Electrical” requirements.
- G. Control Panel
1. A control panel and control circuit shall be provided to interface between all barrier control stations and the power unit. A control panel shall be provided for the inbound lanes and a separate one for the outbound lanes where the barriers are located. The control station is defined as the main control panel and the remote control panel as indicated. The control circuit shall contain all relays, timers, and other devices or an industrial programmable controller programmed as necessary for the barrier operation. The control panel shall allow direct interface with auxiliary equipment such as card readers, remote switches, loop detectors, infrared sensors, and limit switches. Loop controllers shall not cause an automatic barrier raise following power loss or restoration. The enclosure shall be located as indicated on Drawings. All device interconnect lines shall be run to terminal strips.
  2. Main Control Panel: A main control panel shall be supplied to control barrier function. This panel shall have a key-lockable main switch with main power "ON" and panel "ON" lights. Buttons to raise and lower each barrier shall be provided. Barrier "UP" and "DOWN" indicator lights shall be included for each barrier. An emergency fast operate circuit (EFO) shall be operated from a push button larger than the normal controls and have a flip safety cover installed over the push button or toggle switch. The EFO shall also be furnished with an EFO-active light and

reset button. The main control panel shall have a key lockable switch to arm or disable the remote control panel. An indicator light shall show if the remote control panel is enabled.

3. Remote Control Panel: A remote control panel, one panel for the inbound lane(s) and a separate panel for the outbound lane(s), shall have a panel "ON" light that is lit when enabled by a key lockable switch on the main control panel. Buttons to raise and lower each barrier shall be provided. Barrier "UP" and "DOWN" indicator lights shall be included for each barrier. The EFO shall be operated from a push button larger than the normal controls and have a flip safety cover installed over the push button or toggle switch. Activation of either EFO will operate all barriers. The EFO shall be interconnected with an EFO-active light. When the remote control panel EFO is pushed, operation of the barrier will not be possible from this panel until reset at the main control panel.

#### H. Miscellaneous Equipment

##### 1. Safety Equipment:

- a. Barrier Systems Sensors: The barrier system sensors shall consist of the following:
  - 1) Suppression Loops - Two inductive loops whose outputs shall be used to prevent barriers raising when a vehicle is within a prescribed distance of the barrier. The output of the loops shall override all barrier rise signals until one second after a vehicle clears the suppression loop.
  - 2) Speed Loops - Two inductive loops whose output shall be used to signal the barrier controller of a vehicle approaching at a speed greater than the posted speed ( 25 mph or less (recommended)). The speed loops shall cause the barrier control panel to annunciate a warning sound alerting the guard to make a decision as to whether the barrier should be raised or not.
  - 3) Wrong Way Loops - Two inductive loops whose output shall be used to signal the barrier control panel to enunciate a warning sound if a vehicle is attempting to enter the facility through the exit lane. The warning sound will alert the guard to make a decision as to whether the barrier should be raised or not.
- b. The sensors shall be compatible with the barrier controller and shall function as part of a complete barrier control system.
- c. Traffic Lights: Red/yellow 8 inch traffic lights shall be supplied for each entrance and exit to alert motorists of the barrier position. The yellow flashing light shall indicate that the barrier is fully open. All other positions shall cause the light to show red. Brackets shall be supplied to allow the light to be mounted a minimum 4.5 feet above the roadway pavement on a 3.5 inch outside diameter metal post or mounted directly on the crash gate.
- d. Warning Annunciator: Provide a warning annunciator built into the barrier control panel that produces a pulsing audible sound when the speed loop detects a vehicle entering the facility with excess speed. Provide a warning annunciator built into the barrier control panel that produces a continuous sound whenever a wrong way loop detects a vehicle entering from the exit. The warning annunciator shall sound until a warning annunciator silence reset button is pressed.

- e. Heater: A waterproof barrier heater with a thermostat control and NEMA 4 junction box connection point shall be provided for de-icing and snow melting. The heater shall provide barrier operation to an ambient temperature of minus 40 degrees F. For retractable bollards, a 250-watt heater shall be provided for each bollard.

## 2.3 ANTI-RAM SECURITY BOLLARDS

### A. General Description.

1. The Anti-Ram security bollards shall be a fixed system high security bollard system meet the Performance Requirements indicated and be rated to M50, capable of stopping and immobilizing vehicles with weight and velocity characteristics as described in the Performance Requirements.

### B. Construction:

1. The anti-ram bollards shall be 10.75 inches in diameter. Bollard Height shall be a minimum of 39 inches; constructed of heavy gauge steel fully welded prior to hot dip galvanizing. Galvanizing shall comply with ASTM 123 specifications.
2. Outer shell sleeve shall be Type 304 stainless steel, No. 4 directional finish.
3. Provide all reinforcing cages, cast in place concrete and other components as required to comply with the tested installation according to the manufacturers requirements to meet the designated Performance Requirements.

### C. Basis of Design: Provide ASP DS 22 fixed Anti-Ram Security Bollards by Ameristar Security Products. Subject to compliance with the requirements of this Section, and aesthetic equivalence as determined by the Architect, products by one of the following may also be acceptable:

1. NASATKA

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Perform installation in accordance with manufacturers instructions and in the presence of a representative of the manufacturer. Manufacturer's representative shall be experienced in the installation, adjustment, and operation of the equipment provided. The representative shall also be present during adjustment and testing of the equipment. If the active vehicle barrier is crash rated and/or certified, then the barrier system shall be installed in an 'as-tested' condition. Additional site investigation and construction will be required in order to accomplish this; except when a site specific crash test was performed where the exact site requirements were utilized in the crash test.

### 3.2 ELECTRICAL

- A. All control power wiring requiring compression terminals shall use ring-style terminals. Terminals and compression tools shall conform to UL 486A-486B. Roundhead screws and lockwashers shall be used to provide vibration-resistant connections. Connections between any printed circuit cards and the chassis shall be made with screw connections or other locking means to prevent shock or vibration separation of the card from its chassis. The electrical power supply breaker for the hydraulic power unit shall be capable of being locked in the power on and power off positions.

### 3.3 ANTI-RAM BOLLARD INSTALLATION

- A. The Anti-Ram bollard system shall be installed per the sealed, approved submittals and Shop Drawings. Bollards shall be installed per product drawings and installation instructions. All excavation, reinforcing and concrete shall be provided as submitted, meeting the related Sections of the Project. Sections of this specification shall govern material requirements for concrete footings and reinforcing unless otherwise specified by the product drawings or installation instructions.

### 3.4 MANUFACTURER'S SERVICES

- A. Provide the services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment supplied. The representative shall supervise the installation, adjustment, and testing of the equipment.

### 3.5 FIELD TRAINING

- A. Provide a field training course for designated operating staff members. Training shall be provided for a total period of not less than 4 hours of normal working time and shall start after the system is functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance instructions.

### 3.6 FIELD TESTING

- A. Upon completion of construction, perform a field test for each vehicle barrier. The test shall include raising and lowering the barrier, both electrically and manually, through its complete range of operation. Each vehicle barrier shall then be continuously cycled for not less than 30 minutes to test for heat build-up in the hydraulic system. Notify the Owner at least 7 days prior to the beginning of the field test. Furnish all equipment and make all necessary corrections and adjustments prior to tests witnessed by the Owner. Any conditions that interfere with the proper operation of the barrier disclosed by the test shall be corrected at no additional cost to the Owner. Adjustments and repairs shall be done by the Contractor under the direction of the Manufacturer. After adjustments are made to assure correct functioning of components, applicable tests shall be completed.

END OF SECTION