

The following specification has been developed by:

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assist Architects and Designers in the specification of THE SHIELD® ANTI-RAM VEHICLE BARRIERS; security rated vertical pivot lift (VPL) barriers capable of withstanding K-4 and K-12 vehicle impact loads in accordance with the United States State Departments SD-STD-02.01, REVISION A, DATED MARCH 2003).

Anti-Ram Vehicle Barriers are electrically operated vehicle gates or arms that lift by pivoting vertically at the gate operator. VPL style of operation has advantages over sliding or swinging barriers in the speed of operation and the ability to operate free of road or other obstructions (e.g. snow, ice, curbs, slopes and plant growth). The operator is controlled using low voltage DC power with battery backup allowing operation in the event of utility company power failure. In addition the system is able to be operated in a stand alone mode utilizing solar power cells to maintain battery charge. The gate is furnished as a complete assembly with framing and operator. Pickets or mesh fabric which matches the adjacent fence line are provided by AutoGate.

This specification was prepared with consideration to government procurement practices, except for the specific naming of AutoGate's Shield® VPL. For projects not under restrictive procurement regulations refer to the AutoGate VPL specification for acceptable proprietary components. The section has been formatted in accordance with the principals embodied in the Construction Specifications Institute's Manual of Practice and is intended for use in conjunction with Contract Conditions, Bidding Conditions and General Requirements developed in accordance with CSI guidelines.

Notes to the specifier are included in the boxes. Options that must be selected by the specifier are shown in brackets []. Inapplicable clauses shall be deleted.

SECTION 32 3140 (02829) - ANTI-RAM VERTICAL PIVOT LIFT BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vertically pivoting low voltage electrically operated gates and barriers that are rated to resist penetration of heavily weighted vehicles traveling at a high rate of speed.
 - a. Fully welded gate frame with an integral housing which incorporates high strength synthetic ropes that act as the means of capture.
 - b. Barrier Arm with no gate frame solely using an aluminum housing incorporating high strength synthetic ropes.
 - c. Gate operator, of a vertical lift type, for opening and closing the gate. Security fence panels of [chain link fabric] [vertical pickets] [wire mesh] [matching the contiguous fence line]
 - d. Tubular steel bolsters at each end of the gate designed to withstand the impact loading of the attacking vehicle.

Coordinate the following with other sections of the specifications to avoid duplication and conflicts.

2. Concrete and earthwork for operator pads and bolsters.
3. Bolsters for gate operators including foundations.
4. [Push Button Gate Controls.]
5. [Mechanical] [and or] [Photoelectric] external secondary entrapment protection devices including automatic reversing.

B. Products Not Furnished or Installed under This Section:

1. Electrical power service to the gate operator.
2. Line Fencing.
3. Passive anti-ram barriers.
4. [Automatic gate control systems.]
5. [Solar powered battery chargers.]

1.2 RELATED SECTIONS

- A. Section [____] - Line fencing.
- B. Section [____] - Earthwork for Foundations.
- C. Section [____] - Cast-In-Place Concrete.
- D. Section [____] - Electrical power and distribution.

1.3 REFERENCES

References are listed as a convenience and are often deleted in their entirety. If required by the user agency delete references from the list below that are not actually required by the text of the edited section

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 1. ASTM A36/A 36M-08 Standard Specification for Carbon Structural Steel
 2. ASTM A27/A27M-08 Standard Specification for Steel Castings, Carbon, for General Application
 3. ASTM A47/A47M-99(2009) Standard Specification for Ferritic Malleable Iron Castings
 4. ASTM A53/A53M-07 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 5. ASTM A307-07b Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
 6. ASTM A500-07 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 7. ASTM A615/A615M-09 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 8. ASTM B221-08 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 9. ASTM B429/B429M-06 Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 10. ASTM C33/C33M-08 Standard Specification for Concrete Aggregates.

11. ASTM C94/C94M-09 Standard Specification for Ready-Mixed Concrete
12. ASTM C150/C150M-09 Standard Specification for Portland Cement
13. ASTM F567-07 Standard Practice for Installation of Chain-Link Fence
14. ASTM F1043-08 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework
15. ASTM F2200-05 Standard Specification for Automated Vehicular Gate Construction.
16. ASTM F2656-07 Standard Test Method for Vehicle Crash Testing of Perimeter Barriers.
17. U.S. Army Corp of Engineers – PDC Standard; DOD Certified Anti-Ram Vehicle Barriers.
18. U.S. Department of State DOS - SD-STD-02.01,RevisionA Test Method for Vehicle Crash Testing of Perimeter Barriers and Gates, 2003

B. National Fire Protection Association (NFPA)

1. NFPA 70: National Electrical Code.

C. Underwriter Laboratories, Inc. (UL)

1. UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems. Fifth Edition.

1.4 PERFORMANCE REQUIREMENT

- A. Anti-Ram Vertical Pivot Lift Barriers shall be certified in accordance [U. S. Department of State] [U. S. Department of Defense] based on full scale crash tests conducted in accordance with ASTM F2656 by an independent test laboratories or government-approved facilities for the following rating:

ASTM F2656-07 test method provides a structured procedure to establish a penetration rating for perimeter barriers subjected to a vehicle impact.

1. K12 - Kinetic Energy of approximately 1,200,000 ft-lb (165,960 kg-m) of energy (15,000 lb @ 50 mph [6,818 kg @ 80 kph].)
2. K4 - Kinetic Energy of approximately 400,000 ft-lb (55,320 kg-m) of energy, (15,000 lb @ 30 mph [6,818 kg @ 48 kph].)

B. Gate Dimensions[Each]:

K-12 full size gates are available to a clear opening of 15 feet. K-12 Barrier Arms are available to a clear opening of 17 feet. K-4 gates clear opening of 17 feet, K-4 Barrier arms 20 feet.

1. Width - [_____ feet] [As indicated].
2. Height - Operator Pad surface to top of gate [6 feet] [4 feet] [_____ feet]. [As indicated.]

Gates heights over 8' require special crating & freight arrangements.

1.5 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications. Mark data to indicate:
1. Details of material and construction.

2. Recommended installation requirements to properly accommodate the proposed gate and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and installation of ornamental metal work. Include plans, elevations and detail sections. Indicate materials, methods, finishes and types of joinery, fasteners, anchorages and accessory items. Provide setting diagrams and templates for anchorages, sleeves, and bolts installed by others.

1.6 QUALITY ASSURANCE

Select applicable standards required by the agency operating the facility.

- A. Security Barrier Standards:
1. United States State Departments - SD-STD-02.01, Revision A, dated March 2003
 2. United States Department of Defense:
 - a. [U.S. Army Corps of Engineers] [Naval Facilities Engineering Command] [Air Force Civil Engineer Support Agency] - Unified Facilities Criteria (UFC) Security Engineering: Entry Control Facilities / Access Control Points UFC 4-022-01 25 May 2005
 - b. Department of Defense Handbook Selection and Application of Vehicle Barriers MIL-HDBK-1013/14 1 February 1999.
 3. Federal Emergency Management Agency (FEMA) Risk Management Series - Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings December 2003
- B. Vertical Pivot Gate Standards: Comply with requirements of building authorities having jurisdiction in Project location.
1. Operation Control Systems:
 - a. UL 325 - Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - b. ASTM F2200 - Standard Specification for Automated Vehicular Gate Construction.
 2. Electrical Components, Devices, and Accessories: NFPA 70, Article 100.

Include the following for Chain Link Fences or include other infill panels fence standards as applicable

- C. [Chain link Fencing Standards:
1. Fencing and Gates: Chain Link Fence Manufacturer's Institute "Specifications for Fence-Posts, Gates and Accessories". Install in accordance with ASTM F567.]
- D. Manufacturer Qualifications: Minimum three (3) years documented experience producing systems specified in this section.
1. Installer Qualifications: An experienced installer who has completed fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Store components to avoid damage from moisture, abrasion, and other construction activities. Carefully store materials off the ground to provide proper protection against oxidation caused by ground contact.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Take measurements and generate dimensions where Gate and Operator are to be located. Indicate specific location of gate with regard to existing roadways, proposed roadways, curb locations, grade changes and elevations. Indicate specific location of Gate Operator and its respective concrete foundation, include surrounding landscaping and buildings.

1.9 COORDINATION AND SEQUENCING

- A. Coordinate gate installation with line fencing and paving. Gate and Operator can be installed independent of paving providing the Operator concrete foundation and its respective bolsters are in place, including electrical control conduits. Upon completion of installation place the Gate in an open position and maintain vertically clear of traffic and surrounding fence line installation.
- B. Operators are designed for 120 volt 15 amp primary service and 24 Volt DC battery back-up (batteries are field supplied and installed). Installer is to coordinate electrical service with electrical design and electrical trades. Service connection is supplied via underground conduit and preferably with a GFCI circuit breaker. Connection is made into a 4” x 4” handy box inside the Operator. Within the box wire GFCI Duplex Receptacle “HOT” off of the main breaker. Receptacle may be used for loads under 15 Amps such as hand tools and the like.

1.10 WARRANTY

- A. Standard Warranty: Provide manufacturer's standard three (3) year warranty against defective materials and workmanship after Date of Substantial Completion.
- B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering defective materials and workmanship for the following additional extended period beyond the initial one year warranty:
 - 1. One additional year.
 - 2. Two additional years.
 - 3. Three additional years.
 - 4. Four additional years.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. AutoGate, Inc. Berlin Heights., Ohio.

AutoGate offers standard and custom gate configurations to meet any fence line design. For descriptive specifications gate designs should be indicated on the drawings. As an option standard AutoGate styles may be included in this specification. Refer to AutoGate VPL specification on their website or their literature for design details.

2.2 GATE AND BARRIER CONSTRUCTION

A. Materials:

1. High strength synthetic ropes – Multiple bundles of braided rope continuous lengths in tension within integral rope aluminum housing.
 - a. Ropes do not require tensioning on site.
 - b. Solid high strength steel round pins integral to aluminum rope housing.
2. Aluminum Assembly Framing:
 - a. Plate, Shapes and Bar: ASTM B221, alloy 6061-T6 or 6063-T6.
 - b. Extrusions: Alloy and temper 6063-T6 except formed elbows shall be 6063-T4:
 - c. Round Aluminum Pipe: Standard weight, extruded structural aluminum pipe, alloy 6063-T6, mill finish, complying with ASTM B429.
3. Threaded Fasteners:
 - a. All exterior screws, bolts, nut and washers shall be 300 Series non-magnetic stainless steel.
 - b. Provide lock washers or other locking devices such as deformed thread lock or nylon locking nuts at all bolted connections.

Include any applicable requirements for fencing material if not included in the line fence specification or simply reference the applicable section of the specifications.

4. Infill panels: Refer to Section __ ____.

B. Fabrication:

1. Fabricate perimeter frames of gates from [aluminum] tubing. Assemble gate frames by welding at corners. Infill gate frames with panels to match adjacent fence panels of [chain link fabric] [aluminum square tube pickets] with top treatments of [barb wire] [crush top] [flat top].
2. Configuration: Size and space members in compliance with applicable codes. All gate framing members shall be unspliced single pipe or tube length. Tighten all fasteners so that completed railing is rigid and free of play at joints and component attachments.
3. Welding: Make exposed joints butt tight, flush, and hairline. Continuously seal joined members by continuous welds.

C. Fabricated frame and infill fabric: Epoxy coated or plain to match fence line color.

D. [Barbed wire assemblies: Extend gate post and vertical frame members 12 inches above top of chain-link fabric.]

E. Provide components required for receiving yoke anchorage of gate ends. Fabricate anchors and related components of material and finish matching gate frame.

2.3 GATE OPERATORS

- A. Provide gate operator system, including gate operator, field required batteries, external contact sensing equipment [and] [or] external non-contact sensing equipment.
1. Gate Speed: Fully open to fully closed and fully closed to open not less than 14 seconds.
 2. Frequency of Use: Continuous duty.

In case of power failure battery system using (2) - class 24 deep cycle 12 volt batteries will operate gates for up to 24 hours and then reset operator to normal operation when power resumes. Note AutoGate does not provide batteries, batteries are to be supplied by the Subcontractor installing the gate.

3. Battery Powered Back Up DC Drive System: Operator to run on 24 Volt DC current stand-by battery system with built-in battery maintainer "over-charge" protection.
 - a. Provide two (2) 12v batteries, complying with gate operator manufacturer's requirements.
 - b. Power supply to batteries: 120VAC (15 amp).
4. Gate Operator Enclosure: Fabricate operator frame from steel tubing and sheet metal. Continuous seal weld all frame seams with welds ground smooth. Screwed frame members are not acceptable.

All AutoGate operator enclosures are fabricated from galvanealed steel and continuously seal welded prior to finishing to prevent rusting. Select finished color from the standard Sherwin Williams colors as listed or provide specifics on special colors and paint manufacturers as selected

- a. Frame: 2" Sq., 11 Ga. (.120) Steel Tubing.
- b. Skins: 18 Ga. Galvaneal Sheet.
- c. Mounting Pads: 3" wide x ¾" thick steel flat bar.
- d. Finish: Two component polyurethane coating color [Black] [White] [Brown] [Green] [Gray] [Custom color _____).
5. Mechanical Gate Operator Drive:
 - a. Drive Type: V-belt and worm gear reducers, roller-chain drive.
 - b. Motor: 24VDC 1/3 HP high torque gear ball bearing motor with hardened steel gears lubricated with synthetic automatic transmission fluid (Rated to -70° F)
6. Control Circuitry: Solid state coated control board in NEMA 4x weatherproof electrical enclosure. Sealed proximity switches ensure weather and moisture-proof integrity. (Boards tested to -40° F).
 - a. Control Wiring: 16 & 18 Ga. single conductor. Copper w/electrolytic copper compression terminals tin-plated for maximum corrosion prevention.

Reference appropriate Class in the following paragraph

Class I Residential A vehicular gate operator (or system) intended for use in a home of one to four single family dwellings, or garage or parking area associated therewith.

Class II - Commercial/General Access Vehicular Gate Operator: A vehicular gate operator (or system) intended for use in a commercial location or building such as a multi-family housing unit (five or more single family units, hotel, garages, retail store or other building servicing the general public.

Class III - Industrial /Limited Access Vehicular Gate Operator: A vehicular gate operator (or system) intended for use in an industrial location or building such as a factory or loading dock area or other locations not intended to service the general public.

Class IV - Restricted Access Vehicular Gate Operator A vehicular gate operator (or system) intended for use in a guarded industrial location or building such as an airport security area or other restricted access location not servicing the general public, in which unauthorized access is prevented via supervisions by security personnel.

- B. Gate Operator System shall conform to UL 325 [Class I] [Class II] [Class III] [Class IV] as determined in accordance with ASTM F2200.
1. Type A Entrapment Sensing Device - Operator shall have inherent motor current sensors as part of the gate operator system. Type A shall be constructed such that it may not be removed or bypassed.
 2. Operator shall have provision for connection of Control System and for connection of [or supplied with] Secondary Entrapment Sensing Device specified hereinafter.
- C. Secondary Entrapment Sensing Device: Provide the following external secondary entrapment protection devices as appropriate for the specific site conditions to protect against all potential entrapment zones.

The same type of device shall not be utilized for both the primary and the secondary entrapment protection means. Use of a single device to cover both the opening and closing directions is in accordance with the requirement; however a single device is not required to cover both directions. A combination of one Type B1 for one direction and one Type B2 for the other direction is the equivalent of one device for the purpose of complying with the requirements of either the primary or secondary entrapment protection means.

1. Photo Beams Type B1 - Non-contact sensor (photoelectric sensor or the equivalent);
 2. Safety Edges (Contact Edges) Type B2 - Contact sensor (edge device or the equivalent).
 3. Provide adjustable timer (adjustable from 0 – 60 seconds) for gate closure.
 4. Provide maximum run timer.
- D. Operator Options:
1. Provide surge and spike protection.
 2. Provide power plug for solar panel connection generator.
 3. Provide siren.

2.4 CONTROL SYSTEMS\

Include basic three position control system unless more sophisticated controls are specified in a separate section. Any dry contact type operator system is compatible with AutoGate controls

- A. Operation control system: Remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
1. Control Station (located remotely from gate): Momentary-contact [Two Position (Open/close)]. Provide key switch to lock out open and close buttons.

Or

- B. Gate Operation control systems are specified under Section __ ____.
1. Card Reader: Functions only when authorized card is presented.
 1. Digital Keypad Entry Unit: Multiple-[programmable,]code
 1. Radio Control: Digital system consisting of code-compatible universal receiver for each gate,
 1. Telephone Entry System.
 1. Vehicle Loop Detector.
 1. Vehicle Presence Detector.
 2. Provide emergency stop button in an outdoor weathertight enclosure.

2.5 ACCESSORIES

- A. Provide [audible] [and] [or] [visible] warning device to signal both directions when the gate is opening and closing.
- B. Provide warning signs on each side of gate.
- C. Options:
1. Gearmotor Heater: Provide thermostatically controlled electric heat tape to maintain critical components operational.
 2. Operator Cabinet Heater: Provide an insulated Operator Cabinet and include a thermostatically controlled electric space heater with integral circulating fan.
 3. Ventilation: Provide adjustable humidistat and fan to provide supplemental ventilation of operator enclosure.

2.6 SETTING MATERIAL

- A. Ready-mixed concrete complying with ASTM C94: Normal-weight concrete[air entrained] 3000-psi 28 days compressive strength, 3-inch slump, and aggregate.
1. Portland cement: ASTM C150, Type I.
 2. Aggregates: ASTM C33, 1-inch maximum size.
- B. Reinforcing Bars: ASTM A615.
- C. Service and control conduit: Rigid Schedule 40 PVC embedded in concrete. All other conduit and wiring as specified in Division [26] [16].
- D. Expansion Bolts: Threaded or wedge type; galvanize ferrous castings, ASTM A47 malleable iron or ASTM A27 cast steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed for compliance with all specified criteria.
 - 1. Submit written notification to Architect and system manufacturer if any conditions that are unacceptable.
 - 2. Beginning erection constitutes installer's acceptance of initial conditions.

3.2 ELECTRICAL SERVICE & CONTROLS

- A. Provide all power and control wiring required for the work in accordance with the applicable provisions of Division [26] [16] and NEC 70.
- B. Perform all trenching and backfilling associated with this Section. Conduit shall be direct buried except under areas of vehicular traffic where it shall be reinforced concrete encased.
- C. Grounding system: All equipment and branch circuits shall be grounded. Provide driven ground rod at service. Provide separate ground wire in all branch circuits.

3.3 PADS & BOLSTERS

- A. Foundations: Construct pads and Bolster foundations as indicated on the drawings with top of concrete flat and level.
 - 1. Excavation:
 - a. Locate concrete foundations for operator base on firm, undisturbed soil.
 - b. Bolster Excavation: Locations to be in accordance with manufacturers site drawings. Foundation pit to be excavated an additional 3” of depth to allow for a 3” concrete Leveling Pad. Leveling Pad to be completed prior to placement of Bolsters in foundation pit and pouring of concrete foundation which surrounds Bolsters.
- B. Vibrate or tamp concrete for consolidation. Finish top of foundations, smooth and even. Cure concrete 72 hours before place operator.
- C. Fasteners: Install operators with expansion bolts provided by the Gate system manufacturer.

3.4 OPERATOR INSTALLATION

- A. Install units in accordance with the manufacturer's instructions.
 - 1. Operator Expansion Bolt Mounting: Anchor through base plates to concrete substrate.
 - 2. Install all loose shipped operator lower panels and guarding per manufacturer instructions.
- B. Secondary Entrapment Sensing Device: Installing contractor shall be responsible for providing external secondary entrapment protection devices as appropriate for the specific site conditions to protect against all potential entrapment zones. Proper operation of these safety devices shall be

verified and training as to the operation and maintenance of these devices for the users and owners shall be documented.

3.5 GATE INSTALLATION

- A. Connect gate to operator arm in accordance with gate manufacturer's instruction.

Add infill panel installation requirements if not part of line fencing

- B. Install gate so that it is plumb and level when fully closed within the following tolerances:
1. Maximum misalignment from true position: 1/4 inch (6.0 mm).
 2. Maximum misalignment between adjacent separated members: 1/8 inch (3.0 mm).

3.6 ADJUSTING

- A. Adjust and lubricate operating components for smooth, accurate operation free of binding and racking.

3.7 START-UP AND DEMONSTRATION

- A. Manufacturer's Service Representative: Provide at least 2 hours of manufacturer's representatives time for start-up and initial operation. Make a final check of each gate operation, with Owner's personnel present, immediately before date of substantial completion.
- B. Instruct Owner's personnel in proper use, operations, and daily maintenance of gate. Review emergency provisions, including procedures to be followed if gate does not close or open. Train Owner's personnel in normal procedures to be followed in checking for sources of damage or operational failures or malfunctions.
- C. Determine that control systems and operating devices are functioning properly.
- D. [Adjust time clock for periods required and as directed.]

3.8 CLEANING AND PROTECTION

- A. Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.
1. Clean units in accordance with the manufacturer's instructions.
- B. Protection: After installation, protect installed work until project completion.
1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
 2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.

END OF SECTION 32 3140 (02829)