**SECTION 34 75 14**

FIXED BOLLARDS

1. GENERAL

The purpose of this specification is to describe the Nasatka Maximum Security Barrier VI without an operator (fixed) NMSB VI-F for the purpose of providing architecture and engineering specification templates.

This section of this specification provides a top level view of document administration and Nasatka specifications; including references, a description of the active vehicle barrier (AVB) which shall be comprised of fixed bollards, manuals, warranty, and maintenance.

Equipment names and model numbers included herein are those currently under production or are utilized in the NMSB VI-F as of the writing of this specification, and are subject to change without notice.

1. The Owner/Operator (End User) or facility architect shall assume responsibility for providing traffic and safety engineering, including all necessary safety features to be used at each barrier location, including, but not limited to the requirement of: sidewalks for pedestrian traffic, sufficient roadway lighting, caution signage, traffic lights, audible warning alerts, visual warning alerts, secondary traffic control devices, guard/ control booths.
2. The NMSB VI-F system shall consist of one bollard or multiple bollards in an array, as specified.
3. The design and materials of the active vehicle barrier (AVB) system shall be the same as those used in the crash test of the AVB, whether the test was conducted following Department of State (DOS) or ASTM F2656-07 criteria.
4. Other devices required to prevent vehicles from going around the barrier shall be specified/provided by the facility on either side of the barrier.

All barrier systems should be carefully planned with safety as a paramount concern. The product is designed to control vehicle traffic; however, Nasatka Barrier Inc., DBA Nasatka Security, is not a traffic safety engineering firm and recommends that a system be reviewed before installation. It is recommended that all forms of safety equipment be utilized to the maximum extent possible. Such safety equipment includes, but is not limited to, proper lighting, written warning signs, traffic lights, gate arms and/or audible alarms.

* 1. References
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
2. Safety Systems: This Division shall apply to Common Work Results for “Electronic Security” only. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
3. When applicable, Common Work Results for “Safety” shall precede this division.
	1. Related Sections:
4. UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)

DIVISION 01 GENERAL REQUIREMENTS

DIVISION 03 CONCRETE

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

DIVISION 31 EARTHWORK

DIVISION 32 EXTERIOR IMPROVEMENTS

DIVISION 34 TRANSPORTATION

1. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-17 (2002; Errata 2003; Errata 2005) Standard Specifications for Highway Bridges

1. AMERICAN WELDING SOCIETY (AWS)

Shear Studs: AWS D1.1

AWS D1.1/D1.1M (2010) Structural Welding Code – Steel

Welding Electrodes: AWS A5.1 or A5.5 E-7-XX

1. ASTM INTERNATIONAL (ASTM)

ASTM F 2656 (2007) Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

Steel Pipes: ASTM A36

Shear Studs: ASTM A106

Cement: ASTM C150 Type I

Aggregates: ASTM C33

1. U.S. DEPARTMENT OF STATE (SD)

SD-STD-02.01 (2003; Rev A) Specification For Vehicle

Crash Test of Perimeter Barriers and Gates

1. U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910 Occupational Safety and Health Standards

1. Concrete: ACI building code 318-99
2. PRODUCT
3. The Active Vehicle Barrier (AVB) system shall be a Nasatka Security Inc. model NMSB VI-F manufactured by:

Nasatka Barrier, Inc.

7702B Old Alexandria Rd.

Clinton, MD 20735 USA

Phone: (301) 868-0300

Fax: (301) 868-0524

Web (General): [www.nasatka.com](http://www.nasatka.com)

Web (Request a Quote): [www.nasatka.com/contact-us-2/requestforquote/](http://www.nasatka.com/contact-us-2/requestforquote/)

Web (Online Store): [webstore.nasatka.com/](http://webstore.nasatka.com/)

1. United States government, local government, and federal agencies may inquire to Nasatka Barrier, Inc. about procuring AVB system model NMSB VI (and options), installation and construction labor through GSA Schedule 84, GS-07F-9776H. For the AVB system see SIN#: 246-35(5) for Installation and Maintenance Services use SIN# 246-50 (ancillary services).
	1. Bollard Standard Configuration

The bollard shall be a fixed bollard. The bollard shall consist of three major assemblies: the sub-frame assembly, the bollard assembly, and the concrete foundation. All components shall be finished as specified in paragraph 2.3 to prevent rust.

The bollard(s) shall be fixed in the Secure positions.

The system shall be arranged as shown on site drawings for the project.

* 1. Bollard Operations
1. Single Bollard Operation
2. Each single bollard shall be installed independently from any other bollard or bollard arrays within the system.
3. Multi Bollard Operation (Bollard Array)
4. Multiple bollards shall be able to be grouped into an array. A bollard array shall be specified by the number of bollards contained in the array. An array shall contain from two to six bollards.
	1. BOLLARD Construction

The bollard assembly:

1. The bollard sub-frame shall be a below grade assembly.
2. The bollard position shall present a formidable obstacle to approaching vehicles.
3. The bollard(s) shall be filled with concrete (when the foundation is poured) and free of voids.
4. Bollard Dimensions.
5. Bollard height shall be 36 inches [914 mm].
6. Bollard height shall be determined as a measurement from the top of the foundation frame to the top of the bollard assembly.
7. Bollard diameters and wall thickness shall be (before aesthetic covers are added) as follows.

K12 (Crash/Engineer Rated) bollard diameter (OD) shall be 10.75 inches (273 mm).

K4 (Engineer Rated) bollard diameter (OD) shall be 8.625 inches (219 mm).

Unrated 5 ft (1.524 m) bollard diameter (OD) shall be 8.625 in (219 mm).

Unrated 6 ft (1.828 m) bollard diameter (OD) shall be 4 in (101.6 mm).

K12 (Crash/Engineer Rated) bollard pipe shall be NPS schedule 140 [1.0 in (25.4 mm) wall thickness] or schedule 80 [0.594 in (15.09 mm) wall thickness] and utilize a stiffener bar.

K4 (Engineer Rated) bollard pipe shall be NPS schedule 160 [0.906 in (23 mm) wall thickness].

Unrated 5 ft (1.524 m) or 6 ft (1.828 m) bollard wall thickness shall be as specified by Customer.

1. Bollard shall be made using the following steel pipe.

K12 (Crash/Engineer Rated) bollards shall be made using ASTM A53 (or A106) grade B carbon steel high temperature seamless pipe.

K4 (Engineer Rated) bollards shall be made using ASTM A53 (or A106) grade B carbon steel high temperature seamless pipe.

1. When a stiffener is required, the stiffener shall be as follows.
2. The stiffener shall be made of ASTM A36 grade B structural steel.
3. The stiffener shall be 0.98-in (25 mm) thick, 9.25 in (235 mm) wide, and 83.25 in (2115 mm) long.
4. The stiffener shall be welded into the bollard.
5. When a stiffener is used, the bollard shall be installed with the thickness of the stiffener (0.98‑in/ 25 mm side) facing the direction of threat.
6. Bollard Finish
7. The bollard shall utilize a combination of hot dip galvanized, anodized, and powder coated steel to provide enduring corrosion resistance.
8. The above grade portion of the bollard shall be white and have alternating yellow and black diagonal stripes.
9. Customer specified custom finishes shall be available.
10. Customer specified custom covers shall be available.

The sub-frame assembly:

1. Upon impact, forces shall be first absorbed by the weldment and then transmitted to the foundation.
2. The sub-frame shall be constructed IAW manufacturer drawings.
3. The sub-frame shall be available with deep or shallow mounting.
4. Shallow mount fixed bollards shall be specified as either crash tested K12/L3 (ASTM M50/P1) or K4 (ASTM M30) Engineer Rated. Sub-frame shall be as specified in manufacturer drawings.
5. Deep mount fixed bollards shall be specified as either Engineer Rated K12 (ASTM M50), K8 (ASTM M40), or K4 (ASTM M30), or unrated. Sub-frame for Engineer Rated bollards shall be as specified in manufacturer drawings.
6. Unrated fixed bollards shall not utilize a sub-frame. Five ft unrated fixed bollard shall have a 12 x 12 x 1/4 inch (304.8 x 304.8 x 6.35 mm) steel plate welded to the bottom of the bollard.
7. All sub-frame materials shall be ASTM A36 carbon structural steel.
8. All sub-frame components and the bollard assembly shall be welded IAW AWS D1.1/D1.1M (2010).

The concrete foundation:

1. The manufacturer shall including detail drawings, for foundations.
2. The foundation shall utilize 4000 psi concrete.
3. The shallow mount foundation depth shall be 12 inches.
4. The deep mount foundation depth shall be as follows.
5. Unrated fixed bollards shall be available 5 ft long (2 ft below grade) filled with concrete and domed at top of bollard.
6. Unrated fixed bollards shall be available 6 ft long (3 ft below grade) filled with concrete and domed at top of bollard.
7. K12 or K4 (Engineer Rated) bollard foundations shall be as specified in manufacturer drawings.
8. PERFORMANCE
	1. Acceptable Manufacturers
9. Nasatka Barrier, Inc. Clinton MD.
10. DBA (Doing Business As): Nasatka Security

Web (General): [www.nasatka.com](http://www.nasatka.com)

Web (Request a Quote): [www.nasatka.com/contact-us-2/requestforquote/](http://www.nasatka.com/contact-us-2/requestforquote/)

Web (Online Store): [webstore.nasatka.com/](http://webstore.nasatka.com/)

* + 1. Experience
1. Bollard shall be of a proven design utilizing proven components.
2. Manufacturer shall have used similar bollard and sub-frame assembly structure for a minimum of 3 years with documented field experience.
	* 1. Performance Evaluation
3. A crash test shall have been performed in accordance with either SD-STD-02.01 Revision A or ASTM F2656 07 (K12/L2 or M50/P2).
4. Barriers tested and certified on the previous Department of State (DOS) standard, SD-STD-02.01, April 1985, and listed on the Department of Defense (DOD) approved anti-ram vehicle barrier list shall also be acceptable.
5. The manufacturer of the barrier system shall utilize a barrier similar to one listed by DOD on the USACE list. The manufacturer must also including detail drawings (including foundations and sub-frames) to demonstrate that the barrier would meet the specified design criteria if tested.
6. It is at the discretion of the Government to accept barriers proposed that are not listed by DOS or DOD.
	* 1. Stopping Capacity

Shallow Mount Bollard System

1. Shallow mount bollard system shall be designed to stop a vehicle attacking from a single direction.
2. Shallow mount bollard system shall provide excellent security and positive control of normal traffic by providing an almost insurmountable obstacle to non-armored or non-tracked vehicles.
3. Shallow mount bollard system shall be determined by Engineer Rating to meet or exceed the following.

Note standard test vehicle requirement changed from 1985 to 2003 for ASTM F2656.

1. K12 (Crash Rated) shall meet or exceed either SD‑STD‑02.01 K12/L2 (typically equivalent to ASTM F2656 07 M50/P2) note the difference between P2 and L2 as follows.

P2 = 3.31 ft to 23 ft (1 to 7 m)

L2 = 3 ft to 20 ft (1 to 6 m)

M50=K12 [15,000 lb (6804 kg) standard test vehicle at 50 mph (80 kph)]

1. K8 (Engineer Rated) shall be determined by engineering analysis and certified to meet or exceed either ASTM F2656 07 M40/P2 or SD‑STD‑02.01 K8/L2; note the similarity between M40 and K8 as follows.

M40=K8 [15,000 lb (6804 kg) standard test vehicle at 40 mph (65 kph)]

1. K4 (Engineer Rated) shall be determined by engineering analysis and certified to meet or exceed either ASTM F2656 07 M30/P2 or SD‑STD‑02.01 K4/L2; note the similarity between M30 and K4 as follows.

M30=K4 [15,000 lb (6804 kg) standard test vehicle at 30 mph (50 kph)]

Deep Mount Bollard System

1. Deep mount bollard system bollard(s) shall provide excellent security and positive control of normal traffic in both directions by providing an almost insurmountable obstacle to non-armored or non-tracked vehicles.
2. The bollard shall provide security as determined by an Engineer Rated design that has been rated to meet or exceed the following.

Note standard test vehicle requirement changed from 1985 to 2003 for ASTM F2656.

1. K12 (Engineer Rated Design) shall meet or exceed either SD‑STD‑02.01 K12/L2 or ASTM F2656 07 M50/P2; note the difference between P2 and L2 as follows.

P2 = 3.31 ft to 23 ft (1 to 7 m)

L2 = 3 ft to 20 ft (1 to 6 m)

M50=K12 [15,000 lb (6804 kg) standard test vehicle at 50 mph (80 kph)]

1. K8 (Engineer Rated) shall be determined by engineering analysis and certified to meet or exceed either ASTM F2656 07 M40/P2 or SD‑STD‑02.01 K8/L2; note the similarity between M40 and K8 as follows.

M40=K8 [15,000 lb (6804 kg) standard test vehicle at 40 mph (65 kph)]

1. K4 (Engineer Rated) shall be determined by engineering analysis and certified to meet or exceed either ASTM F2656 07 M30/P2 or SD‑STD‑02.01 K4/L2; note the similarity between M30 and K4 as follows.

M30=K4 [15,000 lb (6804 kg) standard test vehicle at 30 mph (50 kph)]

* 1. SUBMITTALS
1. SD-02 Shop Drawings
2. Show on the drawings proposed layout and anchorage of equipment and equipment relationship to other parts of the work including foundation and clearances.
3. Include with the detail drawings a copy of the Department of State certificate of barrier performance.
4. SD-03 Product Data
5. Barrier Systems

A 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.

1. SD-06 Test Reports
2. Field Testing

Test reports in booklet form showing all field tests, which may include concrete cure strength and demonstration of compliance with the specified performance criteria, upon completion and testing of the installed fixed bollard(s).

1. SD-10 Operation and Maintenance Data
2. Data Package with section OPERATION AND MAINTENANCE DATA.

Six copies of operation and maintenance manuals, a minimum of two weeks prior to commissioning. One complete set prior to commissioning and the remainder upon acceptance.

Manuals shall be approved prior to acceptance.

The manuals shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment. Maintenance manuals shall include routine maintenance procedures.

* + 1. Certification
1. Manufacturer’s certification of compliance with the specified performance requirements will be obtained by having an employee of the bollard manufacturer perform the following activities:
2. Attend pre-installation meeting.
3. Onsite to certify bollard placement, leveling, rebar (if required) and spacing prior to concrete pour.
4. Onsite for concrete pour.
5. Onsite for Commissioning and Training to certify that manufacturer documented procedures are followed.
	* 1. Warranty
6. Each item of equipment is under warranty, by Supplier for a period of one year, after delivery F.O.B. plant unless otherwise specified by Supplier.
7. From failure of operation in ordinary use and against defects due to faulty material or workmanship.
8. Any defective equipment in the AVB system shall be returned to the factory, at Supplier's option, for repair or replacement.
9. Supplier assumes no responsibility for service at any consumer site. Supplier is in no event responsible for any labor costs under the warranty.
10. Subject to the above limitation, all service, parts, and replacements necessary to maintain the equipment as warranted shall be furnished by Supplier at no cost to consumer. Supplier shall not have any liability under these specifications, other than for repair or replacement as described above for equipment malfunction or equipment failure of any kind, caused for any reason, including, but not limited to unauthorized repairs, improper installation, installation not performed by Supplier personnel, nor by Supplier authorized personnel, modifications, misuse, accident, catastrophe, neglect, natural disaster, act of God of if at any time the power supplied to any part of the AVB system falls short or exceeds the rate of tolerance for the equipment.
11. The exclusive remedy for breach of any warranty by Supplier shall be the repair or replacement at supplier’s option, of any defects in the equipment. IN NO EVENT SHALL THE SUPPLIER BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES OR ANY KIND OF DAMAGES TO ANYONE.
12. Except as provided herein, Supplier makes no warranties or representations to consumer or to anyone else and consumer hereby waives all liability against Supplier as well as any other person for the design, manufacture, sale, installation, and/or servicing of the AVB system.
13. The foregoing warranties are in lieu of all other warranties express or implied, including the implied warranty of merchantability and fitness for a particular purpose. No other warranties exist. Any modification or alteration by anyone other than Supplier or Supplier’s authorized personnel will render the Supplier warranty null and void.
	1. QUALITY ASSURANCE
		1. Testing
14. Upon completion, the bollard system will be fully inspected in the manufacturer’s shop. In addition to inspection the following checks shall be made:
15. Workmanship.

The bollard and subsystems shall have a neat and workmanlike appearance.

1. Dimensions.

Shall be checked against drawings and ordering information.

1. Finish.

Coatings shall be checked against ordering information and shall be workmanlike in appearance.

* + 1. Compliance
1. Comply with all laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the Work.
	* 1. Installer Qualifications
2. Engage an experienced installer who shall be experienced in the installation of vehicle barriers or is an authorized representative of the bollards manufacturer.
	* 1. Manufacturer Qualifications
3. The manufacturer shall be a company specializing in the design and supply of vehicle barrier systems with a minimum of 25 years of experience.
4. The manufacturer shall design or provide a complete vehicle barrier system that has been fabricated, assembled and inspected prior to shipment.
5. The manufacturer shall have had an actual crash test performed on the design/type of vehicle barrier system being provided.
	1. PROJECT/SITE CONDITIONS
		1. Coordination
6. Coordinate the fabrication and installation of the fixed bollard(s) with other trades (i.e. security and concrete).
	1. DELIVERY AND MAINTENANCE
		1. SHIPPING
7. The bollard or array shall be crated or mounted on a skid as necessary to prevent damage from handling.
8. Lifting points shall be of sufficient structural integrity to enable the assembly to be lifted and transported by overhead crane or forklift without failure.

END OF SECTION