UFGS 34 71 13.19 ACTIVE VEHICLE BARRIERS

06/2013

NASATKA SPECIFICATION

HYDRAULIC BOLLARDS

1. GENERAL

The purpose of this specification is to describe Nasatka Maximum Security Barrier VI with an electric motor driven hydraulic operator NMSB VI-H (and -SC) 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 hydraulic bollards, manuals, warranty, and maintenance.

Equipment names and model numbers included herein are those currently under production or are utilized in the NMSB VI-H and NMSB VI-SC 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: 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-H system shall consist of one bollard or multiple bollards in an array and a remote Hydraulic Power Unit (HPU), as specified. The NMSB VI-SC system shall consist of one bollard or multiple bollards in an array and the HPU shall be self-contained.
3. The design and materials of the AVB system shall be the same as those used in the crash test of the AVB, and approved by the Department of State (DOS) or Department of Defense (DOD), or as defined by ASTM F2656-07.
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 A53

Shear Studs: ASTM A108

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. UNDERWRITERS LABORATORIES (UL)

UL 486A-486B (2003; Rev thru Apr 2009) Standard for Wire Connectors

1. Concrete: ACI building code 318-99
	1. NMSB VI-H (and -SC) System Description
2. The NMSB VI AVBs shall be available in two configurations: an ASTM rated 39 inch and a K rated 36 inch configuration.
3. Each configuration shall be available with two foundation variations: the traditional foundation variation (VI-H) housing from one to five bollards utilizing a remote located HPU or an optional self-contained foundation variation (VI-SC) housing from one to five bollards with each bollard housing its own HPU.
4. The traditional bollard system (VI-H) shall utilize sets of bollards (bollard array) that operate simultaneously via a single, remotely located HPU.
5. The innovative self-contained bollard (VI-SC) system shall incorporate an HPU within each individual bollard to create a self-contained, self-operating bollard barrier system.

The VI-SC when providing a multiple bollard installation (a bollard array) shall be non-reliant on a single system HPU.

The VI-SC shall allow greater perimeter security to remain intact by not having a single HPU failure impact more than one bollard.

VI-SC arrays shall be controlled to operate each bollard independently or together as a traditional system.

1. The VI-SC bollard shall require no external hydraulic lines.

This shall greatly increase ease of installations especially for locations with close proximity to bordering roadways and/or no place to position a remote HPU enclosure.

1. Optionally, a battery-operated HPU shall be available which operates up to 100 cycles without the aid of external power (before requiring recharge from an AC or Solar power source).
	* 1. Thirty-six Inch Bollards (DOS K12)
2. A crash test shall have been performed and data compiled by an approved independent testing agency in accordance with SD-STD-02.01, in which the impact conditions and performance levels are:

|  |  |  |  |
| --- | --- | --- | --- |
| Crash Rating | Vehicle Weight | Impact Speed | Impact Energy |
| K12 | 15,000 pounds(6804 kg) | 50 mph(80 km/h) | 1,253 ft-kips (1,699 kJ) |
| Performance Level | Penetration Definition | Permitted Penetration |
| L2 | Vehicle and cargo stopped | Less than or equal to 20 ft (6 m) |

1. The vehicle barrier system performance shall meet or exceed L2 – Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of up to 20 feet (6 m) shall be permitted.
	* 1. Thirty-nine Inch Bollards (ASTM M50)
2. The vehicle barrier system performance shall be based on the ASTM publication F2656-07, Standard Test Method for Vehicle Crash Testing of Perimeter Barriers, in which the impact conditions and performance levels are:

|  |  |  |  |
| --- | --- | --- | --- |
| Crash Rating | Vehicle Weight | Impact Speed | Impact Energy |
| M50 | 15,000 pounds(6804 kg) | 50 mph(80 km/h) | 1,253 ft-kips (1,699 kJ) |
| Performance Level | Penetration Definition | Permitted Penetration |
| P2 | Vehicle and cargo stopped | 1.01 to 7 m (3.3 to 23.1 ft) |

1. The vehicle barrier system performance shall meet or exceed P2 – Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of between 1.01 and 7 m (3.3 to 23.1 ft) shall be permitted.
2. PRODUCT
3. The Active Vehicle Barrier (AVB) system shall be a Nasatka Security Inc. model NMSB VI-H or NMSB VI-SC 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 hydraulically operated. The bollard shall be considered an AVB which may consist of three main components: the bollard (Bollard Assembly), the Hydraulic Power Assembly (HPU), and the User Interface Panel (UIP). The AVB is available in two configurations, the NMSB VI-H using a traditional remote HPU (not collocated within the Bollard Assembly) and the NMSB VI-SC using a self-contained HPU (built into the Bollard Assembly).

The NMSB VI-H shall consist of up to four major assemblies: the Bollard Assembly, the remote HPU, the concrete foundation, and may include one or more UIP. All components shall be finished as specified in paragraph 0 to prevent rust.

The NMSB VI-SC system shall consist of up to three major assemblies: the Bollard Assembly (including the self-contained HPU), the concrete foundation, and may include one or more UIP. All components shall be finished as specified in paragraph 0 to prevent rust.

Secure and unsecure positions will be initiated by a guard or other authorized person via the UIP (master or remote). When the bollard reaches the unsecured position the traffic arm, if equipped, shall raise then the traffic light, if equipped, shall turn amber. When the secure/close pushbutton is activated the traffic light, if equipped, shall turn red, the traffic arm, if equipped, shall lower and the bollard(s) shall move to the secure position. When the AVB is in normal operation, the loop detectors shall act as a safety keeping the bollard(s)/ traffic arm, if equipped, from moving to the secure/closed position if a vehicle is present.

The emergency secure feature shall be initiated at a UIP and the system shall remain secured until the operator resets the AVB via the key operated/lockable reset on the Customer selected UIP (master, if multiple UIPs). The emergency function shall override any active safety feature.

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 operated independently from any other bollard or bollard arrays within the system.
3. Each single bollard shall have its own controls.
4. Multiple Bollard Operation (Bollard Array)
5. 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 five bollards. An array of bollards shall operate as shown on the project site drawings.
6. The Customer shall specify the size array(s) required at each location.
7. Each bollard array shall have its own controls and operate independently from other arrays (or other single bollards) within the system.
8. The AVB system shall operate at the following speeds and frequency.
9. Each bollard (or array) shall be capable of Normal Operation.

Normal Operation shall support a bollard (or bollard array) being raised or lowered in 3 to 8 seconds (Customer adjustable) when operated at a repetition rate not greater than specified in paragraph 3 below.

Bollard direction shall be instantly reversible at any point in its cycle from the control stations.

1. Each bollard (or array) shall be capable of Emergency Fast Operation (EFO)

Bollard (or array) shall rise to the SECURE position from fully UNSECURE in 3 seconds maximum when the EFO button is pushed provided the system has not previously been exhausted by power off or manual operation.

Bollard shall remain in the SECURE position (Normal Operation up/down buttons inoperable) until the EFO condition is reset.

1. Bollard (or array) shall be capable of 300 complete up/down cycles per hour.
2. Each bollard (or array) shall operate under the following environmental conditions:
3. Extremes in temperature.

The AVB shall operate to a maximum ambient temperature of 110°F (43.3°C).

When Customer specified, air conditioning shall be added to extend the operable maximum ambient temperature.

The AVB shall operate to a minimum ambient temperature of -20°F (‑28.9°C).

When Customer specified, for a remote HPU, an optional HPU heater shall be added to extend the operable minimum ambient temperature.

Optional concrete pavement heater shall provide extended operation to an ambient temperature of between -40°F (-40°C) with an average wind speed of 5 mph (8 kph) and 0F (-18°C) with an average wind speed of 20 mph (32 kph). When the HPU is self-contained a HPU heater shall not be required for the AVB to operate at these extend temperatures.

1. Precipitation.

Each bollard housing shall include one drain outlet located at the electric box side of the housing assembly near to bottom of the bollard housing. The outlet shall accept 4 inch PVC pipe.

A 4 inch PVC drain pipe shall be installed with a minimum of 1/2% slope to provide a discharge rate of between 117 and 783 gal/min
(442 to 2964 L/min).

With the bollard(s) in the unsecure position, the roadway may be mechanically, manually, or chemically cleared whenever required.

The optional concrete pavement heater shall prevent ice and/or snow from accumulating over the bollard (or array) and foundation under the conditions listed above.

1. The HPU accumulator shall provide three complete reserve up/down cycles when facility power fails.
2. When Customer specified, an uninterruptible power supply (UPS) shall be sized to meet three complete reserve cycles. When the Customer elects, a larger UPS may be specified to provide higher reserve cycle counts. Counts of 10, 100, or 200 shall be supported.
3. The bollard weight restrictions (for vehicles traveling over this bollard) shall be IAW AASHTO HB-17 [wheel load = 16,000 lb/7,257 kg (8 ton/7.25 MT)].
	1. BOLLARD Construction
4. The bollard shall be a below grade assembly containing a heavy steel cylindrical weldment capable of being raised to an above grade position (secure).
5. The secure position shall present a formidable obstacle to approaching vehicles.
	* 1. Bollard Assembly

Bollard dimensions shall be as follows.

1. K12 Bollard Dimensions.
2. Bollard height shall be 36 inches (914 mm). Bollard height shall be determined as a measurement from the top of the foundation frame to the top of the bollard assembly.
3. Bollards shall be 10.75 inches (273 mm) in diameter (before aesthetic covers are added).
4. Bollard pipe shall be NPS (nominal pipe size) schedule 140 [1.0 in (25.4 mm) wall thickness].
5. M50 Bollard Dimensions.
6. Bollard height shall be 39 inches (990.6 mm). Bollard height shall be determined as a measurement from the top of the foundation frame to the top of the bollard assembly.
7. Bollards shall be 10.75 inches (273 mm) in diameter (before aesthetic covers are added).
8. Bollard pipe shall be NPS schedule 140 [1.0 in (25.4 mm) wall thickness].
9. K8/K4 Bollard Dimensions.
10. Bollard height shall be 36 inches (914 mm). Bollard height shall be determined as a measurement from the top of the foundation frame to the top of the bollard assembly.
11. Bollards shall be 8.625 inches (219 mm) in diameter (before aesthetic covers are added).
12. Bollard pipe shall be NPS schedule 160 [0.906 in (23 mm) wall thickness].
13. Bollard Finish
14. The bollard shall utilize a combination of hot dip galvanized, anodized, and powder coated steel to provide enduring corrosion resistance.
15. The roadway plates shall have a non-skid surface.
16. The above grade portion of the bollard shall be white and have alternating yellow and black diagonal stripes.
17. Customer specified custom finishes shall be available.
	* 1. Remote HPU Assembly

The HPU enclosure shall be NEMA rated. The HPU enclosure dimensions (L – W – H) shall be determined by the amount of components required. The enclosure shall optionally be available with NEMA ratings of -3R, -3X, or -4X (stainless steel) when specified by Customer.

1. HPU (Dual Drum)
2. The hydraulic pump shall be driven by a submersible (in hydraulic fluid) 5-HP AC electric motor.
3. The HPU reservoir shall be the drum and shall nominally hold 15 gal (56.8 L) of hydraulic fluid.
4. The following patent shall apply to the dual drum HPU.

5,466,088

1. HPU (Single Drum)
2. The hydraulic pump shall be driven by a submersible (in hydraulic fluid) 3-HP AC electric motor.
3. The HPU reservoir shall be the drum and shall nominally hold 15 gal (56.8 L) of hydraulic fluid.
4. The following patent shall apply to the dual drum HPU.

5,466,088

1. Self-contained HPU
2. Each self-contained bollard assembly shall have a HPU internal to the housing assembly.
3. The HPU shall consist of the following major components:

12V, 1HP, DC Motor

1 gal (3.8 L) reservoir

Pump

Controls and Valves

* + 1. Hydraulic Fluid
1. The hydraulic fluid shall meet or exceed the following:
2. The hydraulic fluid shall be biodegradable. The fluid shall be compliant with US Fish & Wildlife and EPA standards.
3. The hydraulic fluid shall have an ISO Viscosity Grade of 32.
4. The hydraulic fluid shall have an operable temperature range of -32ºF to 239ºF (-36ºC to 115ºC) and a pour point of -38ºF (-39ºC).
5. Optionally, an alternate synthetic hydraulic fluid shall provide an operable temperature range of -40ºF to 250ºF (-40ºC to 121ºC) and a pour point of -65ºF (‑54ºC).
	* 1. Housing Assembly
6. Upon impact, forces shall be first absorbed by the weldment and then transmitted to the foundation.
7. The housing assembly shall be constructed of 100% hot dip galvanized A36 steel.
8. The hydraulic actuator (cylinder) shall be attached to the bollard assembly and the housing assembly and causes the bollard to extend above ground or retract into the housing assembly.
9. The hydraulic accumulator shall be housed in the housing assembly.

The K12/K8/K4 housing assembly:

1. The housing assembly weights shall be as follows.

|  |  |  |
| --- | --- | --- |
| **Type - Remote HPU** | **K12/K8 Weight (lb/kg)** | **K4 Weight (lb/kg)** |
| Single Bollard | 1300/589 | 1167/529 |
| 2 Bollard Array | 2600/1179 | 2334/1058 |
| 3 Bollard Array | 3900/1769 | 3500/1587 |
| 4 Bollard Array | 5200/2358 | 4668/2117 |
| 5 Bollard Array | 6500/2948 | 5835/2646 |
| **Type - SC HPU** |  |  |
| Single Bollard | 1500/680 | 1368/620 |
| 2 Bollard Array | 3000/1360 | 2736/1241 |
| 3 Bollard Array | 4500/2041 | 4104/1861 |
| 4 Bollard Array | 6000/2721 | 5472/2482 |
| 5 Bollard Array | 7500/3401 | 6840/3102 |
| **Type - Manual** |  |  |
| Single Bollard | 1117/506 | 985/446 |
| 2 Bollard Array | 2234/1013 | 1970/893 |
| 3 Bollard Array | 3351/1429 | 2955/1340 |
| 4 Bollard Array | 4468/2026 | 3940/1787 |
| 5 Bollard Array | 5585/2533 | 4925/2233 |

1. The housing assembly dimensions (L – W – D) shall be 30.5 in (77.47 mm) – 18 in (45.72 mm) – 59 in (149.86 mm) for a single bollard.
2. The housing assembly dimensions shall be the same for self-contained and manual bollards as well as bollards using a remote HPU.

The M50 housing assembly:

1. The housing assembly weights shall be as follows.

|  |  |  |
| --- | --- | --- |
| **Type - Remote HPU** | **K12 Weight (lb/kg)** | **K8/K4 Weight (lb/kg)** |
| Single Bollard | 1500/680 | 1300/589 |
| 2 Bollard Array | 3000/1360 | 2600/1179 |
| 3 Bollard Array | 4500/2041 | 3900/1769 |
| 4 Bollard Array | 6000/2721 | 5200/2358 |
| 5 Bollard Array | 7500/3401 | 6500/2948 |
| **Type - SC HPU** |  |  |
| Single Bollard | 1700/771 | 1500/680 |
| 2 Bollard Array | 3400/1542 | 3000/1360 |
| 3 Bollard Array | 5100/2313 | 4500/2041 |
| 4 Bollard Array | 6800/3084 | 6000/2721 |
| 5 Bollard Array | 8500/3855 | 7500/3401 |
| **Type - Manual** |  |  |
| Single Bollard | 1500/680 | 1300/589 |
| 2 Bollard Array | 3000/1360 | 2600/1179 |
| 3 Bollard Array | 4500/2041 | 3900/1769 |
| 4 Bollard Array | 6000/2721 | 5200/2358 |
| 5 Bollard Array | 7500/3401 | 6500/2948 |

1. The housing assembly dimensions (L – W – D) shall be 34.5 in (87.63 mm) – 20.5 in (52 mm) – 72.875 in (185.1 mm) for a single bollard.
	* 1. Concrete Foundation
2. The K12/K8/K4 foundation dimensions (L – W – D) shall be as follows.

|  |  |  |
| --- | --- | --- |
| **K12/K8/K4Type** | **36 Inch Spaced ArrayDimensions [L-W-D] (inches/cm)** | **48 Inch Spaced ArrayDimensions [L-W-D] (inches/cm)** |
| Single Bollard | 48.5 – 41 – 61 /(123.2) – (104.1) – (154.9) | 48.5 – 41 – 61 /(123.2) – (104.1) – (154.9) |
| 2 Bollard Array | 84.5 – 41 – 61 /(214.6) – (104.1) – (154.9) | 96.5 – 41 – 61 /(245.1) – (104.1) – (154.9) |
| 3 Bollard Array | 120.5 – 41 – 61 /(306) – (104.1) – (154.9) | 144.5 – 41– 61 /(367) – (104.1) – (154.9) |
| 4 Bollard Array | 156.5 – 41 – 61 /(397.5) – (104.1) – (154.9 | 192.5 – 41 – 61 /(488.9) – (104.1) – (154.9) |
| 5 Bollard Array | 192.5 – 41 – 61 /(488.9) – (104.1) – (154.9) | 240.5 – 41 – 61 /(610.8) – (104.1) – (154.9) |

1. The M50 foundation dimensions (L – W – D) shall be as follows.

|  |  |  |
| --- | --- | --- |
| **M50Type** | **36 Inch Spaced ArrayDimensions [L-W-D] (inches/cm)** | **48 Inch Spaced ArrayDimensions [L-W-D] (inches/cm)** |
| Single Bollard | 48.5 – 41 – 74.875 /(123.2) – (104.1) – (190.2) | 48.5 – 41 – 74.875 /(123.2) – (104.1) – (190.2) |
| 2 Bollard Array | 84.5 – 41 – 74.875 /(214.6) – (104.1) – (190.2) | 96.5 – 41 – 74.875 /(245.1) – (104.1) – (190.2) |
| 3 Bollard Array | 120.5 – 41 – 74.875 /(306) – (104.1) – (190.2) | 144.5 – 41– 74.875 /(367) – (104.1) – (190.2) |
| 4 Bollard Array | 156.5 – 41 – 74.875 /(397.5) – (104.1) – (190.2 | 192.5 – 41 – 74.875 /(488.9) – (104.1) – (190.2) |
| 5 Bollard Array | 192.5 – 41 – 74.875 /(488.9) – (104.1) – (190.2) | 240.5 – 41 – 74.875 /(610.8) – (104.1) – (190.2) |

1. The manufacturer shall include detail drawings, for foundations and reinforcement.
2. The foundation shall utilize 4000 psi concrete.
	1. ELECTRIC CONTROL SYSTEM
3. The electric control system operates the bollard in accordance with the operator’s input.
4. The electric control system shall be located external of the bollard and housing assemblies.
5. The electric control system and accessories shall be mounted in a weather resistant enclosure.
	* 1. HPU Interface
6. The HPU shall house:
7. The system controller.
8. Any optional components, such as an UPS.
9. The VFD shall be located external to the bollard assembly.
10. The bollard assembly to VFD cable length shall be up to 300 ft (91 m). The length shall be up to 108 ft (33 m) for OM1 and 269 ft (82 m) for OM2 @ 10GB.
11. The HPU to UIP cable runs shall support four interface types with the distance limitations for each listed below.

|  |  |  |
| --- | --- | --- |
| Encrypted RS-485 | 1,000 ft (304 m) [4,000 ft max.] (1219 m) |  |
| CeLan(22 gauge stranded) | 350 ft(106 m) |  |
| CeLan(18 gauge stranded) | 900 ft(274 m) |  |
| Fiber | Nominal Range | Max Range |
| Ce-FC-N (Multimode) |  | 2.9 M (4.66 km) |
| Ce-FC-ER (Multimode) | 6 M (9.65 km) |  |
| Ce-FC-S (Single Mode) | 16 M (25.74 km) |  |

* + 1. System Controller
1. The system controller shall contain all required circuitry and logic required to properly operate the system when using discrete circuitry and logic devices.
2. Terminal strips shall be provided to interconnect all AVB system devices.
3. Customer specified interconnect to external devices shall be supported via optional terminal strips.
4. The system controller shall be protected by Type 2 SPD surge suppression with the following characteristics.
5. Complies with ANSI/IEEE C62.41 and C62.45 Category B standards
6. Provides diagnostic indication for: ground presence, power, SPD function
7. Available for 120V and 240V
8. Peak Surge Current shall be 19.5 kA for a single phase device and 13 kA/Phase or 6.5 kA/Mode for split phase devices.
9. UL 1449 rated at 700V L-N, L-G; 600V N-G; 1200V L-L VPR for applicable modes and an I normal rating of 3 kA.
10. Optionally, to support Rampart capability UIPs, the system controller shall utilize a modular designed, AES encrypted, RCU-VBS (Rampart Control Unit - Vehicle Barrier System) processor based control and VBS-N module(s) to provide a microprocessor based link between vehicle barrier(s) and the RCU.
11. When selected, the RCU shall support the following features:
12. The RCU shall control and monitor the vehicle barrier systems, gate arms, traffic lights, rolling gates, swing gates and garage doors.
13. The RCU shall support eight general purpose inputs for security device monitoring.
14. The RCU shall support up to 20 VBS barrier controllers.
15. The RCU shall support pre-defined input configurations for standardization. Each input shall be capable of reporting the following:

Open circuit

Short circuit

Ground fault

1. The RCU shall support up to 252 definable user codes for system user login/logout option.
2. The RCU shall support onboard 12 VDC 5A auxiliary power output.
3. The RCU shall provide dual CeLAN ports and support for up to 100 devices.
4. The RCU shall support a 6000 event buffer with time and date stamp. The RCU shall support metrics tracking via event database to improve performance and reduce costs. Optionally, RCU shall optionally support up to 262 million event via use of a 32GB SD card.
5. The RCU shall support field upgradeable software.
6. The RCU shall support CeLAN expansion – communication copper, fiber optics or TCP/IP.
7. The RCU shall support 5.7 in (145 mm) color touchscreen for high security vehicle barrier operation.
8. The RCU shall support all modules having built-in tamper inputs for enclosure protection.
9. The RCU shall support a 12 or 24 hour clock display.
10. The RCU shall provide user and installer help menus.
11. The RCU shall support auto daylights savings option.
12. The RCU shall support dual redundant fiber configuration option.
13. The RCU shall be microprocessor based (NOT PLC control).
14. RCU environment shall be the listed temperatures and humidity.

Operating Temp = 32 to 120º F (0 to 49ºC). Up to 140º F (60ºC) under temporary conditions.

Humidity = 90% relative.

1. The RCU shall provide two, panel programmable outputs with Form C relay contacts (COMMON, N/C, N/O). Relay contacts shall be rated 10A@24 VDC, 10A@24 VAC, 10A@40 VAC maximum.
2. The RCU shall allow printing of all system VBS events or events shall be selectable via programming.
3. The RCU shall support real time system battery voltage and current readings.
4. The RCU shall support up to three back-up batteries (54 Ahr). Each battery shall be supervised and charged separately.
5. The RCU shall provide a remote power supply option fully supervised AES encrypted 5A@12 VDC.

The following circuits and/or controls shall be furnished:

1. A control circuit shall provide interface between all UIPs (optional item or items) and the system controller.
2. The control circuit shall consist of all relays, timers and other devices necessary for bollard operations.
3. The circuit controls shall be based on a real time microprocessor.
4. When a microprocessor controlled system controller is required, the processor shall use a secure, standard-based end-to-end architecture, utilizing a real time AVB microprocessor to control all input and output, data logging, device enrollment and validation.
5. The microprocessor shall support the following features:
6. Up to Five Levels of Control Override/Priority
7. Isolated Onboard Relay Outputs
8. Redundant Copper or Fiber Capability Between Each Device
9. Secure DOS Approved (AES 256 bit key) Encrypted Communication
10. Events History Database and Reporting
11. Power Management - Isolated from Electrical Shock and EMI
12. Barrier Monitoring Capabilities
13. Video Integration
14. Blast Wave Detection
15. Support for RS485, Single or Multimode Fiber Optic, or Ethernet.
16. The control circuit shall operate from 24 VDC power supply.
17. The control circuit power consumption shall not exceed 250 watts for up to a 5-bollard array.
18. The control circuit shall be mounted in a general purpose enclosure.
19. All device interconnect lines shall be run to terminal strips.
	1. UIP (Optional)
20. A UIP may be supplied to control bollard operation.
21. The UIP shall be available with or without Rampart capabilities.
	* 1. Non-Rampart Capabilities
22. The UIP shall operate on 24 VDC supplied by the system controller.
23. The UIP shall have a key operated/lockable main switch, MAIN POWER ON, and PANEL ON indicator lights.
24. This switch shall also include the EFO reset function (when EFO is elected). The switch shall require a key to function and the key shall have the following characteristics:
25. The key distribution shall be controlled.
26. The key shall be of the type or marked to prevent unauthorized duplication.
27. All switch positions shall function as dry contacts.
28. All switch indicators shall be wired separately from the switch portion and shall be powered by 24 VDC.
29. The UIP shall have a button to SECURE (raise) and a button to UNSECURE (lower) each bollard (or array).
30. The SECURE (UP) button shall provide dry contact to command the bollard (or array) to the SECURE (UP) position.
31. The UNSECURE (DOWN) button shall provide dry contact to command the bollard (or array) to the UNSECURE (DOWN) position.
32. The SECURE (UP) button shall illuminate to indicate the bollard is positioned SECURE (UP).
33. The UNSECURE (DOWN) button shall illuminate to indicate the bollard is positioned UNSECURE (DOWN).
34. All button indicators shall be wired separately from the button portion and shall be powered by 24 VDC.
35. An EFO feature shall be available as an option.
36. When elected, the EFO feature shall be activated from an inadvertent-activation-protected switch and/or from a remotely locatable switch of the same type.
37. The activating EFO switch shall illuminate to indicate when EFO is active.
38. When elected, the EFO feature shall include an EFO ACTIVE light and RESET key switch. The EFO RESET shall be the clockwise most position on the key operated/lockable main switch.
39. The UIP shall be a console mount or rack mount panel with all devices wired to a terminal strip. The panel shall conform to the following:
40. The panel shall be fabricated from 14 gauge carbon steel or type 304 stainless steel with continuously welded seams. Enclosure dimensions shall be per drawing. Customer specified dimensions may be supported.
41. The panel cover shall be secured with captivated screws. The cover may be hinged per the drawing or per Customer specification.
42. The panel shall have oil resistant gasket(s) applied to the cover.
43. The panel shall have external mounting feet for wall or machinery mounting.
44. The universal pushbutton holes shall be selectable as 22 mm or 30.5 mm. Number and placement of holes shall be per drawing or Customer specification.
45. The panel finish options shall include:

Standard RAL 7035 texture polyester powder coat finish on interior and exterior of enclosure.

Recoatable, smooth, white or ANSI-61 gray shall be available.

Custom match finishes shall be available.

NOTE: All powder coat finishes applied over cleaned phosphatized surfaces.

Stainless steel enclosure shall be available and shall have a polished #4 finish.

1. The panel shall meet the following industry standards:

UL 50 Listed

CUL 50 Listed

Type 12

1. UIP panel switches and indicators shall be finger safe (IP20 contacts and IP65/66 from panel) and marked for CE, UL, CSA, CCC, and TUV approval. UL Types 1, 3R, 4, 4X, 12 and 13.
	* 1. Rampart Capabilities
2. The UIP shall operate on 12 VDC supplied by remote power boards/kits.
3. System I/O protection shall be designed and tested to exceed UL1076. Protection shall be provided for data, power, and zone lines.
4. Optional terminal strips shall be provided to interface with Customer specified access/traffic control systems and operations devices.
5. Optional remote memory module (RMM) shall be supported with the following features.
6. RMM shall provide a secure way to review and manage security events.
7. RMM shall support 2, 4, 8, 16, or 32 GB SD memory cards (or micro SD and a size adaptor). RMM shall store a minimum of 16, 32, 65, 131, 262 million events respective to SD card size. Note actual event count may vary due to event file size.
8. RMM data shall not require a printer. RMM data file shall be compatible with MS Excel. RMM data shall be tamper protected via watermarking.
9. RMM shall operate on 12 VDC nominal (± 2.0 VDC) with a maximum current draw of 25 mA.
10. RMM input shall be supervised (3.0 K ohm EOL resistor).
11. RMM environment shall be the listed temperatures and humidity.

Operating Temp = 32 to 120º F (0 to 49ºC). Up to 140º F (60ºC) under temporary conditions.

Storage Temp = -30 to 140º F (-34 to 60ºC).

Humidity = 90% relative (non-condensing).

1. RMM shall support AES encrypted communications, be field upgradeable, dual CeLAN configurable, Read/Write and SD busy LEDs, and card removal switch.
2. Optional manual mode selector (MMS) or manual barrier card (MBC) shall be supported with the following features.
3. MBS/MMS shall convert manual controller devices into RS-485 AES encrypted communications to the control panel for barrier operation mode needs, based on operator selection.
4. MBS/MMS shall provide 4-conductor connections between master and remote controls to allow cleaner installation with less cabling. MMS shall also ease adding or moving master or remotes control locations.
5. MBS shall provide four independent inputs for up, down, EFO and reset operation of a single barrier. MBS shall allow “by barrier” reset option capability when used with this control system.
6. MMS shall provide three independent inputs for mode control: Normal- Gate and barrier together, Gate Arm only, Access Control.
7. MMS shall allow for mode selection for traffic needs, include operation with or without gate arm during peak times. MMS shall allow/disallow access readers operation.
8. MBS/MMS shall operate on 12 VDC nominal (± 2.0 VDC) with a maximum current draw of 80 mA.
9. MBS/MMS input shall be four 5VDC powered input zones.
10. MBS/MMS environment shall be the listed temperatures and humidity.

Operating Temp = 32 to 120º F (0 to 49ºC). Up to 140º F (60ºC) under temporary conditions.

Storage Temp = -30 to 140º F (-34 to 60ºC).

Humidity = 85% (± 5%) relative (non-condensing), 86º F +/-3º (28.33 to 31.67ºC).

1. MBS/MMS shall support wire gauge 18AWG to 22AWG.
2. MBS output shall be three open collector, 30 milliamp/each @ 6VDC.
3. MMS output shall be five open collector, 30 milliamp/each @ 6VDC.
4. The UIP shall be equipped with a barrier left UNSECURE timer circuit and an audible annunciator.
5. The audible annunciator shall notify the operator that the bollard (or bollard array) has been left in the UNSECURE (DOWN) position for too long.
6. The time interval for the circuit shall be Customer specified and/or selectable.
7. Optional vehicle barrier controller (VBS-EZ) card shall be supported with the following features.
8. The VBS-EZ shall provide a microprocessor based standalone or support a multiple barrier system.
9. The VBS-EZ shall provide 11 supervised digital inputs.
10. The VBS-EZ shall provide an onboard 2 x 16 LCD display.
11. The VBS-EZ shall support 2, 4, 8, 16, or 32 GB SD memory cards (or micro SD and a size adaptor). The VBS-EZ shall store a minimum of 16, 32, 65, 130, 260 million events respective to SD card size. Note actual event count may vary due to event file size.
12. The VBS-EZ data shall not require a printer. The VBS-EZ data file shall be compatible with MS Excel. The VBS-EZ data shall be tamper protected via watermarking.
13. The VBS-EZ shall operate from an external power supply of 12 VDC nominal (± 2.0 VDC) with a minimum current of 5A. The VBS-EZ shall output 12 and 24 VDC nominal power at a maximum of 300 mA.
14. The VBS-EZ input shall be supervised (3.0 K ohm EOL resistor).
15. The VBS-EZ output shall be seven Form A relays and one Form C relay each rated for 10A at 120 VAC and 10A at 30 VDC.
16. The VBS-EZ environment shall be the listed temperatures and humidity.

Operating Temp = 23 to 131º F (-5 to 55ºC). Up to 140º F (60ºC) under temporary conditions.

Storage Temp = 23 to 131º F (-5 to 55ºC).

Humidity = 90% relative (non-condensing).

1. The VBS-EZ shall support the following AVB inputs:

Manual EFO and Manual EFO reset

Gate arm

Card reader and reader valid

Traffic safety 1 & 2

Manual up and down

Limit switch secure and unsecure

Linear position

1. The VBS-EZ shall support the following AVB outputs:

EFO valve relay

Non-secure valve relay

Secure valve relay

Motor run relay

Warning horn relay

Traffic light(s)

Gate arm

Limit switch up and down status outputs

* + 1. Touchscreen UIP (Optional)
1. The standard Touchscreen UIP shall provide a 5.7 in (144.8 mm) color touchscreen display with protective Lexan shield.
2. Touchscreen UIP upgrades shall be available to provide larger sizes of 8-, 10-, 12-, or 17-inches (203, 254, 305, or 432 mm) and may include custom user interface and optionally a background site map.
3. The touchscreen controller display shall:
4. Have a minimum of 320 x 240 resolution with 16 bit color.
5. Be assignable per barrier controller.
6. Provide a simple, easy to use Graphical User Interface (GUI), with built-in (online) help and diagnostic screens, including self-test diagnostics enabling the user or installer to test AVB functions.
7. Provide complete prompt messaging and display all relevant operating and test data.
8. The touchscreen data bus shall accommodate connection to system expanders, output expanders, and other interface devices.
9. The touchscreen controller shall be monitored independently; each touchscreen unique address shall be monitored and supervised independently using AES 256 bit encrypted communications via: RS485, Single or Multimode Fiber Optic, or Ethernet.
10. Each touchscreen controller shall have two spare inputs for tamper circuit input connections.
11. Optional terminal strips shall be provided to interface with Customer specified access/traffic control systems and operations devices.
	* 1. Master UIP (Optional)
12. If elected, a Master UIP shall be supplied to control bollard function.
13. The Master UIP shall:
14. House a key operated/lockable main switch, MAIN POWER ON, and PANEL ON indicator lights.

This switch shall also include the EFO reset function (when EFO is elected). The switch shall require a key to function and the key shall have the following characteristics:

The key distribution shall be controlled.

The key shall be of the type or marked to prevent unauthorized duplication.

1. House a button to SECURE (raise) and a button to UNSECURE (lower) each bollard (or bollard array).

The SECURE (UP) button shall illuminate to indicate the bollard is positioned SECURE (UP).

The UNSECURE (DOWN) button shall illuminate to indicate the bollard is positioned UNSECURE (DOWN).

1. Provide, as an option, an EFO feature.
2. When elected, the EFO feature shall be operated from an inadvertent-activation-protected switch and/or from a remotely locatable switch of the same type. When elected, the EFO feature shall include an EFO ACTIVE light and a reset function. The EFO reset shall be the clockwise most position on the key operated/lockable main switch.
3. House a key operated/lockable switch to arm or disarm the remote slave panel.
4. House an indicator light to show when the slave panel is armed.
5. Operate on 24 VDC.
6. Be a console mount or rack mount panel with all devices wired to a terminal strip.
7. Be equipped with a barrier left UNSECURE timer circuit and an audible annunciator.

The audible annunciator shall notify the operator that the bollard (or bollard array) has been left in the UNSECURE (DOWN) position for too long.

The time interval for the circuit shall be Customer specified and/or selectable.

1. The Master UIP shall be available with or without Rampart capabilities. See paragraph 2.5.2.
2. Optional terminal strips shall be provided to interface with Customer specified access/traffic control systems and operations devices.
	* 1. Slave UIP (Optional)
3. If elected, a Slave UIP shall be supplied to control the bollard operation.
4. This panel shall have a PANEL ON indicator that is lit when the Slave UIP is enabled by a switch on the Master UIP.
5. This panel shall house a button to SECURE (raise) and a button to UNSECURE (lower) each bollard (or sets of bollards).

The SECURE (UP) button shall illuminate to indicate the bollard is positioned SECURE (UP).

The UNSECURE (DOWN) button shall illuminate to indicate the bollard is positioned UNSECURE (DOWN).

1. This panel shall provide an EFO feature operated from an inadvertent-activation-protected switch and/or from a remotely locatable switch of the same type. When the slave panel EFO is pushed, an EFO ACTIVE indicator light will light and of the bollard operation will not be possible until reset at the Master Panel.
2. The Slave UIP shall operate on 24 VDC.
3. The Slave UIP shall be a console mount or rack mount panel with all devices wired to a terminal strip.
4. The Slave UIP shall be available with or without Rampart capabilities. See paragraph 2.5.2.
5. Optional terminal strips shall be provided to interface with Customer specified access/traffic control systems and operations devices.
	1. ACCESSORY EQUIPMENT

Any or all of the following may be selected.

* + 1. Electro-Mechanical Signal Gate (Optional)
1. When elected, an electrically operated aluminum arm signal gate shall be supplied to alert vehicle operators of the bollard (s) position (s).
2. The gate operator shall interface with the bollard at the control circuit.
3. The control circuit shall close the gate at the bollard SECURE (UP) command and the gate shall remain closed unless the bollard is fully in the UNSECURE (DOWN) position.
4. The gate arm shall be 8 feet (2.4 m) long unless otherwise specified by the Customer.
5. The Customer may specify a gate arm length of 6, 8, 10, or 12 feet (1.8, 2.4, 3.0, or 3.7 m).
6. Gate arms shall be fully retro reflectorized on both sides and shall have vertical stripes alternating red and white at 16-inch (406 mm) intervals measured horizontallyper the current MUTCD.
7. The gate assembly shall be mountable directly to the roadway surface.
	* 1. Traffic Lights (Optional)
8. When elected Stop/Go traffic lights, Red/Amber 8 inch (203 mm) stand-alone traffic lights shall be supplied to alert vehicle operators of the barrier position.
9. The amber light shall indicate that the barrier is fully down.
10. All other positions shall cause the light to show red.
11. Brackets shall be supplied to allow the light(s) to be located on a [3.5 inch (88.9 mm)] OD post or wall [3.5 inch (88.9 mm) OD post - back to back].
12. The light operating voltage shall be 24 VDC.
13. The lights shall be LED type.
14. When elected three-light traffic lights, Red/Amber/Green 12 inch (304.8 mm) stand-alone traffic lights shall be supplied to alert vehicle operators of the barrier position.
15. A traffic pole and mast shall be supplied to allow the light(s) to be located above the barrier(s) per local traffic specifications.
16. The light operating voltage shall be 24 VDC.
17. The lights shall be LED type.
	* 1. Sump Pump (Optional)
18. When elected, a self-priming sump pump shall be supplied to prevent water from collecting in the bollard foundation.
19. The pump shall have the capacity to remove rainfall to the distance of the Customer supplied discharge drain.
20. The pump shall have the capacity to remove the water as specified by the Customer.
21. Pump operating voltage shall be 120 VAC/1-Ph/50-60 Hz unless the Customer alternately specifies 240 VAC/1-Ph/50-60 Hz.
	* 1. Optional Vehicle Detectors
22. When elected, a vehicle detector module (or modules) shall be supplied to provide any of the following functions (or valid combinations thereof):
23. Safety
24. Vehicle presence (for access control via card reader or RFID)
25. Over speed
26. Wrong way
27. Auto close
28. Free exit
29. The detector module shall provide normally open dry contact to the system.
30. The system shall support up to three detectors. The detector modules may be available in dual channel.
31. The detector module shall be compatible with the selected type of detection device (Customer specified from the following list).
32. Inductive loop (see paragraph 2.6.4)
33. Doppler/microwave/laser radar
34. Photo eye
35. Infrared
36. Ultrasonic or acoustic
37. VIP (video image processing)
38. The system shall support an alert function. When an alert function is elected, the detector/system output shall be dry contact (normally open – closed = true).
	* 1. Safety Loop Detection
39. When a safety loop (accomplished via an inductive loop) is elected, a detector module shall be supplied to provide fully automatic tuning.
40. The detector module shall be available in dual channel.
41. When a safety loop is elected, the barrier shall be prevented from being accidentally raised under an authorized vehicle in normal operation.
42. When an EFO function is also elected, the EFO/Safety interaction shall be selectable from the following.
43. EFO overrides safety present
44. Safety present delays EFO activation
45. Safety present overrides EFO
46. As an option, an enhanced loop monitor detector module shall be supplied that conforms to NEMA TS1-1989 (R2005) requirements and provides the following.
47. Automatic tuning, with temperature compensation
48. Loop input protection up to 2000 V
49. Eight, user selectable, loop frequencies (minimizes cross talk for adjacent loops.
50. Sensitivity supporting user selectability, 20 ranges, 20 to 2500 micro Henry, and a Q factor greater than 5
51. Diagnostics and related indications for short and open loop circuit.
52. Relay outputs supporting: an AC rating of 5A @ 240 VAC and a DC rating of 5A @ 30 VDC
53. Optionally relay outputs supporting: optically isolated outputs with the following characteristics.

True (low, 50 mA) less than 1.5 Vdc

False (high) greater than 16 Vdc

Maximum Leakage Current (high) less than 1 uA

Maximum Current 100 mA

1. Environmental

Storage Temperature Range -45 to +85 ºC (-49 to +185 ºF)

Operating Temperature Range -34 to +74 ºC (-29 to +165 ºF)

LCD Operating Temperature Range -20 to +74 ºC (-4 to +165 ºF)

Humidity Range (non-condensing) 0 to 95% Relative

1. User selectable modes of:

Loop modes:

Normal (normal inductive loops)

Rail (special loops – supports light rail applications)

Output modes:

Presence

Pulse

Paired channel modes:

3RD car

Directional logic

Vehicle counting

Operational modes:

Presence

Timing

1. Input voltages of:

90 to 270 VAC, 50/60Hz

Optionally 24 VDC

1. The module and loop combination shall be capable of detecting motorcycles, passenger vehicles, and high bed trucks with the same sensitivity setting.
2. Optional available surge protection/filter shall provide the following characteristics (listed below) in addition to these features: automatic recovery, lightning protection for vehicle loop detectors, solid state protection, differential protection, common-mode protection, compatible with digital detectors.

Operating Voltage: 75 VDC

Clamping Voltage: 130 VDC

Peak Surge Current: 250A

* + 1. Uninterruptible Power Supply (UPS – Optional)
1. When elected, the standard UPS shall be sized to meet at a minimum three complete up/down cycles before UPS depletion. The standard UPS shall be single phase.
2. When elected, the UPS shall be Customer selectable to support three phase operators.
3. When Customer specified, the UPS shall be sized to meet higher cycle counts of 10, 100, or 200 complete up/down cycles before UPS depletion.
	* 1. Concrete Pavement Heater
4. The concrete pavement heater shall perform snow melting and anti-icing for the AVB concrete foundation.
5. The concrete pavement heater shall be a self-regulating heating cable.
6. The heating cable shall automatically reduce output as the pavement warms.
7. The heating cable shall prevent failure due to overheating.
8. Installation shall be in accordance with Article 426 of the NEC (National Electric Code) The use of a 30 mA GFPD (Ground Fault Protection Device) shall be required.
9. The heater shall consist of the following items. Quantity of each item shall be specified by drawing.
10. Self-regulating heating cable shall be EM2-XR. Minimum bend radius shall be 2 in (50.8 mm).
11. Power connection kit shall include 3 ft (91.4 cm) end seal.
12. Splice kit shall include 1 ft (30.5 cm) cable seal each.
13. Expansion kit shall be used for crossing each expansion joint and be 1.5 ft (45.7 cm).
14. Snow controller and sensor shall be available as an option.

Snow controller shall operate on 120 VAC (50 W).

The snow sensor shall be located within 200 ft (61 m) of the controller.

1. Weatherproof junction box shall be of UL508 standard and rated for a temperature range of ‑40 to 185ºF (-40 to 85ºC). The box shall utilize 1 in (25.4 mm) rigid metal electrical conduit.
2. The heater shall operate on the following AC power.
3. 208 to 277 VAC, single phase 60 Hz.
4. 480/277 VAC, three phase, 4-wire, 60 Hz. (Optional)
5. As an option, a snow melt caution sign may be supplied. The sign shall be 6 X 4 in (150 X 100 mm).
6. The heater documentation shall include installation, operation, testing, and corrective/preventative maintenance.
7. PERFORMANCE
	1. Acceptable Manufacturers
8. Nasatka Barrier, Inc. Clinton MD.
9. 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. Bollards shall utilize proven components to the maximum extent possible.
2. Manufacturer shall have used similar bollard and housing assembly structural components for a minimum of 3 years with documented field experience.
	* 1. Performance Evaluation
3. Thirty-six inch bollards shall provide the following.
4. A crash test shall have been performed and data compiled by an approved independent testing agency in accordance with SD-STD-02.01 (SD-STD-02.01 K12/L2), equivalent to ASTM M50 P2.
5. Barriers tested and certified on the previous DOS standard, SD-STD-02.01, April 1985, and listed on the DOD anti-ram vehicle barrier list shall also be acceptable.
6. The manufacturer of the barrier system shall have a similar barrier listed by DOS or DOD, and shall provide engineer rating documentation. The manufacturer must also including detail drawings, for foundations and reinforcement, to demonstrate that the barrier would meet the specified design criteria if tested.
7. It is at the discretion of the Government to accept barriers proposed that are not listed by DOS or DOD.
8. Thirty-nine inch bollards shall provide the following.
9. A crash test shall have been performed and data compiled by an approved independent testing agency in accordance with ASTM F2656-07, Standard Test Method for Vehicle Crash Testing of Perimeter Barriers with a result of M50/P2.
10. The manufacturer of the barrier system shall have a similar barrier listed by DOS or DOD, and shall provide engineer rating documentation. The manufacturer must also including detail drawings, for foundations and reinforcement, to demonstrate that the barrier would meet the specified design criteria if tested.
11. It is at the discretion of the Government to accept barriers proposed that are not listed by DOS or DOD.
	* 1. Stopping Capacity
12. Normal operation bollard 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.
13. The bollard shall provide security and positive control of normal traffic in both directions by meeting or exceeding either ASTM F 2656 M50/P2 for 39 inch bollards or SD-STD-02.01 K12/L2 for 36 inch bollards. Note the difference between P2 and L2.

P2 = 3.3 ft to 23.1 ft (1.01 to 7 m)

L2 = 3 ft to 20 ft (less than 6 m)

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

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

1. The bollard system shall be designed to stop a vehicle attacking from either direction.
	1. SUBMITTALS
2. SD-02 Shop Drawings
3. 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.
4. 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.
5. Include with the detail drawings a copy of the Department of State certificate of barrier performance.
6. SD-03 Product Data
7. 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. Spare Parts

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.

1. SD-06 Test Reports
2. Field Testing

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.

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

Six (6) copies of operation and maintenance manuals, a minimum of 2 weeks prior to field training.

One complete set prior to performance testing and the remainder upon acceptance.

Manuals shall be approved prior to acceptance.

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. 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 tested in the manufacturer’s shop. In addition to complete cycle testing to verify function and operating speeds the following checks shall be made:
15. Identification.

A nameplate with manufacturer's name, model number, serial number and year built shall be located on the HPU.

1. 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 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 tested for proper operation 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 ball screw bollard(s) with other trades (i.e. electrical, security, and concrete).
	1. DELIVERY AND MAINTENANCE
		1. SHIPPING
7. The bollard and/or system shall be crated or mounted on skids 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