SECTION 111200 - VEHICLE CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
1. Active vehicle barrier: Grab-Type.
2. Active vehicle barrier: Drop-Arm.
3. Controls.

B. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete" for support and anchoring equipment.
2. Division 32 Section "Asphalt Paving" for asphalt driveway and approach paving.
3. Division 32 Section "Concrete Paving" for concrete driveway and approach paving.

1.3 REFERENCE DOCUMENTS
A. The follow publications form part of this specification to the extent referenced:
2. Unified Facilities Criteria (DoD) 4-022-02, Selection and Application of Vehicle Barriers.

1.4 SYSTEM DESCRIPTION
A. Ground Retractable Vehicle Barrier: an attenuating device designed to span a roadway or traffic lane to bring an encroaching vehicle to a stop and prevent its passage.
1. The system shall consist of an anchoring system designed to dissipate energy via the reinforced cable/net assembly.
2. The hydraulic energy absorbers shall be reusable.
3. The barrier system shall be listed in the Department of Defense (DoD) approved anti-ram vehicle barrier list.
4. 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 ASTM F 2656 or SD-STD-02.01.
5. Barriers tested and certified on the previous Department of State lists, per SD-STD-02.01, April 1985, are also acceptable.

6. This specification defines a certified, crash tested high security active vehicle net barrier system for placement as a reusable, re-settable barrier to safeguard strategic access control points, protect high-risk security assets, facilities and personnel.

7. The design and structural materials of the vehicle barrier furnished shall be the same as those used in the crash tested barrier.

8. Crash testing shall be performed and data compiled by an approved independent testing agency in accordance with ASTM F 2656 or SD-STD-02.01.

B. Automatic Drop-Arm Vehicle Barrier: a crash-rated, pivoting gate designed to span a roadway or traffic lane to bring an encroaching vehicle to a stop and prevent its passage.

1. The system shall consist of gate beam, pivot post, receiver post and controls.

2. The barrier system shall be listed in the Department of Defense (DoD) approved anti-ram vehicle barrier list.

3. 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 been performed and data compiled by an approved independent testing agency in accordance with ASTM F 2656 M50.

4. Barriers tested and certified on the previous Department of State lists, per SD-STD-02.01, April 1985, are also acceptable.

5. The design and structural materials of the vehicle barrier furnished shall be the same as those used in the crash tested barrier.

6. Crash testing shall be performed and data compiled by an approved independent testing agency in accordance with ASTM F 2656 M50 or SD-STD-02.01.

1.5 CERTIFICATION AND TESTING

A. The barrier system shall be tested and certified by an ASTM Certified anti-ram testing facility to the ASTM standard for M50 testing with a dynamic penetration rating of P2 or better as issued in designation F 2656-07 published August 2007.

B. Grab-Type Barrier:

1. The hydraulic energy absorbers shall be reusable.

2. The barrier system shall be tested and certified by an ASTM Certified anti-ram testing facility to the ASTM standard for M50 testing with a dynamic penetration rating of P2 or better as issued in designation F 2656-07 published August 2007.

C. Drop-Arm Barrier:

1. The barrier system shall be tested and certified by an ASTM Certified anti-ram testing facility to the ASTM standard for M50 testing with a dynamic penetration rating of P2 or better as issued in designation F 2656-07 published August 2007.
1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for vehicle control equipment. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For vehicle control equipment. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Reinforced concrete foundation drawings signed and sealed by a professional engineer.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Test Reports: Test reports indicating field tests, including demonstration of compliance with the specified performance criteria, upon completion and testing of the installed system.

D. Operating and Maintenance Manuals: Six copies of operation and maintenance manuals provided a minimum of 2 weeks prior to field training. Manuals shall be approved prior to acceptance.

1. 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.
2. Maintenance manuals shall include routine maintenance procedures. The manuals shall include equipment layout, and simplified wiring and control diagrams of the system as installed.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Minimum three (3) spare parts for any material considered consumable that must be replaced after each deployment.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain vehicle control equipment from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
   2. Extruded Shapes: ASTM B 221.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, commercial quality, with G60 coating designation; mill phosphatized.

D. Stainless-Steel Sheet: ASTM A 666, Type 304.


2.2 GROUND-RETRACTABLE VEHICLE BARRIER

A. General: Provide an attenuating device designed to span a roadway or traffic lane to bring an encroaching vehicle to a stop and prevent its passage.

   1. Basis-of-Design Product: Subject to compliance with requirements, provide Smith & Wesson GRAB-300 or comparable product by one of the following:
      a. Automatic Control Systems Inc.
      b. Delta Scientific Corporation.

B. System Configuration:

   1. Reduced Risk: The barrier system shall by design inherently reduce risk of injury to vehicle occupants using four hydraulic energy absorbers free to rotate around the steel anchor post at each end attached at each end of the cable/net assembly. Energy absorbing techniques shall be incorporated into the barrier design to reduce energy released at impact.

   2. Bi-Directional Barrier: The barrier system shall be designed to stop a vehicle attempting to gain unauthorized entry from either direction.

   3. Reusable / Re-settable Barrier: The barrier system shall be designed to be a reusable barrier and be re-settable in as little as 30 minutes after impact.

   4. Emergency Operation: The barrier system shall be capable of being raised in less than 2 seconds when activated by the emergency deploy button.
5. Barrier Application: The barrier system shall be configured in accordance with site conditions. A single barrier system may span the entire roadway(s) which must be secured.

6. Barrier Net: The net shall use high strength aircraft cable and assembled with high pressure pressed-swage fittings. The typical net height is approximately 50 inches as measured from the top of the net to the finished road surface. Typical net height from grade is approximately 14 inches to bottom of the net. Length of net will be determined by width of the roadway, height of crown in roadway, and other site conditions. The net shall be raised and lowered in a 90 degree fashion by the lifting arms.

7. Pre-Deployment Net Position: The net shall be recessed in virgin rubber pads made of materials typically used in grade level railroad crossings. The rubber pads shall be a minimum 5-inches thick with recessed preformed pattern to accept net in the pre-deployment position.

8. Anchor Stanchion: Anchor stanchions shall be set in a concrete foundation for transference of energy upon impact. The net of the barrier system shall be recessed into the roadway surface in order to ensure smooth vehicle crossing. When deployed, the barrier shall present a formidable obstacle to approaching vehicles. Upon impact, forces shall be first absorbed by net, pistons, and anchor stanchions and then transferred to the foundation of the unit.

9. Lifting Arm Assembly. Each lifting arm assembly shall be equipped and operated by a variable frequency drive (VFD) electric motor. The size of the electric motor will depend on the length of net specified. The motor shall be inverter duty rated. Electric motor shall have double shaft ends and C-face mount for direct inputs and direct torque transfer. Each lifting arm assembly shall incorporate a single square steel mast with a single pivot point to raise and lower the net. The lifting arm shall incorporate shear pins for net release in the event of an impact. The specified barrier shall not utilize pneumatic or hydraulic pumps, rams or hoses to deploy the barrier.

10. Foundation System: The foundation shall be designed by the barrier system manufacturer. The reinforced concrete foundation shall be capable of safely resisting all vertical and horizontal loads. The roadway surface shall be sloped as required to shed water.

11. All-Electric Operation: The barrier system shall function without the use of pneumatics, hydraulic pumps, cylinders, hoses or reservoirs.

12. Finishes: All exposed surfaces shall be a powder coated, galvanized or other approved weather resistant coating.

13. Weather Conditions: The barrier system shall operate satisfactorily under the following environmental conditions:
   a. Temperature. The barrier system shall be able to function in extreme temperature ranges of -20°F to 120°F regardless of humidity.
   b. Snow and Ice: Freezing precipitation shall be addressed by installing heat strips as required by ambient weather at the site.
c. Flooding: The barrier system shall be operable during flood conditions of up to 6 inches of standing water on the road surface.

C. Electrical: The barrier system electrical supply standard shall be 480VAC 3 phase 60 Hz. However, optional power sources may be specified in and utilized by the barrier, i.e. 208 through 480VAC, single or 3 phase. Contractor shall be responsible for coordinating electrical requirements with available power on site.

D. Electrical and Controls: Furnish and install all necessary components for a complete and usable system.

1. Control Circuit: A master and/or remote control panel shall be provided to interface between all barrier control stations and the power unit. The same control panel may be provided for multiple barriers where applicable. The control circuit shall contain all relays, timers, and other devices or an industrial programmable controller programmed as necessary for the barrier operation.

2. Primary Control Panel: A main control panel shall be supplied to control barrier functions. 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.

a. Construction: The primary control panel shall be a Stainless Steel NEMA enclosure approximately 36" x 30" x 10" deep or as applicable. Terminal strips shall be provided to interconnect all devices.

3. Remote Control Panel: A remote control panel (where applicable) 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 or maintenance panel.

E. Safety Equipment: Provide and install barrier system sensors.

1. Suppression Loops: Two inductive loops whose outputs shall be used to prevent barriers rising when a vehicle is within a prescribed distance of the barrier. The output of the loops shall override all barrier rise signals until 1/2 second after a vehicle clears the suppression loop.

2. Warning 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.
3. **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 -20 degrees F.

2.3 **AUTOMATIC BARRIER GATES**

A. **General:** Provide UL-approved parking control device consisting of operator and controller housed in a weathertight, tamper-resistant cabinet enclosure with gate arm. Device shall be activated by a signal from access or revenue control device. Fabricate unit with gate-arm height in down position of not more than 35 inches above pavement to prevent even small vehicles from passing under gate arm.

1. **Basis-of-Design Product:** Subject to compliance with requirements, provide Smith & Wesson K12-24’ Crash Rated Drop Arm Gate or comparable product by one of the following:

   a. Amano Cincinnati, Inc.
   b. Antel Security System Inc.
   c. Ascom Transport Systems Inc.
   d. Automatic Control Systems Inc.
   e. Came America.
   f. Canadian Parking Equipment Ltd./American Parking Equipment Inc.
   g. Delta Scientific Corporation.
   h. DoorKing, Inc.
   i. Engineered Parking Systems, Inc.
   j. Federal APD, Inc.
   k. LiftMaster: The Chamberlain Group, Inc.
   l. Link Controls, Inc.
   m. Magnetic Automation Corporation.
   n. Operator Specialty Co., Inc.; Linear LLC group member.
   o. PTC Industries.
   p. WPS North America Inc.

B. **Standard:** Provide barrier gates and gate operators that are listed and labeled according to UL 325 by a qualified testing agency. Provide barrier gates that comply with ASTM F 2656-07.

C. **Controller:** Factory-sealed, solid-state, plug-in type, with galvanized-steel box for wiring connections. Include the following features:

   1. Broken gate-arm monitoring.
   2. Switch to test motor and limit switches.
   4. Battery backup.
   5. Single, 115-V ac grounded power receptacle.
   6. Reversible arm capability for right- or left-handed operation.

D. **Cabinets:** Fabricated from metal sheet with seams welded and ground smooth; approximately 15 inches square by 40 inches tall. Provide single, gasketed access door for each cabinet with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet.
1. Material: Not less than 0.097-inch- steel sheet or 0.125-inch- thick aluminum sheet.
   a. Finish cabinet, interior and exterior, with manufacturer's standard baked-enamel finish over primer.

E. Straight Gate Arm: Aluminum with painted finish and black diagonal stripes on traffic-side face.
   1. Length: For 25-ft clear opening.

F. Operator: Single-phase, instant-reversing, continuous-duty motor for operating gate arm. Transmit power to gate-arm drive shaft through speed reducer to harmonic-acting crank and connecting rod. Fabricate crank, rod, and drive shaft of galvanized solid bar steel. Provide an operable cam for adjusting arm travel.
   1. Opening Time: Six seconds.
   2. Inherently adjustable torque limiting clutch for safety.

G. Accessories:
   1. Barrier-arm warning safety signs on both sides of unit limiting traffic to vehicular traffic.
   2. Low-voltage warning lights that illuminate when gate is in down position.
   3. Low-voltage light on cabinet top that flashes or changes from red to green when barrier gate is operating.
   4. Manually operated crank for emergency operation.
   5. Gate-arm receiver support with electromagnetic lock.

2.4 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.5 STEEL FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with the following:
   1. ASTM A 123/A 123M for iron and steel parking control equipment.

B. Galvanized-Steel and Steel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including equipment bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.
B. Examine roughing-in for electrical systems to verify actual locations of connections before vehicle control equipment installation.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Excavation for Barrier Gates: Saw cut existing pavement for recessed traffic controllers and hand-excavate recesses to dimensions and depths and at locations as required by traffic controller manufacturer's written instructions and as indicated on Drawings.

3.3 INSTALLATION
A. General: Install vehicle control equipment as required for a complete and integrated installation.
   1. Rough-in electrical connections.
B. Automatic Barrier Gates: Anchor cabinets to concrete bases with anchor bolts or expansion anchors and mount barrier gate arms.
   1. Install barrier gates according to UL 325.
C. Installation: Perform installation in accordance with manufacturer's 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.
D. 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.

3.4 FIELD QUALITY CONTROL
A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. The test shall include raising and lowering the barrier, both electrically, through its complete range of operation. Furnish all equipment and make all necessary corrections and adjustments prior to tests witnessed by the owner.
5. Any conditions that interfere with the proper operation of the barrier disclosed by the test shall be corrected at no additional cost. Adjustments and repairs shall be done by the Contractor. After adjustments are made to assure correct functioning of components, applicable tests shall be completed.

E. Vehicle control equipment will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust vehicle control equipment to function smoothly and lubricate as recommended by manufacturer.

B. Confirm that locks engage accurately and securely without forcing or binding.

C. After completing installation of exposed, factory-finished vehicle control equipment, inspect exposed finishes and repair damaged finishes.

3.6 DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to provide minimum 8-hours of owner training in the operation and maintenance of the equipment.

END OF SECTION 111200